EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: Mr. First Name: Clark Middle Name:
Last Name: Mercer Suffix:

Title: Executive Director

Complete Address:

Street1: 777 North Capitol St NE Ste 300
Street2:
City: Washington State: DC: District of Columbia
Zip / Postal Code: 20002 Country: USA: UNITED STATES

Phone Number: 202-962-3260 **Fax Number:**

E-mail Address: cmercer@mwcog.org

Payee: *Individual authorized to accept payments.*

Name: Prefix: Ms. First Name: Anna Middle Name:
Last Name: Douglas Suffix:

Title: Controller

Complete Address:

Street1: 777 North Capitol St NE Ste 300
Street2:
City: Washington State: DC: District of Columbia
Zip / Postal Code: 20002 Country: USA: UNITED STATES

Phone Number: 202-962-3334 **Fax Number:**

E-mail Address: adouglas@mwcog.org

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: Mr. First Name: Ivaylo Middle Name:
Last Name: Tsekov Suffix:

Title: Contract and Accounting Manager

Complete Address:

Street1: 777 North Capitol St NE Ste 300
Street2:
City: Washington State: DC: District of Columbia
Zip / Postal Code: 20002 Country: USA: UNITED STATES

Phone Number: 202-962-3229 **Fax Number:**

E-mail Address: itsekov@mwcog.org

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: **Prefix:** Mr. **First Name:** Jeffrey **Middle Name:**

Last Name: King **Suffix:**

Title: Director, Climate, Energy, and Air Programs

Complete Address:

Street1: 777 North Capitol St NE Ste 300

Street2:

City: Washington **State:** DC: District of Columbia

Zip / Postal Code: 20002 **Country:** USA: UNITED STATES

Phone Number: 202-962-32338 **Fax Number:**

E-mail Address: jking@mwcog.org

EPA Form 5700-54 (Rev 4-02)

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: Metropolitan Washington Council of Governments

Address: 777 North Capitol St NE Ste 300

City: Washington

State: DC: District of Columbia Zip Code: 20002

B. Unique Entity Identifier (UEI): NE3JSLQVNMZ3

C. Applicant/Recipient Point of Contact

Name: Clark Mercer

Phone: 202-962-3260

Email: cmercer@mwcog.org

Title: Executive Director

II. Is the applicant currently receiving EPA Assistance? ☒ Yes ☐ No

III. List all pending civil rights lawsuits and administrative complaints filed under federal law against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None.

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that alleged discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None.

V. List all civil rights compliance reviews of the applicant/recipient conducted under federal nondiscrimination laws by any federal agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

None.

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. **Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)** ☒ Yes ☐ No

a. **Do the methods of notice accommodate those with impaired vision or hearing?** ☒ Yes ☐ No

b. **Is the notice posted in a prominent place in the applicant's/recipient's website, in the offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?** ☒ Yes ☐ No

c. **Does the notice identify a designated civil rights coordinator?** ☒ Yes ☐ No

VIII. **Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or disability status of the population it serves? (40 C.F.R. 7.85(a))** ☒ Yes ☐ No

IX. **Does the applicant/recipient have a policy/procedure for providing meaningful access to services for persons with limited English proficiency? (Title VI, 40 C.F.R. Part 7, *Lau v Nichols* 414 U.S. (1974))** ☒ Yes ☐ No

X. **If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.**

N/A

XI. **If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or applicant's/ recipient's website address for, or a copy of, the procedures.**

N/A

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Anna Douglas	Executive Director	04/01/2024

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

Instructions for EPA FORM 4700-4 (Rev. 04/2021)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any State or its political subdivision, any instrumentality of a State or its political subdivision, any public or private agency, institution, organizations, or other entity, or any person to which Federal financial assistance is extended directly or through another recipient, including any successor, assignee, or transferee of a recipient, but excluding the ultimate beneficiary of the assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means: any federal agency-initiated investigation of a particular aspect of the applicant's and/or recipient's programs or activities to determine compliance with the federal non-discrimination laws. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification.

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Statement for Loan Guarantees and Loan Insurance

The undersigned states, to the best of his or her knowledge and belief, that:

If any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions. Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

* APPLICANT'S ORGANIZATION

Metropolitan Washington Council of Governments

* PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE

Prefix: Mr. * First Name: Clark Middle Name:

* Last Name: Mercer Suffix:

* Title: Executive Director

* SIGNATURE: Anna Douglas * DATE: 04/01/2024

Other Attachment File(s)

*** Mandatory Other Attachment Filename:** 1239-Areas_MWCOG Coalition.xlsx

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1234-Cover_Workplan_Budget_Techappx_MWCOG Coalition.pd

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

OMB Number: 4040-0004
Expiration Date: 11/30/2025

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 04/01/2024

4. Applicant Identifier: MWCOG

5a. Federal Entity Identifier: NE3JSLQVNMZ3

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Metropolitan Washington Council of Governments

* b. Employer/Taxpayer Identification Number (EIN/TIN): 52-6060391

* c. UEI: NE3JSLQVNMZ3

d. Address:

* Street1: 777 North Capitol St NE Ste 300
Street2:
* City: Washington
County/Parish:
* State: DC: District of Columbia
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 20002-4201

e. Organizational Unit:

Department Name: Dept of Environmental Programs

Division Name: Climate, Energy and Air

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Mr.
* First Name: Jeffrey
Middle Name:
* Last Name: King
Suffix:

Title: Director, Climate, Energy and Air Programs

Organizational Affiliation: Department of Environmental Programs

* Telephone Number: 202-962-3238
Fax Number:

* Email: jking@mwcog.org

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

M: Nonprofit with 501C3 IRS Status (Other than Institution of Higher Education)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.046

CFDA Title:

Climate Pollution Reduction Grants

*** 12. Funding Opportunity Number:**

EPA-R-OAR-CPRGI-23-07

* Title:

Climate Pollution Reduction Grants Program: Implementation Grants (General Competition)

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

1237-Areas Affected_MWCOG Coalition.pdf | Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Virginia Initiative for Building Efficiency (VIBE)

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: DC-1

* b. Program/Project: Attach

Attach an additional list of Program/Project Congressional Districts if needed.

1238-Congressional Districts_MWCOG Coaliti | Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 10/01/2024

* b. End Date: 09/30/2029

18. Estimated Funding ($):

* a. Federal	96,754,605.00
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	96,754,605.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☒ a. This application was made available to the State under the Executive Order 12372 Process for review on 03/30/2024.

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☐ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Mr. * First Name: Clark

Middle Name:

* Last Name: Mercer

Suffix:

* Title: Executive Director

* Telephone Number: 202-962-3260 Fax Number:

* Email: cmercer@mwcog.org

* Signature of Authorized Representative: Anna Douglas * Date Signed: 04/01/2024

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2025

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Climate Pollution Reduction Grants Program: Implementation Grants General Competition	66.046	$	$	$ 96,754,605.00	$ 0.00	$ 96,754,605.00
2.						
3.						
4.						
5. Totals		$	$	$ 96,754,605.00	$ 0.00	$ 96,754,605.00

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SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
	Climate Pollution Reduction Grants Program: Implementation Grants General Competition				
a. Personnel	$ 2,646,817.00	$	$	$	$ 2,646,817.00
b. Fringe Benefits	592,622.00				592,622.00
c. Travel	43,836.00				43,836.00
d. Equipment					
e. Supplies					
f. Contractual	9,809,775.00				9,809,775.00
g. Construction					
h. Other	81,792,075.00				81,792,075.00
i. Total Direct Charges (sum of 6a-6h)	94,885,125.00				$ 94,885,125.00
j. Indirect Charges	1,869,480.00				$ 1,869,480.00
k. TOTALS (sum of 6i and 6j)	$ 96,754,605.00	$	$	$	$ 96,754,605.00
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. Climate Pollution Reduction Grants Program: Implementation Grants General Competition	$ 0.00	$ 0.00	$ 0.00	$ 0.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$ 0.00	$ 0.00	$ 0.00	$ 0.00

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 16,404,061.75	$ 164,040.62	$ 164,040.62	$ 164,040.62	$ 15,911,939.89
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$ 16,404,061.75	$ 164,040.62	$ 164,040.62	$ 164,040.62	$ 15,911,939.89

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. Climate Pollution Reduction Grants Program: Implementation Grants General Competition	$ 20,738,063.00	$ 21,649,683.00	$ 19,503,652.00	$ 18,459,145.00
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 20,738,063.00	$ 21,649,683.00	$ 19,503,652.00	$ 18,459,145.00

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges: See attached budget documentation.

22. Indirect Charges: See attached approved indirect rate documentation.

23. Remarks:

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Jurisdiction	Population	EJScreen Population	CEJST Population	% EJScreen	% CEJST
MWCOG	**3,008,591**	**626,549**	**325,555**	**21%**	**11%**
Arlington County	235,764	66,162	18,790	28%	8%
Clarke County	14,726	0	0	0%	0%
Culpeper County	52,021	11,967	6,458	23%	12%
Fairfax County	1,146,825	256,312	143,759	22%	13%
Fauquier County	72,416	1,624	0	2%	0%
Loudoun County	413,574	44,940	30,236	11%	7%
Prince William County	477,224	123,684	69,390	26%	15%
Rappahannock County	7,400	0	0	0%	0%
Spotsylvania County	138,493	13,984	0	10%	0%
Stafford County	154,204	12,531	1,996	8%	1%
Warren County	40,442	13,353	9,255	33%	23%
Alexandria City	158,185	59,876	29,594	38%	19%
Falls Church City	14,494	0	0	0%	0%
Fairfax City	23,980	4,448	0	19%	0%
Fredericksburg City	15,795	5,585	0	35%	0%
Manassas City	27,258	6,703	16,077	25%	59%
Manassas Park City	15,790	5,380	0	34%	0%
Richmond	**1,303,212**	**677,094**	**225,160**	**52%**	**17%**
Amelia County	13,220	1,495	0	11%	0%
Charles City County	6,817	3,503	0	51%	0%
Chesterfield County	359,798	160,662	23,123	45%	6%
Colonial Heights City	18,127	14,684	3,431	81%	19%
Dinwiddie County	28,040	8,853	746	32%	3%
Prince George County	42,170	24,773	4,524	59%	11%
Sussex County	10,960	5,084	5,030	46%	46%
Hopewell City	23,020	23,020	12,023	100%	52%
Petersburg City	33,229	29,843	24,288	90%	73%
Goochland County	24,300	0	0	0%	0%
Hanover County	109,232	31,855	0	29%	0%
Henrico County	331,924	175,227	44,007	53%	13%
King and Queen County	6,690	2,338	0	35%	0%
King William County	17,511	1,358	0	8%	0%
New Kent County	22,519	7,010	0	31%	0%
Powhatan County	29,979	0	0	0%	0%
Richmond City	225,676	187,389	107,988	83%	48%
Hampton Roads	**1,749,249**	**558,179**	**289,254**	**32%**	**17%**
Gloucester County	38,586	0	0	0%	0%
Mathews County	8,548	0	0	0%	0%
James City County	77,733	5,809	4,470	7%	6%
Williamsburg City	15,299	7,604	0	50%	0%
York County	69,635	3,854	0	6%	0%
Newport News City	185,069	85,355	62,669	46%	34%
Poquoson City	12,382	0	0	0%	0%
Hampton City	136,748	65,134	27,052	48%	20%
Surry County	6,563	3,151	2,933	48%	45%
Southampton County	18,028	1,213	1,280	7%	7%
Franklin City	8,249	5,187	3,712	63%	45%
Isle of Wight County	38,301	4,722	4,276	12%	11%
Suffolk City	93,268	28,829	20,613	31%	22%
Portsmouth City	97,454	59,343	32,675	61%	34%
Chesapeake City	247,172	49,439	14,474	20%	6%
Norfolk City	238,556	149,215	97,968	63%	41%
Virginia Beach City	457,658	89,324	17,132	20%	4%
TOTAL	**6,061,052**	**1,861,822**	**839,969**	**31%**	**14%**

Jurisdiction	Census Block Groups	Disadvantaged
Amelia County	510079301021	Yes
Arlington County	510131003004	Yes
Arlington County	510131007003	Yes
Arlington County	510131016022	Yes
Arlington County	510131016031	Yes
Arlington County	510131016035	Yes
Arlington County	510131017011	Yes
Arlington County	510131017031	Yes
Arlington County	510131017041	Yes
Arlington County	510131017042	Yes
Arlington County	510131017051	Yes
Arlington County	510131017052	Yes
Arlington County	510131018033	Yes
Arlington County	510131018041	Yes
Arlington County	510131020011	Yes
Arlington County	510131020012	Yes
Arlington County	510131020021	Yes
Arlington County	510131020031	Yes
Arlington County	510131020032	Yes
Arlington County	510131020033	Yes
Arlington County	510131021001	Yes
Arlington County	510131021002	Yes
Arlington County	510131022001	Yes
Arlington County	510131022002	Yes
Arlington County	510131022003	Yes
Arlington County	510131022004	Yes
Arlington County	510131022005	Yes
Arlington County	510131023023	Yes
Arlington County	510131024004	Yes
Arlington County	510131025001	Yes
Arlington County	510131027011	Yes
Arlington County	510131027012	Yes
Arlington County	510131027022	Yes
Arlington County	510131028042	Yes
Arlington County	510131028044	Yes
Arlington County	510131029043	Yes
Arlington County	510131030002	Yes
Arlington County	510131031002	Yes
Arlington County	510131032001	Yes
Arlington County	510131032002	Yes
Arlington County	510131032004	Yes
Arlington County	510131033001	Yes
Arlington County	510131033002	Yes
Arlington County	510131034052	Yes
Arlington County	510131035031	Yes
Arlington County	510131035051	Yes
Arlington County	510131035052	Yes

Arlington County	510131035053	Yes
Arlington County	510131036021	Yes
Arlington County	510131036022	Yes
Arlington County	510131038003	Yes
Arlington County	510131038004	Yes
Charles City County	510366001001	Yes
Charles City County	510366001002	Yes
Charles City County	510366003002	Yes
Chesterfield County	510411001071	Yes
Chesterfield County	510411001072	Yes
Chesterfield County	510411002061	Yes
Chesterfield County	510411002062	Yes
Chesterfield County	510411002063	Yes
Chesterfield County	510411002065	Yes
Chesterfield County	510411002091	Yes
Chesterfield County	510411002092	Yes
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Chesterfield County	510411002121	Yes
Chesterfield County	510411002122	Yes
Chesterfield County	510411002123	Yes
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Chesterfield County	510411003002	Yes
Chesterfield County	510411004033	Yes
Chesterfield County	510411004041	Yes
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Chesterfield County	510411004095	Yes
Chesterfield County	510411004101	Yes
Chesterfield County	510411004102	Yes
Chesterfield County	510411005051	Yes
Chesterfield County	510411005052	Yes
Chesterfield County	510411005054	Yes
Chesterfield County	510411005055	Yes
Chesterfield County	510411005062	Yes
Chesterfield County	510411005063	Yes

Chesterfield County	510411005071	Yes
Chesterfield County	510411005081	Yes
Chesterfield County	510411005082	Yes
Chesterfield County	510411005101	Yes
Chesterfield County	510411005102	Yes
Chesterfield County	510411006001	Yes
Chesterfield County	510411006002	Yes
Chesterfield County	510411006003	Yes
Chesterfield County	510411007011	Yes
Chesterfield County	510411007012	Yes
Chesterfield County	510411007013	Yes
Chesterfield County	510411007014	Yes
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Chesterfield County	510411008041	Yes
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Chesterfield County	510411008171	Yes
Chesterfield County	510411008172	Yes
Chesterfield County	510411008181	Yes
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Chesterfield County	510411008192	Yes
Chesterfield County	510411008193	Yes
Chesterfield County	510411008201	Yes
Chesterfield County	510411008202	Yes
Chesterfield County	510411008232	Yes
Chesterfield County	510411008233	Yes
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Chesterfield County	510411009101	Yes
Chesterfield County	510411009102	Yes
Chesterfield County	510411009103	Yes
Chesterfield County	510411009104	Yes
Chesterfield County	510411009151	Yes
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Chesterfield County	510411009193	Yes
Chesterfield County	510411009201	Yes
Chesterfield County	510411009211	Yes
Chesterfield County	510411009213	Yes
Chesterfield County	510411009214	Yes
Chesterfield County	510411009221	Yes
Chesterfield County	510411009222	Yes
Chesterfield County	510411009223	Yes
Chesterfield County	510411009231	Yes
Chesterfield County	510411009232	Yes
Chesterfield County	510411009343	Yes
Culpeper County	510479302021	Yes
Culpeper County	510479302022	Yes
Culpeper County	510479302023	Yes
Culpeper County	510479302031	Yes
Culpeper County	510479303001	Yes
Culpeper County	510479303002	Yes
Culpeper County	510479305011	Yes
Dinwiddie County	510538401022	Yes
Dinwiddie County	510538403002	Yes
Dinwiddie County	510538403003	Yes
Dinwiddie County	510538404001	Yes
Dinwiddie County	510538405001	Yes
Dinwiddie County	510538405002	Yes
Fairfax County	510594153003	Yes
Fairfax County	510594154011	Yes
Fairfax County	510594154012	Yes
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Fairfax County	510594205033	Yes
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Fairfax County	510594208001	Yes
Fairfax County	510594210023	Yes
Fairfax County	510594211021	Yes
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Fairfax County	510594214003	Yes
Fairfax County	510594215001	Yes
Fairfax County	510594215002	Yes
Fairfax County	510594215003	Yes
Fairfax County	510594215004	Yes
Fairfax County	510594216001	Yes
Fairfax County	510594216002	Yes
Fairfax County	510594216003	Yes

Fairfax County	510594217011	Yes
Fairfax County	510594217012	Yes
Fairfax County	510594218002	Yes
Fairfax County	510594219001	Yes
Fairfax County	510594221013	Yes
Fairfax County	510594221024	Yes
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Fairfax County	510594306001	Yes
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Fairfax County	510594310013	Yes
Fairfax County	510594316021	Yes
Fairfax County	510594401003	Yes
Fairfax County	510594402022	Yes
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Fairfax County	510594515012	Yes
Fairfax County	510594515013	Yes
Fairfax County	510594515014	Yes
Fairfax County	510594515022	Yes
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Fairfax County	510594516022	Yes
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Fairfax County	510594917061	Yes
Fairfax County	510594918012	Yes
Fauquier County	510619307061	Yes
Hanover County	510853206012	Yes
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Hanover County	510853208041	Yes
Hanover County	510853209021	Yes
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Henrico County	510872001061	Yes
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Henrico County	510872001063	Yes
Henrico County	510872001064	Yes
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Henrico County	510872001251	Yes
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Henrico County	510872004122	Yes
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Henrico County	510872004173	Yes
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Henrico County	510872004181	Yes
Henrico County	510872004182	Yes
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Henrico County	510872005032	Yes
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Henrico County	510872006002	Yes
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Henrico County	510872007003	Yes
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Henrico County	510872008074	Yes
Henrico County	510872009042	Yes
Henrico County	510872009044	Yes
Henrico County	510872009051	Yes
Henrico County	510872009052	Yes
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Henrico County	510872009073	Yes
Henrico County	510872009081	Yes
Henrico County	510872009082	Yes
Henrico County	510872010011	Yes
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Henrico County	510872010031	Yes
Henrico County	510872010032	Yes
Henrico County	510872010033	Yes
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Henrico County	510872011024	Yes
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Henrico County	510872011041	Yes
Henrico County	510872011042	Yes
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Henrico County	510872012032	Yes
Henrico County	510872012041	Yes

Henrico County	510872012042	Yes
Henrico County	510872012043	Yes
Henrico County	510872012051	Yes
Henrico County	510872012052	Yes
Henrico County	510872012053	Yes
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Henrico County	510872016022	Yes
Henrico County	510872016023	Yes
Henrico County	510872017011	Yes
Henrico County	510872017012	Yes
Isle of Wight County	510932801051	Yes
Isle of Wight County	510932801052	Yes
Isle of Wight County	510932801053	Yes
James City County	510950801021	Yes
James City County	510950801022	Yes
James City County	510950801023	Yes
James City County	510950801032	Yes
King and Queen County	510979504002	Yes
King and Queen County	510979505001	Yes
King William County	511019502001	Yes
Loudoun County	511076105051	Yes
Loudoun County	511076105052	Yes
Loudoun County	511076105053	Yes
Loudoun County	511076105054	Yes
Loudoun County	511076110181	Yes
Loudoun County	511076110183	Yes

Loudoun County	511076112041	Yes
Loudoun County	511076112042	Yes
Loudoun County	511076112043	Yes
Loudoun County	511076112051	Yes
Loudoun County	511076112092	Yes
Loudoun County	511076114001	Yes
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Loudoun County	511076115022	Yes
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Loudoun County	511076117021	Yes
Loudoun County	511076117022	Yes
Loudoun County	511076118041	Yes
New Kent County	511277001001	Yes
New Kent County	511277001003	Yes
New Kent County	511277002001	Yes
New Kent County	511277002002	Yes
New Kent County	511277002003	Yes
Prince George County	511498501001	Yes
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Prince George County	511498503013	Yes
Prince George County	511498503014	Yes
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Prince George County	511498503022	Yes
Prince William County	511539002011	Yes
Prince William County	511539002012	Yes
Prince William County	511539002021	Yes
Prince William County	511539002022	Yes
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Prince William County	511539003011	Yes
Prince William County	511539003022	Yes
Prince William County	511539004031	Yes
Prince William County	511539004032	Yes

Prince William County	511539004036	Yes
Prince William County	511539004041	Yes
Prince William County	511539004042	Yes
Prince William County	511539004043	Yes
Prince William County	511539004071	Yes
Prince William County	511539004072	Yes
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Prince William County	511539012112	Yes
Prince William County	511539012113	Yes
Prince William County	511539012121	Yes
Prince William County	511539012124	Yes
Prince William County	511539012233	Yes
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Prince William County	511539014034	Yes
Prince William County	511539014071	Yes
Prince William County	511539014072	Yes
Prince William County	511539014093	Yes

Prince William County	511539014162	Yes
Prince William County	511539014181	Yes
Prince William County	511539014182	Yes
Prince William County	511539014183	Yes
Prince William County	511539014191	Yes
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Prince William County	511539017042	Yes
Prince William County	511539017043	Yes
Prince William County	511539017044	Yes
Prince William County	511539019001	Yes
Prince William County	511539019003	Yes
Southampton County	511752003001	Yes
Spotsylvania County	511770201081	Yes
Spotsylvania County	511770202013	Yes
Spotsylvania County	511770202021	Yes
Spotsylvania County	511770202022	Yes
Spotsylvania County	511770202043	Yes
Spotsylvania County	511770203051	Yes
Spotsylvania County	511770203071	Yes
Spotsylvania County	511770203115	Yes
Spotsylvania County	511770203131	Yes
Stafford County	511790102011	Yes
Stafford County	511790102111	Yes
Stafford County	511790102113	Yes
Stafford County	511790102151	Yes
Stafford County	511790102162	Yes
Stafford County	511790102163	Yes
Surry County	511818601001	Yes
Surry County	511818601002	Yes
Surry County	511818601003	Yes
Sussex County	511838703001	Yes
Sussex County	511838703002	Yes
Sussex County	511838703003	Yes
Sussex County	511838704001	Yes
Sussex County	511838704002	Yes
Warren County	511870203001	Yes
Warren County	511870204001	Yes
Warren County	511870204002	Yes
Warren County	511870204003	Yes
Warren County	511870204004	Yes
Warren County	511870204005	Yes
Warren County	511870205001	Yes

Warren County	511870205002	Yes
Warren County	511870205003	Yes
Warren County	511870205004	Yes
Warren County	511870206011	Yes
Warren County	511870206022	Yes
York County	511990502071	Yes
York County	511990503061	Yes
York County	511990505001	Yes
Alexandria City	515102001021	Yes
Alexandria City	515102001022	Yes
Alexandria City	515102001023	Yes
Alexandria City	515102001041	Yes
Alexandria City	515102001042	Yes
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Alexandria City	515102004092	Yes
Alexandria City	515102004093	Yes
Alexandria City	515102004094	Yes
Alexandria City	515102005001	Yes
Alexandria City	515102005002	Yes
Alexandria City	515102005003	Yes
Alexandria City	515102006003	Yes
Alexandria City	515102007032	Yes
Alexandria City	515102008022	Yes
Alexandria City	515102011001	Yes
Alexandria City	515102012041	Yes
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Alexandria City	515102012063	Yes

Alexandria City	515102016022	Yes
Alexandria City	515102018021	Yes
Alexandria City	515102018052	Yes
Chesapeake City	515500200031	Yes
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Chesapeake City	515500216021	Yes
Chesapeake City	515500216024	Yes
Colonial Heights City	515708301001	Yes
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Colonial Heights City	515708302003	Yes
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Colonial Heights City	515708304002	Yes
Colonial Heights City	515708305001	Yes
Colonial Heights City	515708305002	Yes
Fairfax City	516003001002	Yes

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Fairfax City	516003002001	Yes
Fairfax City	516003005003	Yes
Franklin City	516200901001	Yes
Franklin City	516200902001	Yes
Franklin City	516200902002	Yes
Franklin City	516200902003	Yes
Fredericksburg City	516300002012	Yes
Fredericksburg City	516300003011	Yes
Fredericksburg City	516300004001	Yes
Fredericksburg City	516300004003	Yes
Fredericksburg City	516300005001	Yes
Fredericksburg City	516300005005	Yes
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Virginia Beach City	518100448061	Yes
Virginia Beach City	518100448062	Yes
Virginia Beach City	518100448063	Yes
Virginia Beach City	518100448071	Yes
Virginia Beach City	518100448072	Yes
Virginia Beach City	518100448074	Yes
Virginia Beach City	518100448075	Yes
Virginia Beach City	518100448081	Yes
Virginia Beach City	518100448083	Yes
Virginia Beach City	518100452001	Yes
Virginia Beach City	518100452002	Yes
Virginia Beach City	518100452003	Yes
Virginia Beach City	518100454073	Yes
Virginia Beach City	518100454083	Yes
Virginia Beach City	518100454141	Yes
Virginia Beach City	518100454142	Yes
Virginia Beach City	518100454151	Yes
Virginia Beach City	518100454301	Yes
Virginia Beach City	518100454323	Yes
Virginia Beach City	518100456051	Yes
Virginia Beach City	518100456061	Yes
Virginia Beach City	518100458063	Yes
Virginia Beach City	518100458082	Yes
Virginia Beach City	518100458101	Yes
Virginia Beach City	518100460023	Yes
Virginia Beach City	518100460132	Yes
Virginia Beach City	518100460133	Yes
Virginia Beach City	518100460192	Yes
Virginia Beach City	518100462064	Yes
Virginia Beach City	518100462073	Yes
Virginia Beach City	518100462132	Yes
Virginia Beach City	518100462211	Yes
Virginia Beach City	518100462212	Yes
Virginia Beach City	518100462213	Yes
Virginia Beach City	518100462232	Yes
Williamsburg City	518303701001	Yes
Williamsburg City	518303702003	Yes
Williamsburg City	518303703002	Yes

Jurisdiction	Census Tracts	Disadvantaged
Alexandria city	51510200405	TRUE
Alexandria city	51510200104	TRUE
Alexandria city	51510201203	TRUE
Alexandria city	51510200500	TRUE
Alexandria city	51510200303	TRUE
Arlington County	51013102003	TRUE
Arlington County	51013102701	TRUE
Arlington County	51013102100	TRUE
Arlington County	51013102200	TRUE
Chesapeake city	51550020700	TRUE
Chesapeake city	51550020500	TRUE
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Chesapeake city	51550020300	TRUE
Chesterfield County	51041100107	TRUE
Chesterfield County	51041100205	TRUE
Chesterfield County	51041100300	TRUE
Chesterfield County	51041100404	TRUE
Chesterfield County	51041100406	TRUE
Chesterfield County	51041100405	TRUE
Chesterfield County	51041100806	TRUE
Colonial Heights city	51570830200	TRUE
Culpeper County	51047930202	TRUE
Dinwiddie County	51053840400	TRUE
Fairfax County	51059461902	TRUE
Fairfax County	51059471301	TRUE
Fairfax County	51059452200	TRUE
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Franklin city	51620090200	TRUE
Hampton city	51650011800	TRUE
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Isle of Wight County	51093280105	TRUE
James City County	51095080102	TRUE
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Norfolk city	51710003300	TRUE
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Portsmouth city	51740212300	TRUE
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Portsmouth city	51740980100	TRUE
Prince George County	51149850100	TRUE
Prince William County	51153900901	TRUE

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Suffolk city	51800065500	TRUE
Suffolk city	51800065300	TRUE
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Suffolk city	51800065400	TRUE

Surry County	51181860100	TRUE
Sussex County	51183870400	TRUE
Sussex County	51183870300	TRUE
Virginia Beach city	51810045200	TRUE
Virginia Beach city	51810043200	TRUE
Virginia Beach city	51810046221	TRUE
Virginia Beach city	51810041002	TRUE
Virginia Beach city	51810044806	TRUE
Virginia Beach city	51810045810	TRUE
Warren County	51187020500	TRUE
Warren County	51187020400	TRUE
Fredericksburg city	51630000301	TRUE

Metropolitan Washington
Council of Governments

April 1, 2024

U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004

Re: Letter of Intent for Signing a Memorandum of Agreement with PlanRVA and the Hampton Roads Planning District Commission (HRPDC) for the Virginia Initiative for Building Efficiency (VIBE) program as funded through the U.S. EPA Climate Pollution Reduction Grants Program Coalition Application

To Whom It May Concern:

The Metropolitan Washington Council of Governments (COG) commits to collaboratively working with PlanRVA and HRPDC to develop, launch, and implement the Virginia Initiative for Building Efficiency (VIBE) program as supported by funding through the U.S. EPA Climate Pollution Reduction Grants (CPRG) program.

The VIBE program, a proposed new commercial buildings-focused program will provide outreach and marketing, technical assistance, incentives, and financing options for commercial and larger multifamily residential buildings in the three defined MSAs in the Commonwealth of Virginia. The program design is based on identifying and working with market leaders to drive demand, develop projects, and provide financing in an integrated effort to increase the level of functionality in Virginia's clean energy economy. The program acts as an 'accelerator' for clean energy investment, by engaging such networks and partners, and providing a range of technical and administrative services in 'concierge' fashion to take participants from initial interest to completed projects.

We are excited about the opportunity to collaborate with other regional partners in Virginia to address key market barriers through a concerted program effort that is flexible enough to address the unique needs of each region participating in the program and will realize upscaled greenhouse gas (GHG) emission reductions, improve indoor environments and air quality, democratize building decarbonization, overcome seminal barriers to achievement, and improve energy use and cost reductions and additional co-benefits across the three regional geographies, especially in low-income and disadvantaged communities.

As the lead coalition applicant for the VIBE program, COG will play a critical role in the program by managing and administering the grant overall, including EPA reporting; ensuring compliance with quality and performance plans; subgranting funds and managing subgrants for coalition members; releasing an RFP and contracting with third party(ies) for program administration and implementation; staffing the program for program design, startup, management, and reporting; identifying and working with market leaders in Northern Virginia; and establishing and serving on an Advisory Board.

COG commits to leading the successful implementation of the VIBE program in alignment with the programmatic and technical description detailed in this grant application. We are aware that strong partnerships and networks are needed to successfully leverage funding through the CPRG program to advance climate, air quality, environmental, and public health solutions, and this is particularly true for a program such as VIBE which requires a deep connection to communities. Through this program we are deeply committed to prioritizing all disadvantaged and underserved communities within the Northern Virigina, Hampton Roads, and Richmond metro areas.

COG understands that we will be subgranting funds to PlanRVA and HRPDC if funding for the proposed activities in this application is awarded. Under EPA's CPRG program, subawards must be consistent with the definition of that term in 2 CFR 200.1 and comply with EPA's Subaward Policy. As the coalition lead, COG will hold PlanRVA and HRPDC accountable for proper use of EPA funding and to their commitment to fulfill the required subaward reporting requirements.

We are committed to signing an MOA with PlanRVA and HRPDC by July 1, 2024. Should the VIBE program funding request be successful, we look forward to working with you on this immensely needed and highly impactful project beginning in the second half of 2024.

Please contact Jeffrey King, COG Director of Climate, Energy, and Air Programs, at 202-962-3238 or jking@mwcog.org if you have any questions. Thank you for your consideration.

Sincerely,

Clark Mercer

Clark Mercer
Executive Director

HAMPTON ROADS PDC
Douglas G. Pons, Chair | Shannon E. Glover, Vice-Chair
Robert A. Crum, Jr., Executive Director

Member Jurisdictions

Chesapeake

Franklin

Gloucester

Hampton

Isle of Wight

James City

Newport News

Norfolk

Poquoson

Portsmouth

Smithfield

Southampton

Suffolk

Surry

Virginia Beach

Williamsburg

York

March 19, 2024

Mr. Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

RE: Letter of Intent for Signing a Memorandum of Agreement with the Metropolitan Washington Council of Governments for the Virginia Initiative for Buildings Efficiency (VIBE) Program U.S. EPA Climate Pollution Reduction Grants Program Coalition Application

Dear Mr. King:

The Hampton Roads Planning District Commission (HRPDC) commits to partnering with the Metropolitan Washington Council of Governments (MWCOG) to develop, launch, and implement the Virginia Initiative for Building Efficiency (VIBE) program as supported by funding through the U.S. EPA Climate Pollution Reduction Grants (CPRG) program.

The VIBE program, a proposed new commercial buildings-focused program, will provide outreach and marketing, technical assistance, incentives, and financing options for commercial and larger multifamily residential buildings in the three defined metropolitan statistical areas (MSAs) in the Commonwealth of Virginia. The program design is based on identifying and working with market leaders to drive demand, develop projects, and provide financing in an integrated effort to increase functionality in Virginia's clean energy economy. The program acts as an 'accelerator' for clean energy investment by engaging such networks and partners and providing a range of technical and administrative services in a 'concierge' fashion to take participants from initial interest to completed projects.

As one of the three coalition members for the VIBE program, the HRPDC will play a critical role in the program by serving on a program advisory board, identifying and working with market leaders in its region, building a pipeline of projects, and engaging in networks of local partners, and communicating support needs, market barriers, and opportunities to the MWCOG and the VIBE program administrators and implementers.

As a coalition member, HRPDC commits to supporting the successful implementation of the VIBE program in alignment with the programmatic and

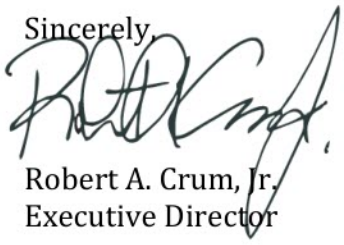
technical description detailed in this grant application. As such, we intend to sign a Memorandum of Agreement (MOA) for the VIBE program with MWCOG by July 1, 2024.

We are aware that solid partnerships and networks are needed to successfully leverage funding through the CPRG program to advance climate, air quality, environmental, and public health solutions, and this is particularly true for a program such as VIBE, which requires a deep connection to communities. Through this program, we are deeply committed to prioritizing all disadvantaged and underserved communities within the Hampton Roads region.

The HRPDC understands that we will be both a partner and subrecipient to MWCOG if funding for the proposed activities in this application is awarded. Under EPA's CPRG program, subawards must be consistent with the definition of that term in 2 CFR 200.1 and comply with EPA's Subaward Policy. As a sub-recipient, HRPDC will be accountable for the proper use of EPA funding, and we commit to fulfilling the required sub-award reporting requirements.

We are committed to signing an MOA with MWCOG by July 1, 2024. Should the VIBE program funding request be successful, we look forward to working with you on this immensely needed and highly impactful project beginning in the second half of 2024. If you have any questions or need additional information, please do not hesitate to contact me at rcrum@hrpdcva.gov or (757) 420-8300.

Sincerely,



Robert A. Crum, Jr.
Executive Director

PlanRVA
Where the region comes together to look ahead.

p: 804.323.2033
w: www.PlanRVA.org

March 20, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Intent for Signing a Memorandum of Agreement with the Metropolitan Washington Council of Governments for the Virginia Efficiency Buildings Initiative (VIBE) program U.S. EPA Climate Pollution Reduction Grants Program Coalition Application

Dear Mr. King:

The Richmond Planning District Commission (PlanRVA) commits to partnering with Metropolitan Washington Council of Governments (MWCOG) to develop, launch, and implement the Virginia Initiative for Building Efficiency (VIBE) program as supported by funding through the U.S. EPA Climate Pollution Reduction Grants (CPRG) program.

The VIBE program, a proposed new commercial buildings-focused program will provide outreach and marketing, technical assistance, incentives, and financing options for commercial and larger multifamily residential buildings in the three defined MSAs in the Commonwealth of Virginia. The program design is based on identifying and working with market leaders to drive demand, develop projects, and provide financing in an integrated effort to increase the level of functionality in Virginia's clean energy economy. The program acts as an 'accelerator' for clean energy investment by engaging workforce development partners, private development firms and small businesses, and energy efficiency contractor networks, as well as others, to provide a range of technical and administrative services in 'concierge' fashion to take participants from initial interest to completed projects.

As one of the three coalition members for the VIBE program, PlanRVA will play a critical role by serving on a program advisory board, identifying and working with market leaders in our region, building a pipeline of projects, engaging local partners, and communicating support needs and market barriers and opportunities to the MWCOG and the VIBE program administrators and implementers.

As a coalition member, PlanRVA commits to supporting the successful implementation of the VIBE program in alignment with the programmatic and technical description detailed in this grant application. As such, we intend to sign a Memorandum of Agreement (MOA) for the VIBE program with MWCOG by July 1, 2024.

We are aware that strong partnerships and networks are needed to successfully leverage funding through the CPRG program to advance climate, air quality, environmental, and public health solutions, and this is particularly true for a program such as VIBE which requires a deep connection to communities. PlanRVA is the convener of the region, with a strong history of facilitating cooperation and collaboration between government, private sector, and community organizations. We are strongly committed to equity and through this program, we commit to prioritizing disadvantaged and underserved communities within the Richmond metro area.

PlanRVA understands that we will be both a partner and subrecipient to MWCOG if funding for the proposed activities in this application is awarded. Under EPA's CPRG program, subawards must be consistent with the definition of that term in 2 CFR 200.1 and comply with EPA's Subaward Policy. As a subrecipient, PlanRVA will be accountable for proper use of EPA funding, and we commit to fulfil the required subaward reporting requirements.

We are committed to signing a MOA with MWCOG by July 1, 2024. Should the VIBE program funding request be successful, we look forward to working with you on this immensely needed and highly impactful project beginning in the second half of 2024. Please let us know how we may be of additional assistance.

Sincerely,

Martha Shickle (Mar 20, 2024 12:14 EDT)

Martha Shickle

Executive Director, PlanRVA
martha@planrva.org
804.323.2033- Main
804.924.7030- Direct

RichmondMSA_LoI_VIBEProgram

Final Audit Report 2024-03-20

Created:	2024-03-20
By:	Nicole Keller (nkeller@planrva.org)
Status:	Signed
Transaction ID:	CBJCHBCAABAA4Ev0JaPY7vxX7hUlN6Qr0nRQ0X5FNhNv

"RichmondMSA_LoI_VIBEProgram" History

Document created by Nicole Keller (nkeller@planrva.org)
2024-03-20 - 4:09:55 PM GMT

Document emailed to Martha Shickle (martha@planrva.org) for signature
2024-03-20 - 4:10:02 PM GMT

Email viewed by Martha Shickle (martha@planrva.org)
2024-03-20 - 4:10:34 PM GMT

Document e-signed by Martha Shickle (martha@planrva.org)
Signature Date: 2024-03-20 - 4:14:35 PM GMT - Time Source: server

Agreement completed.
2024-03-20 - 4:14:35 PM GMT

Commonwealth of Virginia

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

1111 E. Main Street, Suite 1400, Richmond, Virginia 23219
P.O. Box 1105, Richmond, Virginia 23218
(800) 592-5482
www.deq.virginia.gov

Travis A. Voyles
Secretary of Natural and Historic Resources

Michael S. Rolband, PE, PWD, PWS Emeritus
Director
(804) 698-4020

March 26, 2024

VIA POSTAL MAIL

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Virginia Department of Environmental Quality (VA DEQ) I am writing to express my strong support for the Virginia Initiative for Building Efficiency (VIBE) program coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virgina to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

As the CPRG planning grantee for the Commonwealth of Virginia, VA DEQ has heard firsthand from stakeholders across the state about the need to accelerate action in the commercial buildings sector and reduce greenhouse gas (GHG) emissions. The Commonwealth has a clear and vested interest in promoting cleaner air, reliable and affordable clean energy generation, and improved resilience to increased storm frequency and intensity. The VIBE program will help realize these benefits, particularly in low-income, disadvantaged communities.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the

vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, we will support these organizations through building networks and connections and ensuring alignment with Commonwealth programs.

For example, if the Hawaii Green Infrastructure Authority-led multistate coalition entitled: "Enabling Resilient Local Energy Systems" - of which the Virginia Department of Energy (VE) is a part - is successful, VE will coordinate with the VIBE program to ensure equal distribution of benefits across the Commonwealth to the extent possible, and that municipal buildings that are candidates for solar and battery also have been made more efficient. Similarly, the VA DEQ has coordinated with the coalition members to ensure there is no overlap between the VIBE program and the Enabling Resilient Local Energy Systems application. More specifically, VIBE only includes efficiency and electrification for municipal buildings, and the Enabling Resilient Local Energy Systems application only includes distributed clean generation systems (e.g., solar and battery storage).

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,



Michael S. Rolband
Director

CC: (*via electronic mail*)

Michael Dowd, Director, Division of Air and Renewable Energy Programs
Thomas Ballou, Manager, Office of Air Data Analysis

313 E. Broad Street, Suite 226
Richmond, VA 23219

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Virginia Energy Efficiency Council (VAEEC), I am writing to express my strong support for the Virginia Initiative for Building Efficiency (VIBE) coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virigina to set the stage to substantially transform the commercial buildings sector and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

Founded in 2012, the Virginia Energy Efficiency Council is a 501c3 organization headquartered in Richmond, whose goal is to facilitate discussions and share resources to advance energy efficiency throughout the Commonwealth. We engage our members to identify barriers to and opportunities for energy efficiency advancement, and to develop a strong, fact-based, and balanced industry voice before local, state, and national policymakers and regulators. Our diverse group of roughly 100 members includes Fortune 500 companies, nonprofits, local governments, state agencies, and more, whose vision is for energy efficiency to be an integral part of Virginia's economy and clean energy future.

The VAEEC has worked over the past two years with members and community partners to launch the Energy Efficiency Workforce Initiative (EEWI) pilot program in Hampton Roads. This initiative is intended to be a holistic workforce pipeline, braiding existing entities and funding streams to take HVAC and weatherization recruits from onboarding through class room and on-the-job training through to placement and retention. Partnerships and communication are critical to the short-and-long term success of this program, and the VIBE program will offer addition resources to not only bolster outreach efforts, but also potentially scale beyond the region.

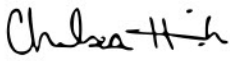
While the VIBE program is focused on commercial buildings, much of the low-income housing stock in the identified Metropolitan Statistical Areas (MSA) are multifamily buildings that are in need of weatherization and energy services. Training additional weatherization providers will help ensure these residences can take advantage of a number of programs to reduce energy burden – Dominion Energy's Low-Income Housing programs, the Home Electrification and Appliance Rebates, Home Energy Tax Credits, the Low-Income Housing Tax Credit, and more. Single family residences are heavily incentivized to make energy efficiency upgrades through some of these IRA funded programs, but multifamily residents and property owners encounter many more significant barriers to making improvements to the building.

VIBE would offer the funding and technical assistance to help business owners, contractors, property owners, and residents navigate the different programs and options available to maximize energy savings, whereas the VAEEC can serve as a partner and conduit to connect multifamily residents with job training and placement opportunities. We can also utilize our member network and industry expertise to make the necessary connections between funding opportunities, stakeholders, and providers.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, our expertise and broad membership network uniquely position us to further the VIBE program through outreach and messaging across the state. We are a recognized and respected industry voice and can use that to connect the subgrantees and advisory board members with the voices and resources that can help the program succeed.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,



Chelsea Harnish
Executive Director
chelsea@vaeec.org

ARLINGTON VIRGINIA

DEPARTMENT OF ENVIRONMENTAL SERVICES
Office of the Director

2100 Clarendon Boulevard, Suite 900, Arlington, VA 22201
Phone: 703 -228-5022 | Fax: 703-228-4455

March 25, 2024

Jeffrey King
Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street N.E., Suite 300
Washington, D.C. 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Arlington County, I am writing to express my strong support for the **Virginia Initiative for Building Efficiency (VIBE),** the coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in the Virginia to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

For more than two decades, Arlington County has established itself as a climate and energy leader, through its AIRE team (Arlington Initiative to Rethink Energy). The AIRE team is responsible for planning, policy, and program/project development; blending strategy experience with deep, broad technical expertise. AIRE's subject-matter portfolio includes building science, greenhouse gas metrics and analytics, climate psychology and behavior, and energy efficiency co-benefits ranging from environmental equity to public health and human health risk mitigation and metrics. These capacities drive awarded and recognized Green Building, Sustainable Facilities, LEED® and Zero-Net Energy Schools, and clean transportation programs, among others. https://www.arlingtonva.us/Government/Programs/Office-of-Sustainability-and-Environment/AIRE

Beyond Arlington's Human Services programs (e.g., food and rent assistance, child care, language services, transit, and others), the County funds an Affordable Housing Investment Fund (AHIF), extends bonus density to developers of new construction in return for supplemental AHIF funding, and the AIRE team recently completed a technical partnership with NREL, specifically scoped to assess multifamily buildings in Arlington's Low-Income Disadvantaged Communities (LIDACs). This latter project was expressly planned as an initial data-mining opportunity in advance of precisely the kind of federal funding the CPRG represents. By way of investment, in 2022 the County committed $160 Million to ensure that its largest, oldest LIDAC

(Barcroft, established in the 1930s and with more than 1300 residents) would remain affordable housing for 99 years. Moreover, several years ago the County established an Equity Office, and its policies are strictly embodied in the County's Comprehensive Plan elements, including Arlington's Community Energy Plan.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, Arlington County will leverage its existing climate and energy staff and programs and the full range of partnerships and relationships that commonly support our energy, climate adaptation, resilience, and green building initiatives. In addition, Arlington County can access its network of trusted community leaders, trade, economic, and institutional organizations as well as affordable housing developers and funding entities, building sector, economic development, environmental liaisons to identify, stimulate, promote, and implement projects.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Greg D. Emanuel

Greg Emanuel
Director, Department of Environmental Services
gemanuel@arlingtonva.us

cc: Mark Schwartz, County Manager
Michelle Cowan, Deputy County Manager
Mike Moon, DES Chief Operating Officer
Demetra McBride, DES Environmental Management

ARLINGTON
VIRGINIA

DEPARTMENT OF COMMUNITY PLANNING, HOUSING AND DEVELOPMENT (CPHD)
HOUSING DIVISION

Bozman Government Center 2100 Clarendon Blvd, Suite 700 Arlington, VA 22201
TEL 703.228.3765 FAX 703.228.3834 www.arlingtonva.us

March 18, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the **V**irginia **I**nitiative for **B**uilding **E**fficiency (VIBE) under the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Arlington County, I am writing to express our strong support for the Metropolitan Washington Council of Governments (COG) in implementing the measures identified and described in its Virginia Initiative for Building Efficiency (VIBE) Virginia Coalition Application under the Climate Pollution Reduction Grant (CPRG).

Arlington County has committed to 100% renewable energy resources for government operations by 2025 (achieved in 2023); carbon neutral government by 2040 and a carbon neutral community by 2050. Buildings and transportation are the largest sources of GHG emissions in the region and therefore it is essential to address emissions in these sectors to achieve COG's and our own climate goals.

VIBE provides technical assistance, construction incentives, and leverages a financing mechanism portfolio for energy performance improvements to multifamily and commercial building owners in both low-income disadvantaged communities (LIDAC) and non-LIDAC districts; as well a municipal and schools component. Through these three building inventory sectors, VIBE will bridge existing critical resource gaps, amplify existing programs that decarbonize buildings, and accelerate Virginia governments' efforts to address LIDAC buildings that often represent old construction under previous energy codes and standards, which may increase risk to indoor environments, air quality and human health.

Importantly, VIBE will recognize, remedy and close the social and equity divide in the places where people live, work, and stimulate local economies in LIDAC communities.

We support the VIBE Program and look forward to being a part of its success in implementation.

Sincerely,

Anne Venezia

Anne Venezia
Housing Director
Department of Community Planning, Housing, and Development
Arlington County

March 18, 2024

Jeffrey King
Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Dear Director King:

On behalf of the Arlington Chamber of Commerce, I am writing to express our support for the Metropolitan Washington Council of Governments (COG) in implementing the measures identified in the Virginia Initiative for Building Efficiency (VIBE) program, under the U.S. Environmental Protection Agency's Climate Pollution Reduction Grant.

Arlington County government has committed to being a carbon neutral County by the year 2050. The target by the County is aspirational and can be an impetus for innovation, provided that the County encourages policies and programs that accommodate individual circumstances and focus on incentives rather than mandates.

The VIBE program is such a policy, incentivizing energy performance improvements for multifamily and commercial buildings through providing technical assistance, construction incentives, and resources for building owners to leverage a financing mechanism portfolio. This would apply to building owners in both low-income disadvantaged communities and non-disadvantaged communities, as well as municipal buildings and schools. The project will complement existing programs and expand incentives within Virginia to modify, renovate and improve older buildings in disadvantaged communities, which have structural and occupational issues affecting air quality and human health.

The VIBE program would incentivize property owners to improve their buildings' energy performance and their building efficiency in a manner that would not add undue burdens to Virginia businesses and property owners.

We support the project and look forward to its implementation. We thank you for your consideration of our comments.

Sincerely,

Kate Bates

Kate Bates
President & CEO

Office of Climate Action
301 King Street
Alexandria, VA 22314

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the City of Alexandria, I am writing to express my strong support for the coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virigina to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The City of Alexandria has set the target to reduce greenhouse gas emissions by 50% by 2030 relative to 2005 levels. However, only 4% of emissions in Alexandria are the result of the City government operations. On the flip side, commercial buildings account for 36% of city emissions—tied with transportation for the largest source of GHG emissions in the city.[1] In order to achieve our ambitious greenhouse gas reduction goals, the City must be able to support commercial buildings in taking rapid and widespread decarbonization, electrification, and energy efficiency efforts.

Alexandria's commercial buildings sector includes multifamily housing, which serves the city's LIDAC population. Housing Alexandria is a building owner and operator in the city with approximately 900 units across 10 buildings—all serving residents at 80% area mean income or less, with the vast majority serving residents at 60% area mean income or less. These properties, and their residents, would greatly

[1] City of Alexandria. 2019. Environmental Action Plan 2040. Environmental Action Plan 2040 (alexandriava.gov)

benefit from COG's proposed program. Several buildings are in need of substantial renovations that would significantly improve energy efficiency and increase electrification of the properties—in turn, becoming more affordable, reliable, comfortable, and healthy for their residents. All buildings have proposed but unfunded net-zero upgrades. The proposed program would allow for these renovations and upgrades to become reality.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, we will provide connections to Housing Alexandria and other building owners and operators to help build the pipeline of viable projects, promote the program through our ties to the commercial sector to expand the program's reach and impact, and implement our identified municipal building projects.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,



Ryan Freed
Climate Action Officer
Ryan.Freed@AlexandriaVA.gov

CITY OF FALLS CHURCH

March 21, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Programs (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the *Virginia Initiative for Building Efficiency (VIBE)* under the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the City of Falls Church I am writing to express my strong support for the *Virginia Initiative for Building Efficiency (VIBE)* coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virigina to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The City of Falls Church recently adopted a Community Energy Action Plan (CEAP) and a Government Operations Energy Action Plan (GOEAP) as roadmaps for the City government to support and collaborate with the community to pursue Falls Church's ambitious climate targets of reducing greenhouse gas (GHG) emissions below 2005 levels by 50% by 2030. Commercial buildings are the second largest source of GHG emissions in the City and therefore it is essential to address these emissions in order to meet the City's climate goals.

As a small municipality, the City of Falls Church government has the ability to work directly with low income disadvantaged residents and affordable housing providers. There are several multifamily developments within the City boundaries that could take advantage of the support provided by this program.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, we will provide connections and insights to support building the pipeline of viable commercial buildings projects, identify and implement projects in municipal buildings, and, provide information about the program throughout the community to expand its reach and identify key partners.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Wyatt Shields
City Manager
City of Falls Church
wshields@fallschurchva.gov

March 22, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Fairfax County, I am writing to express our strong support for the Virginia Initiative for Building Efficiency (VIBE) coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan areas in Virigina to substantially transform the commercial buildings sector in Virginia, and bring benefits to low-income and disadvantaged communities and all Commonwealth residents through improved air quality, reduced energy burdens, increased job opportunities, and increased resilience to climate impacts.

The objectives of the VIBE program closely align with Fairfax County's operational goals to be carbon neutral by 2040 and increase resilience to climate change. Implementation of these goals is largely focused on the county's building stock, with measures to increase energy efficiency and on-site renewable energy generation and incorporate climate resilience into infrastructure decisions. Since 2021, the county has completed 13 energy retrofits and installed solar on five county buildings, totaling 397 kW. Additional energy efficiency and solar projects are planned for the next five years, including several buildings that provide critical services and programs to disadvantaged communities.

The VIBE program also aligns with the county's community goals to be carbon neutral by 2050 and build resilience to climate change. To help advance both efforts, the county oversees programs such as the Energy Conservation Assistance Program (ECAP), which provides financial and technical assistance to property owners of commercial buildings implementing energy efficiency updates,

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12000 Government Center Parkway, Suite 533
Fairfax, VA 22035-0066
703-324-7136 TTY 711
www.fairfaxcounty.gov

installing renewable energy solutions, and enhancing the resilience of structures and property to withstand the impacts of climate change. Program participants that fall within federal or locally designated equity areas are eligible to receive additional financial assistance in the ECAP.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program, as well as with local collaborators such as the Faith Alliance for Climate Solutions, a vital partner in our recent programming with ECAP and other community-facing efforts. While the coalition applicants will take on the majority of the work, we will identify and implement projects through our operational and community-facing work. We will leverage our partnerships within the community and promote the program through our networks to expand its reach and ensure its success.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,



John Morrill
Director
Fairfax County Office of Environmental and Energy Coordination
john.morrill@fairfaxcounty.gov
703-324-1792

Loudoun County
VIRGINIA

General Services
801 Sycolin Road, SE, PO Box 7100, Leesburg, VA 20177
703-771-5552 O | dgs@loudoun.gov
loudoun.gov/generalservices

March 18, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Loudoun County, I am writing to express my strong support for the *VIBE: Virginia Initiative for Building Efficiency* coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in the Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

Loudoun County will provide connections and insights to COG and partners to support building the pipeline of viable commercial buildings projects, identify and implement projects (e.g., for a municipal building project), and provide information about the program throughout the community to expand its reach.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

George Govan

George Govan
Director
Department of Finance and Procurement
Loudoun County
George.govan@loudoun.gov

NVAHA
Northern Virginia
Affordable Housing Alliance

March 26, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the Virginia Initiative for Building Efficiency (VIBE) under the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Northern Virginia Affordable Housing Alliance (NVAHA), I am writing to express our strong support for the Metropolitan Washington Council of Governments (COG) in implementing the measures identified and described in its Virginia Initiative for Building Efficiency (VIBE) Virginia Coalition Application under the Climate Pollution Reduction Grant (CPRG).

NVAHA's mission is to promote healthy, sustainable and equitable communities that meet the diverse housing needs of Northern Virginia residents.

Buildings and transportation are the largest sources of GHG emissions in the region and therefore it is essential to address emissions in these sectors to achieve COG's and our own climate goals.

VIBE provides a technical assistance, construction incentives, and leverages a financing mechanism portfolio for energy performance improvements to multifamily and commercial building owners in both low-income disadvantaged communities (LIDAC) and non-LIDAC districts; as well a municipal and schools component. Through these three building inventory sectors, VIBE will bridge existing critical resource gaps, amplify existing programs that decarbonize buildings, and accelerate Virginia governments' efforts to address LIDAC buildings that often represent vintage construction under marginal energy codes and standards, which increase risk to indoor environments, air quality and human health.

Among the Virginia jurisdictions implementing VIBE, the building sector accounts for 47% -54% of jurisdictional greenhouse gas emissions. Because the Commonwealth restricts home rule and bars reach codes, local governments must apply a Commonwealth Building Code that is currently 9 years behind the International Building Code. This Code will be further diminished under Executive Directive Number One (2022) which compels the Virginia Board of Housing and Community Development to eliminate “at least 25% of all regulation that is not mandated by federal or state statute” from the Commonwealth’s Building Code.

As a result, implementation of VIBE in Virginia will produce significantly greater greenhouse gas emissions reductions and greater energy efficiency returns than the same program implemented in any home rule state.

Importantly, VIBE will recognize, remedy and close the social and equity divide in the places where people live, work, and stimulate local economies in LIDAC communities. We support the VIBE program.

Sincerely,

Jill Norcross

Jill Norcross
Executive Director

HAMPTON ROADS ALLIANCE

March 20, 2024

Mr. Jeffrey King
Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

I am writing on behalf of the Hampton Roads Alliance to express our enthusiastic support for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07 application led by the Metropolitan Washington Council of Governments (COG), in collaboration with coalition members PlanRVA and Hampton Roads Planning District Commission.

If successful, this application will unite the three largest metropolitan statistical areas in Virginia, laying the groundwork for substantial transformation within the commercial buildings sector. Such transformation promises to deliver tangible benefits to low-income and disadvantaged communities, as well as all Commonwealth residents, through enhanced air quality, reduced energy burden, job creation, and increased resilience.

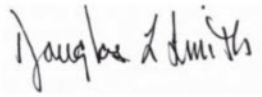
The Hampton Roads Alliance serves as the regional economic development organization, providing support to 14 localities and over 100 companies. We operate collaboratively to spearhead initiatives aimed at attracting, nurturing, and retaining both companies and talent, thereby fostering a more resilient, inclusive, and equitable region.

Hampton Roads Alliance
3 Commercial Place, Suite 1320
Norfolk, VA 23510

(757) 627-2315
info@757alliance.com
HamptonRoadsAlliance.com

We eagerly anticipate the positive impact that the Climate Pollution Reduction Program application could have on commercial buildings within Virginia's most populous areas. We wish to reaffirm our unwavering support for this coalition application.

Sincerely,



Douglas L. Smith
President & CEO

Hampton Roads Alliance
3 Commercial Place, Suite 1320
Norfolk, VA 23510

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info@757alliance.com
HamptonRoadsAlliance.com

HAMPTON ROADS CHAMBER | Means Business

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Norfolk, VA 23510

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HRChamber.com

03/20/2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Hampton Roads Chamber I am writing to express my strong support for the Hampton Roads Planning District Commission/Washington Council of Governments and PlanRVA Climate Pollution Reduction Grant Application.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The role of the Hampton Roads Chamber is to set the conditions for businesses to succeed in the region and the Commonwealth. This grant once approved will significantly enhance business growth and attraction as well employment opportunities while simultaneously addressing environmental concerns.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Bryan K. Stephens
President & CEO
Hampton Roads Chamber

STRATEGIC PARTNERS
ABNB Federal Credit Union • ADP • Atlantic Union Bank • Bank of America • Bayport Credit Union • Bon Secours Hampton Roads • Chartway Federal Credit Union • Chesapeake Regional Healthcare • Clark Nexsen
Cox Communications • Dominion Energy • GEICO • Goldkey PHR • Hampton Roads Workforce Council • Langley Federal Credit Union • News 3 WTKR • Norfolk State University • Old Dominion University • Old Point National Bank
Sentara Healthcare/Optima Health • Southern Bank • STIHL • The Franklin Johnston Group • The Port of Virginia • TowneBank • Truist • Verizon • Virginia Media • Virginia Natural Gas • Walmart • Wells Fargo

HAMPTON ROADS EXECUTIVE ROUNDTABLE

GO VIRGINIA REGION 5 — VIRGINIA INITIATIVE FOR GROWTH & OPPORTUNITY IN EACH REGION

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Hampton Roads Executive Roundtable (Roundtable), I am writing to express my strong support for this application led by the Metropolitan Washington Council of Governments (COG) and with coalition members PlanRVA and Hampton Roads Planning District Commission (HRPDC),

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The Roundtable is a regional economic development strategy organization, and we see the direct benefits to our region's economic growth from this application.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Thank you for your consideration,

Nancy L. Grden
President & CEO
ngrden@roundtablehr.org | 757.572.6089 mobile

HAMPTON VA

March 29, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs

Department of Environmental Program (DEP)

Metropolitan Washington Council of Governments

777 North Capitol Street NE, Suite 300

Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the City of Hampton, I am writing to express my strong support for the Commercial Building Accelerator coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in the Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The City of Hampton is experiencing the impacts of Climate Change, resulting from increased Greenhouse Gas emissions. The City is working to reduce its emissions and supports other efforts for other localities to recognize the impact and work toward a solution.

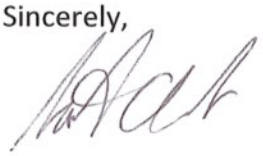
Through the City's Neighborhood Services staff and Diversity Equity and Inclusion Office. Staff works with the Neighborhood Commission to address the needs and concerns of underserved communities in Hampton.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, we will work to identify efficiencies in our

publicly maintained buildings to demonstrate practices and work to provide information about the program throughout the community to expand its reach, identify good partners or community-based organizations, etc.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,



Scott A. Smith, PE, LS, CPWP-M

Senior Civil Engineer/Project Manager

Water Resources Division, Hampton Department of Public Works

HAMPTON ROADS MILITARY AND FEDERAL FACILITIES ALLIANCE

ROBERT M. DYER, CHAIR . CHARLES M. SOUTHALL, III, VICE-CHAIR . SHEILA S. WILSON, TREASURER

RICHARD E. DWYER, EXECUTIVE DIRECTOR . TODD NICHOLS, SECRETARY

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Hampton Roads Planning District Commission/ Washington Council of Governments, and PlanRVA Application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Hampton Roads Military and Federal Facilities Alliance (HRMFFA), I am writing to express my strong support for the Climate Pollution Reduction Program coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

HRMFFA provides a focused regional voice in matters relating to attracting, retaining, and growing Hampton Roads' many Federal capabilities and installations. Today, the 16 communities that comprise HRMFFA collectively support 18 military installations, all six military service branches, including approximately 120,000 active duty, reserve, and civilian personnel, over 125,000 military dependents, and over 230,000 veterans. With additional NASA, Department of Energy, Veterans Affairs, and Interior facilities, there is arguably not a denser concentration of federal installations elsewhere in the country outside of Washington, DC.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience. The application has the potential to bring to the commercial building sector the same transformational benefits of electrification that the Federal government is undertaking with its numerous facilities in our respective regions.

HRMFFA
REGIONAL ADVOCACY FOR ★ FEDERAL INVESTMENT ★

723 WOODLAKE DRIVE . CHESAPEAKE, VIRGINIA 23320 . OFFICE (757) 644-6324 . FAX (757) 523-4881

HRMFFA looks forward to the benefits the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our staunch support for this coalition application.

Sincerely,



Richard E. Dwyer
Executive Director

City of Newport News
Office of the City Manager
2400 Washington Avenue, 10th Floor
Newport News, VA 23607

March 25, 2024

Mr. Jeffrey King
Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

RE: Letter of Support for the Metropolitan Washington Council of Governments' for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant. Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of The City of Newport News, Virginia, I am writing to express my strong support for the U.S. Environmental Protection Agency's (EPA) Climate Pollution Reduction Grants Program Implementation Grant coalition application led by the Metropolitan Washington Council of Governments (COG), with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in the Virigina to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income, disadvantaged communities and Commonwealth residents, through improved air quality, reduced energy burden, job opportunities, and increased resilience.

To achieve lower energy consumption, energy efficiency upgrades will lead to lower energy consumption, which can reduce the demand on power plants that may be local to low-income and disadvantaged communities (LIDAC) areas. Since many power plants burn fossil fuels, reducing demand means less burning and, therefore, fewer emissions of pollutants and greenhouse gases. In providing cleaner air, reduced emissions from lower energy consumption will lead to cleaner air in the surrounding community.

Pollutants such as nitrogen oxides, sulfur dioxide, and particulate matter can cause respiratory problems, heart disease, and other health issues. LIDAC

populations often bear a disproportionately heavy burden of chronic health impacts, hence, cleaner air can have a significant and positive effect on public health.

Further, energy efficiency upgrades will lower energy costs for our municipal buildings. These savings can be redirected towards other vital community services and programs that benefit LIDAC populations, such as healthcare, education, and social services. These efforts also impact the job creation. The implementation of energy efficiency upgrades will require labor, which creates employment opportunities in local communities. These opportunities for residents of LIDAC areas, offer a pathway to more stable economic security.

We know that strong community partnerships and networks are critical elements of this program, and through this letter of support, we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on much of the work, as called upon, we will identify and implement projects as a local government for municipal buildings, as well as provide open communication to our communities about the benefits of these projects and how they can contribute to address its overall success.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Alan K. Archer
City Manager

AKA:MM:jlt

cc: Ralph L. (Bo) Clayton III, Assistant City Manager
Eoghan P. Miller, Acting Assistant City Manager

VIRGINIA
PENINSULA
CHAMBER
21 Enterprise Parkway, Suite 100, Hampton, VA 23666
Office: 757-262-2000 www.vapeninsulachamber.com

March 26, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Virginia Peninsula Chamber, I am writing to express my strong support for the Hampton Roads Planning District Commission/Washington Council of Governments and PlanRVA Climate Pollution Reduction Grant Application.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The mission of the Virginia Peninsula Chamber is to work with community partners and stakeholders to help create conditions that are conducive to economic growth. This Grant would significantly aid in supporting our mission by improving our local communities from a health and safety standpoint and increasing our citizens' resilience.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Robert S. McKenna
President/CEO
Virginia Peninsula Chamber
Virginia Peninsula Chamber Foundation

VIRGINIA BEACH
VISION

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Virginia Beach Vision, Inc. and its 130 senior business and community leaders in Virginia Beach, I am writing to express our support for the Hampton Roads Planning District Commission/Washington Council of Governments and PlanRVA Climate Pollution Reduction Grant Application.

This grant, if approved, will bring together the three largest metropolitan statistical areas in Virginia to lay a foundation that could substantially transform the commercial building sector in Virginia. Its outcomes will bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

Virginia Beach Vision, Inc. is a not-for-profit business association dedicated to identifying and advocating initiatives that will ensure the economic stability and quality of life in Virginia Beach, and by extension, the Hampton Roads Region.

The Climate Pollution Reduction Program Grant would influence commercial building in the most populous areas of Virginia, bringing significant benefits to our communities. We request your favorable consideration.

Sincerely,

Scott D. Miller, Ph.D.
President
Virginia Beach Vision, Inc.
5101 Cleveland Street
Virginia Beach, VA 23462

March 26, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the City of Chesapeake, I am writing to express my support for the Council of Governments' Accelerator Grant application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

Strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, we will provide connections and insights to support building the pipeline of viable commercial buildings projects, provide information about the program throughout the community to expand its reach, and identify good partners or community-based organizations to encourage the project's success.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our support for this coalition application.

Sincerely,

Christopher Price
City Manager
City of Chesapeake

NORFOLK
INNOVATION
CORRIDOR

March 20, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Norfolk Innovation Corridor, I am writing to express my strong support for the Hampton Roads Planning District Commission/Washington Council of Governments and PlanRVA Climate Pollution Reduction Grant Application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The Norfolk Innovation Corridor (NIC) is a technology zone located in Norfolk, Virginia, that supports and connects small and large leading-edge entrepreneurs and innovation resources sharing a common goal of creating resilient solutions and expanding the quality of life for all. We are fully committed to making decarbonization of our buildings a priority as reducing GHG emissions supports the NIC's goals of sustainability and resilience.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Linda Peck
Executive Director
lpeck@norfolkinnovation.com

Chesterfield County, Virginia
Community Operations

9901 Lori Road – P.O. Box 40 – Chesterfield, VA 23832-0040
Phone: (804) 748-1211 – Fax: (804) 717-6297 – Internet: chesterfield.gov

CLAY BOWLES
Deputy County Administrator

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP), Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support - Metropolitan Washington Council of Governments' Application for U.S. EPA Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Chesterfield County, I am writing to express support for the application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in the Virginia to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities and increased resilience.

Chesterfield County has a long history of advancing environmental sustainability programs and initiatives for municipal facilities, all with goal of reducing GHG emissions. This grant would allow us to accelerate those initiatives as well as continue to advocate for similar strategies withing other commercial buildings sectors in Virginia. Further, this grant would allow us to further benefit low-income/disadvantaged communities in Central Virginia.

We understand that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to realize the vision of this new program. While the coalition applicants will take on the majority of the work, as called upon, we will work to impact the pipeline of viable commercial buildings projects in support of program goals, identify and implement municipal building projects, provide information about the program throughout the community to expand its reach and recruit additional partners and stakeholders.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Clay Bowles
Deputy County Administrator
bowlesc@chesterfield.gov | 804-543-2779

CITY OF RICHMOND
SUSTAINABILITY OFFICE

03/29/2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the City of Richmond, I am writing to express my strong support for the *Virginia Initiative for Building Efficiency* (VIBE) coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virginia to set the stage to substantially transform the commercial buildings sector and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

The City of Richmond has outlined its commitment towards advancing climate-equity and climate-resilience goals in the RVAgreen2050 Climate Equity Action Plan. This includes a focus our frontline communities— primarily communities of color that have been historically disadvantaged and underrepresented – and working with community-based organizations to ensure that the needs and voices of residents are represented and prioritized. As part of the plan, the City is working on a number of priorities for vulnerable neighborhoods, including clean and equitable transit, restoring urban tree canopy, improving flood resilience, and reducing residential energy burden.

Currently, Richmond's greenhouse gas emissions from commercial energy equate to 34%. Based on modeling conducted by Greenlink Analytics, the greatest opportunity for greenhouse gas emission reductions across the community is through energy efficiency gains in commercial buildings. Strategy *BE 2.2* (Buildings and Energy) of our Climate Equity Action Plan outlines the necessary actions and centers equity by prioritizing assistance and technical expertise to those businesses that are financially challenged while promoting workforce development in the field of clean energy. The proposed *Virginia Initiative for Building Efficiency* aligns with the City's commercial building energy efficiency

goals and provides an opportunity to lower emissions generated from building usage and improve air quality in Richmond.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, the City of Richmond will offer support as needed. We will provide connections and insights to support building the pipeline of viable commercial buildings projects, work to identify and implement projects for municipal buildings and schools, provide information about the program to the community to expand its reach, and identify potential community-based organizational partners. This collective work will accelerate the equitable transition towards greater energy efficiency.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,

Laura Thomas

Laura Thomas
Director of Sustainability
City of Richmond, VA
730 E. Broad St. | 8th Floor
Richmond, VA 23219
804-432-5931
RVA.gov/Sustainability

313 E. Broad Street, Suite 226
Richmond, VA 23219

March 25, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the Virginia Energy Efficiency Council (VAEEC), I am writing to express my strong support for the Virginia Initiative for Building Efficiency (VIBE) coalition application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in Virigina to set the stage to substantially transform the commercial buildings sector and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

Founded in 2012, the Virginia Energy Efficiency Council is a 501c3 organization headquartered in Richmond, whose goal is to facilitate discussions and share resources to advance energy efficiency throughout the Commonwealth. We engage our members to identify barriers to and opportunities for energy efficiency advancement, and to develop a strong, fact-based, and balanced industry voice before local, state, and national policymakers and regulators. Our diverse group of roughly 100 members includes Fortune 500 companies, nonprofits, local governments, state agencies, and more, whose vision is for energy efficiency to be an integral part of Virginia's economy and clean energy future.

The VAEEC has worked over the past two years with members and community partners to launch the Energy Efficiency Workforce Initiative (EEWI) pilot program in Hampton Roads. This initiative is intended to be a holistic workforce pipeline, braiding existing entities and funding streams to take HVAC and weatherization recruits from onboarding through class room and on-the-job training through to placement and retention. Partnerships and communication are critical to the short-and-long term success of this program, and the VIBE program will offer addition resources to not only bolster outreach efforts, but also potentially scale beyond the region.

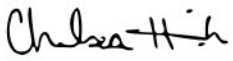
While the VIBE program is focused on commercial buildings, much of the low-income housing stock in the identified Metropolitan Statistical Areas (MSA) are multifamily buildings that are in need of weatherization and energy services. Training additional weatherization providers will help ensure these residences can take advantage of a number of programs to reduce energy burden – Dominion Energy's Low-Income Housing programs, the Home Electrification and Appliance Rebates, Home Energy Tax Credits, the Low-Income Housing Tax Credit, and more. Single family residences are heavily incentivized to make energy efficiency upgrades through some of these IRA funded programs, but multifamily residents and property owners encounter many more significant barriers to making improvements to the building.

VIBE would offer the funding and technical assistance to help business owners, contractors, property owners, and residents navigate the different programs and options available to maximize energy savings, whereas the VAEEC can serve as a partner and conduit to connect multifamily residents with job training and placement opportunities. We can also utilize our member network and industry expertise to make the necessary connections between funding opportunities, stakeholders, and providers.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on the majority of the work, our expertise and broad membership network uniquely position us to further the VIBE program through outreach and messaging across the state. We are a recognized and respected industry voice and can use that to connect the subgrantees and advisory board members with the voices and resources that can help the program succeed.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

Sincerely,



Chelsea Harnish
Executive Director
chelsea@vaeec.org

viridiant

March 20, 2024

Jeffrey King, Director, Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Subject: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of Viridiant, a 501c3 non-profit based in Richmond, VA, I offer my strongest support for the VA MSA Commercial Buildings Accelerator Program application led by the Metropolitan Washington Council of Governments (COG) and including coalition members PlanRVA and the Hampton Roads Planning District Commission (HRPDC).

This application, if successful, will bring together Virginia's three largest metropolitan statistical areas to substantially transform our commercial buildings sector and bring benefits to low-income disadvantaged communities and the entire Commonwealth through improved air quality, reduced energy burden, job opportunities, and increased resilience.

Since 2006, Viridiant has advanced sustainable construction in Virginia and nearby states by providing building science expertise via certification services, consulting, and industry education. We have advised a diverse range of commercial building clients on all manner of energy efficiency, renewables, advanced controls, and other technologies and practices to reduce energy costs and climate impact.

The bulk of our work is in low-income housing, and it is primarily via the affordable housing movement that we serve and engage low-income and disadvantaged communities. But we also advocate widely for improved energy efficiency initiatives from utilities and state/local governments, and we have supported green jobs initiatives focused on disadvantaged communities with entities such as the City of Richmond. This work has provided us with an extensive network of builders, trades, real estate development professionals, clean energy advocates, and state/local government officials. We stand ready to leverage this network and our technical expertise to help COG, PlanRVA, and HRPDC recruit projects and partners, thereby maximizing the program's climate and community benefits.

We look forward to the benefits that this Climate Pollution Reduction Grant could bring to Virginia and reiterate our strong support for this coalition's application.

Sincerely,

Andrew Grigsby
Energy Services Director
804-773-3200 / andrew.grigsby@viridiant.org

City of Petersburg

Office of the City Manager
135 North Union Street
Petersburg, Virginia 23803

(804) 733-2301
Fax 732-9212
TDD 733-8003

March 29, 2024

Jeffrey King, Director
Climate, Energy, and Air Programs
Department of Environmental Program (DEP)
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

RE: Letter of Support for the Metropolitan Washington Council of Governments' application for the U.S. Environmental Protection Agency Climate Pollution Reduction Grant, Funding Opportunity EPA-R-OAR-CPRGI-23-07

Dear Mr. King:

On behalf of the City of Petersburg, I am writing to express our support for this application led by the Metropolitan Washington Council of Governments (COG) with coalition members PlanRVA and Hampton Roads Planning District Commission.

This application, if successful, will bring together the three largest metropolitan statistical areas in the Virigina to set the stage to substantially transform the commercial buildings sector in Virginia and bring benefits to low-income disadvantaged communities and Commonwealth residents through improved air quality, reduced energy burden, job opportunities, and increased resilience.

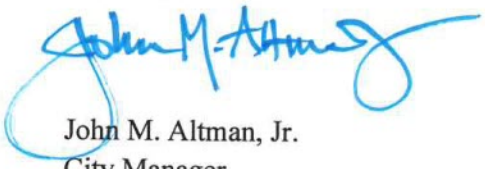
The City of Petersburg seeks to support and encourage commercial, municipal facilities, and multifamily development and looks to improve energy efficiency to lower costs and greenhouse gas emissions per the Petersburg Next, the draft 2044 Comprehensive Plan, which is anticipated for adoption in May 2024. As a disadvantaged community, we hope to make available equitable access to healthier environments and the associated cost savings.

We know that strong community partnerships and networks are critical elements of this program and through this letter of support we are also affirming that we are committed to working with COG, PlanRVA, and Hampton Roads Planning District Commission to successfully realize the vision of this new program. While the coalition applicants will take on most of the work, as called upon, we will provide information about the program throughout the community to expand its reach and assist how we can.

We look forward to the benefits that the Climate Pollution Reduction Program application could bring to commercial buildings in the most populous areas in Virginia and want to reiterate our strong support for this coalition application.

If you have any questions, please do not hesitate to contact me at (804) 733-2301 or maltman@petersburg-va.org.

Sincerely,



John M. Altman, Jr.
City Manager

Metropolitan Washington
Council of Governments



Qualifications Highlights

- 34 years of experience leading climate mitigation programs
- Effective project manager for air, energy, and climate programs

Education

- BS Natural Resources, Cornell University, 1990

Certifications and Trainings

- Certified Public Manager, George Washington University, Center for Excellence in Public Leadership, 2010

Mr. King will serve as the Program Manager for the project. He has more than 34 years of experience leading successful efforts to address environmental pollution.

JEFF KING
Director, Climate, Energy, and Air Programs

RELEVANT EXPERIENCE

Experienced environmental program manager with proven track record managing programs and projects to reduce emissions of air pollutants and greenhouse gases. Managed more than $50 million in environmental projects. Mentor host for the DC SEU Workforce Development Program. Member of the US DOE Better Buildings Residential Efficiency Network.

PROJECT EXPERIENCE

Climate Pollution Reduction Grant (CPRG) Priority and Comprehensive Climate Action Plans (PCAP/CCAP), District Department of Energy and Environment, U.S. Environmental Protection Agency, Washington, DC/MD/VA/WV MSA. 2023-2024

Project Manager. Manage all staff and contractors to handle all aspects of the CPRG planning process, including steering and technical committees, community engagement, development of strategies and actions, and preparation of the climate action plans. Submitted the PCAP on March 1, 2024.

Climate Energy and Environment Policy Committee (CEEPC), Metropolitan Washington, 2009-2024

Director, Climate, Energy and Air Programs.
Served as Director of staff responsible for managing COG's Climate Energy and Environment Policy Committee (CEEPC) with funding from the Regional Environment Fund (REF). Establish emission reduction goals, develop climate and energy action plans, support program and project implementation regionwide.

Metropolitan Washington Air Quality Committee (MWAQC), Metropolitan Washington, 2009-2024

Director, Climate, Energy and Air Programs.
Served as Director of staff responsible for managing the region's Metropolitan Washington Air Quality Committee (MWAQC). Manage all aspects of the MWAQC policy and technical committees. Develop State Implementation Plans (SIPs) for the DC/MD/VA ozone and fine particulate nonattainment area. Handle daily air quality forecasting and reporting. Issue air quality alerts. Support implementation of local voluntary measures as well as federally enforceable state measures. Track and report on progress on pollutant concentrations and exceedance days. Developing air quality environmental justice plans for the region.

Diesel Emission Reduction Act (DERA) Projects, U.S. Environmental Protection Agency, Washington, DC, 2010-Present
Project Manager. Manage all aspects of partnerships with eligible equipment owners and competitive procurement process for purchasing emission reduction technologies for installation in equipment, document engine destruction, conduct project reporting. Replaced legacy high-polluting diesel equipment with new clean Tier 4 engines or Diesel Particulate Filters (DPFs) in locomotives, passenger vessels, and construction equipment.

Rooftop Solar Challenge and Solar Market Pathways Grants, U.S. Department of Energy (DOE), Metropolitan Washington, 2013-2017
Subcontractor. Managed team supporting development of a Solar Roadmap for metropolitan Washington to encourage local governments to implement best practices for achieving enhanced solar markets. Helped develop the Statewide Solar Strategy for the Commonwealth of Virginia.

Global Covenant of Mayor's (GCoM) Metro-Scale Climate Leaders, European Commission/GCoM, Metropolitan Washington, 2019-2020
Grant Recipient. With support from the European Commission through the Global Covenant of Mayor's, COG participated in the GCoM Metro-scale Climate Leaders program along with the Kansas City, Chicago, Denver and St. Paul Minnesota metropolitan areas. Developed a GCoM-compliant 2030 climate and energy action plan, including an adopted goal of 50 percent reduction of emissions by 2030.

Consultant Support for Local Climate Mitigation and Resilience Planning and Implementation, COG member governments, Metropolitan Washington, 2017-2024
Partner. Manage a program to provide on-call consulting services to COG member governments to assist in development of local climate and energy action plans and for implementation support. Supported more than eight localities develop and implement climate action and electric vehicle deployment plans.

Military Installation Resilience Review (MIRR), Department of Defense Office of Local Defense Community Cooperation, Washington DC, 2020-2022
Lead Contractor. Managed a Military Installation Resilience Review (MIRR) project for the Washington Navy Yard, Naval Research Laboratory, Joint Base Anacostia Bolling, and Joint Base Myers/Fort McNair.

Ozone Depleting Substance (ODS) and High Global Warming Potential Gas (GWP), U.S. EPA, World Bank, United Nations, European Commission, European Bank for Reconstruction and Development, Washington DC, the Caribbean, Central/South America, Russia. 1990-2004
ICF Consultant. Handled projects in support of the phase out of ozone depleting substances and mitigation of emissions of high-GWP gases. Supported both regulatory and non-regulatory efforts to mitigate emission through adoption of substitutes, as well as recovery, reuse, and destruction.

SELECT PUBLICATIONS AND PRESENTATIONS

Priority Climate Action Plan (PCAP) for the Washington, DC/MD/VA/WV Metropolitan Statistical Area (MSA). Metropolitan Washington Council of Governments (COG), March 2024.

2030 Climate and Energy Action Plan. Metropolitan Washington Council of Governments (COG), COG Climate, Energy and Environment Policy Committee (CEEPC), November 2020.

National Capital Region: Climate Change Report and Recommendations. Metropolitan Washington Council of Governments (COG) for the Climate Change Steering Committee of the COG Board of Directors, November 2008.

State Implementation Plan for the Washington, DC-MD-VA PM2.5 Nonattainment Area, Metropolitan Washington Council of Governments (COG) for Maryland, the District of Columbia, and the Commonwealth of Virginia, April 2008.

State Implementation Plan for the Washington, DC-MD-VA 8-hour Ozone Nonattainment Area, Metropolitan Washington Council of Governments (COG) for Maryland, the District of Columbia, and the Commonwealth of Virginia, May, 2007.

Voluntary Program Guidance: Incorporating Energy Efficiency and Renewable Energy into Air Quality Plans (SIPs). Presented to the Metropolitan Washington Air Quality Committee (MWAQC), 2005.

U.S. Emissions and Reduction Opportunities for High Global Warming Potential Gases. Prepared for the U.S. Environmental Protection Agency. ICF Consulting. 2001. http://www.epa.gov/highgwp/projections.html

Global Mitigation of Non-CO_2 Gases. Prepared for the U.S. Environmental Protection Agency. ICF Consulting. 2006. http://www.epa.gov/nonco2/econ-inv/international.html

Baseline CO_2 Study for Buryatia Energy, Ulan Ude, Russia. Prepared for European Bank for Reconstruction and Development (EBRD) and Linden Consulting, London, UK. ICF Consulting. 2001.

Regulatory Impact Analysis (RIA) of EPA's Proposed Requirements for Leak Detection and Repair, and Recovery and Recycling of Refrigerant Gases from Commercial and Industrial Building Chillers. Prepared for the U.S. EPA. ICF Consulting. 1998.

Global Supply and Demand of Ozone Depleting Substances. Prepared for the European Commission. ICF Consulting. 2001.

AWARDS

Albert Einstein Award, 1986

White House Climate Action Champion, 2014-2016

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Principal Planner, Director, 2004-2024

ICF Consulting. Senior Associate, Project Manager, Consultant. 1990-2004

Cornell University, Agricultural Engineering Soil and Water Laboratory, 1986-1988

Metropolitan Washington
Council of Governments



Qualifications Highlights

- Over a decade of experience in executive leadership roles overseeing strategic planning, budget management, and team development.
- Proven track record of delivering impactful results in clean energy initiatives, economic development, and complex policy landscapes spanning more than 15 years.

Education

- MPP, George Washington University, 2005
- BA, Yale University, 2002

Acting Executive Director with a background in taking on instrumental policy issues and producing results through building out and supporting talented and diverse teams.

CLARK MERCER
Executive Director
Metropolitan Washington Council of Governments

RELEVANT EXPERIENCE

Dynamic leader with a proven track record of navigating complex policy landscapes and delivering impactful results. Extensive experience in executive leadership roles and demonstrated expertise in strategic planning, budget management, and fostering diverse and inclusive teams. Proven leadership skills in advancing clean energy initiatives, economic development, and innovative solutions to address societal challenges in the metropolitan Washington region.

ROLE EXPERIENCE

Metropolitan Washington Council of Governments (COG), Washington, DC, 01/2023–Present
Executive Director. As the acting director at COG, Mr. Mercer manages a staff of 130 and a budget exceeding $50M. Responsibilities include active collaboration with 300 elected officials from 24 local governments, state legislatures, and Congress to advance transit, public safety, affordable housing, clean energy, and environmental initiatives.

Office of the Governor, Commonwealth of Virginia, 2017–2022
Chief of Staff. Mr. Mercer previously Coordinated the development and implementation of the $145B+ biennial state budget as Chief of Staff for the Office of the Governor, Commonwealth of Virginia. He successfully managed diverse teams, facilitated economic development projects, and played a pivotal role in passing the Virginia Clean Economy Act and securing investments in clean energy and transportation infrastructure.

Office of the Lieutenant Governor, Commonwealth of Virginia, 2013–2017
Chief of Staff. As Chief of Staff for the Office of the Lieutenant Governor, Mr. Mercer managed all staff and day-to-day operations, overseeing policy development, communications, social media, office budgeting, and legislative outreach. He also played a pivotal role in preparing the Lieutenant Governor to lead key initiatives such as chairing the Governor's Mental Health Task Force and spearheading early childhood education through the Children's Cabinet. Additionally, he served as the Lieutenant Governor's representative on critical state entities including the Virginia Economic Development Partnership, Virginia Tourism Authority, and the Fort Monroe Authority.

Metropolitan Washington
Council of Governments

PROJECT EXPERIENCE

Virginia Clean Economy Act, Commonwealth of Virginia, 2020
Chief of Staff. Played a leading role in working with the legislature to pass the Virginia Clean Economy Act, which puts Virginia on a path to be carbon neutral by 2050. Served as the Administration's point person for offshore wind efforts, which resulted in the largest offshore wind farm now being built off Hampton Roads, and Siemens Gamesa. This work included coordinating with several other states, including Washington D.C. and Maryland, and Virginia hosting a marquee international wind conference.

Economic Development and Infrastructure Initiatives, Commonwealth of Virginia, 2017–2022
Chief of Staff. Successfully led transformative economic development and infrastructure initiatives that significantly impacted the region. Notably, he spearheaded a monumental rail funding and metro funding project, approving a nearly $4 billion deal with Virginia and CSX. This initiative is set to upgrade rail infrastructure across the state and eastern seaboard, including the construction of a new Long Bridge across the Potomac River. Collaboration with state legislators, Congressional representatives, and counterparts in Washington D.C. and Maryland was instrumental in securing crucial funding for essential transportation projects, ensuring enhanced connectivity and economic growth for the region.

PROFESSIONAL AFFILIATIONS

Habitat for Humanity. Board Member. 2022-Present
Sports Backers. Board member. 2022-Present
Ashland Theatre Foundation, President, 2014-Present

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Executive Director, 2023-Present
Fall Line Consulting, President, 2022-Present
Office of the Governor, Commonwealth of Virginia, Chief of Staff, 2017-2022
Office of the Lieutenant Governor, Commonwealth of Virginia, Chief of Staff, 2013-2017
Democratic Party of Virginia, Political Director, 2012-2013
Commission on Wartime Contracting, Professional Staff & Congressional Outreach, 2009-2011
Mark Warner for United States Senate, Research and Policy Deputy Director, 2007-2009
LMI Government Consulting, Research Fellow, 2005-2007

Metropolitan Washington
Council of Governments



Qualifications Highlights

- Over 30 years of experience in transportation engineering, land use, air quality, and climate change planning.
- Comprehensive expertise in regional strategic planning, public administration, and policy implementation.

Education

- MS, Transportation Engineering, University of Maryland, 1992
- BS, Civil Engineering, Bangalore University, 1985

Acting Deputy Executive Director for Regional Planning with extensive technical and management expertise in multi-sectoral and multi-modal planning programs.

KANATHUR SRIKANTH
Deputy Executive Director
Regional Planning

RELEVANT EXPERIENCE

Accomplished environmental program manager adept at overseeing initiatives and projects aimed at mitigating air pollutants and greenhouse gas emissions, with a demonstrated ability to develop innovative solutions and foster stakeholder engagement for impactful environmental outcomes.

ROLE EXPERIENCE

Metropolitan Washington Council of Governments (COG), Washington, DC, 2014–Present
Deputy Executive Director for Regional Planning. Mr. Srikanth has played a pivotal role at Metropolitan Washington Council of Governments (MWCOG) as the Deputy Executive Director for Regional Planning since 2019 acting as an instrumental leader in managing multi-sectoral and multi-modal regional planning efforts, integrating transportation engineering, land use, air quality, and climate change planning to achieve strategic policy outcomes.

Key contributions include:

- Leading the development and implementation of the National Capital Region's Long-Range Transportation Plans from 2014 to 2022, focusing on multi-modal transportation solutions and sustainability.
- Steering the creation of the Bicycle and Pedestrian Plan for the National Capitol Region in 2022, promoting active transportation and reducing carbon emissions.
- Assisting in the creation of the Climate Change Mitigation Report in 2021, outlining strategies to reduce greenhouse gas emissions and enhance resilience to climate impacts.

Metropolitan Washington Council of Governments (COG), Washington, DC, 2014–2019
Director of Transportation Planning Department. As the previous Director of the Transportation planning Department at COG; his responsibilities included aspects of land use (planning and zoning) assumptions, and regional demographic trends and forecasting. His work activities were also informed by and coordinated with regional State Implementation Plans to comply with National Ambient Air Quality Standards for criteria pollutants (enunciated by the US EPA) and Climate Change

mitigation and adaption activities. Mr. Srikanth played a pivotal role in:

- Orchestrating the Regional Freight Plan in 2016 to optimize freight movement while minimizing environmental impact.
- Coordinating with federal, state, and local agencies to ensure alignment with State Implementation Plans for air quality and climate standards, fostering a collaborative approach to environmental stewardship in the region.

SELECTED PUBLICATIONS

Long Range Transportation Plans, National Capital Region Transportation Planning Board, 2014 – 2022.
Bicycle and Pedestrian Plan for the National Capital Region, National Capital Region Transportation Planning Board, 2022.
Climate Change Mitigation Report, National Capital Region Transportation Planning Board, 2021.
Long Range Plan Task Force Report, National Capital Region Transportation Planning Board, 2017.
Regional Freight Plan, National Capital Region Transportation Planning Board, 2016.

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Executive Director, 2019-Present
Metropolitan Washington Council of Governments, Director of Transportation Planning Department, 2014-2019
Virginia Department of Transportation, Director of Transportation Planning, 2011-2014
Virginia Department of Transportation, Regional Transportation and Air Quality Planning Liaison, 2005-2011
Virginia Department of Transportation, Transportation Engineer, 1994-2005
JHK AND ASSOCIATES, Transportation Engineer, 1990-1994

Metropolitan Washington
Council of Governments



Qualifications Highlights

- 19 years of experience leading climate mitigation, resilience, sustainability, and water programs
- Effective project manager for climate, energy, air, and water programs

Education

- MS City and Regional Planning, Georgia Institute of Technology, 2006
- BS University of Maryland, Eastern Shore (UMES), 2003

Certifications and Trainings

- Environmental Planning and Geographical Information Systems (GIS), Georgia Institute of Technology, 2006

Ms. Davis will serve as program support for the project. She has more than 19-years of experience leading successful efforts to address environmental pollution.

MAIA A. DAVIS
Senior Environmental Planner
Climate, Energy, and Air Programs

RELEVANT EXPERIENCE

Experienced environmental program manager with proven track record managing programs and projects to address emissions of greenhouse gases, climate resilience, sustainability, and water supply.

PROJECT EXPERIENCE

Climate Pollution Reduction Grant (CPRG) Priority and Comprehensive Climate Action Plans (PCAP/CCAP), District Department of Energy and Environment, U.S. Environmental Protection Agency, Washington, DC/MD/VA/WV MSA. 2023-2024
Project Coordinator. Lead developer of Metropolitan Washington Council of Governments' (COG) grant application to the District Department of Energy and Environment to secure management of the MSA CPRG plans. Development of procurement documents to secure contractor's support for PCAP. Project advisor. Submitted the PCAP on March 1, 2024.

Climate Energy and Environment Policy Committee (CEEPC), Metropolitan Washington, 2010-2024
Climate Planning Lead. Lead staff for COG Climate Energy and Environment Policy Committee (CEEPC) establishing, tracking, and implementing emission reduction goals and climate and energy action plans. Lead the development of more than 100 greenhouse gas inventories. Secured, managed, and provided technical support on more than $1.8 million grants and technical assistance for climate mitigation and resilience planning, clean energy infrastructure feasibility assessments, electric vehicle planning, training local officials, and more. Provided management support on more than $2 million in contracts for local climate, energy, and sustainability planning and implementation for ten local jurisdictions.

Global Covenant of Mayors (GCoM) U.S. Metro Scale Climate Leader, Metropolitan Washington, 2019-2021
Project Manager. Led the application for Metropolitan Washington to be designated as a U.S. Metro Scale Climate Leader by GCoM in 2019. Coordinated with GCoM to advance metro-scale climate planning in the U.S. Develop the Metropolitan Washington 2030 Climate and Energy Plan that

was designated as fully compliant with the global standards of best practices for climate planning in 2021.

Environmental Justice Toolkit, Metropolitan Washington, 2016-2017
Project Manager. Led staff for the Air and Climate Public Advisory Committee (ACPAC) that established equity and environmental justice as a priority. Coordinated with ACPAC and engaged with environmental justice advocates and experts from across the region to guide the development of an Environmental Justice Toolkit and educate local and state officials. The Toolkit provides guidance to policymakers on incorporating social equity, cultural sensitivity, and community health considerations into air quality, climate, and energy planning.

White House Climate Action Champion, Metropolitan Washington, 2014-2016
Project Manager. Led the application for Metropolitan Washington to be designated as a White House Climate Action Champion. This designation made COG and its members eligible for enhanced technical assistance and grant funding that supported the region's work in electric vehicle and infrastructure deployment and clean energy feasibility assessments that included district energy, combined heat and power, geothermal, and solar. This work directly contributed to the Falls Church schools campus development of a net zero energy high school.

Green Communities Program, Atlanta Regional Commission, 2007-2010
Program Manager. Developed and managed one of the first regional green local government certification programs in the country. Provided policy and implementation support that resulted in comprehensive implementation of sustainability practices and certification of nine local governments in the first year of the program.

Regional Water Supply and Conservation Management Plan, Atlanta Regional Commission, 2005-2010
Program Manager. Managed development and implementation of the Regional Water Supply and Conservation Management Plan. Data analytics and monitoring informed dam releases, water restrictions, infrastructure needs, and water conservation programs. Developed, managed, and supported implementation of conservation initiatives that conserved more than 2 million gallons of water per day.

SELECT PUBLICATIONS AND PRESENTATIONS

Priority Climate Action Plan (PCAP) for the Washington, DC/MD/VA/WV Metropolitan Statistical Area (MSA). Metropolitan Washington Council of Governments, March 2024. https://www.mwcog.org/documents/2024/03/01/priority-climate-action-plan/

Community-Wide Greenhouse Gas Emissions Inventory Summaries, Metropolitan Washington Council of Governments, December 2022. https://www.mwcog.org/documents/2022/12/27/community-wide-greenhouse-gas-emissions-inventory-summaries-featured-publications-greenhouse-gas/

Greenhouse Gas Emissions Inventories Methodology Guide, Metropolitan Washington Council of Governments, December 2022. https://www.mwcog.org/documents/2022/12/09/greenhouse-gas-emissions-inventories-methodology-guide-climate--energy-greenhouse-gas/

2030 Climate and Energy Action Plan. Metropolitan Washington Council of Governments, Climate, Energy and Environment Policy Committee (CEEPC), November 2020. https://www.mwcog.org/documents/2020/11/18/metropolitan-washington-2030-climate-and-energy-action-plan/

Regional Climate and Energy Action Plans and Resource Guide, Metropolitan Washington Council of Governments, Climate, Energy and Environment Policy Committee (CEEPC). 2013-2020. https://www.mwcog.org/documents/2017/03/23/regional-climate-and-energy-action-plans-2010---2020-climate--energy-climate-change-energy/

Environmental Justice Toolkit, Metropolitan Washington Council of Governments (COG), COG Air and Climate Advisory Committee (ACPAC). July 2017. https://www.mwcog.org/documents/2017/07/27/environmental-justice-toolkit/

Climate Action Champions Solar Case Study, Metropolitan Washington Council of Governments. March 2016. https://www.mwcog.org/documents/2016/3/2/climate-action-champion-solar-case-study/

Annual Regional Climate and Energy Progress Reports, Metropolitan Washington Council of Governments. 2010-2015. https://www.mwcog.org/documents/2015/12/01/annual-climate-and-energy-progress-report-climate--energy-climate-change-energy/

Gold Book: State & Local Government Initiatives to Clean the Air, Metropolitan Washington Council of Governments. October 2014. https://www.mwcog.org/documents/2014/10/02/gold-book-state-and-local-government-initiatives-to-clean-the-air-air-quality/

Summary of Potential Climate Change Impacts, Vulnerabilities, and Adaptation Strategies in the Metropolitan Washington Region, Metropolitan Washington Council of Governments. July 2013. https://www.mwcog.org/documents/2013/07/01/summary-of-potential-climate-change-impacts-vulnerabilities-and-adaptation-strategies-climate-change/

Electric Vehicles in Metropolitan Washington; Understanding the Region's Current EV Readiness and Options for Expanding Their Use, Metropolitan Washington Council of Governments. October 2012. https://www.mwcog.org/documents/2012/10/17/electric-vehicles-in-metropolitan-washington-clean-fuel-vehicles-electric-vehicles/

Green Communities Program Manual and Outreach Materials, Atlanta Regional Commission. 2008 – 2010. https://atlantaregional.org/natural-resources/sustainability/green-communities-program/

Water Supply & Water Conservation Management Plan, Metropolitan North Georgia Water Planning District. 2009. https://northgeorgiawater.org/

AWARDS

Global Covenant of Mayors U.S. Metro-Scale Climate Leader, 2019
White House Climate Action Champion for Metropolitan Washington Region, 2014
Georgia Planning Association Outstanding Initiative Award for ARC Green Communities Program, 2009
All-American Collegiate Scholar's List, 2003, 2004
National Dean's List, 2002, 2003, 2004

UMES Honors Cum Laude Graduate, 2003
UMES Honors Convocation Honoree, 2002, 2003
NCAA Student-Athlete Academic Award, 2002, 2003

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Senior Environmental Planner, 2010-2024
Atlanta Regional Commission, Principal Environmental Planner, 2005-2010
National Aeronautics Space Administration (NASA), Research Assistant, 2003

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Qualifications Highlights

- Over 20 years of experience in regional environmental planning initiatives.
- Demonstrated success leading energy planning efforts and managing public input on regional climate and air quality planning.

Education

- MS, Nutrition and Integrative Health, Maryland University of Integrative Health, 2019
- BS, Architectural Engineering, North Carolina A&T State University, 1994

Seasoned Environmental Planner with vast experience leading regional energy, environmental justice, and planning initiatives.

LEAH BOGGS
Senior Environmental Planner
Climate and Energy Team

RELEVANT EXPERIENCE

Skilled Senior Environmental Planner with more than two decades of experience leading energy planning initiatives, including building efficiency and alternative fuel vehicles. Experience managing public input for regional climate and air quality planning and developing tools to promote environmental justice and sustainability in the region.

ROLE EXPERIENCE

Metropolitan Washington Council of Governments (COG), Washington, DC, 1999–Present
Senior Environmental Planner. As a Senior Environmental Planner, Ms. Boggs actively leads energy planning efforts, manages public input for regional climate and air quality planning, oversees the development of equity focused resources, and supports regional electric vehicle deployment planning. She has a proven track-record of collaborating with government agencies and community stakeholders to promote clean energy, integrate environmental justice projects, and advance sustainability initiatives throughout the region.

Ms. Boggs has played a pivotal role in shaping energy planning initiatives and advocating for environmental justice initiatives. Through managing public input and advisory processes for regional climate and air quality planning, Ms. Boggs is currently leading the update of the 2017 Environmental Justice Toolkit, which helps address equity concerns in environmental decision-making. Her technical expertise extends to regional electric vehicle deployment planning, where she provides valuable insights to support COG's efforts in promoting cleaner transportation options. Ongoing contributions have facilitated the development of regional policies, strategies, and actions aimed at improving energy productivity and reducing greenhouse gas emissions.

PROJECT EXPERIENCE

Built Environment and Energy Advisory Committee (BEEAC), Metropolitan Washington, 2011-Present
Lead Staff. As the energy planning lead for BEEAC – a technical advisory committee to the Climate, Energy and Environment Policy Committee (CEEPC) – Ms. Boggs supports integral capacity building for COG member governments through

facilitating trainings, educational sessions, and series planning focused on the transition to clean energy, building decarbonization, and energy and climate justice.

Air and Climate Public Advisory Committee (ACPAC), Metropolitan Washington Council of Governments, Washington, DC, 2020–Present
Lead Staff. Lead planner to promote and support committee initiatives, including the annual Climate and Energy Awards Program and Environmental Justice Toolkit. Responsibilities include facilitating engagement efforts, recruiting new members, and organizing bi-monthly committee calls. This involvement contributes to ACPAC's mission of advising on air quality, climate, and energy issues to policy committees of the Metropolitan Washington Council of Governments (COG), ensuring meaningful input from diverse community interests and opinions.

Building Codes Training, 2013 - 2021
Program Manager. Managed regional participation in the International Code Council's Public Comment Hearing voting processes on the 2015, 2018, and 2021 International Energy Conservation Codes. Partnered with the Energy Efficient Codes Coalition to develop training sessions for designated Governmental Member Voting Representatives for government staff in the region.

Fleets for the Future, U.S. Department of Energy Awarded Project, 2016-2018
Program Manager. Managed all aspects of the Metropolitan Washington-Baltimore Region's efforts to develop cooperative procurement contract opportunities for local and state governments and schools interested in purchasing clean fuel vehicles and infrastructure installment in their fleets.

Metropolitan Washington Alternative Fuels Clean Cities Partnership and Electric Vehicle Task Force, 2000-2015
Support and Lead Staff. Managed the nationally recognized U.S. Department of Energy's Clean Cities Coalition for the metropolitan Washington region which advanced the region's interests and deployment of clean fuel vehicles and supporting infrastructure including compressed natural gas, propane, ethanol, biodiesel and electric vehicles. As the lead program staff of the Electric Vehicle Task Force, staff was responsible for supporting EV-readiness in the region by providing a reliable framework for multi-stakeholder engagement and the development of new strategies to increase electric vehicle deployment.

SELECTED PUBLICATIONS

Electric Vehicles in Metropolitan Washington; Understanding the Region's Current EV Readiness and Options for Expanding Their Use, 2012

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Senior Environmental Planner, 1999-Present

Metropolitan Washington
Council of Governments



ERIN MORROW
Transportation Engineer
Department of Transportation Planning

Qualifications Highlights

- 15 years of experience in climate change mitigation in the transportation sector
- Led technical analysis for key regional transportation studies

Education

- Regional Executive Development Program, George Washington University, 2015
- MS, Civil Engineering, University of Maryland, 2015
- BS, Mechanical Engineering, Carnegie Mellon University, 2000

Skilled Transportation Engineer with proven success in executing regional studies and performing technical analysis to produce climate mitigation solutions within the on-road transportation sector.

RELEVANT EXPERIENCE

Experienced and results-oriented Transportation Engineer with a robust background in conducting detailed technical analyses and implementing effective climate mitigation strategies within the transportation sector. Demonstrated leadership and management skills in overseeing complex studies and initiatives that have made a significant impact on the metropolitan Washington Region's transportation landscape.

ROLE EXPERIENCE

Metropolitan Washington Council of Governments (COG), Washington, DC, 2014–Present
Transportation Engineer. As a Transportation Engineer at COG, Ms. Morrow contributes vast analysis on the Model Application Group to Travel Forecasting and Emissions Analysis Team. Ongoing responsibilities include staying current on planning assumptions related to transportation and climate change mitigation and assessing potential greenhouse gas emissions impacts of proposed national, state, and local initiatives.

AECOM, Dallas, TX, 2001-2006
Consultant. Responsibilities centered around the preparation of travel demand forecasts for FTA New Starts projects including transit network coding, model calibration and validation, model development (specifically the incorporation of fringe parking within an existing mode choice model), and preparation of New Starts templates and user benefit maps.

PROJECT EXPERIENCE

Regional Electric Vehicle Infrastructure Implementation (REVII) Strategy, Metropolitan Washington Council of Governments (COG), Washington, DC, 2022-2023
Played a crucial role in facilitating the development of the Regional Electric Vehicle Infrastructure Implementation (REVII) Strategy, which supports state and local governments in prioritizing locations for EV infrastructure deployment. The strategy included key deliverables such as electric vehicle projections for various scenarios, GIS mapping for local jurisdiction staff, public-facing GIS mapping linked to COG's EV Clearinghouse, and a comprehensive report outlining the regional EV deployment implementation strategy with county-level insights on projections, areas of interest, challenges, opportunities, and equity considerations.

SELECTED PUBLICATIONS

Visualize 2045: A Long-Range Transportation Plan for the National Capital Region. 2022

TPB Climate Change Mitigation Study of 2021: Phase 1 Report: Greenhouse Gas Emissions Reductions Strategies: Findings from Past Studies. 2021.

Greenhouse Gas Emissions Inventories: Methodology Guide. 2019.

Morrow, E.M., J. Park, E. Randall, D. Sivasailam, and D.H. Son. Linking Transportation and Land Use Goals Through Scenario Planning: Case Study of the Metropolitan Washington Region. In Transportation Research Record No. 2397, Transportation Research Board of the National Academies, Washington, D.C., 2014, pp. 22-29.

Bansal, M., and E. Morrow. Meeting Transportation Goals to Reduce Greenhouse Gases in the National Capital Region: "What Would it Take?" Scenario. In Transportation Research Record No. 2252, Transportation Research Board of the National Academies, Washington, D.C., 2012, pp. 135-143.

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Senior Transportation Manager, 2006-Present

AECOM, Consultant, 2001-2006

Metropolitan Washington
Council of Governments



Robert Christopher
Environmental Planner
Climate and Energy Team

RELEVANT EXPERIENCE

Skilled environmental planner with expertise in tracking regional greenhouse gas emissions inventories, analyzing emission trends, and leading sustainable transportation deployment efforts. Supports various committees and subcommittees focused on climate, energy, and environmental policy development and advocacy.

ROLE EXPERIENCE

Metropolitan Washington Council of Governments (COG), Washington, DC, 2022–Present

Environmental Planner. Actively contributes to developing and maintaining COG's greenhouse gas emissions inventories and analyzing emission trends to produce fact sheets for jurisdictions in the region. Serves as the electric vehicle (EV) deployment lead, supporting COG member local governments in their efforts to integrate EVs within their operations and communities. Supports the Climate, Energy, and Environment Policy Committee (CEEPC) Legislative Subcommittee, tracking and analyzing local and regional legislation, and develops advocacy materials to promote sustainable practices.

PROJECT EXPERIENCE

Regional Electric-Vehicle Deployment (REVD) Working Group, Metropolitan Washington, 2023-Present

Lead Staff. Planning lead for REVD – a forum for members to collaborate and coordinate actions necessary for electric-vehicle (EV) adoption. Collaborates and coordinates actions to deploy EVs and EV infrastructure, focusing on information sharing, policy development, model partnership agreements, incentive programs, and identifying regional grant opportunities, contributing significantly to the advancement of sustainable transportation solutions across the region.

SELECTED PUBLICATIONS

Community-Wide Greenhouse Gas Emissions Inventory Summaries, 2022

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments, Environmental Planner, 2022-Present

Metropolitan Washington
Council of Governments



Qualifications Highlights

- Accomplished technical staff supporting climate and energy projects
- Strong grant, contracting, and planning coordination skills

Education

- MS Sustainability Management, American University, 2023
- BS Industrial Engineering, North Carolina State University, 2021

Certifications and Trainings

- LEED GA, 2023

Ms. Boggs will provide grant coordination and technical services to support program implementation.

ALISSA BOGGS

Environmental Planner

Climate, Energy and Air Team

RELEVANT EXPERIENCE

Demonstrated proficiency in qualitative and quantitative sustainability tasks, adeptly tackling challenges with analytical precision and strategic competence.

PROJECT EXPERIENCE

Climate Pollution Reduction Grant (CPRG) Priority and Comprehensive Climate Action Plans (PCAP/CCAP), District Department of Energy and Environment, U.S. Environmental Protection Agency, Washington, DC/MD/VA/WV MSA. 2023-Present
Plan Coordinator. Assist managing staff and contractors to handle all aspects of the CPRG planning process, including steering and technical committees, stakeholder engagement, development of strategies and actions, and preparation of the climate action plans. Submitted the PCAP on March 1, 2024.

Local Climate Planning and Implementation Support for Prince George's County, Charles County, Loudoun County, and the City of Laurel, 07/2023–Present
Grant Manager. COG provides technical and planning services to its member jurisdictions through Memorandum of Understanding (MOUs) with individual cities and counties. COG provides access to on-call expert consultant teams. Projects involve climate, energy, and sustainability plan development and support for programmatic implementation work. Handle technical analysis and grants management coordination for the project teams.

Annual Utility Data Collection and Analysis, Metropolitan Washington, 03/2023–Present
Lead Technical Analyst. Handle the annual natural gas and electricity consumption data request under an agreement with the nine utilities that serve the region. Analyze and identify trends in data and provide summary reports to local jurisdictions. Track deployment of renewable energy systems region-wide. Track deployment of EV charging stations. Handle updates to the regional climate and energy dashboard.

SELECT PUBLICATIONS AND PRESENTATIONS

Priority Climate Action Plan (PCAP) for the Washington, DC/MD/VA/WV Metropolitan Statistical Area (MSA). Metropolitan Washington Council of Governments (MWCOG), March 2024.

Local Jurisdiction Electric Vehicle (EV) Ready Checklist. Metropolitan Washington Council of Governments (MWCOG), July 2023.

EMPLOYMENT HISTORY

Metropolitan Washington Council of Governments. Environmental Planner. 2023–Present
Network Building + Consulting. Design Engineer. 2021–2022
Amazon. Area Manager Intern. 2020-2020



Whitney Katchmark joined the Hampton Roads Planning District Commission (HRPDC) in 2006. She was hired as the regional geologist and managed the development of a new, robust regional groundwater model which demonstrated the over withdrawal of water from the deep aquifer. She was also the project manager for the first regional water supply plan. In 2010, Whitney began leading the Water Resources department which coordinates multi-jurisdictional efforts in the areas of drinking water, wastewater, stormwater, sea level rise, coastal zone management and water quality. Currently, she is the project manager for Phase 1 of the Climate Pollution Reduction Grant for the Virginia Beach-Norfolk-Newport News MSA. She recently led the creation of a regional network of roadway flooding sensors to support the HRPDC Coastal Resiliency program and build on recommendations from two resiliency reports addressing coordination between military installations and their host localities.

Prior to joining HRPDC, she worked for the Naval Facilities Engineering Command for eight years. She received her Bachelor of Science in Environmental Engineering from the University of Notre Dame and a Master of Science in Civil Engineering from the University of Virginia.



Quan McLaurin

Quan McLaurin serves as the DEI & Title VI/Civil Rights Liaison for the Hampton Roads Planning District Commission (HRPDC) and the Hampton Roads Transportation Planning Organization (HRTPO). In this role, Quan supports the agency in exploring and integrating equity frameworks into the various planning duties of the agency, public involvement efforts that prioritize meaningful engagement, and compliance with Title VI of the Civil Rights Act of 1964 and other related nondiscrimination statutes and regulations.

Quan received his B.S. in Psychology with a clinical, research, and counseling concentration in 2015 from Liberty University. Quan co-founded LUQueerSpace, an enriching and supportive community group with a focus on protecting ostracized Queer people. Quan served as a board member for the Lynchburg Diversity Center, a nonprofit community-based organization focused on uplifting, protecting, and proving community for Queer people in central Virginia. Quan also served on the board of Many Voices – One Community in Lynchburg, VA, which focused on advancing social equity for socially vulnerable groups in the Lynchburg area. Quan was part of the planning committee for Many Voices – One Community's annual Race, Poverty, and Social Justice conferences and held workshops focused on social determinants of health for Queer POC. Recently, Quan joined the board of the LGBT Life Center in Norfolk, VA.

In 2020, Quan began consulting for mental health professionals with a focus on highlighting the needs of clients with racial trauma and expanding therapeutic frameworks to account

for the impacts of structural and systemic oppression on marginalized people groups. During this time, Quan was able to work directly with licensed mental health clinicians to examine how traditional studies and approaches in the field of behavioral sciences often exclude marginalized populations, their experiences, and how mental health conditions may present differently.

In February 2023, Quan joined the HRPDC and HRTPO. Since then, he has assisted the agency in responding to civil rights compliance reviews, planning implementation plans for the organization, expanding public involvement opportunities, and fostering relations with community groups that focus on supporting the needs of underserved low-income and Disadvantaged Communities (LIDAC). As a priority for the Climate Pollution Reduction Grant (CPRG), Quan intends to focus on garnering feedback and engagement from communities impacted by proposed projects, specifically any communities that are experiencing Environmental Justice-related concerns. With Hampton Roads being a coastal region that is at the forefront of climate-related issues such as Sea Level Rise, LIDAC and socially vulnerable communities must be especially considered in any plans made, as they are likely to incur the most risk and cost burden.



Nikki Johnson serves as a regional economist at the Hampton Roads Planning District Commission (HRPDC). Her responsibilities include publishing various reports on the regional economy, conducting forecasts and economic impact analyses, and maintaining a data repository of socio-economic indicators. Before joining the HRPDC, Nikki was a research associate at the Dragas Center for Economic Analysis and Policy at Old Dominion University, where she produced several reports on a range of subjects, including cash bail reform in Hampton Roads, the post-pandemic economic recovery across Virginia's metropolitan areas, and nursing shortages in the region. She also worked as an adjunct instructor in the Economics Department.

Nikki has worked as an external consultant on a range of planning-related topics like the 2021 GO Virginia Region 5 Growth and Diversification Plan and has produced economic impact studies for various governmental and non-profit entities. She has also assisted in the production of impact studies related to resilience such estimating the economic impacts associated with recurrent flooding in Virginia and the potential economic impact of a hurricane in Hampton Roads.

Nikki has also informed the public on economic conditions in the region. She has appeared in the Virginian Pilot, Virginia Business, WAVY-TV, Daily Press, and the WY-Daily. Nikki holds a Master of Arts degree in Economics and a Bachelor of Science and Business Administration degree in Economics from Old Dominion University.



Greg Grootendorst was born and raised in Vancouver, Canada. He came to the United States in 1992 to attend college, receiving a bachelor's degree in economics from Calvin College located in Grand Rapids, Michigan. After college, Greg worked with the AmeriCorps National Service Project, working to provide affordable housing opportunities with a non-profit housing development agency in the inner city. Upon completion of his AmeriCorps commitment, Greg returned to school where he received a master's degree from Michigan State University in Urban and Regional Planning. While at Michigan State, Greg worked with the University's Extension service, assisting in planning projects for downtown Grand Rapids. Greg also worked with the City of Lansing's Economic Development Department conducting economic impact analysis on various projects.

Greg began work with the Hampton Roads Planning District Commission (HRPDC) in 2001, working as the agency's Regional Economist. Greg created the organization's Benchmarking Study, which remains in publication, and produced numerous regional economic impact analysis.

In 2007, Greg began serving as Chief Economist, providing short-term and long-term socio-economic forecasts for Hampton Roads. Greg has led a diverse array of projects, including comprehensive economic development planning, organization data management, regional tax reform, transportation project prioritization, recycling & solid waste planning, comprehensive planning, and socioeconomic forecasting & analysis.

Greg currently serves as the Deputy Executive Director of the Hampton Roads Planning District Commission, overseeing the Emergency Management, Environmental Education, Housing & Human Services, Planning & Economics, and Water Resources program areas.



Qualifications Highlights

- CPRG grant manager
- Resilience planning

Education

- Masters in Biology, Virginia Commonwealth University, 2020;
- Bachelor of Arts in Environmental Studies and Political Science, Marietta College, 2012

Certifications and Trainings

- Human Health and Global Environmental Change – edX, HarvardX, 2013
- NASA Hyperspectral Data for Land and Coastal Systems

Environmental planning and climate-smart adaptation leadership. Data analysis expertise.

Nicole Keller, MS.

Resilience Planner

RELEVANT EXPERIENCE

Nicole is leading the Climate Pollution Reduction Grant (CPRG) planning process for the Richmond MSA, facilitating the steering committee to the successful submission of the PCAP in March 2024. She has expertise in Geographic Information Systems (GIS) and data analysis; grant writing and grant management; climate-smart adaptation planning; and organizational plan development. She specializes in crafting innovative strategies that enhance resilience in the face of environmental disruptions, utilizing GIS to analyze ecological patterns, predict climate impacts on human and ecological assets, and formulate actionable solutions. Her passion is for fostering climate change adaptation and mitigation initiatives that drive sustainable resource management and urban resilience.

PROJECT EXPERIENCE

Resilience Planner

Climate Pollution Reduction Grant (CPRG) Project Manager, 2023-Present
Leading the planning process for the Richmond MSA, successfully convening and facilitating a stakeholder steering committee and harnessing their guidance to submit a quality Priority Climate Action Plan.

Homeward Extreme Weather Taskforce, 2022-Present
Key member of the Extreme Weather Taskforce, serving the Greater Richmond Continuum of Care (GRCoC), focusing on crafting guidance for protecting and responding to the needs of unhoused individuals in the face of extreme weather. Established a partnership with Homeward to provide GIS services to and improve the data collection of the annual Point-In-Time (PIT) Count.

SolSmart Initiative Lead, 2022-Present
Leads PlanRVA in receiving and maintaining bronze designation, first achieved in 2023.

Extreme Heat and Cooling Capacity Project Manager, 2023-Present
PlanRVA leader, mapping and analyzing extreme heat and resiliency in the region. Project funded in part by VADOF.

EMPLOYMENT HISTORY

Department of Conservation and Recreation, 2021-2022

Agricultural Incentive Program Technician. Provided GIS analysis and programmatic support.

NASA DEVELOP, 2020
Worked on a small team to conduct a GIS analysis of urban heat and social vulnerability in Sacramento. Provided resilience scenario planning support.

Virginia Commonwealth University, 2016-2018
Wetlands Research Technician. Conducted field and lab work to study the influence of saltwater intrusion to freshwater wetlands on greenhouse gas flux.

National Wildlife Federation, 2015-2016
Wildlife & Climate Safeguards Intern. Supported development of a guide for New Jersey coastal cities to improve resilience using nature-based solutions. Co-authored the Nature-Based Solutions Report (2015).



Qualifications Highlights

- Community and Economic Development expertise
- Transportation Planning

Education

- Masters in Urban Planning, University of Tennessee; 1978
- BA in Urban Studies, Virginia Tech; 1975

Certifications and Trainings

- American Institute of Certified Planners, Charter Member

EXPERIENCED PLANNER IN PRIVATE AND PUBLIC SECTORS, WORKING TO BUILD MULTIMODAL NETWORKS WITH A STRONG SENSE OF PLACE.

Barbara V. Jacocks, AICP
PlanRVA Director of Community Development

RELEVANT EXPERIENCE

Barbara has decades of experience in public and private sector planning. She directs the PlanRVA Community Development program to facilitate regional collaboration among the nine member localities and multiple partners, including State agencies, non-profits, and philanthropic organizations. Her private sector planning expertise with architectural/engineering firms focused on the built environment considering uses ranging from industrial and commercial to mixed use communities. This work included large scale land planning, zoning, and environmental permitting. Her community development work has focused on comprehensive economic development, housing, land use, corridor planning, comprehensive & small area planning, funding applications and grant management.

PROJECT EXPERIENCE

Ashland Trolley Line Public History Project
PlanRVA, Richmond, VA. Served as a team lead for PlanRVA working with the National Park Service through their Rivers, Trails, & Conservation Assistance (RTCA) program for the Trolley Line Trail Public History Project. The project's purpose is to expand public awareness of the history and interpret untold stories of the trolley neighborhoods from ca 1910-1939 along the northernmost portion of the Fall Line trail from the depot in Richmond to the Town of Ashland.

BikePedRVA 2045 Richmond Regional Bicycle & Pedestrian Plan, PlanRVA, Richmond, VA.
PlanRVA, Richmond, VA-Adopted in May 2022, BikePedRVA recognizes micromobility as a vitally important transportation mode, prioritized for funding as part of the regional transportation system. Barbara served as principal planner on the team helping to lead community engagement, the planning process and final product development.

Richmond Regional Comprehensive Economic Development Strategy (CEDS), 2014-2019 PlanRVA, Richmond, VA.
Working with a 33-member strategy team representing the localities, workforce agencies, educators, and minority interests, the CEDS has helped the region set target metrics for both public and private investments in infrastructure and site development. Barbara served as the team lead and is preparing an update to the CEDS with a goal for re-establishing eligibility for EDA support for

the Economic Mobility Framework and Regional Indicators led by PlanRVA data analysis team and our regional partners.

Bus Rapid Transit Pulse Corridor Plan, 2017, *PlanRVA, Richmond, VA.*
Barbara served as the team lead through a special services contract with the City of Richmond to undertake a comprehensive analysis of the potential for development or redevelopment of areas immediately surrounding the 14 Pulse corridor stations. The plan framework established six guiding principles and best practices that would support Transit Oriented Development (TOD) and led to the creation of a special TOD-1 zoning distrtict that would ensure the City could realize a positive return on investment and assist with directing public capital improvements and investments within the corridor.

Richmond Regional Transit Vision Plan/Near Term Strategic Analysis
PlanRVA, Richmond, VA. 2019. Working with a consulting team, Barbara served as the PlanRVA team lead to prioritize the fixed route transit corridor identified by the 2045 Regional Transit Vision Plan that were most ready for immediate or near-term (5 years) investment in more frequent 20-minute transit service. Of the five corridors identified, three are currently moving forward with transit expansion and upgrades for greater transit coverage.

Previous Relevant Experience

Manager of City of Richmond Annual Contract for Planning involving 38 separate projects such as the Virginia Biotechnology Research Park Master Plan, predevelopment rezoning and permitting for the construction of Biotech 1-5 laboratory buildings including the Division of Consolidated Laboratory Services. Client and public sector liaison for a wide range of planning projects, including industrial parks and sites, commercial, institutional, and mixed-use development.

Reuse and Cost Benefit Analysis of Elko tract for the Commonwealth of Virginia prior to the purchase/development of White Oak Technology Center by Henrico County; analysis considered environmental constraints and development permits required for prospective institutional and industrial uses.

EMPLOYMENT HISTORY

McKinney and Company, Architects, Engineers, & Planners; 1997-2009
Higgins Associates Landscape Architects & Planners, 1988-1997
K.W. Poore & Associates, Community Development Planners, 1979-1988



Qualifications Highlights

- Housing Planning
- Research

Education

- Masters in Urban and Regional Planning (MURP), Virginia Commonwealth University, 2023
- BA in Geography, University of Denver, 2019

Certifications and Trainings

Grant Writing USA Training, 2024

Researcher and Planner with Community Development Expertise

Margaret "Molly" Frey, MURP

Community Development Planner

RELEVANT EXPERIENCE

Molly is an urban planner whose expertise ranges from environmental planning, hazard mitigation, transportation, real estate, and housing policy. She researches state and locality housing policy and is instrumental in shaping PlanRVA's work in community and economic development. She has experience in environmental planning and protection of Tribal sites and traditions and in tracking and supporting unhoused populations.

PROJECT EXPERIENCE

Locality Comprehensive Plan Review, 2023–Present
Researcher. Tracking local comprehensive plans for the community development team.

Locality Zoning Ordinance Review, 2023-Present
Researcher. Tracking local zoning ordinances for the community development team.

Community Development Housing Research Project, Present
Evaluating and tracking short term rentals, manufactured homes as affordable housing, zoning reform, strategies for homelessness such as short-term rental assistance and providing permanent housing (housing first).

Lower Chickahominy Watershed Collaborative, 2023-Present
Work Group Member. Sustainable economic development and protection of tribal sites and traditions. Helping to develop an active transportation map of the Richmond region and Hampton Roads region. Planning land conservation and recreational infrastructure. Helping to develop and market tourist packages.

Flood Mapping, Present
Updating PlanRVA's Flood Mapper website with newest data. The tool helps citizens and business owners understand multiple types of flood risk to their assets.

Virginia General Assembly Tracking, Present
Tracking local new legislative developments for the community development team, with particular emphasis on housing legislation.

Hazard Mitigation Plan, 2023
Stakeholder outreach, collecting data via MS forms and Excel, crafting a unified document.

PlanRVA

Development Mapping, BizSense, Present
Mapping new large scale residential, commercial, and industrial developments in ArcGIS online for public use.

Henrico County Community Revitalization Dept, 10/2022–04/2023.
Intern. CAPER (Consolidated Annual Performance Evaluation Report). Collected data and reported to the US Department of Housing and Urban Development (HUD) information on the county's performance and outcomes of federally funded programs and projects.

Henrico County Community Revitalization Dept, 10/2022–04/2023.
Intern. HUD's AI (Analysis of Impediments to Fair Housing). Performed analysis and created summaries of AI report.

AWARDS

American Institute of Certified Planners (AICP) Outstanding Student Award, 2023.

VCU MURP Plan-Off! finalist for capstone, "Social Vulnerability and the Disparate Impacts of Floods as a Fair Housing Issue in Norfolk, VA."

EMPLOYMENT HISTORY

Henrico County Community Revitalization Dept., 2022-2023
Intern.

Gaia Environmental Consulting, 2022
Field Technician

PlanRVA



Emily Williams, MA

Grants Specialist

Qualifications Highlights

- Grant Writer
- Researcher

Education

- MA in English, Virgina Commonwealth University, 2012

Certifications and Trainings

- Grant Writing USA, 2024
- Online@VCU Online course development program & certification, 2019
- VCU Institute for Inclusive Teaching, 2014

Grant writer, researcher, and project manager, dedicated to promoting community development that centers equity, sustainability, and innovation.

RELEVANT EXPERIENCE

Researches funding opportunities and makes application recommendations that meet and enhance the goals of the commission, member local governments and established regional priorities. Coordinates application preparation and submission, serving as team lead with internal staff subject matter experts and external stakeholders to prepare and submit quality, competitive applications for funding opportunities. Project manages grant processes to include status reports on applications, organization contact reports, and maintain a calendar of critical steps, ensuring that grant timelines and key deliverables are met. Tracks grants, including oversight of the project budget and deliverables compared to the approved timeline and coordination with the finance manager to prepare required monthly, quarterly, and annual financial reports. Provides technical assistance to member jurisdictions and partner organizations for grant identification and support for proposal development and submission.

PROJECT EXPERIENCE

EPA Climate Pollution Reduction Implementation Grant, PlanRVA, Richmond, Present
Grants Specialist, Fall Line Trail project. Bike and pedestrian trail that connects 7 localities in the greater Richmond region.

Governor's Agriculture and Forestry Industries Development Fund, PlanRVA, Present
Grants Specialist, uLESA Urban Agriculture project. GIS mapping of urban agricultural land use.

Virginia Commonwealth University, Richmond, 2012-2018
National Scholarship Office Reviewer.
Reviewed and supported applications for Fulbright, Boren, Critical Language Scholarship, Peace Corps, and other academic grants.

National Endowment for the Humanities grant application, Elise A. Friedland, Washington, DC, 2019
Project Editor. Provided feedback on NEH grant proposal for classical architecture book project.

Faculty Fulbright Application, Diane Cline, Washington, DC, 2017
Project editor. Dr. Cline won the Fulbright grant to the University of Crete.

SELECT PUBLICATIONS AND PRESENTATIONS

Presentations

UNC Charlotte Conference on Writing Studies: Risks and Rewards in Writing Studies Classrooms: "Course Themes Critiquing Injustice" (10/25/19)

College English Association, New Orleans, "Inclusivity in Practice in the Classroom" with Thad Fortney (moderator), Ryan Cales, Tom Nelson, and Amber Pearson (3/30/19)

Institute for Inclusive Teaching 2018-19, VCU, "Gender Dynamics and Course Evaluations." (5/17/18)

VCU New Faculty Orientation: "Women and Minorities in the Classroom," with Faedah M. Totah (1/11/18)

Equity and Inclusion Leadership Symposium, VCU, "Minority Faculty and the Classroom," with Faedah M. Totah (9/18/17)

AWARDS

University College Teaching Award for Innovative Project, 2019, Virgina Commonwealth University

EMPLOYMENT HISTORY

Virginia Commonwealth University. Associate Professor, Focused Inquiry. 2013-2023
Reynolds Community College. Instructor, English. 2012-2013



Qualifications Highlights

- Financial & Organizational Leadership Expertise
- Adept Community-Building and Collaboration

Education

- MPA, Concentration in State and Local Government, George Mason University, 2007.
- BA, Sociology, The College of William and Mary, 2003

Certifications and Trainings

- University of Virginia, Weldon Cooper Center for Public Service: Leading Educating and Developing (LEAD) Certificate Program, 2007
- University of Virginia, Institute for Environmental Negotiation: Virginia Natural Resources Leadership Institute, 2005

Experienced strategic and innovative leader and organizational director

Martha Shickle, MPA

PlanRVA Executive Director

RELEVANT EXPERIENCE

Innovative and energetic executive with 20+ years of experience in project management, developing new initiatives and evaluating program and organizational performance. Martha is skilled at leveraging strategic leadership experience and creativity to improve organizations and the community. She is a strong relationship builder with passion for problem solving and leadership development. With her leadership expertise, Martha has shepherded PlanRVA into an increasingly respected regional institution with strong ties to community partners and local governments.

PROJECT EXPERIENCE

Organizational and Financial Leadership

PlanRVA, Richmond, VA, 2015–Present
Executive Director. Strategic and operational leader of 31 team members focused on program delivery, grants administration and regional cooperation in core program areas of community development; resiliency; emergency management; the environment; and transportation.

Steward for $4.5 million organizational budget for operating and pass through grant administration.

"Client" relations manager for nine local member jurisdictions as well as affiliate organizations including Richmond Regional Transportation Planning Organization, Emergency Management Alliance of Central Virginia and Central Virginia Transportation Authority.

Architect for first organizational strategic planning process achieving agency rebrand, governance review and financial stabilization.

Engaged community leader supporting public and private organizations with regular focus on initiating and maintaining partnerships with regional anchor

organizations, public and private entities, local universities and community leaders.

Northern Shenandoah Valley Regional Commission (NSRVC), 05/2011-12/2015
Executive Director. Organizational leader for ten member team supporting regional transportation, natural resources and community development programs. Responsible for $2.5 million organizational budget including operating and pass through grants. Established new lines of business/services to improve relations with member local governments. Launched innovative regional on-call consulting program that provided localities access to professional planning and engineering firms through a cooperative solicitation process

Northern Shenandoah Valley Regional Commission (NSRVC), 08/2008-05/2011
Community Development Program Manager. Facilitated partnerships with key community organizations including institutes of Higher Education, Healthcare, Local Advocacy and Interest Groups. Progressive responsibilities beginning as Program Manager and succeeding to Assistant Executive Director prior to appointment as Executive Director.

ADDITIONAL LEADERSHIP EXPERIENCE
Economic Development and Professional Engagement
- City of Richmond Workforce Commission, 2024
- NADO Research Foundation. Advisory Committee Chair, 2021
- Richmond Region Tourism Master Plan. Industry Advancement & Advocacy Committee, 2020-2021
- RVA/ Hampton Roads Collaborative Mega Region Institutional Council, 2020- present
- National Association of Development Organizations. Board of Directors, 2019-present. Audit Committee Chair, 2020. Nominating Committee, 2021.
- GROW Capital Jobs (GO Virginia) Region 4. Council Member, 2019-present
- Southeast Regional Directors Institute Council of Peers, 2014-present. Chair, 2021-2023
- Virginia Association of Planning District Commissions, 2011- present. Second Vice President, 2020-2021

Community Impact
- The Forum Club of Richmond. 2020-present. Program Committee Chair, 2024.
- Lead Virginia. Class of 2018. Richmond Region Curriculum Committee Co-Chair, 2020
- Thrive Birth to Five. Board of Directors, 2019-present. Finance Committee Chair, 2020-2021
- Partnership for Housing Affordability. Board of Directors, 2019- present. Vice Chair, 2023-2024
- Virginia Repertory Theatre. Board of Directors 2018-present. Gala Auction Co-chair,

2019-2021. Governance Committee Chair, 2023-2024

- Homeward. Board of Directors, 2017-2020. Vice Chair, 2018-2020
- YWCA Young Women's Leadership Alliance. 2017-2018
- Richmond Memorial Health Foundation Health + Equity Fellowship. 2017
- Winchester Planning Commission. 2014-2015
- Boys and Girls Club, NSV. Board of Directors 2013-2014
- Habitat for Humanity, Winchester-Frederick County. Nominating Committee, 2013-2014.

PROFESSIONAL AFFILIATIONS

Virgina Association of Planning District Commissions, 2019-Present
National Association of Development Organizations, 2017-Present
SouthEast Regional Directors Institute, 2017-Present

AWARDS

Virginia's Top 40 Under 40 in Housing, Virginia Housing Alliance, 2012
2009 Garland Thayer Exemplary Service Award, People Incorporated
2008 Rotarian of the Year, Rotary Club of Winchester's Lates

EMPLOYMENT HISTORY

Northern Shenandoah Valley Regional Commission (NSRVC)
Executive Director, 2011-2015
Community Development Program Manager, 2008 –2011
City of Winchester, Virginia Neighborhood Revitalization Director, 2004–2008



Qualifications Highlights

- Data Analysis
- Research

Education

- PhD, Urban Affairs, University of Louisville, 2015

Certifications and Trainings

- Certification and/or training, Year Completed

Skilled in GIS and data analysis with a focus on equity in urban issues.

Sarin Adhikari, PhD

Principle Data Manager

RELEVANT EXPERIENCE

Sarin handles data insights, GIS, dashboards and data management. His expertise includes regional planning, economic development, housing, research methods, statistics, data analysis, and mapping. His favorite aspects of the role are discovering exciting insights from the data, conducting research on burning urban issues and collaborating with a team of highly skilled people.

PROJECT EXPERIENCE

Regional Indicators Project, Community Foundation / PlanRVA, Richmond, 10/2022–Present
Project role title: Team lead.

The Regional Indicators project is PlanRVA's approach to using data to understand the region and to make information publicly available to assist in data-driven decisions. We have identified several indicators under each of the five pillars of inclusive growth – Housing, Transportation, Economy, Education, and Health. Wherever possible, we present the indicators through the lens of racial and economic equity. We are developing an Indicators Dashboard with an expected soft launch in May/June of 2024.

Upward Mobility Framework, United Way / Urban Institute, Richmond, 01/2024–Present
Project role title: Collaborator

The Upward Mobility Framework, led by United Way of Greater Richmond and Petersburg, is a planning grant funded by the Urban Institute. The objective of the grant is to build consensus around upward mobility metrics in the Richmond region and identify relevant indicators that can be tracked over time to measure mobility trends.

WORTH BIPOC Homeownership Project, LISC Va, Richmond, 10/2022–Present
Project role title: Data/Research Support

WORTH project is a part of the $7.5 million grant from Well Fargo Bank to improve BIPOC homeownership in the Richmond and Petersburg region. Richmond's WORTH collaborative is led by LISC Virginia, and supported by Project HOMES, Partnership for Housing Affordability (PHA), Southside Community Develpment and Housing Corporation (SCDHC), Better Housing Coalition

(BHC), Home of Virginia, Richmond Regional Housing Authority (RRHA), Maggie Walker Community Land Trust (MWCLT), Habitat for Humanity, and PlanRVA. The objective of the grant is to create 5000 new BIPOC homeowners in Richmond and Petersburg region by 2025. We provide data analysis and research support and maintain a dashboard of activities around BIPOC homeownership in the region.

Richmond MVA, RMHF, Richmond, 05/2022–05/2023
Project role title: Data collaboration, hosting, and dashboard

Richmond MVA is the study of the region's housing market undertaken by The Reinvestment Fund (a Philadelphia-based consulting firm) and funded by the Richmond Memorial Health Foundation (RMHF). The first MVA was completed in 2018 followed by an update in 2022. PlanRVA has been one of the convenors / collaborators in both times. After 2022 MVA, PlanRVA volunteered to host the MVA data, story maps, and reports to make them available to the public via our website. We also prepared a dashboard to overlay relevant socio-economic data over MVA outcomes.

West Broad BRT Corridor Impact Study, TPO, Richmond, 11/2022–05/2023
Project role title : Collaborator.

Pulse is Richmond's mass transit solution that extends from Rockett's Landing to Willow Lawn. There is a proposal to extend the service to Short Pump in Henrico. PlanRVA conducted a detailed analysis of the corridor and the positive economic impact along the existing segment to estimate for what to expect if the service is extended beyond its existing footprint.

Employer Assisted Housing Research, Henrico County, Richmond, 03/2023–06/2023
Project role title: PI

A research report was prepared for the Partnership for Housing Affordability (PHA) to highlight the housing market trends in the Richmond region and a need for employer assisted housing as a tool to help working class families in the region to attain housing in the locality where they work.

REVIVE! For First Responders Program Evaluation, VACP, Richmond, 10/2023–12/2023
Project role title : PI

REVIVE! For First Responders is a program to train first responders on how to identify a situation of opioid overdose and to administer Naloxone, if necessary, to reverse the effect of opioids and save lives. The Virginia Association of Chiefs of Police and Foundation conducts the training all over Virginia. We assist VACP in evaluating the training program and its outcomes and have been preparing the impact report since 2022.

Regional Land Use Database Development, PlanRVA, Richmond, 04/2023–06/2023
Project role title: PI

We develop and maintain parcel-based land use database for the entire PlanRVA footprint. We use the data internally – mostly by the Environment and TPO teams – and externally to provide relevant data support – for example, to VCU's TransAtlantic Seminar.

PlanRVA

SELECT PUBLICATIONS AND PRESENTATIONS

Publications

John Accordino & Sarin Adhikari (2022) Balancing Act: Preserving Historic Fabric and Enhancing Economic Vitality in Towns in the Metropolitan Periphery, Planning Practice & Research, 37:1, 95-110, DOI: 10.1080/02697459.2021.1995970

Savitch, Hank V. and Sarin Adhikari. 2017. "Response to Lidstrom, Lewis, and Barnes on Fragmented Regionalism." *Urban Affairs Review,* Vol. 53(2): 423-430

Savitch, Hank V. and Sarin Adhikari. 2017. "Fragmented Regionalism: Why Metropolitan America Continues to Splinter." *Urban Affairs Review*, Vol. 53(2): 381-402.

Adhikari, S. 2015. "Community characteristics associated with local intergovernmental cooperation." *Electronic Theses and Dissertations.* Paper 2108. https://doi.org/10.18297/etd/2108.

Kelly, J. M., and Sarin Adhikari. 2013. "Indicators of Financial Condition in Pre- and Post-Merger Louisville." *Journal of Urban Affairs,* Vol 35 (5): 553-567.

Presentations

Research presentation: Geospatial Evaluation of Food Insecurity in the Richmond Region, at National Science Foundation, Smart and Connected Cities, PI's Conference, May 2021.

Invited lecture: "Tracking development Jobs-Housing balance in the Richmond region", at Virginia Association of Zoning Officials (VAZO) workshop, October 2019.

Invited lecture: "Metro Richmond development trends and emerging issues - application of MetroView geospatial information system" at 97th Certified Planning Commissioners Workshop, Roanoke, August 2019

Invited lecture: "Metro Richmond development trends and socio-economic evaluation" at PPIA Workshop organized by the Wilder School in June 2019

Research presentation: "A Comprehensive Evaluation of Richmond's Rehabilitation Tax Abatement Program, at Richmond City Council Meeting, April 2019.

Method presentation: "Introduction to MetroView Information System and its potential in the CRC Region", at Longwood University, Farmville, February 2019.

Paper presentation: "The impact of GRTC redesign on Richmond's disadvantaged neighborhoods", at The National Neighborhood Indicators Partnership (NNIP) conference held in Los Angeles in October 2018.

Research presentation: "Understanding the Socio-Economic Dimension of Crime in Richmond", for the Office of Attorney General, May 2018.

Invited lecture: "CURA's MetroView information system and its potential use as a research and grant writing tool" at Richmond's Institute of Philanthropy (IOP), April 2018

Data presentation: Richmond Market Value Analysis (MVA) socio-economic and parcel data overlay study, at RMHF, July 2017.

Research presentation: Review of the Virginia Enterprise Zone Program, at DHCD Board Meeting, March 2017.

Paper presentation: "Transcending Local Boundaries: Local Characteristics associated with Inter-Jurisdictional Cooperation". The Urban Affairs Association 44th Annual Conference, San Antonio, Texas, March 19-22, 2014.

Paper presentation: "Fragmented Regionalism: Why Metropolitan America Continues to Splinter" (with Dr. Hank Savitch). The Urban Affairs Association 43rd Annual Conference, San Francisco, California, April 3-6, 2013.

Paper presentation: "Financial Condition in Pre-and Post-Merger Louisville" (with Dr. Janet Kelly). The Urban Affairs Association 42nd Annual Conference, Pittsburgh, Pennsylvania, April 18-21, 2012.

PROFESSIONAL AFFILIATIONS

Professional Organization Name, Years of Membership (Delete this section if not applicable.)

- Association of Collegiate Schools of Planning (ACSP)
- Urban Affairs Association (UAA)
- National Neighborhood Improvement Partnership (NNIP)

EMPLOYMENT HISTORY

Center for Urban and Regional Analysis (CURA@VCU), Research Economist, 2016-2022
Urban Studies Institute, University of Louisville, Postdoctoral Research Fellow, 2015-2016



Qualifications Highlights

- Environmental Planning and Leadership
- Data Analysis

Education

- BA, French, University of Mary Washington, 2005
- MURP, Virginia Commonwealth University, 2007

Certifications and Trainings

- AICP, 2017
- Virginia Natural Resources Leadership Institute, 2011

Experienced resilience, emergency management, and environmental director.

Sarah Stewart, MURP, AICP

Resilience, Emergency Management, & Environment (REME) Director

RELEVANT EXPERIENCE

Sarah has 17 years of experience with environmental planning, data analysis, project management and plan development. She leads the REME program and manages environmental and resiliency grants and projects related to watershed policy coordination, Chesapeake Bay TMDL planning, regional environmental committee coordination, hazard mitigation planning and litter prevention. She is skilled in group & committee facilitation and management and provides nuanced Tribal coordination. She provides oversight and technical assistance for the Lower Chickahominy Watershed Collective.

PROJECT EXPERIENCE

REME Director

Direct staff team of 3-4 working on environmental, emergency management and resilience projects; Work with REME staff to develop, fund, and implement REME planning and program projects; Coordinate with fellow Directors and other staff to design and develop the Regional Strategic Plan and lead development of REME components; Coordinate relationships with state agencies and community partners.

Environmental Technical Advisory Committee, 2009–Present
Director. Management of regional environmental technical advisory committee for PlanRVA.

Strategic Plan Development, PlanRVA.
Collaboration colleagues on development and integration of a regional strategic plan for PlanRVA/Richmond region

Lower Chickahominy Watershed Collaborative, Location,
Management and technical assistance of collaborative organization of Tribes, counties, and PDCs in the lower Chickahominy River watershed working towards natural resource conservation and sustainable economic development.

Virginia Coastal Policy Team & Costal Resilience Technical Advisory Committee, member
PlanRVA Representative.

Environment Program/REME Planning Manager, 2018-2023
Planner 3/Planning Manager. Manager for Environmental Projects and grants at PlanRVA; Manager of hazard mitigation plan and programing; Supervise Staff of 2-4 working on environmental, emergency management, and GIS projects; GIS data creation and management; Coordinate and Facilitate the

RRPDC Environmental Technical Advisory Committee; Respond to general information requests from local staff, non-profits, etc.

Richmond Regional Planning District Commission, 2008-2018.
Senior Planner. Project Manager for Environmental projects at the RRPDC; Manage RRPDC Virginia Coastal Zone Management and Watershed Implementation Plan grant administration; Coordinate the RRPDC Environmental Technical Advisory Committee; GIS data creation, management, and analysis; Respond to general information requests using Census and other datasets

Richmond Regional Planning District Commission, 2007-2008
Associate Planner. Update the RRPDC/MPO 2031 Regional Socio-Economic Data Report; Respond to general information requests using Census and other datasets

EMPLOYMENT HISTORY

PlanRVA. REME Planning Manager, 2023 – 2024
Environmental Planning Manger, 2019 – 2023
Senior Planner, 2007 – 2019

DEMETRA J. MC BRIDE

Mobile (941) 228-6666 loupdor8@gmail.com

Strategic Thinker, Fluent Multi-Tasker, Empowering Leader, and Team Builder. Thrives in Collaboration and Partnerships. Performance-Driven Leader in Energy, Infrastructure, and Resilience Policy and Programs. Seasoned Regulatory and Legislative Strategist. Seeks Solutions Through Technical Expertise, Purposeful Innovation, and an Entrepreneurial Approach.

SELECTED ACHIEVEMENTS

Redesigned and Restructured Major Infrastructure, Utility and Energy/Climate Programs to a Performance-Based Risk Mitigation Model (Arlington, VA). Restructured energy, climate and resilience programs to focus on cross-disciplinary design, risk mitigation, and long-term urban performance. Core focus on introducing climate adaptation and resilience to countywide strategy, revisioning green building program, and building cross-departmental and external partnerships to drive climate and energy goals.

Redesigned Stormwater Capital Program (Arlington, VA) to deploy a blended-engineering approach to overcome legacy development, space constraints, insufficiency of capacity infrastructure system, and systemic lack of overland relief.

Early attainment of Climate Benchmarks and Goals (Arlington, VA) including 100% renewable energy resources for government operations electricity, accelerated EV conversion of government fleet, alternative fuels assessment for municipal bus transit fleet/system, and enhanced green building strategies and programs (new construction and retro-commissioning).

Reform and Re-Manage California's Largest Regional Energy Programs (County of Los Angeles). Operational/functional improvement and delivery of $2 Billion PACE (Property Assessed Clean Energy) Program, with focus on customer protections, contractor integrity, and program analytics. Program Director of the Southern California Regional Network (SoCalREN), tripling performance (annual) energy efficiency portfolio funded through the California Public Utilities Commission (CPUC).

Developed new Guidelines for California Residential Property Assessed Clean Energy Programs to ensure equity, quality-assurance-and-control, and consumer protections; used as model for CA legislation.

T-Grid: Transition from a Buildings-Centric Energy Grid to Transportation-Driven Energy Infrastructure (County of Santa Clara) Proposal awarded by the California Energy Commission (CEC) under its EV-Ready Communities Planning-Infrastructure Grant Program, designed to manage the shape of regional energy loads and remodeling infrastructure to absorb transportation-driven energy demand.

Leadership in Redefining Government Roles in the California Energy Sector (2010-2018). Designed and directed ARRA-funded community energy program to highest performance in the San Francisco Bay Region. Seasoned regulatory and legislative representative and negotiator under proceedings for Energy Efficiency, Grid Resiliency, Community Choice Aggregation, Transportation Electrification, Workforce Training, Zero Net Energy, and Building Energy Benchmarking. Promoted adoption of Community Choice Aggregation (CCA) in California and developed and co-founded the Silicon Valley Clean Energy CCA.

Developed Regional Energy Network (REN) Model and Secured Regulatory Recognition and Funding. Co-designed the REN model and secured its approval by the California Public Utilities Commission (CPUC). This effort has secured $750M+ to date in funding for the Bay Regional Energy Network and the Southern California Energy Network, to design, pilot, and implement government and community energy program portfolios.

SELECTED ACHIEVEMENTS

Advanced Santa Clara County as a leader in sustainability, climate, and energy portfolios; and secured grants and alternative funding sources. As the County's Founding Director of the Office of Sustainability, built dynamic relationships with municipalities, secured grants for, and managed, multi-jurisdictional greenhouse gas inventory and climate/energy action plan projects, and a multi-sector fuels-reduction pathway. Produced and implemented leading-edge regional adaptation platform and decision-support tool (**Silicon Valley 2.0**) (https://sustainability.sccgov.org/silicon-valley-20), promoted as Best-in-Class adaptation strategy by the Governor's Office of Planning and Research.

Designed and manage regional sustainable transportation project, Driving to Net Zero: Decarbonizing Transportation in Silicon Valley (California Strategic Growth Council), supporting an integrated feasibility analysis, siting plan, and resource kit for implementers; and developing policy, programmatic, technology and market-based solutions to drive uptake in EV, PHEV, and alternative fuel vehicles. *Also,* **2018 CEC Grant Award for County of Los Angeles under EV-Ready Communities Blueprint Planning Phase 1.**

Created and implemented Master Capital Program for Green/Built Infrastructure Integration (Sarasota County). Designed and manage countywide capital improvement program to integrate green and built infrastructure; collaborating with Public Works, Utilities, Natural Resources, Engineering, Maintenance and Operations managers, Transportation and Planning staff and officials, as well as community-based organizations, environmental groups, and community stakeholders.

PROFESSIONAL EXPERIENCE

ARLINGTON COUNTY, VA 04/2018-present

Office of Sustainability and Environmental Management, Bureau Chief

Responsible for implementation of resilience, energy, and climate initiatives, and manage a staff of 53 engineering, technical, policy, and analytics professionals. Tasked with transforming the implementation mechanisms for the County's energy programs, reforming stormwater regulatory and infrastructure programs, and coordination of all programs, policies and strategies under the County's emissions reduction plan, including transportation, solid waste, wastewater, community energy efficiency and renewables, government facilities, policy, resiliency, and environmental equity. Key achievements:

- Contemporized Community Energy Plan (2019) to integrate 100% renewables goals, electrification of transportation and buildings, energy resiliency systems, energy equity and create an operationalized work plan for implementation, measurability and accountability
- Diversify funding/financing portfolio for enhanced expansion of stormwater system investments, including Utility Feasibility Study, bonding options, and alternative funding including grants
- Stormwater Risk Assessment and Management Plan, to model climate and inundation projections as basis for infrastructure investments, code/regulatory measures, and adaptation (SLR) projects
- Re-Vision Stormwater Program (capacity/infrastructure systems and MS4 compliance programs), and establish hybrid engineering solutions; co-siting; dual-tasking capital projects; develop risk mitigation strategies; and dynamic communications and engagement platforms
- Executed specialized energy programs, e.g., technical alliance with NREL, team skills training in adaptive reuse of buildings, expanded Green Building Incentive Program to include PHIUS, net-zero buildings, existing buildings pathway, and adaptive reuse
- Designed and secured state and federal grants

COUNTY OF LOS ANGELES, CA 11/2016-04/2018

Environmental Initiatives Division Manager, Energy + Environment

Design, management and oversight of energy and electrification programs, supported by rigorous regulatory representation. Responsible for securing/managing California Energy Commission and U.S. Department of Energy grants for innovative technical and market-solutions projects, including AB 802 energy benchmarking implementation and market-based solutions based on end-user clusters (residential and commercial customers, building owners and managers, and banking-investment actors). In less than one year:

PROFESSIONAL EXPERIENCE (cont.)

- Tripled energy savings achievements under the SoCalREN Programs
- Increased SoCalREN Program in Disadvantaged Communities by 250%
- Secured CPUC concessions to regional governments, e.g., financing pilots, residential redesign
- Secured nearly $2 Million in benchmarking and market solutions grants
- Designed and launched County Electric Vehicle Infrastructure Plan
- Led development for government sector of the County's Regional Sustainability Master Plan
- Integrated process, tracking, and program integrity improvements to the Residential PACE Program
- Active role in development of new PACE legislation (AB 1284 and SB 242), and state oversight
- Designed and managed Air Quality Resources Board and Air Quality Management District grants

COUNTY OF SANTA CLARA COUNTY, CA 11/2010 – 11/2016

Director, Office of Sustainability

Recruited from a national search to build and direct a newly-created agency to develop and implement policy, projects, and programs for sustainability, climate mitigation and adaptation, and resource efficiency and conservation. Responsible for: cross-department awareness, innovation, and collaborative dynamics in all sustainability sectors; project design & management; enterprise-wide adoption of sustainability principles and practices; establish the County's regional leadership role in sustainability and demonstrate success in multi-jurisdictional and diverse stakeholder projects; represent the County in local, state, and national venues; and to forge public-private partnerships, market-based solutions, and innovative energy, resource, and climate projects. Key accomplishments:

- Developed, funded and manage regional zero-emissions transportation initiative, ***Driving to Net Zero: Decarbonizing Transportation in Silicon Valley***
- Developed, funded and managed ***Silicon Valley 2.0***, a Regional Climate Adaptation Platform (9 sectors) and creation of the accompanying geo-economic Decision-Support Tool
- Developed the **Regional Energy Network** model, and secured adoption of the REN model: Santa Clara Funding $13M/annually
- Lead role (technical, regulatory, programmatic, operational and community outreach) in development and launch of the **Silicon Valley Clean Energy** (community choice aggregation)
- Secured additional $5.6 million in direct federal/state grant funds for County climate, energy and transportation programs and projects (2011-2014) and $16.0 million+ in community incentives, local economic stimulus, and job creation/maintenance
- Developed, funded and managed multi-jurisdictional climate/sustainability projects
- Strategically manage cross-departmental implementation of sustainability policy and measures
- Develop countywide Sustainability Blueprint and Implementation Plan, establish sustainability indicators, goals, metrics and tracking systems to measure progress
- Stakeholder and public liaison for County sustainability programs, projects, and policies
- Garnered national and state awards for innovative energy and climate programs

SARASOTA COUNTY, Sarasota, FL 04/2005 – 10/2010

Program / Project Manager, Natural Resources / Office of Sustainability

Responsible for climate-energy action planning, green infrastructure programs, energy efficiency projects, ecological footprinting, life-cycle analyses, sustainability training programs, environmental planning for public health, and project manager for grant-based (including ARRA) and capital programs.

- Developed Climate Action, Energy Efficiency, Green Infrastructure & Urban Forest Master Plans
- Program Manager for Capital, Surtax, and Federal Stimulus Programs
- Member of Low Impact Development Design Project Team (focused on water conservation and smart land-use design strategies)
- Committee Member for Plan Review for Development/Infrastructure/Transportation Projects
- Regulatory Analysis and Compliance (Federal, state and local)

EDUCATION

New York Law School, New York, New York *Juris Doctorate*
Awards, Special Honors, Publications and Internships

- American Jurisprudence Award in Administrative Law
- "*Sexual Abuse of Children: The Best Kept Legal Secret*", NYLS Human Rights Law Annual, Volume III, Part Two
- Book Review Editor, NYLS Human Rights Law Journal
- Benjamin Cardoza Moot Court Competition, Semi-Finalist

Sorbonne, Université de Paris, Paris FRANCE *Diplôme de la Langue et la Civilisation Française*

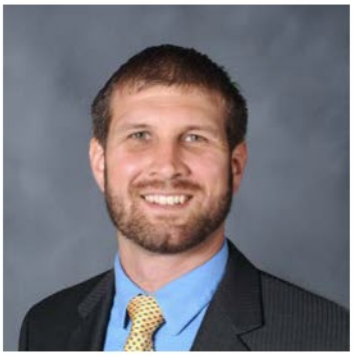
Florida International University, Miami, Florida *B.A. International Relations*
"*The Role of Women in the Soviet Union*" – Majors Thesis (awarded)
"*The Changing Culture of Terrorism*" – Minors Thesis

LANGUAGES: Fluent in French, basic Spanish and German

LICENSES: Member, Legal Bar of the State of New York
Member, Legal Bar of the State of Florida

AFFILIATIONS: PJM Cities and Counties Coalition, and member of Policy Committee
MWCOG Climate Change Energy Environmental Policy Committee
Advisory Committee, California Adaptation Forum 2016, 2018
Board Member, NACO Green Government Initiative
Board Member, Local Government Sustainable Energy Coalition (LGSEC)
Board, Climate Task Force, Joint Venture Silicon Valley
Steering Committee, Bay Area Climate Collaborative
Steering Committee, Sustainable Silicon Valley
Member, Urban Sustainability Directors Network
Built Environment Technical Advisory Committee, ICLEI (2010-2012)

Representation: **2022/23 European Union International Urban and Regional Collaboration Cohort**
SPUR, Innovation Award 2019 for Silicon Valley Clean Energy
Monday Morning, Global Opportunity Report 2016 – Designated Public Sector Innovator by the United Nations Global Compact Program, which recognizes 10 sector-specific Global Innovation Leaders in climate action
VERGE 2014 – *Climate Adaptation and the 3P Nexus*
Board, Local Government Sustainable Energy Coalition (California Statewide) – principal strategist and advocacy under California Public Utilities Commission and California Energy Commission proceedings
Silicon Valley 2.0 Climate Adaptation Platform Presented before state and national conferences, California Senate Testimony and US Congressional workshops, and for institutional, research, academic, and foundational groups
ICLEI National Action Committee for the Built Environment, National Technical Advisory Committee for ICLEI's Sustainable STAR Communities toolkit
American Planning Association National Committee, Co-Author of 2010 White Paper, *Rebuilding America's Green Infrastructure*
2nd Int'l Conference on Countermeasures to Urban Heat Islands, Sept 2009 *Eco-Masterplanning for Healthy Cities and Urban Islands* (peer-reviewed by Lawrence Berkeley National Laboratories and the Centers for Disease Control)



Qualifications Highlights

- Climate Action Policy
- Building Energy Efficiency & Electrification Programs
- Renewable Energy Systems
- Transportation Electrification

Education

- BSEE, University of Dayton, 2002
- BCE, University of Dayton, 2003
- MS Eng, University of Dayton, 2006

Certifications and Trainings

- Professional Engineer, State of Ohio, 2012
- Certified Climate Change Professional, 2021
- Certified Energy Manager, 2021
- Sustainability Excellence Associate, 2021
- EcoDistrict Accredited Professional, 2020
- Certified Public Manager, 2012
- LEED Accredited Professional, 2009

BILL EGER, PE, CEM, CC-P, ISSP-SEA, CPM, LEED AP

Climate Policy Officer

Arlington County, VA Office of Climate Policy & Coordination

RELEVANT EXPERIENCE

Bill serves as the Climate Policy Officer for Arlington County, Virginia where he leads the Office of Climate Policy & Coordination for the Arlington County Manager's Office. Bill serves to coordinate and amplify the County's ongoing responses to climate change, and support Arlington's sustainability initiatives through collaboration across all Arlington County departments; work with regional, state and federal partners; and by creatively leveraging collective action by each member of the Arlington community, including private companies, institutions, and community-based organizations. Bill's relevant technical, programmatic, and policy expertise includes delivery residential & commercial building energy efficiency and electrification, resilient renewable energy systems, and electric vehicles & transportation infrastructure programs.

ROLE EXPERIENCE

Arlington County, Virginia, 03/2023–Present
Chief Climate Policy Officer. Provide strategic climate action leadership to institutionalize climate change as organizational priority, amplifying existing energy, sustainability, and climate action programs, foster community collaboration, and integrate equitable outcomes.

City of Alexandria, Virginia, 01/2010–02/2023
Energy Manager/Climate Programs Manager. Develop and deliver building energy efficiency & electrification programs, implement resilient renewable energy systems, and deliver electric vehicle & transportation electrification programs. Advance climate action and resiliency planning and policy development.

City of Cleveland, Ohio, 08/2007–12/2009
Energy Manager. Implement building energy efficiency and renewable energy programs.

SELECT PUBLICATIONS AND PRESENTATIONS

Publications

Kaiser, D., Eger, B., Defreitas, S. (2022). Pursuing Portfolio-Wide, Zero-Energy Existing Buildings on a Budget. *ACEEE 2022 Summer Study on Buildings.* https://www.aceee.org/2022-buildings-summer-study

Presentations

Eger, B. (2020, November 18). *Electrifying Transportation for Climate Action and Clean Air in Alexandria. NoVA/Washington IEEE Power and Engineering Society.* Washington, DC, United States. https://events.vtools.ieee.org/m/247878

PROFESSIONAL AFFILIATIONS

Association of Energy Engineers
Institute for Electrical and Electronic Engineers
American Society of Mechanical Engineers
American Society of Heating, Refrigeration, and Air-Conditioning Engineers
United States Green Building Council
Association of Climate Change Officers

STEPHEN T. BURR

EDUCATION

MA, City and Regional Planning, Clemson University, Clemson, SC, 2010

BBA, Business Administration, Marshall University, Huntington, WV, 2008

PROFESSIONAL CERTIFICATIONS

Association of Energy Engineers- Certified Energy Manager (CEM)

American Planning Association- American Institute of Certified Planners (AICP)

Association of Energy Engineers- Renewable Energy Professional (REP)

U. S. Green Building Council- Leadership in Energy and Environmental Design Green Associate (LEED-Green Associate)

PROFESSIONAL EXPERIENCE

July 2021 – Present **Arlington County** **Arlington, VA**

Energy Manager

- Manages energy efficiency, decarbonization and renewable energy planning, implementation and reporting for County facilities in coordination with other bureaus and departments to reduce County energy consumption and climate impacts
- Develops innovative tools to identify, prioritize and implement decarbonization measures in County facilities through energy modeling, measure evaluation and quantification of key energy, cost and climate metrics
- Facilitates collaborative process with technical support to identify and drive decarbonization efforts in affordable housing sectors to achieve equity and community-wide goals.
- Manages renewable energy planning, deployment and reporting in a variety of methods including on-site screening and identification, virtual power purchase agreement implementation, and evaluating aggregation models
- Supports the implementation of the County's Community Energy Plan programs technical assistance and strategic planning to the climate and energy programs addressing the broader community greenhouse gas reduction goals
- Collaborates cross-functionally for the planning, analysis and installation of electric vehicle charging infrastructure at County facilities

April 2018 – July 2021 **Washington Gas** **Springfield, VA**

Supervisor, Energy Efficiency Data Analytics

- Leads regulatory reporting efforts for the EmPOWER Maryland energy efficiency program portfolio by completing quarterly reporting templates for energy savings, program participation and program budgets along with the accompanying semi-annual narrative report
- Completes data requests and regulatory requirements from the Maryland Public Service Commission and intervening stakeholders related to the EmPOWER Maryland energy efficiency programs in coordination with Washington Gas internal stakeholders including Regulatory Affairs and Office of General Counsel
- Creates, monitors, and communicates performance of energy savings and participation metrics towards program goals for the energy efficiency team and senior leadership through Power BI dashboards and data visualizations
- Supports implementation of energy efficiency programs for the residential behavioral program, limited-income programs, and electric-natural gas coordinated programs as well as the Company's Climate Business Plan

- Assist with program design process to create multi-year program portfolios of energy efficiency programs by forecasting program participation, energy savings and budgets, identifying program gaps, opportunities, and potential vendors while ensuring customer benefits, cost-effectiveness and developing associated rate surcharges
- Manages the evaluation, measurement and verification (EM&V) process, including a third-party vendor, data inputs for program avoided costs, net to gross ratios, gross energy savings calculations, and other data as needed

2013 – 2018 **BCS, Incorporated** **Washington, DC**

Manager

- Lead on-site contractor that supported the Department of Energy's Sustainability Performance Office (SPO) with data collection, data quality assurance and control, and departmental reporting for Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*
- Aided with the development of the Department's Strategic Sustainability Performance Plan (SSPP) that provide strategies for attaining sustainability goals including greenhouse gas emissions mitigation, energy use intensity, renewable energy, waste diversion, climate change adaptation, fleet vehicles optimization, electric vehicle and fuel reduction and high performance sustainable buildings
- Lead contractor that managed the Department of Energy's annual greenhouse gas emissions (GHG) inventory with data collection, validation, and reporting. Coordinate annual sustainability reporting and analysis including calculating performance for sustainability related goals including renewable energy, energy use intensity, waste diversion and high performing sustainable buildings
- Lead contractor that managed the Energy Independence and Security Act (EISA) Section 432 reporting process by creating workbook reporting templates, provide training, coordinate data quality assurance related to covered energy use, comprehensive energy and water audits, identified energy conservation and renewable energy measures, implemented projects, and measurement and verification for departmental reporting requirements. Manage the Compliance Tracking System (CTS) database for departmental reporting, and assisting sites to utilize Portfolio Manager benchmarking program
- Assisted with the development of the DOE Sustainability Dashboard, a SQL database, by providing systems requirements, calculations, and overall system design to automate annual greenhouse gas emissions inventory reporting and maintain historical data to enhance the current Excel-based reporting process

PAUL F. ROMAN

Education

Philadelphia University | 2014 - 2018

B.S. Environmental Sustainability

Pennsylvania State University- World Campus | 2021 - 2024

MPS Renewable Energy and Sustainability Systems

Professional Experience

Arlington County

Green Building Program Manager | 2022 – Current

As the Green Building Program Manager for Arlington County, Paul works with community, business leaders, public committees, and government staff to facilitate the development of sustainable, high-performing buildings in Arlington County, VA.

Gensler

Sustainability Specialist | 2018 – 2022

As a Sustainability Specialist at Gensler, Paul worked with clients and design teams to optimize the sustainable features of projects, ensuring their sensitivity to the environment and responsible consumption of resources. Paul worked on multiple projects ranging in scale from small retail interiors to large commercial new construction, totaling over 16 million-sf of work with teams across the US.

Professional Certifications

- U.S. Green Building Council (USGBC) LEED AP ID+C, BD+C
- International Living Future Institute (ILFI) Accreditation (LFA)

Office of Environmental and Energy Coordination



John Morrill, B.A., M.U.R.P.

Director, Fairfax County Office of Environmental and Energy Coordination (OEEC)

RELEVANT EXPERIENCE

Senior energy and climate action professional with a demonstrated record of creating and managing clean energy programs with strong, measurable results. Interdisciplinary thinker. Skilled at making connections between varied constituencies in pursuit of shared objectives. Recognized by local, regional, and national peers for contributions to the field.

EMPLOYMENT HISTORY

Director, Office of Environmental and Energy Coordination, Fairfax County, Virginia 3/2024–present
Division Manager, 11/2020-3/2024
Leading interdisciplinary agency staff handling broad environmental and energy policies and program implementation. Office has an emphasis on *(i)* climate mitigation through carbon emissions reductions using clean energy, and *(ii)* climate resiliency through proactive planning and deployment of measures to protect life and property.

Energy Manager, Arlington County, Virginia 01/2012-11/2020
Led negotiations for an offsite power purchase agreement satisfying nearly 100 percent of the electricity needs of county government operations.

Provided substantial subject matter expertise guiding creation of initial Arlington Community Energy Plan (2013) and subsequent updated CEP (2019).

Laid groundwork for achieving U.S. Dept of Energy's Better Buildings Challenge 20% improvement goal in county building energy efficiency (2012 baseline to 2022 target year) after substantial reduction in building energy use from 2007-2012 to achieve original Arlington Initiative to Rethink Energy goal.

Vice President for Sustainability, Emerald Cities Collaborative 07/2011-12/2011

EMPLOYMENT HISTORY (CONTINUED)

Energy Manager, Arlington County, Virginia 07/2000-06/2011
First energy manager for a locality in Commonwealth of Virginia. Initiated energy efficiency upgrades in facilities and pursuit and purchase of renewable energy credits. Co-led creation of a first-

Education

- MA, Urban & Environmental Planning, School of Architecture, University of Virginia, 1994
- BA, Physics and Science, Technology & Society, Clark University, 1982

Certifications and Trainings

- Certified Energy Manager (2000-present)
- Graduate, Leadership Arlington (2013)

of-its-kind climate action program among Virginia jurisdictions with the Arlington Initiative to Rethink Energy *(nee* Arlington Initiative to Reduce Emissions).

Director of Operations, American Council for an Energy-Efficient Economy (ACEEE), Washington DC 6/1990-4/2000

Managing the financial and administrative activities of a leading not-for-profit energy research and policy organization and contributing to analyses on energy-efficient appliances and feebates for fuel-efficient vehicles. Co-author of popular book, *Consumer Guide to Home Energy Savings* 2nd-7th editions (1991-1998)

Research Associate, ACEEE, Washington DC 5/1983-5/1988

Performing research and analysis on indoor air quality and energy efficient appliances. Co-author of book, *Residential Indoor Air Quality and Energy Efficiency* (1989).

PROFESSIONAL AFFILIATIONS

2014-2023, Member, Board of Governors (Chair, 2021-2023), Virginia Energy Efficiency Council
2011-2020, Member, Board of Directors, Virginia Energy Purchasing Governmental Association
Member, ASHRAE
Life Member, Association of Energy Engineers
Life Member, American Solar Energy Society

AWARDS

U.S. EPA Climate Protection Award (2008) for role creating Arlington Initiative to Rethink Energy

Graduated from Clark University *cum laude*, Phi Beta Kappa, with departmental honors in Science, Technology & Society

Office of Environmental and Energy Coordination



Education

- PhD, Geography, UNC Chapel Hill, 2004
- MS, Geography, University of Toronto, 1996
- BS, Environmental Studies & Urban Planning, University of Waterloo, 1993

Dr. Law manages Fairfax County's Energy Conservation Assistance Program, which provides technical and financial support to property owners installing energy efficiency, renewable energy, and resilience upgrades.

NEELY LAW, PHD

Senior Community Specialist

Fairfax County Office of Environmental and Energy Coordination (OEEC)

RELEVANT EXPERIENCE

Dr. Law holds 20 years of environmental program planning and management experience. She is an accomplished and results-focused community leader and program manager that oversees financial activities, manages project budgets, and integrates governmental and non-governmental partnerships. She has a long history of success in collaboration with local, state, federal, and non-profit stakeholders and partners for innovation, research development, workforce development, and regulatory compliance to address environmental issues with a sustainability and resilience focus.

EMPLOYMENT HISTORY

Climate and Energy Programming

OEEC, Fairfax, Virginia, 12/2023–Present
Senior Community Specialist. Develops and implements programs to support the county's climate mitigation and resilience plans. Leads the county's Energy Conservation Assistance Program, Climate Champions Program, and Green Business Partners Program to advance climate and energy goals. Engages with non-profits, businesses, residents, and community-based organizations, and manages budgets, teams, and resources to coordinate, promote and manage these programs.

OEEC, Fairfax, Virginia, 06/2022–11/2023
Community Specialist. Developed programs to support implementation of Fairfax County's Community-wide Energy and Climate Action Plan (CECAP). Grew and marketed education and outreach programs to businesses, nonprofits, regional planning organizations, county agencies, and other partners to further county goals. Successfully relaunched the county's Energy Conservation Assistance Program, which provides technical and financial assistance to property owners implementing energy efficiency, renewable energy, or resilience upgrades.

Environmental and Watershed Protection

Department of Public Works and Environmental Services, Fairfax, Virginia, 03/2020–06/2022
Water Resources Project Manager. Provided project management and design oversight of watershed restoration projects. Negotiated and prepared task orders with A/E consultants, coordinated surveys, utility designations, and

relocations for restoration projects, and collaborated with county agencies to enhance stormwater management on new and redevelopment projects. Worked closely with residents and community groups, ensuring transparent and strong engagement with the surrounding community. Led the development of stream restoration design databases for project documentation and analysis, and initiated new ideas and approaches to watershed and ecologicalrecovery through shared research and activities.

Center for Watershed Protection, Ellicott City, Maryland, 05/2017–03/2020
Director of Education and Training. Spearheaded the development of regulatory, educational, and technical watershed and stormwater training for professionals and workforce development programs, including the development of green jobs training programs for under- and unemployed young adults and individuals in low-income communities. Demonstrated leadership in the development of intensive and innovative proposals while successfully supervising projects dedicated to effectively restoring watersheds, including air quality and climate impacts. Led the formulation of strategic plans and effective operations. Served as Co-Chair of the EPA Chesapeake Bay Program, Stream Health Workgroup and Co-Editor of Watershed Science Bulletin.

Center for Watershed Protection, Ellicott City, Maryland, 04/2004–04/2017
Senior Research Analyst and Project Manager. Project Manager for multiple federal, state, and local grants, to include climate impacts on urban forests and trees, water quality, stormwater best management practices, emerging contaminants, and environmental curriculum development and training. Project Manager for Sediment Reduction and Stream Corridor Restoration for the US EPA Chesapeake Bay Program. Provided expertise to Chesapeake Bay partners to expand and accelerate implementation of nutrient and sediment loan reduction practices and technologies. Spearheaded proposal development and intensive research optimizing urban watershed management best practices. Facilitated public meetings and provided conference presentations, data analyses, report writing, professional presentations, literature review and synthesis. Managed cross-functional teams for watershed restoration projects. Served as Co-Chair of the EPA Chesapeake Bay Program, Stream Health Workgroup, and Co-Editor of the Watershed Science Bulletin.

University of Maryland University College, Adelphi, Maryland, 2009–2011
Adjunct Faculty. Administered curricula as an instructor for courses in Geographic Information Systems applied to urban watersheds. Developed class syllabus to ensure alignment with department standards and institutional goals. Worked collaboratively with the university to report student learning outcomes and analyze student data.

viridiant

Andrew Grigsby

Energy Services Director

Education & Training

- Master of Science, Community and Regional Planning, University of Texas, 1999
- Bachelor of General Studies, Virginia Commonwealth University, 1992

Professional Certifications and Licenses

BPI Building Analyst, Virginia Residential Building Energy Analyst

Professional Experience

Energy Services Director
Viridiant (April 2020 – Present)

- Establish and grow Viridiant's new Community Energy Services Department providing consumer services including home energy audits, energy efficient mortgages, utility rebates, solar programs, consulting and community education
- Engage the public, utility staff, community groups, government, and industry partners to promote clean energy solutions – via direct outreach, webinars, events, stakeholder meetings, and conference presentations

Executive Director
Richmond Region Energy Alliance (January 2020 – April 2020)

- Wrote/managed grants/partnerships to revive this non-profit and merge with Viridiant

Executive Director
Virginia Renewable Energy Alliance, Richmond, VA (December 2017 – December 2019)

- Led a state-wide trade group advancing renewable energy in Virginia
- Curated/executed conferences including the 2019 Virginia Clean Energy Summit

Business Develoment Director, Customer Solutions Manager
Secure Futures, LLC, Richmond, VA (October 2017 – December 2019)

- Secured 2.9MW of solar power purchase agreements (PPAs) in MUSH market
- Managed outreach campaigns, client sales cycle, education initiatives, community partnerships, events

Executive Director
Local Energy Alliance Program, Charlottesville, VA (February 2015 – September 2017)

- Managed budgeting, contracts, grants, business development, and strategic planning
- Managed staff activities and contributed materially to programs including solar power campaigns, energy audits, general contracting, community education

Sustainability Consultant, Owner
Commonwealth Sustainability Works, Richmond, VA (July 2001 – January 2015)

- Recommended green building designs, techniques, and materials to builders, homeowners, NGOs, local governments, and businesses
- Performed energy audits of hundreds of houses, apartments, and small businesses
- Developed/taught classes for businesses, NGOs, government agencies, schools

Related Experience

Virginia Energy Efficiency Council Executive Committee (2013-2016), Policy Committee (2016 to present); Virginia Multifamily Energy Efficiency Coalition member (2016-2017); Virginia State Building Code Energy Working Group member (2007-2020); presenter/moderator at local, state, and national conferences since 1999

Chelsea Harnish

409 E. Main St. ■ Richmond, VA 23219 ■ Phone: 804.457.8619 ■ E-Mail: Chelsea@vaeec.org

Experience

Executive Director, Virginia Energy Efficiency Council — November 2015- present

- Work with membership and stakeholders to fulfill the organization's mission through our programmatic work
- Lead the organization's regulatory and legislative work
- Manage budgets and contracts

Policy and Campaigns Manager, Climate and Energy, Virginia Conservation Network — July 2012-October 2015

- Facilitated monthly meetings and coordinate legislative agenda for work group during general assembly sessions
- Participated in revising state energy plan through four-year appointment on the Governor's Energy Council
- Wrote and edited whitepapers on energy policy for annual briefing book for state legislators and their staff

Project Management Consultant, Virginia Conservation Network — February 2012-June 2012

- Coordinated a press conference to release the report, *Potential Economic Impacts of Renewable Energy in Virginia*
- Set up a webinar for legislators to showcase report findings
- Worked with researchers and stakeholders to finalize the report for public release

Virginia Policy Coordinator, Chesapeake Climate Action Network — September 2010-February 2012

- Established the legislative agenda for Virginia staff
- Collaborated with coalition partners on federal and state environmental policy initiatives
- Lobbied General Assembly on priority energy legislation

Regional Campaign Coordinator, Chesapeake Climate Action Network — January 2009-August 2010

- Developed and implemented campaign strategy for federal, state and local issues
- Lobbied General Assembly on priority legislation with emphasis on renewable energy and energy efficiency
- Built grassroots base throughout Virginia to support our work

Development Associate, Clean Power Now — May 2008-December 2008

- Wrote grant applications for submission to foundations
- Assisted with direct mail appeals to our membership
- Planned and executed summer house parties

Membership Coordinator, Clean Power Now — October 2005-May 2008

- Coordinated with Executive Director to develop campaign strategy promoting Cape Wind
- Handled all communication with members including e-newsletters and campaign materials

Education

Boston University — September 2004

Master of Science in Biology with an emphasis in Marine Ecology and Conservation

University of South Carolina — May 2000

Bachelor of Science in Biology with an emphasis in Marine Science

Jessica K. Greene

OBJECTIVE

Continuously focused on turning my passion for environmental sustainability and social justice into practical actions that lead to positive changes for all.

REFERENCES

Available upon request.

ADDRESS

1007 West 42nd St
Richmond, VA 23225

PHONE

804.516.7198

EMAIL

jpkidder@gmail.com

LINKEDIN

Jessica (Kidder) Greene

EDUCATION

Master of Environmental Studies, May 2012

Virginia Commonwealth University | 4.0 GPA

B.S. in Environmental Science and Geography, May 2010

University of Mary Washington | 3.6 GPA

EXPERIENCE

SEPT 2016 - PRESENT

Director, Events & Digital Media | Virginia Energy Efficiency Council | Richmond, VA

- Work with membership and stakeholders to fulfill the organization's mission through programmatic work, including Commercial Property Assessed Clean Energy and local government engagement
- Developed and implement the organization's annual program evaluation
- Organize VAEEC events, including biannual forums, legislative site tours, workshops, and webinars
- Established and oversee the organization's Virginia Energy Efficiency Leadership Awards and Energizing Efficiency Campaign
- Maintain the website, including making sure existing content is up to date and creating new pages to reflect new programmatic work
- Design all VAEEC publications, including annual reports, strategic plans, event programs, case studies, and fact sheets using graphic design tools
- Collaborated with VAEEC staff and Board to create and implement our 2020-2023 and 2023-2025 strategic plans
- Represent the organization at industry events
- Past responsibilities: managed the internship program, created monthly e-newsletters and dedicated emails, managed social media platforms, membership management

APR 2015 – OCT 2016

Environmental Scientist | Environmental Stewardship Concepts | Richmond

- Provided outreach and education to clients, advocacy groups, and community members
- Submitted public comments to U.S. EPA on behalf of communities
- Updated and maintained the website, social media, action alerts, and monthly e-newsletters
- Assisted leadership with transition from an LLC to a 501(c)3 nonprofit

JAN 2015 – SEPT 2016

Climate Organizer | Virginia Conservation Network | Richmond

- Represented VCN in the Climate Action Campaign; always exceed the Campaign's quarterly metrics
- Solely organized numerous events and assisted with large-scale organization events
- Built and strengthened Virginia's clean energy campaign: conducted media outreach, met with local elected officials, circulated petitions, organized events, strategized and coordinated with coalition partners

viridiant

Sean Shanley
Interim Executive Director

Education & Training

- Master of Environmental Studies, Virginia Commonwealth University, 2008
- B.A., New Media, Emerson College, 2003

Professional Certifications

RESNET HERS Rater, RESNET Instructor, RESNET Quality Assurance Designee (QAD), LEED-AP for Homes, LEED for Homes QAD, WaterSense QAD, LEED for Homes Green Rater (inactive)

Professional Experience

Interim Executive Director, Viridiant (March 2024-Present)
Deputy Director, Viridiant (July 2022 – March 2024)
Director of Residential Operations, Viridiant (July 2016 – July 2022)

- Budgeting and financial oversight
- Present at conferences, lectures, trainings, and webinars
- Manage green building program delivery and quality assurance
- Implement process improvements and technology to aid staff efficiency and consistency

Director of Customer Experience
WegoWise, Boston, MA (August 2011 – June 2016)

- Managed the Client Services team to ensure renewals, support and sell additional services
- Increased efficiency of team through improved processes and tools, enabling them to support a larger customer base

Quality Assurance Designee
Viridiant (formerly EarthCraft Virginia), Richmond, VA (August 2011 – June 2016)

- Performed quality assurance for all raters under HERS Providership

Director of Residential Operations
Viridiant (formerly EarthCraft Virginia), Richmond, VA (October 2007 – August 2011)

- Performed quality assurance and mentoring for 30+ raters under RESNET HERS Providership.
- Managed EarthCraft House Single and Multi-Family programs, WaterSense Providership, and ENERGY STAR program process
- Instructed LEED for Homes, ENERGY STAR, and WaterSense trainings

Select Presentations

RESNET (2020): Co-presented "What we've learned from 10 years of multifamily HERS Ratings."
Virginia Governor's Housing Conference (2019): Co-presented "Energy Code: Meeting new requirements, mitigating risks."
Southeast Energy Efficiency Alliance Conference (2019): Co-presented "Local Strategies for Regional Problem"
Clean Energy Summit (2019): Presented "Bringing Buildings Forward: 2015 Virginia Energy Code."
RESNET (2018): Co-presented "Multifamily Housing: Perspectives from a multi-year study evaluating rated vs. measured energy performance and construction costs."

Select External Grants

"BENEFIT: Advanced Ready Workforce Southeast" Dept. of Energy
"Strategies to Increase Residential Energy Code Compliance Rates and Measure Results" Dept. of Energy
"Virginia Residential Energy Code Training" Dept. of Energy's Energy Efficiency and Conservation Block Grant

U.S. Department of Transportation
Federal Transit Administration

REGION III
Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia

1835 Market Street
Suite 1910
Philadelphia, PA 19103
215-656-7100
215-656-7260 (fax)

February 15, 2024

Ms. Julie Mussog
Chief Financial Officer
Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

Re: FY 2025 Indirect Cost Rate Proposal

Dear Ms. Mussog:

The Federal Transit Administration (FTA) has reviewed the Metropolitan Washington Council of Governments' (MWCOG) recent indirect cost proposal, as requested. As the Cognizant Agency for Indirect Costs, FTA concurs with MWCOG's use of a fixed rate with carryforward of 57.71% for the period of July 1, 2024 to June 30, 2025. This rate should be applied to direct salaries and wages, as specified in your Indirect Cost Rate Proposal.

As an agency receiving less than $35 million in annual direct federal funding, MWCOG is required to develop a plan every year and maintain the plan and all related supporting documentation for audit. MWCOG is not required to submit the plan for federal approval unless specifically requested to do so by FTA, or there is a change in accounting system or methodology, or the rate exceeds the last approved rate by more than 20 percent. The scope of FTA's review of future rates is based on the policies outlined in FTA's Circular 5010.1E.

Attached to this letter is the Indirect Cost Negotiation Agreement formally concurred and incorporated herein. FTA has completed and signed the attached agreement form. Please sign the agreement form and return a countersigned copy to our office. The countersigned document serves as your organization's record of FTA's concurrence with the FY 2025 indirect cost rate and should be provided to FTA and other Federal agencies to reflect the concurred rate, terms, and effective dates.

If you have any questions, please contact Kelly Tyler at (202) 366-3267 or email at Kelly.Tyler@dot.gov.

Sincerely,

Digitally signed by THERESA GARCIA CREWS
Date: 2024.02.15 08:17:45 -05'00'

Terry Garcia Crews
Regional Administrator

cc: Anna Douglas, MWCOG

Enclosure

INDIRECT COST NEGOTIATION AGREEMENT
BETWEEN THE
METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
AND THE
FEDERAL TRANSIT ADMINISTRATION

This agreement is made and entered between Metropolitan Washington Council of Governments (MWCOG) and the United States Department of Transportation, Federal Transit Administration (FTA), the cognizant Federal agency for indirect costs under government-wide Uniform Administrative Requirements and Cost Principles, 2 CFR 200.

The indirect cost rates concurred and contained herein are for use and may be charged to grant awards, cooperative agreements and contracts with the Federal Government, to which 2 CFR 200 Subpart E and Appendix VII applies, subject to the limitations contained in Section II.A of this agreement, as well as the grants management guidelines included in FTA's Circular 5010.1E.

The indirect cost rates were concurred by FTA in accordance with the authority contained in Appendix G of FTA Circular 5010.1E.

Section I: Rate

Type: Fixed with Carry Forward Adjustment

Effective Period: July 1, 2024 to June 30, 2025

Rate: 57.71 percent

Base: Direct salaries and wages

Applicable To: All programs not specifically exempted, or limited by law, or otherwise not applicable because special operating factors necessitate special indirect cost rates.

Section II: General

A. Limitations

The rates contained in this agreement may be subject to statutory or administrative limitations and are reimbursable through grant, contract, or other agreement only to the extent that funds are available. Acceptance of these rates is predicated on these conditions: (1) Only costs incurred by MWCOG were included in its indirect cost pool as finally accepted and are allowable under the governing cost principles; (2) The same costs that have been treated as indirect costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment, and (4) The information provided by MWCOG which was used to establish the rates are not later found to be materially incomplete or inaccurate by the Federal Government. In such situations, the agreement will be subject to reopening, and the rates may be adjusted and refunds made if the proposal included unallowable costs.

B. Accounting Changes

This agreement is based on the accounting system to be in effect during the agreement period. Changes in the method of accounting for costs that affect the amount of reimbursement resulting from the use of these rates require prior concurrence of FTA. Such changes include, but are not limited to, changes in the charging of a particular type of cost from indirect to direct. Failure to obtain concurrence may result in cost disallowances.

C. Fixed Rate with Carryforward

This agreement and concurrence is for fixed rate with carryforward indirect cost rates and is based on an estimate of the costs for the period covered by the rates. When the actual costs for this period are determined, an adjustment will be made to the rates for the subsequent Fiscal Years to compensate for the difference between the costs used to establish the fixed rates and actual costs as required under 2 CFR 200 Appendix VII.

D. Use by Other Federal Agencies

The rates in this Agreement were concurred in accordance with the authority in 2 CFR 200 Subpart E and Appendix VII, and should be applied to grants, contracts, and other agreements covered by this regulation, subject to any limitations in Section I or II.A above. Copies of this document may be provided to other Federal Agencies as a means of notifying them of this agreement.

E. Other

If any Federal contract, grant, or other agreement is reimbursing indirect costs by means other than the concurred rates in this agreement, MWCOG shall notify FTA.

Metropolitan Washington
Council of Governments

Julie Mussog
Julie Mussog
Chief Financial Officer

2-15-24
Date

U. S. Department of Transportation
Federal Transit Administration

Digitally signed by
THERESA GARCIA CREWS
Date: 2024.02.15 08:19:17
-05'00'

Terry Garcia Crews
Regional Administrator

Date

PRIORITY CLIMATE ACTION PLAN

Washington-Arlington-Alexandria
DC-VA-MD-WV Metropolitan Statistical Area

Prepared for the U.S. EPA as a deliverable for the Climate Pollution Reduction Grants (CRPG) Program, section 60114(a) of the Inflation Reduction Act

February 2024









Metropolitan Washington
Council of Governments

DISCLAIMER

This project has been funded wholly or in part by the United States Environmental Protection Agency (EPA) under assistance agreement 5D - 95316301 – 0 to the Washington D.C. Department of Energy and Environment (DOEE). DOEE engaged the Metropolitan Washington Council of Governments (COG) through a subgrant (GAN-FY23-COG-189) to develop this Priority Climate Action Plan (PCAP). The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

COG is an independent, non-profit association that brings area leaders together to address major regional issues in the District of Columbia, suburban Maryland, and Northern Virginia. COG's membership is comprised of 300 elected officials from 24 local governments, the Maryland and Virginia state legislatures, and U.S. Congress.

The Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Statistical Area (MSA) PCAP was developed to meet the requirements of the Climate Pollution Reduction Grants (CPRG) program, Inflation Reduction Act Section 60114(a). It does not replace or supersede the COG 2030 Climate and Energy Action Plan, rather it provides a set of priorities for the MSA that will enable governments and other stakeholders in the region to seek competitive implementation funding through the CPRG program, Inflation Reduction Act Section 60114(b).

CREDITS

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COG would like to acknowledge contributions from staff of the National Capital Region Transportation Planning Board (TPB). COG would also like to acknowledge the contributions of ICF and PRR, Inc, whose staff worked closely with COG and stakeholders to develop the PCAP.

ACKNOWLEDGMENTS

COG deeply appreciates the contributions of the CPRG Steering and Technical Committees, COG Committees and multiple stakeholders across the MSA.

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COG would like to acknowledge the contributions of multiple COG and TPB committees, including:

- Air and Climate Public Advisory Committee (ACPAC)
- Built Environment and Energy Advisory Committee (BEEAC)
- Chief Equity Officers Committee (CEOC)
- Climate, Energy and Environment Policy Committee (CEEPC)
- Food and Agriculture Regional Member (FARM) Policy Committee
- Metropolitan Washington Air Quality Committee (MWAQC)
- MWAQC Technical Advisory Committee (MWAQC-TAC)
- Regional Electric Vehicle Deployment (REVD) Working Group
- TPB Community Advisory Committee (TPB-CAC)
- TPB Technical Committee (TPB-Tech)

Additional stakeholders who engaged with COG are listed in Appendix F.

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ACRONYMS LIST

ACPAC	Air and Climate Public Advisory Committee
ATV	All-terrain vehicles
BAU	Business-as-usual
BEEAC	Built Environment and Energy Advisory Committee
BEPS	Building energy performance standards
BIPOC	Black, Indigenous, and People of Color
BRIC	FEMA Building Resilient Infrastructure for Communities
CBO	Community-based organizations
CCA	Community choice aggregation
CCAP	Comprehensive Climate Action Plan
CECAP	Community-wide Energy and Climate Action Plan
CEEPC	Climate, Energy and Environment Policy Committee
CEOC	Chief Equity Officers Committee
CGA	Common Grain Alliance
CHP	Combined heat and power
CMAQ	Congestion Mitigation and Air Quality
COG	(Metropolitan Washington) Council of Governments
CPRG	Climate Pollution Reduction Grants
CSNA	Climate Solutions Now Act
DERA	Diesel Emissions Reduction Act
DEQ	Virginia Department of Environmental Quality
DOE	U.S. Department of Energy
DOEE	D.C. District Department of Energy and Environment
DPOR	Department of Professional and Occupational Regulation
EEA	Equity Emphasis Areas
EV	Electric vehicles
ESPC	Energy Savings Performance Contract
FACS	Faith Alliance for Climate Solutions
FARM	Food and Agriculture Regional Member
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GCoM	Global Covenant of Mayors
GGRA	Greenhouse Gas Reduction Act
GHG	Greenhouse gas
GWRCCC	Greater Washington Region Clean Cities Coalition
HUD	Housing and Urban Development
ILSR	Institute for Local Self-Reliance
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act
LIDAC	Low-Income, Disadvantaged Community
MCEC	Maryland Clean Energy Center
MDE	Maryland Department of the Environment

MEA	Maryland Energy Administration
MSA	Metropolitan Statistical Area
MWAA	Metropolitan Washington Airports Authority
MWAQC	Metropolitan Washington Air Quality Committee
NVRC	Northern Virginia Regional Commission
PACE	Property Assessed Clean Energy
PCAP	Priority Climate Action Plan
REC	Renewable energy certificate
REVD	Regional Electric Vehicle Deployment
RHE	Rockville Housing Enterprises
SELC	Southern Environmental Law Center
SEU	Sustainable Energy Utility
STBG	Surface Transportation Block Grant
TPB	Transportation Planning Board
VMT	Vehicle miles traveled
WMATA	Washington Metropolitan Area Transit Authority
WSSC	Washington Suburban Sanitary Commission
WRRF	Water Resource Recovery Facility
WVSWMB	West Virginia Solid Waste Management Board
ZEV	Zero-emission vehicle

EXECUTIVE SUMMARY

Air pollution and climate change pose significant threats to communities and ecosystems worldwide, including the Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Statistical Area (MSA). The diverse communities in metropolitan Washington face health risks like respiratory and cardiovascular illnesses from exposure to air pollutants while climate change leads to additional risks like extreme heat, increased frequency and severity of extreme weather events, and flooding, which all pose additional risks to the safety and well-being of community members.

In light of these interconnected challenges, urgent and coordinated action by leaders is imperative to reduce air pollution and greenhouse gas (GHG) emissions to combat climate change and safeguard communities, particularly those most vulnerable to the impacts of climate change.

Gross GHG emissions for the MSA in 2020 were 61.4 million metric tons of carbon dioxide equivalent ($MMTCO_2e$). Net GHG emissions amounted to 54.2 $MMTCO_2e$ after accounting for the sequestration of GHG emissions attributed to the MSA's forests and green spaces.

In a business-as-usual (BAU) scenario, modeling results indicate that gross emissions are projected to increase by 38% between 2020-2050. Increased emissions are projected to be primarily from the buildings sector due to continued development and increased population growth.

Actions to improve air quality and reduce GHG emissions are underway, coordinated by the Metropolitan Washington Council of Governments (COG) staff and participating governments. COG, alongside Maryland, Virginia, Washington D.C., and many county and city governments within the MSA, have set ambitious goals to reduce GHG emissions. They have also created climate action plans and engaged with local residents and organizations to shape the future of climate resilience and mitigation in their jurisdictions.

The prospect of receiving funding from the Climate Pollution Reduction Grant (CPRG) to expand and accelerate these efforts would bring additional benefits to the MSA, including low-income, disadvantaged communities (LIDACs).

This Priority Climate Action Plan (PCAP) presents eight vital measures to reduce air pollution and GHG emissions in the MSA, summarized in Table 1. These measures were developed through a collaborative and iterative process with the many government offices and committees within the MSA and the states it crosses, as well as other stakeholders such as community-based organizations, private sector actors, utilities, planning boards and committees, and more. These are practical and achievable strategies spanning buildings and clean energy, transportation, waste, and land use sectors.

Table 1 represents cumulative GHG reductions or sequestration in the short term (2025 – 2030) and the long-term (2025 – 2050). In some instances, already existing modeling efforts from COG were used, and in other situations new modeling was conducted. The values presented in Table 1 are not additive as there may be areas of overlap between measures. This might result in double counting when comparing it to the clean and renewable energy measure, which also accounts for emissions reductions from cleaner electricity.

Table 1. Summary of PCAP Measures

Sector	Measure	Cumulative 2025-2030 GHG reductions ($MMTCO_2e$)	Cumulative 2025-2050 GHG reductions ($MMTCO_2e$)
Buildings and Clean Energy	Accelerate the deployment of energy efficiency solutions and decarbonization of residential, institutional, municipal, and commercial buildings.	5.00	66.67
Buildings and Clean Energy	Accelerate the deployment of clean and renewable energy.	2.66	11.24
Buildings and Clean Energy	Study, plan for, and deploy district energy and microgrid opportunities.	Varied based on system type, for a single generalized system ranges from 0.01 - 0.38	Varied based on system type, for a single generalized system ranges from 0.25 - 0.84
Transportation	Provide and promote new and expanded opportunities to reduce VMT through public transportation, non-motorized travel, micromobility, shared travel options, and development.	0.72	5.22
Transportation	Accelerate the deployment of low- and zero- emission transportation, fuels, and vehicles.	2.80	135.50
Transportation	Accelerate the deployment of off-road/non-road electric equipment.	3.40	17.74
Waste	Reduce GHG emissions from waste and wastewater treatment.	5.47	30.23
Land Use	Accelerate the expansion of the regional tree canopy and reduce tree canopy loss.	0.47	3.94

The GHG reduction measures described in the PCAP may provide more than just GHG emission reductions; they will result in additional co-benefits including improved air quality, quality job opportunities, cost savings, and enhanced community well-being across the MSA. From increasing energy efficiency in the buildings sector and developing clean energy generation to improving public transportation to planting more trees, the co-benefits these measures will provide to MSA communities, particularly to LIDACs, can be accelerated through additional funding and coordination action.

COG will develop a comprehensive CAP (CCAP) by 2025. In the meantime, COG will continue to meaningfully engage with stakeholders, including local governments, state governments, industry, community organizations, tribes, a matrix of stakeholders (e.g., Commissions, Committees, academic and research resources, CBOs, foundations and institutions), and the public to inform the development of the CCAP and in the implementation of climate actions, throughout the MSA.

1 INTRODUCTION

The Metropolitan Washington Council of Governments (COG) developed this Priority Climate Action Plan (PCAP) for the Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Statistical Area (MSA) to meet the requirements of the U.S. Environmental Protection Agency's (EPA) Climate Pollution Reduction Grants (CPRG) program. The CPRG program provides funding to states, local governments, tribes, and territories to develop and implement plans for reducing greenhouse gas (GHG) emissions and other harmful air pollution.

The Washington, D.C. Department of Energy and Environment (DOEE) awarded COG a subgrant to lead the development of this PCAP and the other required CPRG planning deliverables for the MSA, including a Comprehensive Climate Action Plan (CCAP, due mid-2025) and a Status Report (due 2027) for the MSA.

1.1 CPRG Program Overview

The Inflation Reduction Act (IRA), signed into law on August 16, 2022, directs funds to lower healthcare costs, increase America's energy security, improve the tax code, create good-paying jobs here in America, and address the existential threat of climate change by funding climate solutions. The IRA contains provisions that directly or indirectly address climate change, including reduction of U.S. GHG emissions and promotion of adaptation and resilience to climate change impacts.[1]

The CPRG program, authorized under Section 60114 of IRA, provides $5 billion in grants to states, local governments, tribes, and territories to develop and implement plans for reducing GHG emissions and other harmful air pollution. The program consists of two phases: planning and implementation. The planning phase provides $250 million in noncompetitive planning grants for state and local agencies, tribes, and territories to develop a PCAP, CCAP, and Status Report. The second phase provides $4.6 billion in competitive grants for eligible applicants to implement GHG reduction measures identified in their applicable PCAP(s).

Definitions

GHGs: GHGs include the air pollutants carbon dioxide (CO_2), hydrofluorocarbons (HFCs), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

GHG Inventory: A list of emission sources and sinks and the associated emissions quantified using standard methods.

GHG Reduction Measure: Implementable actions that reduce GHG emissions or enhance carbon removal. Measures that enhance "carbon removal" are those that increase the removal of carbon dioxide from the atmosphere through, for example, the uptake of carbon and storage in soils, vegetation, and forests (i.e., sequestration).

Benefits: Direct changes in air pollution (e.g., $PM_{2.5}$) that result from a GHG reduction measure.

Co-Benefits: Positive effects beyond the stated goal of a GHG reduction measure (e.g., improved public health outcomes, economic benefits, increased climate resilience).

Low Income Disadvantaged Community (LIDAC): Communities with residents that have low incomes, limited access to resources, and disproportionate exposure to environmental or climate burdens.

1.2 PCAP Overview and Definitions

This PCAP identifies high priority, ready-to-implement GHG reduction measures that will provide significant GHG reductions and other benefits to the metropolitan Washington region. The PCAP

[1] CRS. "Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change," October 3, 2022. https://crsreports.congress.gov/product/pdf/R/R47262.

measures were developed based on significant stakeholder engagement and input about potential concepts for which CPRG implementation funding may be sought. Table 2 outlines the information included in this PCAP.[2]

Table 2. Crosswalk of CPRG PCAP requirements to Metropolitan Washington Region PCAP Section

PCAP Required Elements	Metropolitan Washington Region PCAP Section
GHG Inventory	Section 2.1
Quantified GHG Reduction Measures	Section 4
Low-Income, Disadvantaged Community (LIDAC) Benefits Analysis	Sections 1.4 and 3, Section 4 within each measure
Review of Authority to Implement	Section 4 within each measure
PCAP Encouraged/Not Required Elements	
GHG Emissions Projections	Section 2.2
GHG Reduction Targets	Section 2.3
Benefits Analysis for Full Geographic Scope and Population	Will be assessed in the CCAP
Intersection with Other Funding Availability	Section 4 within each measure
Workforce Planning Analysis	Will be assessed in the CCAP

[2] US EPA. "Climate Pollution Reduction Grants Program: Formula Grants for Planning," March 1, 2023. https://www.epa.gov/system/files/documents/2023-02/EPA%20CPRG%20Planning%20Grants%20Program%20Guidance%20for%20States-Municipalities-Air%20Agencies%2003-01-2023.pdf

1.3 Scope of the PCAP

This PCAP covers the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA, the geographic area outlined in Figure 1.[3] The MSA crosses three states (Maryland, Virginia, West Virginia) and the District of Columbia and extends beyond COG's usual geography. Each of these states has developed its own PCAP. COG and the local governments within the MSA are coordinating with state CPRG leads to align GHG reduction priorities.

Figure 1. Jurisdictions included in the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA. Not listed but mapped jurisdictions include Arlington County (VA), City of Alexandria (VA), City of Fairfax (VA), City of Falls Church (VA), City of Fredericksburg (VA), City of Manassas (VA), and City of Manassas Park (VA).



[3] COG is comprised of 24 jurisdictions: The District of Columbia, Town of Bladensburg, City of Bowie, City of College Park, Charles County, City of Frederick, Frederick County, City of Gaithersburg, City of Greenbelt, City of Hyattsville, City of Laurel, Montgomery County, Prince George's County, City of Rockville, City of Takoma Park, City of Alexandria, Arlington County, City of Fairfax, Fairfax County, City of Falls Church, Loudoun County, City of Manassas, City of Manassas Park, and Prince William County. For more information, see https://www.mwcog.org/about-us/cog-and-our-region/local-governments/.

1.4 Approach to Developing the PCAP

1.4.1 GHG INVENTORY AND GHG REDUCTION TARGETS

COG regularly prepares a GHG inventory using the ICLEI (Local Governments for Sustainability) ClearPath tool.[4] COG leveraged and expanded its existing GHG inventory and projections to cover the entire MSA. COG used the existing 2020 GHG inventory for portions of the MSA that fall within COG's geographic scope. For counties and cities outside of this area, COG sought other data sources and approaches to prepare a 2020 GHG inventory for the MSA. Additional information on the GHG inventory may be found in Section 2.1 and Appendix A.

COG and many of the communities within the MSA already have established GHG reduction targets. These are described in Section 2.3 and Appendix B. During the CCAP development process, COG will work with jurisdictions across the MSA to establish an MSA-wide GHG reduction target(s).

1.4.2 PRIORITY GHG REDUCTION MEASURES AND THE PCAP

Many cities and counties within the MSA and the states that the MSA crosses have already engaged in significant climate planning efforts and action. Plans such as the *Metropolitan Washington 2030 Climate and Energy Action Plan,*[5] the *Tree Canopy Management Strategy,*[6] and climate and energy action plans from local governments across the region, and the 2022 TPB GHG Reductions Goals and Strategies Resolution (Resolution R18-2022), provided a solid foundation of planned and ongoing actions to reduce GHG emissions for the PCAP. Appendix B lists existing local, regional, and state plans.

To identify, prioritize, and analyze GHG reduction measures, COG used the process outlined in Figure 2. Stakeholder engagement activities were done continuously across all the steps discussed below.

Figure 2. COG's Process to Develop and Assess Priority GHG Reduction Measures



1. Collect priority project and program ideas. COG used multiple mechanisms to collect ideas for GHG reduction priorities across the MSA. COG reviewed existing plans and climate actions across the region. COG developed and distributed a project survey to CPRG Steering and Technical Committee members to complete or share with other stakeholders (see responses in Appendix D). A public survey was conducted via COG's CPRG website and other virtual channels to collect ideas on community climate priorities (see above and Appendix E).[7] Lastly, COG presented to and held discussions with many stakeholders on existing COG committees and with other external stakeholders.

[4] https://icleiusa.org/clearpath/
[5] https://www.mwcog.org/documents/2020/11/18/metropolitan-washington-2030-climate-and-energy-action-plan/
[6] https://www.mwcog.org/committees/regional-tree-canopy-workgroup/
[7] https://www.mwcog.org/environment/programs/climate-pollution-reduction-grants-cprg-program/

2. Compile ideas and develop GHG reduction measures. COG compiled existing plans and actions, along with responses to both the project and community climate priorities surveys. COG then reviewed these ideas to categorize them by relevant GHG inventory sector, identify themes, and group similar ideas to form broader GHG reduction measures. COG prepared an annotated draft list of measures. To be as inclusive as possible, COG did not explicitly cut any ideas from the initial draft measures list.

3. Prioritize GHG reduction measures. The annotated draft list of measures was shared with the CPRG Steering and Technical Committees and with other stakeholders for review through smaller discussions, webinars, and email. Specifically, COG asked for a review and feedback to identify any potential gaps reviewers saw in line with their priorities for funding, and to identify any potential measures to deprioritize. Using this feedback, COG finalized the list of GHG reduction measures presented in this PCAP.

4. Assess GHG reduction measures. As a next step, COG began to assess GHG reduction measures in line with PCAP requirements, such as quantified GHG reductions, authority to implement, LIDAC benefits, and other information (e.g., available funding, key implementors). COG sought input on many of these analysis elements in the initial project survey. Using the survey results, combined with other relevant information already in existing plans, and based on continued discussions with stakeholders and committees, COG assessed GHG reduction measures. Additional information on quantification of GHG reductions may be found in Appendix A.

5. Draft PCAP. COG drafted the PCAP using information from the previous steps and shared a version with the CPRG Steering and Technical Committees for review. A version of the draft PCAP was also posted publicly online to collect other stakeholder comments and feedback.

6. Finalize PCAP. COG reviewed comments and feedback on the PCAP, addressed many of these, filled in any remaining required information, and completed the PCAP.

1.4.3 IDENTIFYING AND ENGAGING STAKEHOLDERS

Throughout the process outlined above, COG engaged with stakeholders and community representatives throughout the MSA. Engagement consisted of meetings, communications, and coordination between COG, local, and regional climate change and community leaders to ensure that both regional perspectives and local needs are reflected in the plan. Committee members, stakeholders, and community representatives engaged during PCAP development can be found in Appendix F.

CPRG Committees

COG formed CPRG Steering and Technical Committees to advise on GHG emission reduction priority projects, programs, and measures. The committees are comprised of local and state government staff. Priority projects suggested by these groups informed the measures included in this PCAP.

Steering Committee meetings and Technical Committee meetings were held from November 2023 through February 2024, focused on PCAP development, implementation grant evaluation criteria and to discuss prioritizing projects, programs, and measures. The committees emphasized the best ways to collaborate among local governments and communities, and they will continue to advise on the CPRG program through 2027 when the program concludes.

Other COG Committees

In addition to the CPRG Steering and Technical Committees, COG holds regular meetings with local and regional committees representing climate and environmental concerns and with industries that significantly impact GHG emissions. The CPRG was a topic of discussion at recent and ongoing meetings of these committees.

Industry, Utilities, Other Government Partners, and Stakeholders

COG also conducted a succession of meetings, conversations, and emails with stakeholders to gather information, identify priorities, and make connections to inform the PCAP and implementation grant. Groups engaged include utilities, regional stakeholder groups, higher education institutions' sustainability directors, environmentally focused CBOs, and others.

LIDACs

LIDAC benefits and impacts are a primary consideration for selection of priority regional climate pollution reduction projects, programs, and measures. Recognizing that developing authentic and meaningful engagement with LIDACs relies upon dedicated outreach and time to develop relationships, COG targeted its PCAP LIDAC engagement efforts toward gathering and understanding existing priorities and issues identified through local initiatives, established engagement methods, and successful approaches. These efforts have laid the groundwork for deeper and sustained engagement during the development of the CCAP.

PCAP engagement included contributions representing LIDAC interests from both non-governmental organizations and government representatives. Community engagement webinars, individual engagement meetings, and a Community Climate Priorities survey (described below) were offered during the development of the PCAP.

In addition to the Community Climate Priorities survey, COG distributed a questionnaire to local governments, state governments, and COG committees, including the Chief Equity Officers Committee, to gather information about existing outreach activities with LIDAC representatives and organizations. The questionnaire focused on understanding recent and ongoing LIDAC engagement activities at the local level over the past two years and how such engagement informs climate action plans and priority projects, as well as community climate and energy goals. Additionally, the questionnaire sought input on the needs and priorities identified by LIDAC community members related to GHG reduction projects and activities connected to experienced impacts of climate change. This questionnaire is being used to inform future community engagement. COG continues to coordinate with its Chief Equity Officers Committee to provide input on engagement strategies for the CCAP.

Tribes

Tribal engagement is another distinct effort with a relationship building focus within COG's CPRG outreach efforts. COG aims to foster relationships with tribes and tribal communities, ensuring inclusivity throughout the CCAP development and, if awarded, CPRG implementation grant(s). During PCAP development, COG conducted tribal engagement with several tribal communities including the regional Accokeek Foundation and the Patawomeck Indian Tribe in Virginia. As of 2024, there are four state recognized tribes in the MSA including the Maryland Accohannock Indian Tribe, Maryland Piscataway Conoy Tribe, Maryland Piscataway Indian Nation, and the Virginia Patawomeck Indian Tribe. COG acknowledges that there are many indigenous people and communities living throughout the region and will work closely with tribal representatives and organizations to ensure inclusive and equitable contributions to the CCAP.

In meetings with tribal representatives from community and state tribes, several key themes emerged. Partnering on youth education was highlighted as a priority, recognizing the importance of passing down wisdom teachings and embracing the value of conservation for future generations. There was also a strong emphasis on healing the land from the impacts of urbanization and climate change, with a particular need for clean rivers and addressing invasive species. Energy and building retrofits were discussed as essential for environmental sustainability, with a desire to integrate traditional wisdom with modern technology. Concerns were raised about the potential impacts of data centers on the environment, emphasizing the need for careful planning and consideration of ecological restoration efforts. Discussions underscored the importance of a holistic approach, centering indigenous knowledge and values.

Community Members

To incorporate the perspective of community members across the MSA, COG disseminated the CPRG Community Climate Priorities survey to assess community-wide climate priorities. The survey was shared through multiple online channels, extending beyond formal committees to include distribution through social media, the COG CPRG and main COG websites, local representatives, and community-based/non-governmental organizations. The survey gained responses from 86 participants from 13 jurisdictions within the MSA, encompassing a diverse range of individuals, organizations, coalitions, and agencies. Participants were asked to prioritize strategies for mitigating climate change by ranking mitigation strategies. The eight strategies included in the PCAP were ranked by the community in the following order of importance:

1. Land Use
2. Energy Efficient and Clean Energy Buildings
3. Increasing Supply of On-site Clean Energy
4. Transit Options
5. Increasing Off-site Clean Energy
6. Transportation Technology
7. Waste Reduction, Composting, and Recycling
8. Carbon Removal and Sequestration

Participants were requested to reflect on specific equity priorities, barriers to action, and project ideas within the above eight strategies. Summary results are described in Appendix E.

1.4.4 CONTINUED ENGAGEMENT

During the PCAP development, COG strived for inclusivity and relationship building with sister agencies, jurisdictions throughout the MSA, tribes, industry partners, and CBOs representing LIDACs through stakeholder engagement sessions, surveys, and meetings. COG remains committed to broad public engagement during the CCAP development, with a focus on addressing environmental justice and equity concerns and supporting historically underrepresented and overburdened communities.

During development of the CCAP, a thorough Community Engagement Plan (CEP) will focus on diversity, equity, inclusion, and meaningful engagement of tribes and LIDACs in the MSA. Outreach to community stakeholders through ongoing and future engagements will include people and organizations that represent populations that have historically been marginalized, underserved, or left out of climate planning conversations. Through partnering with tribes, CBOs, and COG's

committee of Chief Equity Officers, a conduit for input and engagement across localities and sectors, particularly among underserved community members, is being established.

COG will work to ensure inclusive and equitable contributions to the CCAP and will focus on engagement that meets people where they are. COG aims to engage community members through various channels and will integrate survey responses, feedback from listening sessions, and insights from numerous meetings to further develop the CCAP Community Engagement Plan. Moreover, COG will actively seek input from a diverse audience throughout climate mitigation planning. For example, using insights from separate meetings with members of the Accokeek Foundation and the Patawomeck Indian Tribe, COG is coordinating with state partners experienced in working with state tribes and tribal communities to develop a comprehensive tribal outreach plan. By communicating closely with tribe representatives and organizations, COG will seek to understand initiatives underway and opportunities for future collaboration on projects, programs, and measures.

2 METROPOLITAN WASHINGTON'S CLIMATE CONTEXT

2.1 GHG Inventory

COG developed a GHG inventory of priority sources of GHG emissions within the MSA for the year 2020 (Table 3). A detailed methodology including data resources for the preparation of this inventory are contained in Appendix A. Gross GHG emissions for the MSA were 61.4 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2020. Net GHG emissions amounted to 54.2 $MMTCO_2e$ after accounting for the sequestration of GHG emissions attributed to the MSA's forests and trees.

Table 3. MSA GHG Emissions Inventory

Emissions Type	Emissions Activity or Source	Sub-Activity Source	2020 MSA Total Emissions ($MTCO_2e$)
BUILDINGS			33,079,836
Residential Energy	Emissions from Grid Electricity	Residential Electricity	6,887,936
	Emissions from Stationary Fuel	Residential Natural Gas	4,656,374
		Residential Fuel Oil	248,908
		Residential LPG	104,879
Commercial Energy	Emissions from Grid Electricity	Commercial Electricity	13,491,249
	Emissions from Stationary Fuel Combustion	Commercial Natural Gas	3,968,236
		Commercial Fuel Oil	62,663
		Commercial LPG	30,194
Process and Fugitive Emissions	Fugitive Emissions from Natural Gas Distribution	Natural Gas Fugitive Emissions	251,260
	Other Process and Fugitive	Hydrofluorocarbon (HFCs)	3,378,137
TRANSPORTATION			23,994,733
	On-Road Transportation (National Emissions Inventory [NEI])	On-Road Mobile Emissions	19,946,011

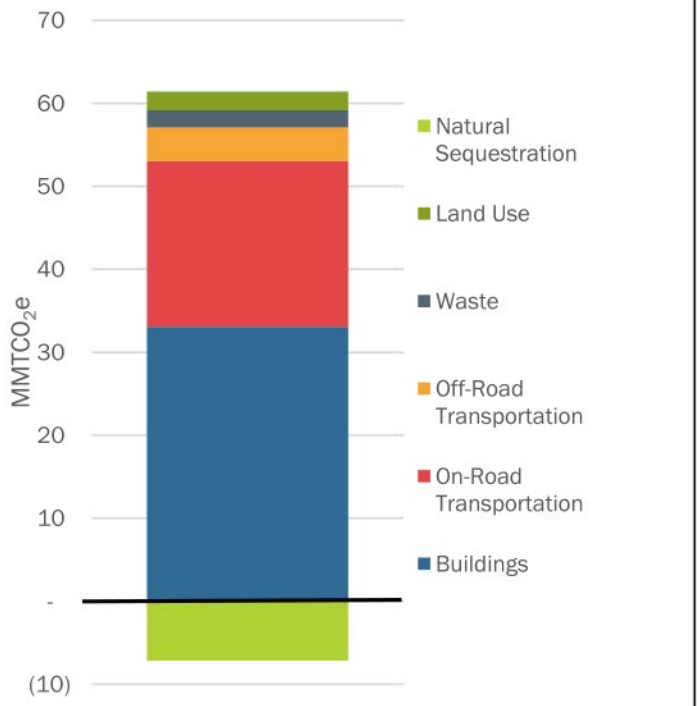
Emissions Type	Emissions Activity or Source	Sub-Activity Source	2020 MSA Total Emissions ($MTCO_2e$)
Transportation and Mobile Emissions	Emissions from Off-Road Vehicles (NEI)	Off-Road Mobile Emissions	2,194,931
	Aviation Travel	Passenger Air Travel	1,814,955
	Rail Transportation	Rail Transportation	38,836
WASTE			2,090,407
Solid Waste	Waste Generation	Landfill Waste Generation	1,390,042
	Combustion of Solid Waste Generated by the Community	Combustion of Solid Waste	618,679
Water and Wastewater	Fugitive Emissions from Septic Systems	Septic System Emissions	60,427
	Nitrification/Denitrification Process N_2O Emissions from Wastewater Treatment	Sewer System Emissions	14,873
	Process N_2O from Effluent Discharge to Rivers and Estuaries	N_2O Effluent Discharge Emissions	6,386
LAND USE			(4,921,268)
Agriculture	Emissions from Agricultural Activities	Enteric Fermentation	493,279
		Manure Management	139,287
		Ag Soils	539,978
Forests and Trees Outside of Forests	Average Annual Emissions	Forests Converted to Non-Forests	500,205
		Disturbances in Forests Remaining Forests	253,207
		Loss of Trees Outside Forests	307,305
	Average Annual Sequestration	Forests Remaining Forests	(5,018,124)
		Non-Forests Converted to Forests	(104,368)
		Trees Outside Forests	(2,032,037)
GROSS GHG EMISSIONS (ALL SECTORS)			61,398,238*
NET GHG EMISSIONS (ALL SECTORS)			54,243,709*

* Totals may differ due to rounding.

The GHG inventory represents GHG-emitting activities undertaken by residents, businesses, industry, visitors, and government located in the MSA. Approximately 54% of the MSA's gross GHG emissions come from residential and commercial building energy consumption and 39% from transportation (32% is on-road). The remainder of GHG emissions comes from other activities including solid waste, wastewater treatment, agriculture, and fugitive emissions (Figure 3).

Note that 2020 represents an atypical year of GHG emission levels due to the impacts of the COVID-19 pandemic. In many places, as in the metropolitan Washington region, this led to reduced GHG emissions from on-road transportation and changes in patterns in building energy use, along with other anomalies that may not be prevalent in future year inventories.

Figure 3. 2020 MSA GHG Emissions by Activity



2.1.1 GHG INVENTORY METHODOLOGY

The MSA inventory and previous COG inventories have been developed to be compliant with the U.S. Communities Protocol for Accounting and Reporting Greenhouse Gas Emissions (USCP), Global Protocol for Community Scale Greenhouse Gas Inventories (GPC), and Global Covenant of Mayors (GCoM) reporting framework. COG mainly follows the calculation guidance from USCP as the USCP identifies sources of data widely available to communities in the US. COG uses ICLEI's ClearPath tool Community Scale Inventory Module for preparing GHG inventories, which is consistent with both US and global accounting protocols.

COG made every effort to capture a complete and accurate picture of GHG trends across the MSA, while also providing for a consistent methodology that is replicable across communities and inventory years. The GHG inventories follow an activities-based approach, meaning emissions are calculated based on the result of activities happening in the local communities. Local results are totaled to create a picture for the region. See Appendix A for the full methodology.

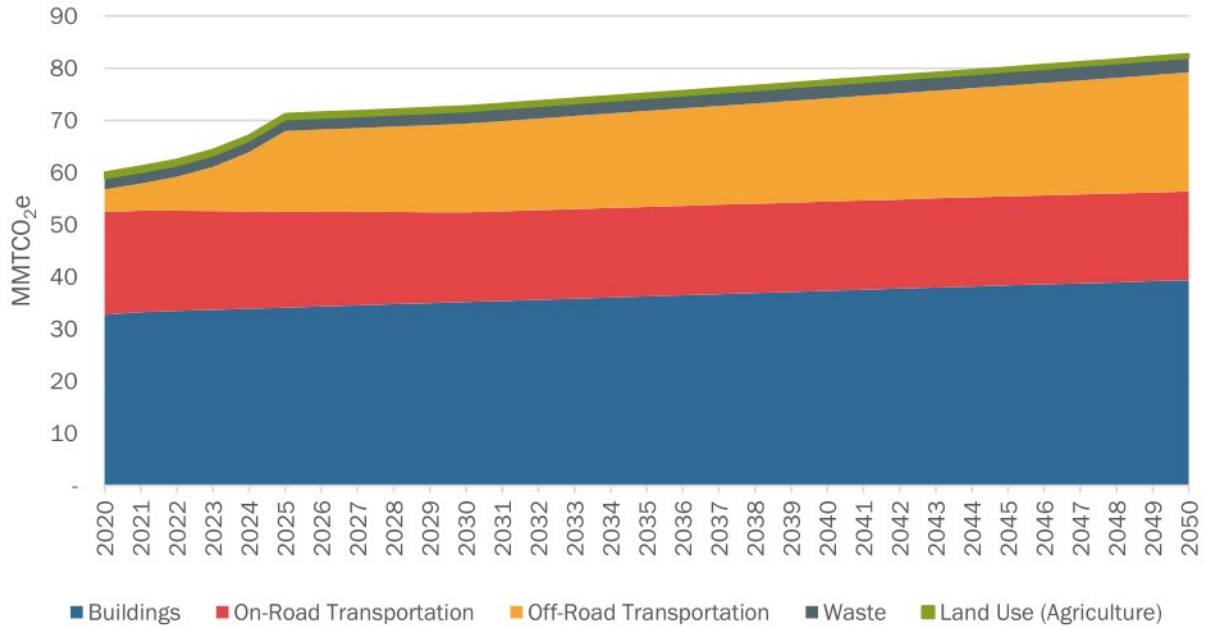
2.2 Business-As-Usual Projections

Business-as-usual (BAU) projections provide a baseline scenario for future GHG emissions. BAU projections account for driving factors such as growth in population, housing and commercial development, and transportation patterns, and estimate the impact they will have on future GHG emissions. BAU projections reflect policies and practices that are currently in place and implemented to-date to reduce GHG emissions, but do not incorporate any additional GHG emission reductions from anticipated future action.

The MSA BAU scenario for this PCAP projected gross GHG emissions out to 2050. Based on the assumptions used, gross emissions increased by 38% between 2020-2050 (not including Land Use - Forests and Trees Outside of Forests).

Figure 4 shows the region's projected BAU emissions to 2050.

Figure 4. MSA Business-As-Usual Projections



See Appendix A for a summary of BAU assumptions. Significant increases were seen in the buildings sector (31% and 10% for residential and commercial energy, respectively) because of continued development and increased population growth. Similarly, population growth is driving waste sector emissions. A decline in GHG emissions from on-road transportation (14%) is seen as a result of continued trends in alternative and electric vehicles, increased efficiency, and other related policies and programs.

2.3 GHG Reduction Targets

The COG Board previously established specific GHG emission reduction goals of 10% below BAU projections by 2012 (bringing regional emission back down to 2005 levels), 20% by 2020 and 80% by 2050 (below the 2005 baseline). In 2019, COG became a Signatory to GCoM. Based on review of the GCoM framework of global best practices for climate planning, updated Intergovernmental Panel on Climate Change (IPCC) recommendations, and a recommendation from the COG CEEPC, the Board approved new 2030 climate goals including:

- The climate mitigation goal of 50% GHG emission reductions below 2005 levels by 2030.
- The climate resilience goal of becoming a Climate Ready Region and making significant progress toward becoming a Climate Resilient Region by 2030.

To be climate ready by 2030, all local governments must assess current and future climate risks, and be actively integrating climate planning across government plans, operations, and communications. To fully be a Climate Resilient Region, the region must have the ability to adapt to

disturbances caused by current and future, acute and chronic climate impacts and successfully maintain essential functions.

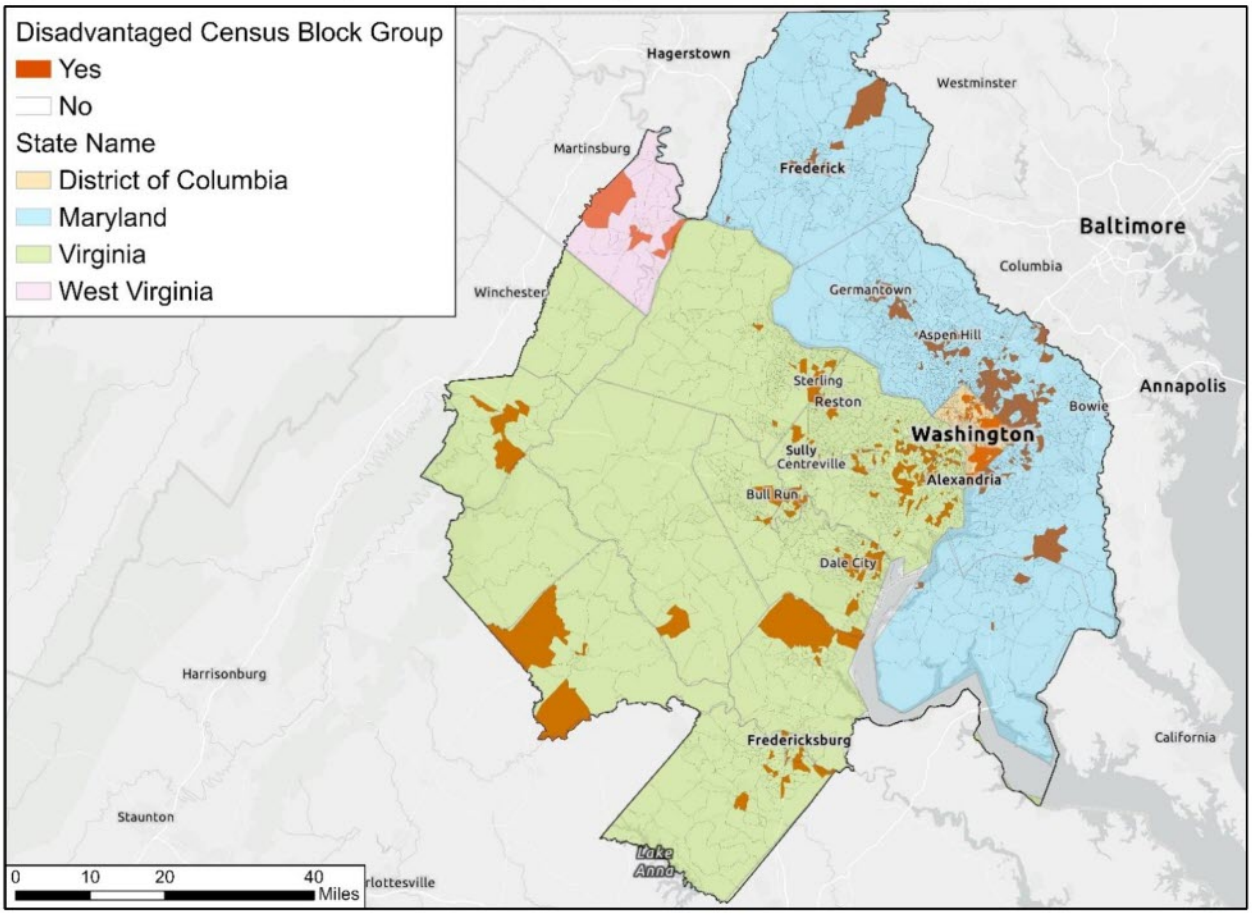
Along with the COG goals, local governments across the MSA and the states the MSA crosses have established goals. Appendix B lists existing local, regional, and state climate and energy goals and plans. During the CCAP development, COG will work with MSA jurisdictions and regional partners to establish an MSA-wide GHG reduction goal(s).

3 METROPOLITAN WASHINGTON LIDACS

3.1 Metropolitan Washington's LIDACs

To identify communities meeting the CPRG LIDAC definition, COG used EPA's Environmental Justice Screening and Mapping Tool (EJScreen) and supplementary data. EJScreen is a tool that uses demographic, social, and environmental datasets to assess the risks and burdens that different communities face. Communities identified as disadvantaged under the EJScreen tool for the MSA include any Census block group at or above the 90th percentile for any of EJScreen's Supplemental Indexes when compared to the nation. COG used EJScreen to visualize and identify Census block groups that EPA designates as disadvantaged in the state (see Figure 5).

Figure 5. LIDACs in the Metropolitan Washington Region as Identified Using EJScreen



In the metropolitan Washington region, 25% of the population is disadvantaged. The percentage of disadvantaged population varies across different states: 47% of the population in D.C., 28% in West Virginia, 23% in Maryland, and 21% in Virginia. A full list of the Census Block IDs that are identified as LIDACs in the MSA is included in Appendix C.

The metropolitan Washington region comprises diverse cities and counties with varying demographics such as education levels, income, and unemployment.

- Education levels vary across the MSA, with 4% of the overall population lacking a high school diploma. However, in LIDACs, this percentage is double the average at 8%.[8]
- Economic diversity is evident in the region's median household incomes. The average median household income across the MSA counties is approximately $125,000. However, within LIDACs, the median household income for the MSA is about 30% less on average at approximately $85,000. Warren County (VA), the City of Fredericksburg (VA), and Jefferson County (WV) reported the lowest household median incomes at $85,096, $89,612, and $94,897, respectively.[9]
- Overall, the unemployment rate in the MSA is 5%, although unemployment rates vary across the region. The District of Columbia experiences the highest overall unemployment rate in the region at 5%; this rises to 10% in LIDAC communities within the District. Maryland experiences the lowest unemployment rate, at about 5% (7% in Prince George's County, 5% in Montgomery County, and 4% in Frederick County). In Virginia, unemployment is 4% (3% in Loudoun County, 5% in Prince William County, 4% in Fairfax County, and 3% in Arlington County). The unemployment rate in Jefferson County, WV is 5%.[10]

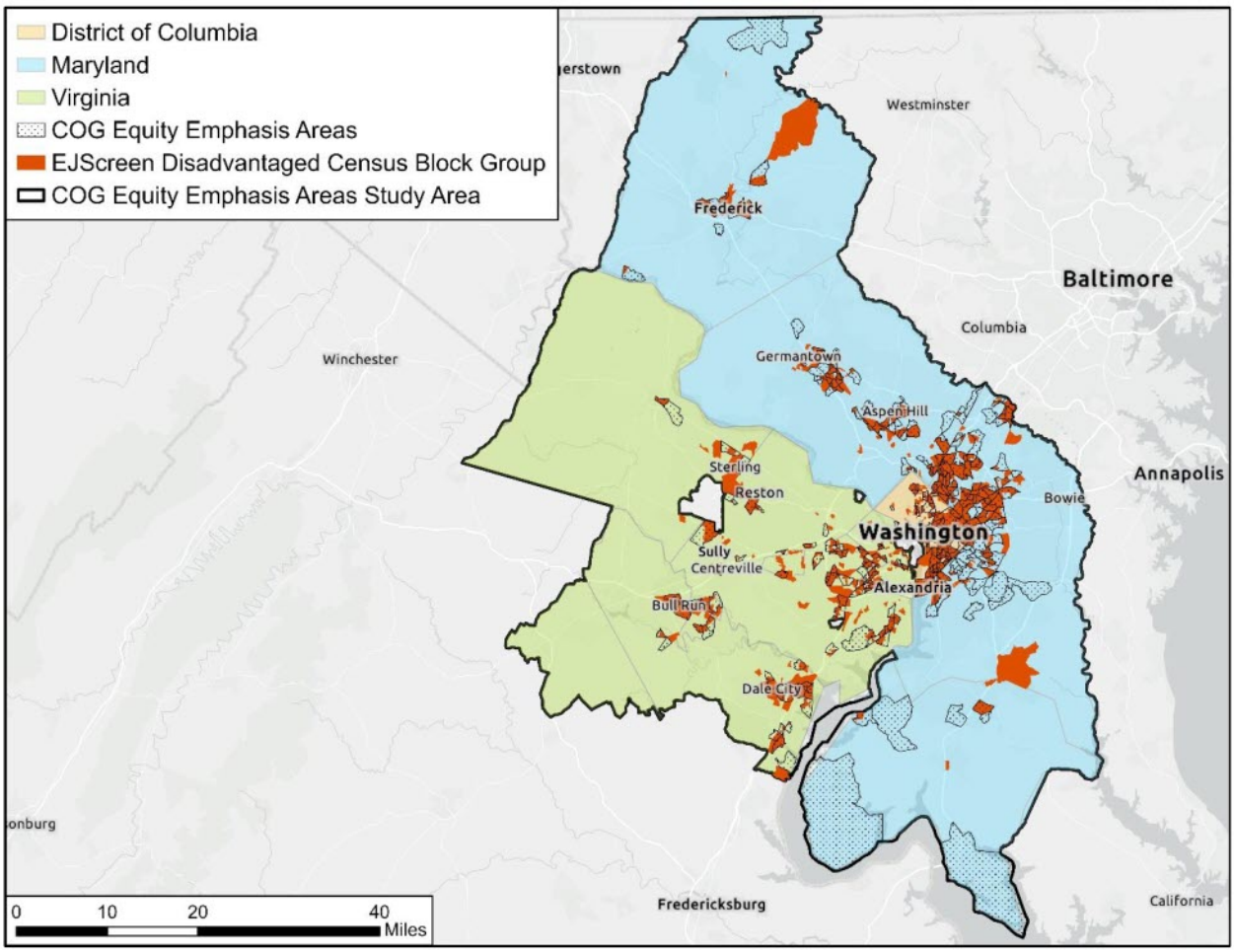
The area that is comprised of the largest cluster of connected LIDACs is in Prince George's County (MD). According to the U.S. Census data, Prince George's County is 64.1% Black, 27.0% White, and 4.4% Asian, and 20.9% Hispanic. The racial makeup of the County shows the intersectionality of socio-economic disparities and race, emphasizing the need for targeted and equitable interventions to address systemic inequalities. Prince George's County also reported the highest number of persons who have not attained a high school diploma with 13,997 persons, followed by Montgomery County (MD) with 12,957 persons, and Fairfax County (VA) with 11,256 persons. A similar pattern exists for English proficiency—Prince George's County (16,842 persons), followed by Montgomery County (9,886 persons) and Fairfax County (8,835 persons) reported the highest number of persons experiencing limited English proficiency.[11]

Additionally, as a part of its regular planning and programming, COG's Transportation Planning Board (TPB) developed Equity Emphasis Areas (EEAs)[12] throughout the COG region to elevate equity and inform future growth and investment decisions (see Figure 6 for EEAs). Analysis of the EEAs show significant overlap with LIDACs.[13]

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[8] Census Bureau. American Community Survey. 2022. https://www.census.gov/data/developers/data-sets/acs-5year.html
[9] Census Bureau. American Community Survey. 2022. https://www.census.gov/data/developers/data-sets/acs-5year.html
[10] Census Bureau. American Community Survey. 2022. https://www.census.gov/data/developers/data-sets/acs-5year.html
[11] https://www.census.gov/quickfacts/fact/table/princegeorgescountymaryland/PST045223
[12] For more information, see https://www.mwcog.org/newsroom/2021/09/24/equity-emphasis-areas-a-tool-to-prioritize-and-invest-in-communities–equity/.
[13] EEAs have high concentrations of low-income individuals and/or traditionally disadvantaged racial and ethnic population groups. For more information, see here: https://www.mwcog.org/transportation/planning-areas/fairness-and-accessibility/environmental-justice/equity-emphasis-areas.

Figure 6. Overlay of COG EEAs and MSA LIDACs Identified with EJScreen



Recognizing the disparities highlighted in the demographic information across the MSA, particularly within LIDACs and EEAs, COG emphasizes the importance of targeting climate investments in LIDAC (and EEA) community priorities. While the range of low-income, unemployed, low educational attainment, and limited English proficiency varies throughout the region, there are opportunities to positively impact many LIDACs through concentrated and focused efforts in the areas of workforce development, training, and an overall focus of green job creation and sustainable yet affordable housing. COG's LIDAC analysis provides valuable insight to support the implementation of outreach programs to meaningfully engage LIDACs using languages spoken at home, diverse imagery, plain language, and other tools that meet the needs of historically underserved populations.

Consideration of LIDACs is a priority focus for COG when selecting climate pollution reduction projects, programs, and measures. Organizations representing LIDACs and local representatives who frequently work with LIDACs were engaged in the creation of this PCAP. A summary of the engagement efforts conducted with LIDACs is presented in Section 1.4. Furthermore, COG plans to conduct direct and comprehensive engagement with LIDACs throughout the development of the CCAP.

3.2 Climate Impacts and Risks to Metropolitan Washington's LIDACs

Social systems amplify negative impacts from climate risks on Black, Indigenous, and People of Color (BIPOC) individuals and communities, income-eligible households, unhoused individuals, rural communities, and outdoor and agricultural workers.[14] Not only do these communities experience the most severe impacts of climate change, but they are also the least able to prepare for and respond to these impacts due to a lack of resources and socio-political power. According to a 2021 EPA analysis, racial and ethnic minorities are particularly vulnerable to climate change impacts, especially Black and African American individuals.[15]

Minority and low-income communities are more likely to suffer the consequences of climate change due to heightened exposure to climate risks and inaccessibility to resources, such as adequate infrastructure and insurance coverage. Many factors contribute to this inequality, including historical discriminatory practices in housing, education, and employment. Pre-existing health status and living conditions are two key components of climate vulnerability, which are often determined by economic power, social policies, political influence, and structural racism.[16]

Within the Washington MSA, the most prevalent climate risks are extreme heat, extreme precipitation events, sea level rise, and storm surge. These climate risks were evaluated as part of *Climate Ready DC: the District of Columbia's 2016 Plan to Adapt to a Changing Climate* (which applies specifically to D.C.), the Metropolitan Washington *2030 Climate and Energy Action Plan* published in 2020, and other local climate plans. Further, COG and TPB's evaluation of climate risks to the EEAs determined that communities within EEAs are particularly vulnerable to climate risks, including extreme heat, extreme weather and flooding, and sea level rise.

In D.C, average annual temperatures have risen 2°F over the last 50 years and are projected to continue rising in the future. Historically, the average summer high was 87°F. By 2080, this number is projected to increase to 93°F (in a low emissions scenario) or 97°F (in a high emissions scenario). In addition to rising average temperatures, climate change is leading to more intense and frequent heat waves. In 2012, a record-breaking heatwave hit the region and temperatures exceeded 95°F for 11 days. Currently, D.C. experiences 30 "dangerously hot days" (days exceeding 95°F) a year; by 2080, projections indicate that there will be 40-75 of these days. The number of extreme heat days and heat waves is projected to increase across the whole MSA as well; the number of days per year with temperatures above 95°F could reach around 40 days by 2080 under a low emissions scenario, and around 60 days by 2080 under a high emissions scenario.[17]

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[14] Marino, E.K., K. Maxwell, E. Eisenhauer, A. Zycherman, C. Callison, E. Fussell, M.D. Hendricks, F.H. Jacobs, A. Jerolleman, A.K. Jorgenson, E.M. Markowitz, S.T. Marquart-Pyatt, M. Schutten, R.L. Shwom, and K. Whyte, 2023: Ch. 20. Social systems and justice. In: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. https://doi.org/10.7930/NCA5.2023.CH20

[15] EPA. 2021. Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency, EPA 430-R-21-003. www.epa.gov/cira/social-vulnerability-report

[16] Patnaik, A., Son, J., Feng, A., Ade, C., 2020. Racial Disparities and Climate Change. Princeton Climate Action. https://psci.princeton.edu/tips/2020/8/15/racial-disparities-and-climate-change

[17] A high emissions scenario refers to a Shared Socio-economic Pathway (SSP) that represents the upper boundary of radiative forcing (for example, SSP5-8.5 represents a pathway with an additional radiative forcing of 8.5 W/m^2 by 2100). Under a high emissions scenario, there is intensified exploitation of fossil fuel resources and a more energy-intensive global lifestyle (Böttinger, M. and Kasang, D. The SSP Scenarios. Deutsches Klimarechenzentrum. https://www.dkrz.de/en/communication/climate-simulations/cmip6-en/the-ssp-

The median number of extreme heat days a year in the MSA is 8.61 days; the median in LIDACs is 8.75 days, demonstrating disparities between communities. Urban heat island effects will put populations residing in urban areas at even greater risk of the health effects of extreme heat. Montgomery County mapped urban heat islands across the county to determine the communities that will be most affected.[18] More frequent and severe droughts will also impact the Potomac River and put vulnerable populations in danger due to agricultural and water system disruptions. Rising temperatures may also increase the occurrence of harmful algal blooms in freshwater and marine ecosystems in the MSA, including in the Potomac River.

Although annual amounts of precipitation have not changed significantly, seasonal precipitation rates have changed; fall and winter rates have increased while summer rates have decreased. Additionally, the frequency and intensity of extreme precipitation events is increasing. Today's 1-in-100-year precipitation event could become a 1-in15-year event by late-century for the MSA.

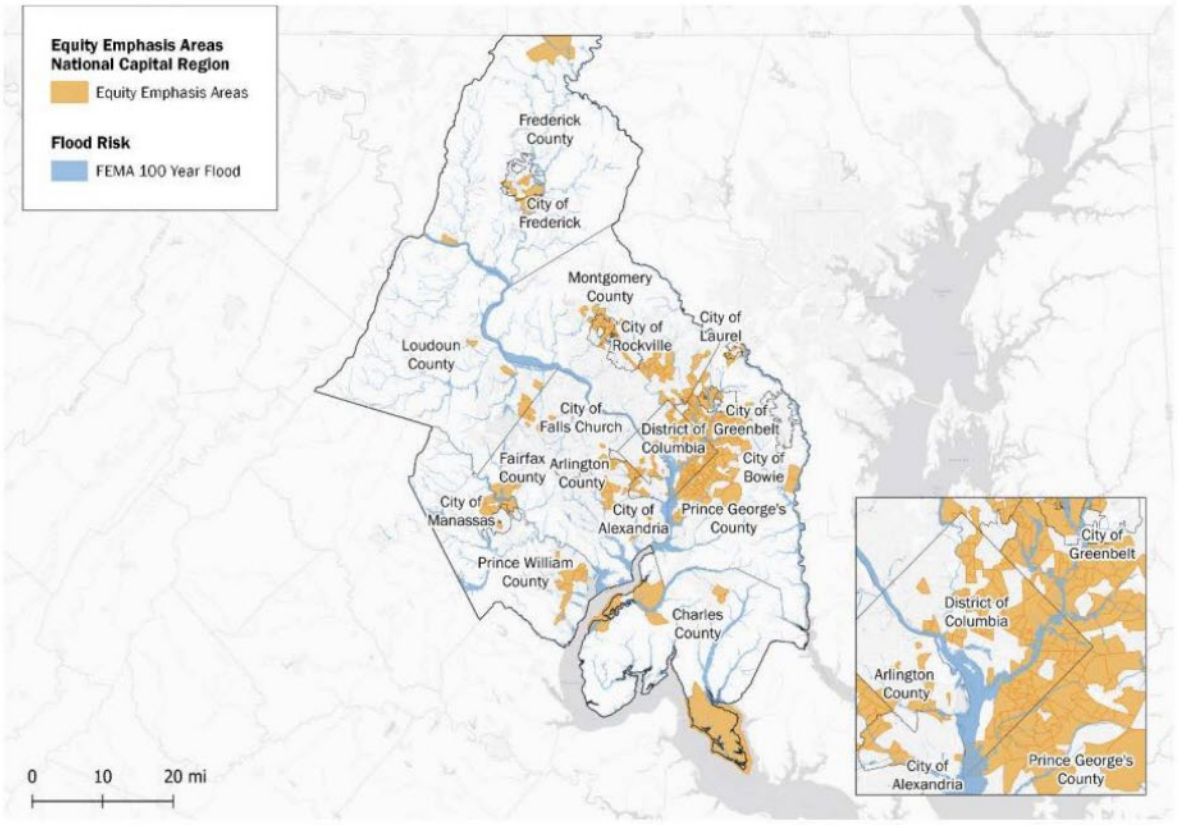
Sea level rise is a problem for low-lying areas in the MSA, particularly in LIDACs. Water levels for the Potomac and Anacostia Rivers (which are both tidal and border LIDACs) have risen 11 inches in the past 90 years. This has resulted in a 300% increase in nuisance flooding along the riverfront. By 2080, there could be up to 3 feet and 5 inches of additional sea level rise. Coastal storms such as hurricanes also create flooding events, and climate model projections indicate that hurricanes will become more intense in the future. The threat of stronger hurricanes combined with rising sea levels puts the region at very high risk of flooding.

EEAs will be more impacted by inland and coastal flooding as well. About 60% of EEAs lie in FEMA 100-year floodplains (about 1 million people total) (see Figure 7), and more than 10% of EEAs will be impacted by a 6-foot sea level rise.

scenarios#:~:text=SSP585%3A%20With%20an%20additional%20radiative%20forcing%20of%208.5,CMIP5%20scenario%20RCP8.5%2C%20now%20combined%20with%20socioeconomic%20reasons.)

[18] https://storymaps.arcgis.com/stories/389babe7ce654fdd87701488ae72e8b6

Figure 7. Equity Emphasis Areas and Inland Flooding Zones for the COG region (orange areas indicate EEAs and blue areas indicate FEMA 100-year floodplains).



Source: FEMA and COG Equity Emphasis Areas

3.3 Benefits and Co-Benefits of GHG Reduction Measures to Metropolitan Washington's LIDACs

Reducing GHG emissions presents a large opportunity to advance equity, environmental justice, health, and economic outcomes in LIDACs. Through strategic interventions in sectors such as buildings, clean energy, transportation, land use, and waste management, communities can experience tangible benefits, including improved air quality, enhanced energy efficiency, increased resilience, and increased access to affordable housing and transportation. Notably, within the eight priority GHG reduction measures, there are significant opportunities to reduce household costs, improve quality of life through better air quality, enhanced green spaces, transit accessibility, and reduced health risks.

Substantial opportunity also exists to enhance the clean energy workforce through tailored trainings, internships, and job placements by both leveraging existing programs and developing new ones. By prioritizing outreach, education, and workforce development initiatives tailored to the needs of LIDACs, climate action programs can effectively mitigate emissions while promoting social equity and building more sustainable and resilient communities.

Additional information on the benefits of each GHG reduction measure for LIDACs in the MSA are presented as a part of each measure below in Section 4.

3.4 Equity, Environmental Justice, and LIDAC Priorities

Through the engagement efforts described in Section 1.4, notable emphasis was placed on equity and environmental justice, particularly concerning the needs of LIDACs. Concerns included air and water quality, greenspace availability, the overall quality of life, and the importance of ensuring that climate initiatives benefit people who have historically faced disproportionate environmental burdens.

Community engagement and empowerment emerged as significant aspects of equity impacts. Responses highlighted the community's call for public support, ensuring investment returns to communities, and involving communities in decision-making during project planning. Priorities also include a focus on addressing food security, creating employment opportunities, and supporting local environmental initiatives in historically underserved neighborhoods.

When asked what emissions reduction projects would have the most positive impact on LIDACs and historically underrepresented communities, responses outlined initiatives and supported priority GHG reduction measures that align with and can be tailored to the unique needs of LIDAC communities. Specifically, communities that include people who use English as a second language, people impacted by environmental impacts on food security, communities overburdened by climate change, air quality, and transportation GHG emissions and pollution, and communities impacted by waste infrastructure such as landfills, incineration sites and trash/recycling collection facilities.

Representatives encouraged the creation or enhancement of programs for climate-related workforce development, increasing access to electric vehicles (EVs), charging infrastructure, and public transit, decreasing vehicle miles traveled (VMT), and clean, efficient, and renewable energy such as solar and weatherization programs. Identified key strategies include:

- Promoting non-car travel, featuring expanded bike lanes, improved bus availability, and pedestrianized streets aimed at enhancing safety and accessibility;
- Locating affordable housing near transit, with an emphasis on the importance of funding for such initiatives;
- Implementing energy efficiency and electrification projects in multifamily and commercial buildings as a crucial step toward reducing energy consumption and emissions;
- Supporting local agricultural and food security initiatives such as community composting and neighborhood farming; and
- Accelerating reuse and repair initiatives, emphasizing waste reduction and promoting local employment.

4 PRIORITY GHG REDUCTION MEASURES

Eight high priority GHG reduction measures were identified for this PCAP, as presented in Table 4. These measures were developed through a collaborative and iterative process with the many government offices and committees within the MSA and the states it crosses, as well as other stakeholders like community-based organizations, private sector actors, utilities, planning boards and committees, and more. These are practical and achievable strategies spanning buildings and clean energy, transportation, waste, and land use sectors.

Table 4. Summary of PCAP Measures

Sector	Measure	2025-2030 GHG reductions ($MMTCO_2e$)	2025-2050 GHG reductions ($MMTCO_2e$)
Buildings and Clean Energy	Accelerate the deployment of energy efficiency solutions and decarbonization of residential, institutional, municipal, and commercial buildings.	5.00	66.67
Buildings and Clean Energy	Accelerate the deployment of clean and renewable energy.	2.66	11.24
Buildings and Clean Energy	Study, plan for, and deploy district energy and microgrid opportunities.	Varied based on system type, for a single generalized system ranges from 0.01 - 0.38	Varied based on system type, for a single generalized system ranges from 0.25 - 0.84
Transportation	Provide and promote new and expanded opportunities to reduce VMT through public transportation, non-motorized travel, micromobility, shared travel options, and development.	0.72	5.22
Transportation	Accelerate the deployment of low- and zero-emission transportation, fuels, and vehicles.	2.80	135.50
Transportation	Accelerate the deployment of off-road/non-road electric equipment.	3.40	17.74
Waste	Reduce GHG emissions from waste and wastewater treatment.	5.47	30.23
Land Use	Accelerate the expansion of the regional tree canopy and reduce tree canopy loss.	0.47	3.94

The GHG reduction measures described in the PCAP may provide more than just GHG emission reductions; they will result in additional co-benefits including improved air quality, quality job opportunities, cost savings, and enhanced community well-being across the MSA. From increasing energy efficiency in the buildings sector and developing clean energy generation to improving public transportation to planting more trees, the co-benefits these measures will provide to MSA communities, particularly to LIDACs, can be accelerated through additional funding and coordination action.

Implementing these measures will depend on available funding, other resources (e.g., staff time), evolving and diverse policy and regulatory landscapes across multiple states, supply chain availability, among other factors. However, COG has outlined a general timeline for PCAP implementation, milestones, and next steps below in Table 5.

Table 5. PCAP Proposed Timeline and Next Planning and Implementation Steps

Milestone	Timeframe
2024	
Deliver final PCAP to EPA	March 1, 2024
Submit CPRG implementation grant	April 1, 2024
Continued engagement, planning, and analysis for the CCAP	May 2024 – December 2024
Expand, accelerate, and develop pilots and programs with CPRG funding, pending award decisions	Late 2024
Continued regional climate action, funding applications, and building on ongoing activities, and aligning/emphasizing PCAP measures	Throughout 2024
2025 - 2026	
Continued engagement, planning, and analysis for the CCAP	Early 2025
Deliver final CCAP to EPA	Mid-2025
Establish approaches for ongoing metrics tracking and track metrics	Late 2025 and on
Continued regional climate action, funding applications, and building on ongoing activities, and aligning/emphasizing PCAP and CCAP measures	Throughout 2025 and 2026
Expand, accelerate, and develop pilots and programs with CPRG funding, pending award decisions	Throughout 2025 and 2026
2027	
Deliver Status Report to EPA	Mid-2027
Continue to implement measures and reduce GHGs at the county and municipal level; Track progress across the MSA	2027 onward

4.1 Buildings and Clean Energy

ACCELERATE THE DEPLOYMENT OF ENERGY EFFICIENCY SOLUTIONS AND DECARBONIZATION OF RESIDENTIAL, INSTITUTIONAL, MUNICIPAL, AND COMMERCIAL BUILDINGS.

Decarbonizing buildings through energy efficiency, fuel switching, adaptive reuse, and other actions are a high priority for the MSA. Building energy consumption accounted for approximately 50% of GHG emissions in the metropolitan Washington region in 2020. This measure focuses on increasing opportunities for owners and users of all building types to access and install technologies to decrease overall energy consumption, increase energy efficiency, and reduce GHG emissions from the built environment. It covers both market rate and low/moderate income customers and private and public buildings.

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTOR(S)

This measure will reduce GHG emissions in the buildings inventory sector. Cumulative estimated GHG emissions reduction potential for this measure are:

GHG reductions ($MMTCO_2e$), 2025-2030	GHG reductions ($MMTCO_2e$), 2025-2050
5.00	66.67

Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCIES AND PARTNERS

- **State governments.** Government organizations such as the D.C. DOEE, Maryland Green Building Council, Maryland Department of the Environment, Maryland Energy Administration, Maryland Clean Energy Center, Virginia Department of Housing and Community Development, and others offer programs to provide funding and technical assistance for energy efficiency and electrification projects. This may include departments of energy, environment, housing, school districts, and others. Government facilities also are opportunities for building efficiency and decarbonization.
- **Local governments, including public schools.** Local departments of energy, environment, housing, school districts, and others may have additional programs and policies to provide funding and technical assistance for energy efficiency and electrification projects. Government and public facilities and sites also provide opportunities to improve regional building efficiency and reduce GHG emissions from the built environment.
- **Energy utilities.** Most utilities in the MSA serve as providers of existing energy efficiency and building decarbonization programs for rate-payers.
- **Businesses, hospitals, private schools, universities, water utilities, airports, data centers, places of worship**. These entities will implement building improvements and design/build decarbonized buildings.
- **Property owners, developers, renters**. As end users, homeowners, property owners, developers, and renters can make behavior changes and decisions that affect building efficiency. While property owners and developers generally have more control over changes to and within buildings, especially at the time of new construction or major renovations, renters can also make behavior and other changes that will result in GHG reductions.

- **Contractors and equipment/energy service providers.** These partners provide the services and equipment to decarbonize buildings, and may include architects, engineers, energy auditors, consultants, and more. Workforce development organizations also play a key role in building the pipeline of skilled workers to serve the building sector's decarbonization needs.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:

- Create voluntary and/or mandatory benchmarking and labeling programs for buildings.
- Strengthen green building policies and energy codes. Implementing strengthened codes, including "stretch codes," can encourage the mitigation of air pollutants from buildings.
- Conduct energy audits and site assessments. By conducting these assessments, implementers can collect information on which areas of the building inventory, if any, need additional support in achieving improved energy efficiency and decarbonization, and have the highest potential to result in energy savings.
- Facilitate net zero building development. Prioritizing low emissions practices across the lifecycle (in construction, maintenance, and end of life) of new buildings and retrofits to existing buildings can yield more integrated emissions savings.
- Expand or create new programs and incentives for retrofits and upgrades to residential, multifamily, and commercial properties (e.g., building efficiency retrofits including window replacements, insulation, more efficient and/or electric appliances, hybrid or all-electric heat pumps or more efficient gas heat pumps).
- Implement energy efficiency and fuel switching in all buildings, particularly data centers and other large energy users (e.g., hospitals, life sciences, wastewater utilities, CHP/District Energy operators), including implementing solutions to make buildings more efficient and decarbonize buildings, including reducing the use of building-code-required back up diesel generators and transition to cleaner alternatives.
- Expand and/or create new programs for retrofits, incentives, and upgrades to municipal and government buildings, including public schools, government buildings, and operations (e.g., building efficiency and electrification retrofits, street lighting and stadium lighting retrofits, microgrids).
- Fund the deployment of microgrids.
- Plan for and address electric panel and electrical transformer upgrades in residential and commercial properties to support electrification.
- Address refrigerant use in buildings (HVAC, chillers, refrigeration) through replacement with lower global warming potential refrigerants/natural refrigerants.

Some of these activities are already underway to varying degrees across the metropolitan Washington region. For example, the Maryland Climate Solutions Now Act of 2022 requires the Maryland Department of the Environment (MDE) to develop building energy performance standards (BEPS).[19] MDE must develop standards for buildings that, among other requirements, achieve a 20% reduction in net direct GHG emissions by January 1, 2030 compared with 2025 levels for average buildings of similar construction and net-zero direct GHG emissions by January 1, 2040.

[19] https://mde.maryland.gov/programs/air/ClimateChange/Pages/BEPS.aspx

Buildings subject to BEPS in Maryland are 35,000 square feet or larger (excluding the parking garage area). Owners of buildings subject to BEPS will need to report data to MDE each year beginning in 2025. Historic properties, public and nonpublic elementary and secondary schools, manufacturing buildings, and agricultural buildings are exempt.

Furthermore, in January 2024, Montgomery County, Maryland issued a transmittal packet of proposed BEPS regulations to the County Council. Buildings subject to BEPS in Montgomery County are 25,000 square feet or greater and will need to meet a long-term energy performance standard based on-site energy use intensity. The regulations will be considered by the County Council in 2024.[20] The D.C. Government also operates a BEPS program that addresses building as small as 10,000 square feet.

Arlington has a voluntary Green Building Bonus Density Incentive Program and a Sustainable Facilities Policy for municipal buildings. Similar programs exist in other counties and cities in Northern Virginia.

Many utilities in the region (e.g., Dominion), through existing statewide programs (e.g., EmPOWER Maryland) offer rate-payer funded energy efficiency and decarbonization buildings programs for residential, commercial, sector-specific, and income- and age-eligible customers.

Other activities may be further behind in implementation due to limited funds, potential authority limitations, and other barriers such as lack of education/awareness and workforce and supply chain limitations. Most of the activities can be implemented or expanded in the near term.

AUTHORITY TO IMPLEMENT

Maryland, Washington D.C., and Montgomery County, Maryland have enacted legislation mandating BEPS, but Virginia law does not currently allow local governments to establish BEPS or related policies such as energy benchmarking. Energy code implementation across the region is governed by state law, which with some variations limits local governments' ability to implement codes different from that adopted at the state level. Notwithstanding the lack of home rule in Virginia to adopt local building codes, cities and counties in the Commonwealth of Virginia have—for as long as 22 years—fashioned and implemented green building incentive programs based on tiers of BEPs and performance certifications. Additionally, state renewable portfolio standards (RPS) requirements drive the cost for RECs in each state. Thus, all activities mentioned above can be implemented or are being implemented through existing voluntary or regulatory programs.

GEOGRAPHIC COVERAGE

This measure will reduce GHG emissions across the entire MSA.

FUNDING SOURCES

Example potential funding sources include:

- U.S. Department of Energy (DOE) Energy Efficiency and Conservation Block Grants
- DOE Home Efficiency Rebates and Home Electrification and Appliance Rebates
- DOE State Energy Program
- U.S. Department of Housing and Urban Development (HUD) Green and Resilient Retrofit Program

[20] https://www.montgomerycountymd.gov/green/energy/beps.html

- DOE and State Weatherization Assistance Programs
- FEMA Building Resilient Infrastructure and Communities (BRIC)
- Washington DC Sustainable Energy Utility (SEU)
- Maryland Clean Energy Center
- DC Green Bank
- Montgomery County Green Bank
- Inflation Reduction Act Tax Credits (Energy Efficient Commercial Buildings Deduction (179D), and New Energy Efficient Home Credit (45L))
- Utility Programs

LIDAC BENEFITS

These actions could contribute to reducing energy expenses for private and public entities. Indirect benefits include the creation and expansion of green energy jobs and training for auditors, construction workers, contractors, and other building trades such as HVAC suppliers and carpenters. Additionally, these measures may encourage infill development, removing blight from LIDACs and improving visual quality, safety, and quality of life. Retrofit programs typically benefit LIDACs in the urban core and in distressed areas. These measures may result in direct benefits including reduced energy costs from the implementation of energy efficiency measures and educational programs that influence user behavior and result in lower utility bills. The incorporation of microgrids may benefit LIDACs by providing alternative network sources for energy during high demand and increasing reliability. This measure will also improve local air quality, leading to a reduction in related health impacts such as asthma. Potential temporary impacts or dis-benefits for business and residential lease holders during construction include construction noise, fugitive dust, utility interruptions, and in some cases early lease termination to complete construction activities. Following construction, increased rents may be a concern.

SAMPLE METRICS FOR TRACKING PROGRESS

Potential metrics to track the progress of this measure include:

- Number of units retrofitted, disaggregated by residential, institutional, municipal, and commercial buildings
- Number of energy conservation measures installed, disaggregated by residential, institutional, municipal, and commercial buildings
- Participation rates in incentives programs, such as EmPOWER Maryland utility offerings or tax credit programs
- Square footage retrofitted, disaggregated by residential, institutional, municipal, and commercial buildings
- Number of units constructed as net zero, high efficiency or electric, disaggregated by residential, institutional, municipal, and commercial buildings
- Square footage of buildings constructed as net zero, high efficiency or electric, disaggregated by residential, institutional, municipal, and commercial buildings
- Energy use intensity (EUI) and GHG improvements (e.g., for local government buildings)
- Local electricity and natural gas consumption by jurisdiction
- Electricity and natural gas consumption by building (if in EPA Portfolio Manager)

ACCELERATE THE DEPLOYMENT OF CLEAN AND RENEWABLE ENERGY.

This measure aims to accelerate the development of on-site solar energy, complemented by battery storage and microgrids (where feasible), by expanding upon successful existing community-based programs (e.g., Solarize NoVA, SUN-Switch, and Capital Area Solar Switch) and introducing new initiatives and technologies, such as agrivoltaics (the co-location of agricultural production and ground-mounted solar photovoltaic systems).[21] It will provide financial and other support to install solar PV systems at single-family residential properties, including LIDAC properties, and install solar systems at public housing and affordable housing properties, and other residential and commercial buildings. Where on-site solar installation and use is not feasible, off-site solar and other renewable power resources through aggregation options such as community solar, retail choice, and community choice aggregation (CCA) could be used. This measure also includes the use of solar energy for local government operations.

COG's Commitment to Renewable Energy
Based on recommendations from the COG CEEPC, in November 2023, the COG Board endorsed a goal of 250,000 solar rooftops in the region by 2030, with additional goals that call on local jurisdictions to pursue solar installations on government facilities, explore renewable energy for 100% of government operations, and support community-wide efforts to deploy solar, including programs for low-income residents, efficient zoning and permitting processes, and incentives. Currently, there are approximately 73,000 solar energy installations in the region.
Note: This does not cover the entire CPRG MSA.
Source: www.mwcog.org/newsroom/2023/11/08/cog-board-adopts-regional-solar-energy-goals-for-2030-/

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTORS

This measure will reduce GHG emissions in the buildings sector. It may also reduce emissions in the transportation sector if electric vehicles are charged using distributed renewable energy sources. Cumulative estimated GHG emissions reduction potential for this measure are:

GHG reductions ($MMTCO_2e$), 2025-2030	GHG reductions ($MMTCO_2e$), 2025-2050
2.66	11.24

Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCIES AND PARTNERS

- **State and local governments.** Governments can install and procure renewable energy on or for public facilities (including schools, municipal buildings, and other public buildings), create solar ordinances and updated zoning ordinances, and develop policies and incentive programs to support renewable energy.
- **Utilities and Regional Transmission Organizations.** As providers of large-scale renewable energy and as actors in renewable energy credit markets, utilities can work with entities to negotiate for and procure renewable energy. Utilities may also work with partners to plan for integration of distributed generation and grid modernization to serve community needs.

[21] https://www.energy.gov/eere/solar/agrivoltaics-solar-and-agriculture-co-location

- **CBOs.** Engaging with local CBOs can help ensure that on-site solar initiatives address the specific needs and concerns of local communities. These organizations can also play a role in raising awareness and promoting community participation, (e.g., in community solar programs) or build the pipeline of trained workforce to install more distributed energy generation.
- **Private sector partners.** Collaboration with private sector entities — including solar developers, financiers, building owners, installers, and technology providers — is crucial for implementing on-site solar installations. Public-private partnerships can lead to greater funding and heightened expertise for these projects.
- **Non-profit organizations.** Non-profits can conduct community engagement, education and outreach, capacity building, research on environmental and social impacts of clean energy projects, and/or developing and installing community renewable energy projects.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:

- Expand the reach of existing programs, such as Solarize NoVA, SUN-Switch, and Capital Area Solar Switch programs.
- Map solar opportunities across the MSA to determine potential priorities and investments.
- Provide clean energy and microgrid feasibility assessments at key facilities (e.g., university campuses, hospitals).
- Incorporate community energy infrastructure needs, goals, and strategies in master plans, comprehensive plans, and small area plans.
- Adopt new solar-ready construction ordinances, building codes, and/or incentive programs.
- Provide or promote incentives to encourage installation of solar in the community and for battery storage.
- Install renewable energy systems on schools and municipal infrastructure.
- Implement battery storage pilot initiatives at public facilities.
- Provide technical assistance and support for negotiating and navigating power purchase agreements, CCA, and community solar.
- Examine the possibility of regional demand aggregation.
- Initiate cooperative purchasing initiatives or energy purchasing consortia.
- Develop new state or local policies to help overcome barriers to CCA adoption.
- Leverage existing cooperative purchasing programs, such as the Mid-Atlantic Purchasing Team and COG Cooperative Procurement Program, to fast-track local implementation.
- Establish PPA(s) to provide clean electricity to local government facilities, potentially aggregating demand with other local jurisdictions or large local businesses to reduce cost.
- Implement and share best practices from CCA and retail choice aggregation pilot programs, where applicable.
- Advocate for increased percentages of clean energy in state Renewable Portfolio Standards (RPS) programs.
- Coordinate with utilities to speed up interconnection agreement processing time and ensure equitable costs for transmission upgrades for residents installing solar.
- Provide financial and other support to install solar PV systems at single-family residential properties, including LIDAC properties, public housing and affordable housing properties, and other residential and commercial buildings.

- Implement large off-site solar procurement projects supplying the wholesale PJM electricity market.

Many of these activities are ongoing and will continue to be implemented throughout the region but need to be scaled. Other activities, such as developing new policies to overcome CCA adoption barriers, still need to be implemented and depend on existing authorities. Some of these planned activities can commence in a shorter timeframe, contingent upon available resources (e.g., regional solar opportunity mapping), whereas others may take more time (e.g. adopting solar-ready ordinances) and may be location-dependent.

AUTHORITY TO IMPLEMENT

The authority to implement on-site renewable energy falls on state and local governments in partnership with utilities and the private sector. Programs like Solarize NoVA, SUN-Switch, and Capital Area Solar Switch operate at the building scale, and the implementation authority for voluntary participation rests with individual building owners. On-site solar development is pursued where feasible, but off-site options, such as community solar, retail choice, and CCA, come into play when on-site solutions are not viable. The authority for off-site renewables, particularly community solar, is governed by state law. Utilities in the metropolitan Washington region can offer voluntary renewable energy certificate (REC) purchases (the cost of which is driven by different state RPS requirements), while community solar, retail choice, and CCA require specific state legal authorizations, each addressed by Maryland, D.C., and Virginia laws in their respective domains. Retail choice, allowing customers to choose alternative energy suppliers, is currently authorized in Maryland and D.C. but not in Virginia, except for large electricity users. CCA, allowing local governments to seek energy supplies independently, is legally authorized in Maryland and Virginia, and is subject to state legal provisions similar to those for community solar.

GEOGRAPHIC COVERAGE

This measure will reduce GHG emissions across the entire MSA.

FUNDING SOURCES

Example funding sources include:

- DOE State Energy Program
- HUD Green and Resilient Retrofit Program
- EPA Greenhouse Gas Reduction Fund (including Solar for All)
- FEMA BRIC
- Washington DC SEU
- Montgomery County Green Bank

LIDAC BENEFITS

Transitioning from fossil fuels to renewable energy would provide benefits such as improved indoor air quality and local air quality as well reduced energy bills. Secondary benefits may include site remediation to create spaces for off-site solar development and a competitive market for users who have expanded choices for energy suppliers. In addition, potential health benefits include reduced cases of asthma and upper respiratory disease, and associated effects from diseases such as obesity, diabetes, and chronic infections related to reduced outdoor activities. Job creation and training in the renewable energy space could benefit LIDAC members.

SAMPLE METRICS FOR TRACKING PROGRESS

- Number of solar rooftops
- Amount of distributed solar capacity installed
- Amount of distributed solar capacity installed in LIDACs
- Size of the current solar workforce

STUDY, PLAN FOR, AND DEPLOY DISTRICT ENERGY AND MICROGRID OPPORTUNITIES.

This measure focuses on targeted and strategic uses of district energy systems, with the opportunity to deploy clean energy sources (e.g., renewable gas generated from a landfill or solid waste operations, solar, waste heat recovery, combined heat and power), and potentially pair with microgrids. District energy systems deliver hot water, steam or chilled water from a central plant(s) to multiple buildings via a network of pipes to meet thermal end uses: space heating, domestic hot water, air conditioning or industrial process heating or cooling.

For large energy users (e.g., data centers, water utilities) and campuses (e.g., hospitals, higher education facilities), district energy offers an opportunity for energy efficiency, GHG reductions, and resiliency. Microgrids can provide a form of energy resilience and independence due to their ability to "island" from the larger grid. This is especially important for critical infrastructure, post-disaster community needs, or near 24/7 large energy users when energy is needed during blackouts or other interruptions in service. These opportunities could be targeted in LIDAC areas and form the basis of community resilience hubs and provide needed community facility investment.

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTOR

This measure reduces GHG emissions from the buildings sector. The potential GHG reduction benefits of district energy systems and microgrids in the metropolitan Washington region is highly dependent on the specific application of the system(s). In 2011, COG worked with FVB Energy Inc to study potential benefits and costs of generalized example district energy systems in the region. The GHG reductions presented below in Table 6 represent the application of various generalized example district energy system types to a comparison building. Calculations based on the FVB study are presented in Appendix A, along with key study assumptions and data sources.

Table 6. Cumulative GHG Reductions for Example Generalized District Energy System Types ($MMTCO_2e$)

System Type	2025-2030	2025-2050
Boilers And Chillers	0.03	0.25
Engine CHP	0.33	0.72
Turbine CHP	0.18	0.38
Combined Cycle CHP	0.38	0.84
Biomass Boiler	0.13	0.70
GSHP	0.01	0.30
Waste Heat	0.09	0.51

KEY IMPLEMENTING AGENCIES AND PARTNERS

- **State and local government agencies.** Government public buildings are community-focused buildings that can serve as microgrid or resilience hub host sights. State and local governments play a role in planning, development, permitting, and other phases of implementation. They may also be the beneficiaries of investments such as resilience hubs

and critical sheltering. Local governments may need to plan for capital budgeting and procurement.

- **Public Service Commissions, Utilities, Energy Suppliers**. Participation and/or approval by energy utilities (e.g., Pepco) and their regulators, is critical for microgrid owners and operators. Further, utilities and energy suppliers will need to fuel district systems running on clean or renewable gases.
- **Private sector**. Support from the private sector, including key implementers and partners mentioned above, will be required for feasibility assessments, construction planning and development, and potential operations and maintenance. Key industry stakeholders will be important to supplying new sources of zero-emission fuels, such as renewable gas or hydrogen. Financing partners are also important.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:

- Support the identification and selection of high energy users and critical infrastructure for combined heat power (CHP), district energy and/or microgrid implementation.
- Decarbonize existing CHP systems.
- Explore or transition to renewable natural gas (RNG), hydrogen, or other low-carbon fuel solutions for energy sourcing and generation.
- Engage with private sector partners interested in solar, biofuel, CHP, district energy and microgrid implementation solutions.
- Engage with LIDACs where resilience hubs are most needed, and engage with the community on what resources they need.
- Conduct site feasibility assessment and pre-construction planning.
- Partner on grant applications or provide contract support for project planning, feasibility, and implementation support.
- Support state incentives and opportunities to help facilitate district energy and microgrid development.
- Support the development of microgrids.
- Coordinate with state and local governments to reduce barriers to deployment.
- Work closely with regulators and utilities to deploy solutions.
- Conduct pilot programs to demonstrate the viability and utility of resilience hubs.

The accomplishments of CEEPC and its members have also earned the region recognition as a White House Climate Action Champion. This designation made its members eligible for targeted federal technical assistance and grant funding from 2014–2016. One way COG leveraged this opportunity was to conduct local clean energy infrastructure assessments at six sites across the region to determine the feasibility of microgrids, CHP, geothermal, or net zero energy development. Two examples of progress at these sites include the Falls Church School Campus (geothermal energy) and the Washington Hospital Center (microgrid deployment).

Montgomery County has installed a microgrid project at the County's Public Safety Headquarters as part of a comprehensive effort to ensure the resiliency of critical public services during major electric distribution system outages. The project installed a microgrid featuring 2 MW of solar PV canopies mounted over a parking lot and an 800-kW CHP system and reduces GHG emissions of 5,900 metric

tons annually.[22] Montgomery County has also installed a microgrid at the County's Correctional Facility, which will reduce GHG emissions by more than 950 tons annually.[23] In addition, Montgomery County has created Brookville Smart Energy Bus Depot, an integrated microgrid and electric bus charging infrastructure project. Montgomery County also developed a microgrid-powered resilience hub at the Montgomery County Animal Services and Adoption Center.[24] Montgomery County Green Bank created a privately-owned resilience hub in an EEA by electrifying an affordable high-rise apartment building and installing a 159kW solar PV system.[25]

Arlington County's CEP includes a goal to ensure Arlington's energy resilience and includes policy actions that focus on developing resilient energy infrastructure, enhancing energy assurance, and assessing microgrid opportunities for critical services. Under the CEP, in 2023, Arlington County completed its Energy Assurance Plan, which advanced a microgrid and resiliency hub feasibility study and implementation as priority actions, with a focus on primary needs of LIDACs. Maryland has been extending programs to incorporate resiliency projects, e.g., MEA introduced in 2020 the Resilient Maryland Program to provide funding for projects to increase microgrids and other distributed energy resources to improve energy resiliency.

NVRC commissioned a study on the legal viability of district energy systems in 2011, and many of these conclusions and opportunities still stand.[26] The study concluded that: there are clear existing paths for public and/or private establishment, ownership and operation of district energy systems; district energy systems will likely be subject to complex legal frameworks; depending on the ownership arrangements and system characteristics, the operation may be subject to limitations of powers of localities under the "Dillon Rule", to State Corporation Commission Regulation, and land use and environmental regulations; the Code of Virginia provides paths to development of district energy systems, but could be amended to provide more clarity about how district energy systems can be developed and operated.

AUTHORITY TO IMPLEMENT

Where microgrids or district energy systems interconnect with and/or displace infrastructure owned by energy utilities franchised under state law, utility participation and/or permission is typically required, which will also involve state regulatory commissions. It may be necessary to amend some state laws to implement this measure. Where municipally owned utilities are involved, the authority typically resides within the local government. In certain situations, such as greenfield development, microgrid/district energy projects could be developed without utility involvement, though it is more likely that interconnection agreements would be encouraged if not required.

GEOGRAPHIC COVERAGE

The actions within this measure are focused on the entire MSA area, but particular opportunities are focused in areas of high energy use, such as in high density data center populations (e.g., Loudoun and Prince William counties), schools and universities (e.g., University of Maryland), and hospitals.

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[22] Microgrids Public Safety Headquarters (montgomerycountymd.gov)
[23] Microgrids Montgomery County Correctional Facility (montgomerycountymd.gov)
[24] https://www.mymcmedia.org/elrich-announces-new-resiliency-hub-at-animal-shelter/
[25] Montgomery County Green Bank. https://mcgreenbank.org/first-privately-owned-resilience-hub-and-electrification-project-at-hampshire-towers-apartments/
[26] NVRC. https://www.novaregion.org/DocumentCenter/View/3050/NVRC-McGuire-Woods-District-Energy-White-Paper-Au?bidId=

FUNDING SOURCES

Example potential funding sources include:

- Energy Efficiency and Conservation Block Grants
- EPA Greenhouse Gas Reduction Fund
- MEA Resilient Maryland Program
- FEMA BRIC
- DOE Grid Innovation Program
- DOE Smart Grid Grants
- Private sector energy performance contracts

LIDAC BENEFITS

This measure directly benefits D.C. and ancillary service networks within the system as the improvements are focused on large system users such as public and private hospitals, schools, institutions and other large facilities. Secondary or co-beneficiaries include LIDACs due to the reduction of GHG emissions and other air toxins surrounding the fossil fuel facilities, expanded job opportunities and training in the areas of maintenance and system network upgrades, and overall system reliability through the introduction of microgrid components.

SAMPLE METRICS FOR TRACKING PROGRESS

- Number of approved/installed projects
- Capacity of microgrid capacity installed

4.2 Transportation

The transportation sector contributed 39% of the GHG emissions in the metropolitan Washington region in 2020, of which 83% is from on-road transportation and the remaining 17% is from off-road transportation (including construction vehicles, rail, and passenger air travel). The COG region is expected to add about 1.3 million people (an 18% increase) and 900,000 jobs by 2045. At the same time there is expected to be a 12.3% increase in VMT by residents in the region.[27] Population growth and increased VMT are even greater for the whole of the MSA, and vehicle trips are expected to continue to be the predominate mode of transportation in a BAU scenario. As such, it is key to expand access to transit options beyond single occupancy vehicles to increase the mode share for public and active transportation of all trips.

As the federally mandated MPO for the National Capital Region, the TPB is responsible for producing the region's Metropolitan Transportation Plan and Transportation Improvement Program. In June 2022, the TPB adopted a Resolution on the Adoption of On-Road Transportation Greenhouse Gas Reduction Goals and Strategies (TPB Resolution R18-2022). As part of that resolution, the TPB adopted a set of priority strategies to reduce GHG emissions from on-road transportation including:

- Improve walk/bike access to all high-capacity transit stations.
- Increase walk/bike modes of travel, e.g., complete the National Capital Trail Network by 2030.

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[27] TPB. Visualize 2045. 2022. https://visualize2045.org/wp-content/uploads/2022/09/Viz2045Final-Report-6-15-22_hyperlinked_.pdf

- Add additional housing near high-capacity transit stations and in COG's Regional Activity Centers.
- Reduce travel times on all public transportation bus services.
- Implement transportation system management and operations improvement measures at all eligible locations by 2030.
- Convert private and public sector light-, medium-, and heavy-duty vehicles, and public transit buses to clean fuels, by 2030.
- Deploy a robust region-wide EV charging network (or refueling stations for alternative fuels) for light, medium, and heavy-duty vehicles.

The resolution also included a set of strategies to be explored in coordination with local and state levels:

- Take action to shift growth in jobs and housing from locations currently forecast to locations near high-capacity transit stations and in COG's Regional Activity Centers to improve the jobs-housing balance locally.
- Make all public bus transportation in the region fare-free by 2030.
- Make all public rail transportation in the region fare-free by 2030.
- Price workplace parking for employees – only in Activity Centers by 2030 and everywhere by 2050.
- Convert a higher proportion of daily work trips to telework by 2030 and beyond.
- Charge a new fee per VMT by motorized, private, passenger vehicles in addition to the prevailing transportation fees and fuel taxes.
- Charge a "cordon fee" (i.e., commuter tax) per motorized vehicle trip for all vehicles entering Activity Centers by 2030.

The TPB's action to adopt GHG goals and strategies specific to the on-road transportation sector were informed by the TPB's Climate Change Mitigation Study of 2021 (CCMS) and a questionnaire of TPB members that was conducted in February and March 2022. The strategies that were studied in the CCMS and later considered by the TPB for adoption are not an exhaustive list of all possible GHG reduction strategies for the on-road transportation sector. As noted previously, documents such as the Metropolitan Washington 2030 Climate and Energy Action Plan and climate action and energy plans from local governments were consulted to identify planned and ongoing actions to reduce GHG emissions. Additionally, strategies that were designated "for further study" by the TPB were designated as such because they were not supported by a majority of members at that time; however, that would not preclude a jurisdiction with implementation authority from implementing one or more of those strategies. A study on those strategies is expected to be completed in June 2024.

The priority GHG reduction measures included below for the transportation sector reflect these already established goals and strategies.

PROVIDE AND PROMOTE NEW AND EXPANDED OPPORTUNITIES TO REDUCE VMT THROUGH PUBLIC TRANSPORTATION, NON-MOTORIZED TRAVEL, MICROMOBILITY, SHARED TRAVEL OPTIONS, AND DEVELOPMENT.

This measure aims to reduce VMT by offering robust, reliable, and safe travel options. It will provide and promote new and expanded opportunities to reduce VMT through public transportation, non-

motorized travel, micromobility, shared travel options, and transit-oriented development. These options include active transportation methods (e.g., bicycling, walking), public transportation (e.g., trains, buses), shared transportation (e.g., carpools, vanpools), and micromobility (e.g., shared bicycles and scooters). Other opportunities for telework and telehealth will also reduce VMT. Land use and transit-oriented development changes also are a part of this measure to help reduce the length of trips and create more opportunities for alternatives to driving.

Public transportation not only reduces GHG emissions, but also improves air quality and makes communities more livable, sustainable, and economically competitive. By attracting businesses, residents, and visitors, well-developed transit systems spur economic growth and development. Public transportation also increases the connectedness of communities, increasing quality of life and economic opportunity by increasing property values and access to jobs, public facilities, and resources.

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTOR

This measure will reduce GHG emissions in the transportation sector. Emissions from the land use sector may also be impacted because of changes in development. Cumulative estimated GHG emissions reduction potential for this measure are:

GHG reductions ($MMTCO_2e$), 2025-2030	GHG reductions ($MMTCO_2e$), 2025-2050
0.72	5.22

Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCIES AND PARTNERS

- **Local governments and municipalities.** Responsible for land use planning and comprehensive planning; transportation planning, development, and operations, including local transit; program development and administration (e.g., travel demand management programs), and local policies. Will support infrastructure investment and implementation, including pedestrian and cyclist infrastructure.
- **State Departments of Transportation.** Will be key partners in transportation infrastructure planning, development, and operations, such as rail and changes to roads to prioritize bus transportation along state routes, as well as policies related to toll roads and interstate corridor charging and fueling infrastructure.
- **Regional planning organizations and commissions.** Plan for, evaluate, and in some cases fund transportation infrastructure investments and programs. This includes COG, TPB, Northern Virginia Transportation Authority (NVTA), National Capital Planning Commission (NCPC), and other regional planning agencies across the MSA.
- **Regional and local transit agencies.** Transit agencies like WMATA, Maryland Transit Administration (MTA), and Northern Virginia Transportation Commission (NVTC) will be critical to implementing programs and policies.
- **Transit advocates and NGOs**. NGOs and advocates can play a supporting role in education and outreach related to this measure and can also help connect and engage with grassroots organizations and LIDACs.

- **Private sector partners.** Private sector partners, such as landowners, developers, and businesses play a key role in development decisions and design that affect the viability of using alternatives to driving. Business can also implement telecommute and other policies that help manage travel demand. Public-private partnerships can lead to greater funding and heightened expertise for these projects.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:[28]

- Implement infrastructure improvements to support non-motorized travel (e.g., roadway designs that make walking and biking safer, adding bicycle and pedestrian pathways, adding, and expanding sidewalks, improving crosswalks, completion of the National Capital Trail Network and other paved and unpaved trails for bicycle use).*
- Enhance micromobility options, including expanding shared bike, e-bike, and scooters.*
- Improve first mile and last mile connections to transit (e.g., shuttles, bicycle storage, bicycle and pedestrian connections to transit, on-demand transit).*
- Provide improvements and enhancements in public transit service (e.g., operational and service enhancements, bus and rail maintenance and investments to improve reliability and quality of service, low-income/free fare products, and bus rapid transit).*
- Support land use policies that encourage development near high-capacity transit stations and within activity centers, including design that supports walking, biking, and transit.*
- Provide transit capital investments to enhance and expand public transit service (e.g., expansion of bus, rail, and bus rapid transit infrastructure; bus stop improvements such as benches and bus shelters, mobility hubs that bring together transit, bike sharing, transit station improvements for operational efficiency, and other options).*
- Implement or expand policies that promote car/ride sharing and reducing vehicle travel, such as through reduced parking minimums, parking pricing, and congestion pricing, as well as HOV-3 free and other policies to encourage ride sharing.
- Implement incentives that encourage use of sustainable modes, such as incentives for purchasing e-bikes, or incentives for ridesharing and using transit, reduced or fare-free transit.
- Implement policies and incentives to manage travel demand, such as those that promote or require telework policies, employer-based trip reduction, ride matching, and vanpool formation.

AUTHORITY TO IMPLEMENT

The actions associated with making changes to increase pedestrian and bicycle infrastructure can be administered by local and state jurisdictions. Policies that impact land use can similarly be administered by local jurisdictions though zoning codes and potential changes and developers can act on where to build based on these policies. Actions related to public transportation may need approvals from regional or state transportation agencies to be implemented and will need higher levels of authority depending on the scope and scale of changes to public infrastructure. Additional agencies and approvals will be needed for any actions related to charges such as congestion pricing and VMT pricing. Employers also play a key role in providing company policies to allow for

[28] Note: Strategies with an * generally fall within the priority GHG reduction strategies that were adopted by the TPB in June 2022 and are included in the quantified GHG reductions.

teleworking. Of note, for this region there is a relatively high number of federal workers, so changes in employee telework policies will be tied in part to federal agency employee policies.

GEOGRAPHIC COVERAGE

This measure will reduce GHG emissions across the entire MSA.

FUNDING SOURCES

Example potential funding sources include:

- Federal Transit Administration (FTA) Grants – Urbanized Area Formula Program
- FTA –Bus and Bus Facility Grants
- FTA – Capital Investment Grants
- Federal Highway Administration (FHWA) Carbon Reduction Program
- FHWA Congestion Mitigation and Air Quality Improvement (CMAQ) Program
- FHWA Highway Safety Improvement Program (HSIP)
- FHWA Surface Transportation Block Grant (STBG) Program
- Virginia Department of Rail and Public Transportation

LIDAC BENEFITS

The actions in this measure aim to improve public transit service through enhanced and increased service along with prioritizing designated service types within LIDACs. Improving public transit service in the urban core and along commuter routes could encourage increased transit use because of reduced commute times from home to workplace and last mile service. Priorities include the enhancement of bus and rail service that could better serve LIDACs using VRE and Maryland Area Rail Commuter (MARC) regional rail service, and commuter bus and local WMATA bus and rail service in addition to other regional transit service such as Montgomery County's RideOn bus service. Expanding and improving bus transportation will benefit LIDACs as many transit-dependent and low-income transit riders use bus systems.[29]

LIDAC members located in the urban core or near congested highways across the MSA experience significant traffic, noise, pollution, and safety related effects. Suburban and rural areas face another set of barriers that increase pollution due to increased commute times and congestion, resulting in increased transportation GHG emissions. Increasing the use of public transportation and accessible and safe transportation options such as walking and biking can positively impact LIDACs by reducing transportation costs and improving health through active transportation alternatives.

This measure also includes transit-oriented development (TOD) considerations. However, TOD development historically leads to gentrification when supportive policies are not implemented to protect underserved homeowners and renters. This measure will require partnership among municipalities, transit agencies, and the development community to truly benefit LIDACs.

SAMPLE METRICS FOR TRACKING PROGRESS

- VMT and VMT per capita

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[29] Shuling Wu & Jennifer D. Roberts (2023) Transit justice: community perceptions and anticipations of a new light rail transit line in Prince George's County, Maryland, United States, Cities & Health, 7:6, 1012-1028, DOI: 10.1080/23748834.2022.2133573

- Mode share for public and active transportation (e.g., percent of workers commuting by single occupant vehicle, rideshare, transit, bike, walk, telework)
- Transit ridership for bus and rail transit
- Active transportation and micromobility uptake
- Percent of businesses that adopt hybrid or fully remote work policies
- Mode share for public and active transportation of all trips

ACCELERATE THE DEPLOYMENT OF LOW- AND ZERO- EMISSION TRANSPORTATION, FUELS, AND VEHICLES.

This measure aims to accelerate the deployment of low emission and zero-emission transportation, fuels, and vehicles across all on-road sectors including light-, medium-, and heavy-duty vehicles. This includes both personal vehicles and private and public fleets, including school and municipal bus fleets, and support for the deployment of charging and fueling infrastructure. To support the deployment of EVs, a robust network of EV charging must be widely available, reliable, and easy to use for residents and businesses, especially in public community and multifamily settings. Beyond EVs, this measure also allows for flexibility in the use of green hydrogen, biodiesel, and other renewable or low-carbon fuels where options are not available or feasible, particularly for medium- and heavy-duty vehicles and buses.

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTORS

This measure reduces GHG emissions from the transportation sector. The increase in EV adoption may also impact GHG emissions in the buildings sector depending on how chargers are tied to the built environment. Cumulative estimated GHG emissions reduction potential for this measure are:

GHG reductions ($MMTCO_2e$), 2025-2030	GHG reductions ($MMTCO_2e$), 2025-2050
2.80	135.50

Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCIES AND PARTNERS

- **COG** can support the aggregation of demand via the COG Cooperative Purchasing Program and local EV buying co-ops. This effort can also be supported by **Clean Cities Coalitions and Washington Area New Dealers Association (WANADA).**
- **TPB** can coordinate efforts in the region and has set priority actions that are reflected in this measure.
- **Local and regional transit agencies** are also key implementors in the transition of public transit fleets and clean fuel and EVs. They also coordinate on implementing charging/fueling infrastructure.
- **State and local governments (including public schools)** can transition municipal fleets to EVs or low-carbon fuel vehicles supported by the adoption of green fleet policies and plans and provide incentives or policies to support EV adoption. State agencies, with federal funding, are building out EV charging networks. Local governments can also implement community-wide buying co-ops for EVs for public and private fleets as well as personal

vehicles and provide education to residents and businesses about EVs and EV charging. Governments can also install charging equipment on municipal properties, including through partnerships with utilities and the private sector.

- **Utilities** can provide incentives for transitioning to clean fuel vehicles and installing EV charging (e.g., both Pepco and Dominion Energy offer support for rideshare and electric bus charging infrastructure in the region). Public Utility Commissions (PUC)/ Public Service Commissions (PSC) will coordinate on the relevant regulations for implementation. Water utilities can transition their fleets to low emission vehicles.
- **Private sector actors**, for-hire vehicle operators such as Uber and Lyft or ridesharing companies such as ZipCar, can procure and offer alternative fuel vehicles and provide EV charging infrastructure. Other private sector actors, such as developers, can include EV charging and EV-ready parking in the construction projects to expand the charging network.
- **Vehicle manufacturers.** Auto manufacturers can add new low emissions vehicles to their product offerings.
- **Grocery stores, shopping plazas, and gas/charging and fueling stations**. These entities can work with state and local governments to bring publicly accessible charging and biofuel or hydrogen fueling stations to the region.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:

- Implement systems to manage and use data on vehicle registrations and charging infrastructure (e.g., uptime) and fueling stations.
- Support cooperative purchasing and community buyer co-ops, as well as ride share and car share that accelerate the use of low- or zero-emissions vehicles.
- Pass and implement ordinances that mandate or incentivize clean fuel infrastructure into development.
- Create and implement clean vehicle and clean fuel procurement policies.
- Plan for, develop, and procure EV charging networks, such as along Alternative Fuel Highway Corridors. Also, develop biofuels infrastructure and markets.
- Develop incentive programs for EV chargers in multifamily, public, commercial, and rental properties.
- Create incentives and programs for EV and low emissions vehicles. Incentives can include direct financial incentives or exemptions to certain restrictions (such as D.C.'s driving restriction exemption, HOV lane exemptions in Maryland and Virginia, or emissions testing exemption in Virginia).
- Develop corridor and local hydrogen fueling stations, including focused on serving medium and heavy-duty vehicles. Work with fleet owners and truck dealers to accelerate the adoption of hydrogen vehicles.
- Provide funding to support the conversion of private and public sector light-, medium-, and heavy-duty vehicles, and public transit buses to clean fuels, and for the necessary supportive infrastructure.
- Provide workforce training (e.g., through the Electric Vehicle Infrastructure Training Program) and upskilling of current trades for installation and maintenance of EV charging and fueling infrastructure.
- Conduct regular analysis of the state of clean fuel infrastructure to address any gaps in charging/refueling needs that may hamper the rate of transition.

- Explore innovations in charging such as vehicle-to-grid regenerative power and solar tie-in to EV infrastructure.
- Provide funding to improve the development of battery-operated equipment.
- Properly dispose batteries through creating end of battery life management systems.
- Provide funding to support the conversion of private and public sector light-, medium-, and heavy-duty vehicles, and public transit buses to clean fuels and for the necessary supportive infrastructure.
- Support grid connection upgrades and infrastructure improvements that support affordable, adequate, reliable, and resilient power supply for private and public sector light medium, and heavy-duty vehicles, and public transit buses using clean fuels.

All these implementation activities and milestones support the TPB's adopted priority strategies (June 2022) to convert private and public sector, light-, medium-, and heavy-duty vehicles, and public transit buses to clean fuels and to deploy a region-wide robust EV charging network (or refueling stations for alternative fuels) for light-, medium-, and heavy-duty vehicles.[30] COG is already taking action to support these priorities. In the summer of 2023, a new Electric Vehicle Deployment Clearinghouse was unveiled.[31] A REVD Working Group was also established and is developing a Regional Electric Vehicle Infrastructure Implementation Strategy.[32]

AUTHORITY TO IMPLEMENT

Local jurisdictions have the authority to purchase vehicles for their fleets; such purchases have already been started across the MSA. In some instances, purchasing or procurement policies may need to be adjusted to prioritize low and no emissions vehicles. Private and personal purchasing of low and no emissions vehicles does not have any statutory limitations. Local zoning or code changes may need to be made for charging and fueling infrastructure, and authority to implement varies across the MSA. States are also using transportation funds to support the planning for and development of EV charging infrastructure. Municipalities and residents may need to coordinate with PUCs and PSCs on regulations regarding the siting of public charging infrastructure, charging resale statues, and other issues as appropriate.

GEOGRAPHIC COVERAGE

This measure will reduce GHG emissions across the entire MSA.

FUNDING SOURCES

Example potential funding sources include:

- IRA – Clean Vehicle Tax Credit
- IRA – Previously Owned Vehicle Tax Credit
- IRA – Clean Commercial Vehicle Tax Credit
- IRA – Alternative Fuel Vehicle Refueling Property Tax Credit
- FHWA National Electric Vehicle Infrastructure Formula Program (NEVI)
- FHWA Charging and Fueling Infrastructure Discretionary Grants

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[30] June 2022 TPB meeting recap: Plan update, new climate goals approved - TPB News - News | Metropolitan Washington Council of Governments (mwcog.org)
[31] COG unveils Electric Vehicle Deployment Clearinghouse - News Highlight - News | Metropolitan Washington Council of Governments (mwcog.org)
[32] Regional Electric Vehicle Deployment Working Group | Metropolitan Washington Council of Governments (mwcog.org)

- EPA Clean School Bus Program
- EPA Diesel Emissions Reduction Program (DERA)
- EPA Clean Heavy-Duty Vehicle Program
- FTA Low or No Emission Grant Program
- Maryland EV Excise Tax Credit Program
- Utility incentive programs, such as EmPOWER Maryland

LIDAC BENEFITS

This measure includes considerations for incentivizing the sale of EV and low emission vehicles and creating EV infrastructure such as charging stations. Possible direct benefits to LIDACs include reduction in $PM_{2.5}$ and ozone and related health impacts such as asthma. The inclusion of incentives for EV infrastructure at multifamily, public, commercial, and rental properties will expand the presence of EV vehicle use beyond suburban or more wealthy urban neighborhoods. These measures would benefit LIDACs throughout the MSA region by reducing overall transportation costs. EV network design and thoughtful consideration of charging station placement are key to ensuring that communities are not left out of the EV network.

Members of LIDACs have historically benefited little from EV programs due to the high capital costs to purchase them. However, programs and incentives that expand the use of EV ride sharing or car sharing can bring benefits to LIDACs. Cooperative purchases for heavy-duty and school bus fleet conversions would also reduce local GHG emissions in LIDACs. Indirect benefits to LIDACs include workforce development and training, but existing jobs for internal combustion engine maintenance may start to dissipate.

SAMPLE METRICS FOR TRACKING PROGRESS

- Number of EVs, and low-carbon fuel vehicles registered (or purchased for local government or public fleets)
- Number of publicly accessible installed charging stations by type (e.g., Level 2 or DC Fast Chargers)
- Uptime hours for public charging stations
- Number of alternative fuel stations
- Quantity of biofuels consumed annually
- Number of maintenance/repair workers trained

ACCELERATE THE DEPLOYMENT OF OFF-ROAD/NON-ROAD ELECTRIC EQUIPMENT.

This measure focuses on accelerating the widespread adoption of electric and/or battery-operated off-road/non-road electric and other low emission equipment through education and awareness campaigns and by implementing a comprehensive framework of incentives and assistance programs to make purchase of new equipment or retrofit of existing equipment more accessible and appealing. This equipment includes lawn and landscaping equipment, construction equipment, recreational vehicles like all-terrain vehicles (ATVs), marine vessels, locomotives, and more. It also includes transitioning government owned and operated equipment to electric.

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTOR

This measure reduces GHG emissions from the transportation sector. Cumulative estimated GHG emissions reduction potential for this measure are:

GHG reductions ($MMTCO_2e$), 2025-2030	GHG reductions ($MMTCO_2e$), 2025-2050
3.40	17.74

Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCY(IES) AND PARTNERS

- **State and local government agencies**. Local governments can create financial incentives for residents to purchase electric lawn care equipment and for construction companies to purchase electric or retrofit existing construction equipment. They can also work with the private sector to educate consumers. Government agencies can put in place procurement policies for, or contract for, electric-powered off-road equipment and partner with the private sector on upstream programs.
- **Private sector (including retailers, landscaping companies, etc.)**. Share information on equipment, join roadshows to demonstrate and give consumers access to equipment and information about retrofit programs. Also procure and use electric or battery-operated equipment.
- **Businesses and residents**. Buy and use electric and other low emission equipment.
- **Local and regional transit agencies**. Key implementors in transitioning equipment to electric.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:

- Provide education and outreach campaigns to introduce new products or technologies to consumers and users (e.g., conduct a "roadshow").
- Expand or create new incentives and technical assistance programs to promote and spread the use of electric equipment.
- Fund the improvement of battery-operated equipment, e.g., increasing the lifespan of battery powered equipment can enable commercial and public entities to adopt battery powered equipment.

There are already examples of available incentives for this measure that could be expanded upon. For example, the City of Bowie, Maryland has implemented a rebate for electric lawn care equipment for residents. Furthermore, the D.C. SEU has implemented a rebate for electric lawn mowers. Because this technology is readily available and programs already exist, this measure could be implemented in the near term.

AUTHORITY TO IMPLEMENT

Because these actions are typically incentive based rather than regulatory, the authority of state and local agencies to mount voluntary programs is typically within their charters. Actions such as regulating criteria air pollution emissions from off-road equipment for the purposes of complying with

ambient air quality standards under state implementation plans or similar regulatory actions are not anticipated in this measure.

GEOGRAPHIC COVERAGE
The actions within this measure are focused on the entire MSA.

FUNDING SOURCES
Example potential funding sources include:

- U.S. EPA Clean Diesel Grant Program/Diesel Emissions Reduction Act

LIDAC BENEFITS
In the short term, benefits may be isolated to business owners and program participants who can afford the upfront costs of transitioning to electric and/or battery-operated equipment. However, as programs gain traction and awareness spreads, LIDACs may become more engaged in the process. Benefits for LIDACs may include reduced operational expenses in the long term for business owners and localized health benefits resulting from reduced GHG emissions and toxins and reduced noise pollution.

SAMPLE METRICS FOR TRACKING PROGRESS

- Dollars of incentives used
- Number of pieces of electric equipment or electric off-road vehicles procured by local government or the private sector
- Number of engines repowered or replaced
- Annual quantity of diesel fuel reduced

4.3 Waste

REDUCE GHG EMISSIONS FROM WASTE AND WASTEWATER TREATMENT.
The waste sector, which includes waste landfills, waste incineration, and wastewater treatment facilities, generates high potency GHG emissions. To address emissions from the waste sector within the metropolitan Washington region, this measure aims to prevent, reduce, and divert waste and to reduce emissions at landfills, solid waste incinerators, drinking water treatment plants, drinking water distribution facilities, and wastewater treatment plants. It also includes harnessing landfill gas (LFG) to generate electricity and heat. This measure covers both inorganic and organic waste.

QUANTIFIED GHG REDUCTIONS AND RELEVANT GHG INVENTORY SECTOR(S)
This measure reduces GHG emissions from the waste sector. GHG emissions from buildings and transportation may also decrease if LFG can be collected and used to generate electricity and heat. Cumulative estimated GHG emissions reduction potential for this measure are:

GHG reductions ($MMTCO_2e$), 2025-2030	GHG reductions ($MMTCO_2e$), 2025-2050
5.47	30.23

Additional indirect GHG emissions reductions may be realized, including reduced energy consumption to process and transport waste and reduced maintenance and operations activities

and inputs (e.g., chemicals). Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCY(IES) AND PARTNERS

- **Local government departments of public works, resource recovery, and/or water.** Oversees landfills, solid waste management and recycling, wastewater treatment operations and facilities.
- **VA Department of Professional and Occupational Regulation (DPOR).** Oversees the Board for Waterworks and Wastewater Works Operators and On-site Sewage System Professionals, which licenses wastewater treatment facilities.
- **MD Department of the Environment.** Handles solid waste management and recycling in the state. MDE also oversees the Board of Waterworks and Waste System Operators, which sets standards for wastewater treatment plant operators.
- **Washington Suburban Sanitary District (WSSC Water).** Provides water and wastewater treatment services for Prince George's and Montgomery County in Maryland.
- **WV Solid Waste Management Board (WVSWMB).** The state agency is charged with helping local Solid Waste Authorities achieve their recycling goals through technical assistance and grants.
- **WV Department of Environmental Protection.** Oversees the Division of Water and Waste Management, which permits wastewater treatment facilities.
- **Additional state government agencies.** The Virginia Department of Environmental Quality, DC Water, and other agencies, where appropriate, will provide guidance and resources for implementation of this measure.
- **Local governments.** General oversight and policy implementation.
- **Private sector.** Including Solid Waste Authorities and privately-owned sanitation centers and wastewater treatment plants, and waste-related businesses support local and state governments in waste and wastewater treatment collection and management.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Proposed actions within this measure focus on increased access to composting, waste diversion practices, waste-to-energy facilities (such as water pollution treatment plants for biowaste), methane capture technology, and food waste reduction programs. These actions and programs will reduce waste sector emissions and provide multiple benefits to communities, including reduced air pollution and improved waste management in LIDACs. Actions to implement this measure could include, but are not limited to:

- Expand and offer new programs to implement waste prevention, recovery and recycling for food waste and other organics. This will include promoting the source reduction of food scraps, edible food recovery and increased recycling of food scraps, along with other organics, through composting, anaerobic digestion, and animal feed operations.
- Expand existing programs or establish new ones to enable using organic waste for compost, including yard trimmings and food waste, for curbside pickup. Collected organic waste will then be brought to a composting site, such as the Prince George's County's Organic Composting Facility in Maryland or Prince William County Balls Ford Road Composting Facility in Virginia, instead of being sent to landfills or waste-to-energy facilities such as the Covanta Fairfax incinerator. The Prince William Landfill is being developed into an Eco-park to capture methane and conduct anaerobic digestion of organic waste. Compost can then

be used to produce soil additives for growing foods and plants. Compost can be collected curbside in city or County-provided composting bins, as proposed below.

- Provide residential compost bins. Provide free compost bins to residents, similar to how many cities and counties provide residents with recycling bins. Residents can pick up a compost bin at a city or County sanitation center. They can use the bins at their home to participate in a city or County-run curbside composting program, as described above, or to start their own home composting operation.
- Encourage commercial composting. Establish an educational program to encourage businesses, including restaurants, universities, multi-resident buildings, and other entities to compost organics and food waste. Training and educational materials could highlight incentives such as GHG emissions reductions and cost savings on waste hauling costs. Cities and Counties could provide training materials for businesses, and potentially subsidize the cost of on-site composting vessels. Pairing this with additional investment in industrial composting facilities and an expanded compost collection program would further incentivize commercial composting.
- Provide commercial composting facilities with necessary. For example, de-packaging equipment to handle expired processed foods and Receiving Buildings with bio-filters to reduce volatile organic compounds.
- Invest in industrial composting facilities. Invest in organics and food composting operations at existing and new solid waste facilities, including composting, mulching, and landfill facilities. Current composting facilities in the metropolitan Washington region include the Prince George's County's Organic Composting Facility in Maryland and the Prince William County Eco-Park in Virginia. Enhancing composting operations across the region would build capacity for a residential curbside composting program, as well as composting from commercial stakeholders with larger quantities of organic waste.
- Support new infrastructure and transportation options for moving compost and organic waste to treatment or processing facilities.
- Support recycling activities including feeding animals and anaerobic digestion (AD) with beneficial use of digestate/biosolids.
- Obtain and use new cold storage systems to reduce food waste.
- Conduct waste education and public service campaigns. Educate the public to promote behavioral changes that encourage waste diversion at the source. Establish a public service campaign and disperse educational materials that encourage households to reuse and buy in bulk. Include education that focuses specifically on limiting single-use materials and food waste. Additionally, educate businesses on how they can reduce waste in their operations or implement composting systems, as described in the above action.
- Improve practices and technologies to increase waste reduction, reuse/recovery, and recycling for all waste streams.
- Support product innovation and policy. Enact policies to ban or tax wasteful single-use packaging (e.g., plastic bags, plastic straws, polystyrene). Additionally, establish a program, potentially a grant, to promote research and develop new product designs to replace wasteful products sold and used in industrial processes in the region.
- Establish landfill waste transfer stations and convenience centers. Establish government owned waste transfer stations that will service homeowners, small haulers, and large haulers. Waste collected at this facility will be transferred to other jurisdictions for processing, recovery, and disposal. The facility will incorporate a public convenience center,

which will assist with reuse and waste diversion initiatives. This action is being explored especially in Charles County, Maryland as their landfill nears capacity.

- Monitor, manage, and capture methane from landfills, food scrap/aerobic compost digester systems, and wastewater treatment plants for beneficial use.
- Use methane capture technology. Introduce methane capture technologies, such as anaerobic digesters or LFG collection systems, via regional pilot or demonstration projects. Ensure project data can be easily tracked and monitored, and that projects can be scaled up if deemed effective.
- Develop LFG-to-energy projects. Expand LFG treatment centers at landfills so that captured LFG can be converted into fuel for vehicles, electricity, and heating systems, rather than burned off.
- Develop wastewater heat exchange projects.
- Promote the electrification of the transportation sector to move food waste. Implement waste-to-energy equipment at regional wastewater treatment plants through available anaerobic digestion technology.
- Produce power for renewable fuel production, enhance power reliability for wastewater treatment plants, reduce biosolids production and prevent sanitary sewer overflows to improve water quality and protect public health.

There are limited barriers to implementing this measure, and with proper funding and support, many actions could be implemented in the near future.

AUTHORITY TO IMPLEMENT

The implementing authorities for this measure are state and county government agencies (e.g., Public Works, Department of the Environment, etc.) in partnership, where applicable, with private utilities, landfills, and composting facilities. Public waste management, demonstration projects, waste-related policies, and public education campaigns can all be carried out under the existing powers of local governments. Support from the private sector, including key implementers and partners mentioned above, will be required for projects that expand to private landfills and wastewater treatment centers.

GEOGRAPHIC COVERAGE

The actions within this measure are focused on the entire MSA.

FUNDING SOURCES

- EPA Solid Waste Infrastructure Recycling Grant Program
- EPA Consumer Recycling Education and Outreach Grant Program
- U.S. Department of Agriculture Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans and Grants

Benefits of Addressing Food Waste

Reducing, rescuing, and repurposing food waste can provide broader benefits to the region beyond GHG reductions. Addressing food challenges can bring health and nutritional benefits to LIDACs and reduce GHG emissions associated with food production and transportation, among many other benefits. Within the metropolitan Washington region, some jurisdictions have implemented the first stage of food waste prevention education campaigns (e.g., Montgomery County's Food Is Too Good To Waste campaign).

LIDAC BENEFITS

Using new and innovative technologies to manage longstanding community facilities such as landfills and treatment plants, which are often sited near low-income and overburdened areas, may result in not just a reduction of GHG emissions but also of odor, eye irritants, fugitive dust, sewer overflows, sewage backups, and other nuisance incidents that directly impact homes and businesses surrounding these locations. Exposure to hazardous materials may also be reduced. Expanding composting and other food waste reduction programs at the neighborhood and commercial level may spur the implementation of urban farming, community gardening, food distribution, farmers markets, and other programs which support farm to table programs, reduced organic waste, and other activities which may benefit LIDACs. Local farming, gardening, and composting programs also reduce the amount of organic waste from food in landfills, therefore reducing methane gas emissions, improving air quality in surrounding neighborhoods, and reducing overall GHG emissions.

SAMPLE METRICS FOR TRACKING PROGRESS

- Weight of waste diverted from landfills or waste-to-energy facilities
- Weight of waste composted
- Number of people reached via waste diversion education programs and public service campaigns (e.g., clicks, views, webinar attendees, flier passed out)
- Weight of biosolids diverted from land application
- GHG reductions and equivalencies

4.4 Land Use

ACCELERATE THE EXPANSION OF THE REGIONAL TREE CANOPY AND REDUCE TREE CANOPY LOSS.

Trees and the canopy they create provide numerous environmental, economic, and social benefits. For example, the tree canopy is important for mitigating the urban heat island effect and protecting communities from the increased temperatures that are a result of climate change and can reduce the cost of energy because of reduced need for air conditioning. Trees and other plants are also carbon sinks, removing CO_2 from the atmosphere and sequestering it in their structures. Trees also provide adaptation benefits by storing stormwater and surface water runoff in the surrounding soil, particularly in upstream areas. Trees reduce the occurrence and severity of flood events and prevent erosion.[33] This measure focuses on increasing tree canopies in urban and rural settings and preventing additional tree canopy losses. It involves planning, implementation, and management efforts on both private and public lands and working with community organizations and property owners to identify and implement strategies to increase tree canopy. Expanding green spaces in addition to tree canopy has the potential to increase sequestration potential of the land use sector.

QUANTIFIED GHG SEQUESTRATION AND RELEVANT GHG INVENTORY SECTOR

This measure reduces GHG emissions from the land use sector. Cumulative estimated GHG sequestration potential for this measure is:

GHG sequestration ($MMTCO_2e$), 2025-2030	GHG sequestration ($MMTCO_2e$), 2025-2050

[33] World Resources Institute. 5 Reasons Cities Should Include Trees in Climate Action. 2022. https://www.wri.org/insights/urban-trees-city-climate-action

0.47	3.94

Key assumptions, methods and data sources used to develop these quantified reduction estimates are provided in Appendix A.

KEY IMPLEMENTING AGENCIES AND PARTNERS

- **State department or divisions of natural resources or forestry.** Maintain and provide technical expertise and services for the maintenance and care of trees and other natural lands.
- **Chesapeake Tree Canopy Network.** Provides a platform for partners to share knowledge and best practices.
- **COG Regional Tree Canopy Subcommittee (RTCS).** A subcommittee dedicated to the management of both the tree and forest canopy. COG and its municipal partners are currently working to determine an implementation path for its integrated urban tree canopy management approach.
- **Local governments.** Local governments operate various programs that enhance tree canopy by planting, maintaining, and monitoring the health of trees on public land and operating programs to incentivize private landowners to plant trees.
- **Community organizations.** Local organizations can help inform the strategic placement of trees to benefit LIDACs.
- **Private landowners.** Can choose to voluntarily increase tree canopy on their land.

IMPLEMENTATION ACTIVITIES AND MILESTONES

Actions to implement this measure could include, but are not limited to:

- Use data and mapping tools to identify priority planting areas and track local and regional tree canopy coverage. Implement programs and tools to assist in care and maintenance of trees.
- Implement and expand partnerships with educational organizations to enable students to plant, monitor, and maintain trees. Teaching students how to manage trees (especially in LIDACs) can increase the public awareness of the benefits of tree canopy and expand capacity to plant and monitor trees.
- Support community gardens and small-scale urban agriculture.
- Review and strengthen local tree canopy-related policies and ordinances. Ensure that local policies are aligned to enable implementers to accelerate the expansion of tree canopy.
- Expand existing programs (e.g., the West Virginia Forestry Stewardship Program) or create new incentivizes for planting trees and forestry management on private land, communities, and developments.
- Fund investments on private land. Provide plans and funds to increase tree canopy in public lands such as in parks and forests, as well as on and around public schools, libraries, and government owned buildings and on publicly owned sidewalks that support safe access to transit and active transportation (e.g. walking, biking and micromobility).
- Adopt and implement policies that stimulate use of green infrastructure such as green roofs, green walls, green common areas.
- Design and install green infrastructure to supplement urban canopy in heat-intensive or vulnerable areas.

- Apply green infrastructure to trails, walkways, streets, and roads, integrating green with built infrastructure.

Many of these activities are ongoing but could be expanded or started in the coming years. COG has taken actions to promote increased tree canopy across the MSA. COG's *Tree Canopy Management Strategy*[34] describes the state of urban forest programs in the COG region as of 2018. COG's RTCS is recommending a tree canopy goal of 50% for the COG region as well as goals by land use type.

Programs such as Arlington County's Land Disturbance Activity Ordinance and Programs have resulted in nearly 170 Green Roofs, and the Green Streets Program has resulted in 14 completed projects.

Beyond the COG region, states across the MSA have also focused on goals and actions to increase and maintain tree cover. For example, the Virginia Department of Forestry's 2019 strategic plan has six strategic goals, that focus on protecting the forest resources and the community members of the Commonwealth from wildfire and reduce impacts to the forest from other threats and increasing the social, environmental, and economic benefits provided by trees and forests, among other priorities.[35]

AUTHORITY TO IMPLEMENT

Implementation authority for tree canopy expansion, preservation, or development on public land typically falls within the powers of the owning jurisdiction (e.g., a state natural resources or forestry agency). Public space tree planting and tree canopy maintenance falls to the owning jurisdiction. For private-owned land, consent of or actions from the landowner would be needed, and applicable covenants and zoning restrictions would need to be honored. Any applicable environmental regulations would also apply (e.g., managing stormwater and runoff). Smart growth and green development incentive programs are deployed by numerous cities and counties within COG territory, as well as local government programs for green infrastructure.

GEOGRAPHIC COVERAGE

The actions within this measure are focused on the entire MSA area.

FUNDING SOURCES

Example potential funding sources include:

- U.S. Department of Agriculture (USDA)
- U.S. Forest Service Urban and Community Forestry Grant
- Local government capital improvement program funds
- Foundation Grants

LIDAC BENEFITS

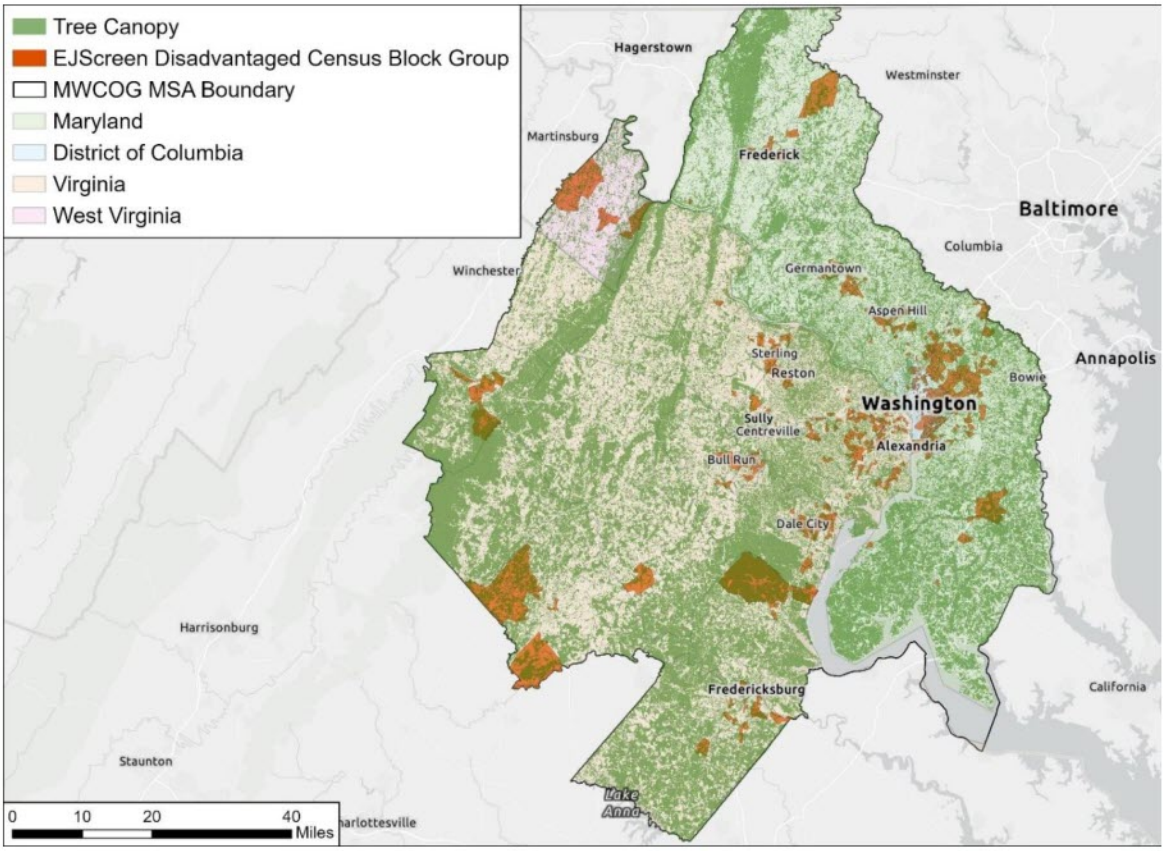
On average, LIDACs have less tree canopy than other areas, particularly urban settings (Figure 8). Increasing the tree canopy can provide cooling and stability benefits in areas within the urban core that are subjected to heat island effects. The regional tree canopy also provides health and aesthetic benefits to LIDAC communities. This measure will have a positive impact for LIDACs in the urban core where parks and green spaces have been preserved, and in rural and suburban settings where growth boundaries have been implemented to protect green space and the tree canopy. Educational

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[34] https://www.mwcog.org/documents/tree-canopy-management-strategy/
[35] https://dof.virginia.gov/strategic-plan/

programs and participation opportunities for adults, teens, and children, including environmental stewardship experiences, can lead to greater awareness and further action in the community. Training and employment opportunities for both planting and maintenance of urban forests may benefit LIDAC members in terms of employment, training, and expanded canopy coverage as canopy restoration programs become more prevalent in cities and urban neighborhoods.

Figure 8. Tree Canopy Overlaid with Metropolitan Washington LIDAC Areas



SAMPLE METRICS FOR TRACKING PROGRESS

- Number of priority planting areas identified and addressed
- Tree canopy cover area
- Number of trees planted
- Number of new tree planting programs

4.5 Cross-Cutting Enabling Actions

All the priority GHG reduction measures identified above may be enabled or enhanced through various cross-cutting actions, such as the following.

- **Public education and engagement.** Education, marketing and outreach, and real-time data will accelerate the deployment of GHG reduction technologies, stimulate passive house and/or smart growth standards that incorporate green infrastructure, facilitate behavior changes, and increase participation in climate and energy programs. Targeting education and engagement efforts on LIDACs by partnering with community leaders and CBOs that

represent LIDACs will help bring additional awareness and benefits to these populations. Conducting marketing research to understand barriers and incentives to adoption can help increase program uptake.

- **Build the clean energy workforce.** An expanded and well-trained workforce is critical to implement the breadth and depth of GHG reduction measures in this plan, beginning with education for building owners, architects, designers, and contractors to influence climate-facing development from the design phase. This also includes developing new programs or expanding existing ones to provide training, paid internships, and job opportunities for a clean energy workforce. Some of these opportunities should be focused in LIDACs to bring benefits to these communities.
- **Leverage or establish umbrella organizations to support centralized resources.** Deploying shared resources and funding through a centralized program for implementation-ready projects or pooling resources to accelerate climate action for a set list of climate actions and technologies that benefit multiple jurisdictions can create administrative and other efficiencies. Providing technical assistance can assist stakeholders in completing projects.
- **Clean energy financing.** Clean energy financing and incentives to increase clean energy, energy efficiency, and fuel switching will accelerate the deployment of GHG reduction measures by overcoming capital and funding barriers. Clean energy financing mechanisms may include green banks, green financing, commercial PACE programs, interest rate buy downs, grant or rebate programs, a revolving loan fund (e.g., green bonds, clean energy loans), Energy Savings Performance Contract (ESPC), as well as grants and rebates.

5 NEXT STEPS

COG, state governments (including D.C. DOEE), local governments, and other related entities across the MSA are eligible to participate in the general competition for CPRG implementation grants, competing against other entities nationally for up to $4.6 billion in funding through individual grants ranging from $2 million to $500 million each ($300 million is set aside for tribes and territories). Implementation grant applications are due April 1, 2024, with awards anticipated in 2024.[36]

As the lead organization for CPRG planning deliverables, COG is also responsible for developing a CCAP by mid-2025 and a Status Report on CCAP progress in 2027.

The 2025 CCAP will include:

- An updated GHG inventory for the MSA
- BAU GHG emissions projections and an economy-wide GHG emissions reduction scenario
- GHG reduction targets for the MSA (short- and long-term)
- A comprehensive list of GHG reduction measures that address economy-wide emissions. Building on the PCAP, this will include the following for each measure:
    - Quantified estimates of GHG reduction and costs
    - Key implementing agency or agencies
    - Implementation schedule and milestones
    - Expected geographic location

[36] For more information about the implementation grant applications and competition see: https://www.epa.gov/inflation-reduction-act/about-cprg-implementation-grants.

- Quantified estimates of co-pollutant reductions (e.g., $PM_{2.5}$, NOx, SO_2, VOCs, air toxics)
- A more robust or quantified analysis of benefits for LIDACs
- A review of the statutory or regulatory authority to implement the measure (and a schedule and milestones for key entities to obtain authority if not existing)
- Identification of funding sources that have been secured for implementation
- Metrics for tracking progress
- A workforce planning analysis

The 2027 CPRG Status Report will include:

- The implementation status of the quantified GHG reduction measures from the CCAP
- Relevant updated analyses or projections supporting CCAP implementation
- Next steps and future budget or staffing needs to continue CCAP implementation

COG will continue to meaningfully engage with stakeholders, including local governments, state governments, industry, community organizations, tribes, a matrix of stakeholders (e.g., Commissions, Committees, academic and research resources, CBOs, foundations, and institutions), and the public throughout the development of the CCAP and in the implementation of climate actions throughout the MSA.

APPENDIX A. GHG INVENTORY, BUSINESS-AS-USUAL PROJECTIONS, AND GHG REDUCTION MEASURE QUANTIFICATION

GHG Inventory

For the CPRG, COG produced a 2020 GHG inventory for the MSA. COG leveraged and expanded its existing GHG inventory and projections for the COG region to cover the entire MSA. COG used the existing 2020 GHG inventory for portions of the MSA that fall within COG's geographic scope. To incorporate counties and cities in the broader MSA COG region, COG sought additional data sources and approaches to prepare a 2020 GHG inventory for the full MSA.

COG completes GHG community-scale inventories for all 24 local government members, Northern Virginia, and metropolitan Washington. COG makes every effort to capture an accurate picture of GHG trends for each of its local government members, while also providing for a consistently applied methodology across all its members' communities. Local inventory results are added together to get the total regional GHG emissions. The emissions attributed to the additional MSA jurisdictions that have been incorporated into COG's 2020 inventory have been calculated as a whole for most sectors included in this inventory.

COG GHG inventories are compliant with both the U.S. Communities Protocol for Accounting and Reporting Greenhouse Gas Emissions (USCP) and Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC). COG inventories use public data readily available on a consistent basis. While both accuracy and consistency are important to GHG inventories, consistency is given a higher priority. COG used global warming potential (GWP) factors from the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC AR4).

The inventory follows an activities-based approach, meaning emissions are calculated based on the result of an activity happening in a community. An example of this is that solid waste emissions are calculated based on the tonnage of trash the community sends to a landfill(s). Simply because they do not have a landfill within their jurisdiction's boundaries, does not mean that they are not contributing to landfill emissions.

The broad categories of emission types covered by COG's GHG inventory work include the built environment (including some process and fugitive emissions), transportation and mobile emissions, waste (solid waste and wastewater), and some land use (agriculture, forests, and trees outside of forests). Most of these sectors, except land use, are required elements to be compliant with the USCP and GPC.

The gases calculated within these inventory records include carbon dioxide (CO2), methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), and Perfluorocarbons (PFCs).

CLEARPATH

ICLEI's ClearPath tool is an online tool for preparing local GHG inventories, forecasts, climate action plans, and monitoring reports. The tool is consistent with both US and global accounting protocols. COG uses the Community Scale Inventory Module to support completing its GHG inventory work for its members and the region. Some of the tool's calculators are used to calculate emissions as

inventory records are created, while in other instances, emissions are calculated outside the tool and recorded in the inventory record.

COVID-19 IMPACTS

The COVID-19 pandemic has had far-reaching impacts on the global economic and social system. Pandemic impacts on GHG emissions are largely due to reduced economic and travel activity. Globally, the pandemic impacted GHG emissions by 4-5% in 2020. The state of Maryland estimates the pandemic had a 4% impact on GHG emission reduction in 2020. COG estimates the pandemic had a 4-6% impact on metropolitan Washington's 2020 GHG emissions.

The pandemic impacted the anticipated reduction in a few key sectors of metropolitan Washington's 2020 GHG emissions inventory. Emissions from the built environment were lower than projected for 2020, in part due to the pandemic; however, the grid getting cleaner and weather impacts also played a role. Emissions from the transportation sector were lower than previously projected for 2020 because less people were on the roads and flying during the height of the pandemic. Finally, solid waste emissions were overall lower than projected for 2020. However, waste that would have been generated and collected from businesses were generated within individual residences during the height of the pandemic and thus it did not make a significant impact on overall GHG emissions in 2020.

BUILT ENVIRONMENT

Residential and Commercial Electricity

Residential Electricity accounts for emissions resulting in electricity use in residential buildings. Commercial Electricity accounts for emissions resulting in electricity use in commercial, government, industrial, and other non-residential buildings and facilities. The Residential and Commercial Electricity emission calculations for the COG member jurisdictions follow the USCP recommended methodology as outlined in Appendix C, BE.2.1 from Version 1.2 of the Protocol. COG annually collects aggregated account and consumption data from the seven electric utilities that serve metropolitan Washington.

Calculations of Residential and Commercial Electricity emissions for the additional MSA jurisdictions also follow the USCP recommended methodology as outlined in Appendix C, BE.2.1 from Version 1.2 of the Protocol. The residential electricity methodology estimates consumption in kilowatt hours (kWh) by multiplying the estimated number of households using electricity with per household electricity consumption data. The Energy Information Administration (EIA) has readily available electricity energy intensity data for the South Atlantic region and the US Census Bureau American Community Survey (ACS) has readily available data on number of households using electricity. The Commercial Electricity methodology estimates consumption by calculating the percent of commercial square footage using electricity. Values for commercial building square footage using electricity are scaled locally by multiplying the local jurisdictional commercial square footage by the percentage of commercial building square footage using electricity in the broader South Atlantic region. These values, in turn, were multiplied by the electricity energy intensity in kilowatt hours per square foot ($kWh/ft.^2$) to get total electricity consumption in kWh per additional MSA jurisdiction.

Electricity consumption data and EPA eGRID emission rates are used to calculate emissions. EPA eGRID Subregions leveraged to complete the MSA inventory include RFC East (RFCE), RFC West (RFCW), and SERV Virginia/Carolina.

Residential and Commercial Natural Gas

Residential and Commercial Natural Gas consumption accounts for combustion emissions from stationary fuel applications, such as boilers and furnaces. The Residential and Commercial Natural Gas emission calculations for the COG member jurisdictions follow the USCP recommended methodology as outlined in Appendix C, BE.1.1 from Version 1.2 of the Protocol. COG annually collects aggregated account and consumption data from the three natural gas utilities that serve metropolitan Washington, which is used to complete emission calculations using this methodology.

Calculations of Residential Natural Gas emissions for the additional MSA jurisdictions follow the USCP recommended methodology as outlined in Appendix C, BE.1.2 from Version 1.2 of the Protocol. This methodology estimates residential utility natural gas consumption in therms by multiplying the estimated number of households using utility natural gas in each jurisdiction with per household natural gas consumption data for the South Atlantic region. The EIA Residential Energy Consumption Survey (RECS) has readily available utility natural gas energy intensity data for the South Atlantic region and the ACS has readily available data on number of households using utility natural gas.

Calculations of Commercial Natural Gas emissions for the additional MSA jurisdictions follow the USCP recommended methodology as outlined in Appendix C, BE.1.3 from Version 1.2 of the Protocol. The Commercial Natural Gas methodology estimates consumption by calculating the percentage of square footage using natural gas. Values for commercial building square footage using utility natural gas are scaled locally by multiplying the local jurisdictional commercial square footage by the percent of commercial building square footage using utility natural gas in the broader South Atlantic region. These values, in turn, were multiplied by the natural gas energy intensity in therms per square foot (therms/ft.^{2}) to get total natural gas consumption in therms per additional MSA jurisdiction.

Residential Fuel Oil and Liquefied Petroleum Gas (LPG)

Fuel oil accounts for both distillate fuel oils and kerosene used in stationary applications. LPG refers to a group of hydrocarbon gases derived from crude oil refining or natural gas processing. Propane is the most common LPG. The Residential Fuel Oil and LPG emissions calculations follow the USCP recommended methodology as outlined in Appendix C, BE.1.2 from Version 1.2 of the Protocol. This methodology estimates residential fuel oil and LPG consumption in gallons by multiplying the estimated number of households using fuel oil or LPG as a home heating fuel in the region and each jurisdiction with the respective residential fuel oil or LPG energy intensity data for the region. Gallons are used to estimate emissions.

Local data on households and consumption related to fuel oil and LPG is not readily available for all MSA members. However, the EIA Residential Energy Consumption Survey (RECS) has readily available fuel oil and LPG energy intensity data for the South Atlantic region and the ACS has readily available data on number of households using fuel oil and LPG as a home heating fuel.

Commercial Fuel Oil and LPG

The Commercial Fuel Oil and LPG emissions calculations follow the USCP recommended methodology as outlined in Appendix C, BE.1.3 from Version 1.2 of the Protocol. These methodologies calculate percentage of square footage using fuel oil or LPG. Values for commercial building square footage using fuel oil or LPG are scaled locally by multiplying the local jurisdictional commercial square footage by the percentage of commercial building square footage using fuel oil or LPG in the broader South Atlantic region. These values, in turn, are multiplied by the fuel energy intensity in gallons per square foot (gallons/ft.^{2}) to get total fuel oil or LPG consumption in gallons per locality and region. Gallons are used to estimate emissions.

The number of commercial buildings and total square footage for each MSA jurisdiction is readily available from the CoStar Commercial Property Records. There is not data readily available on stationary fuel use for these buildings. The EIA does have data available for larger regions on total commercial buildings and square footage; number and square footage of buildings using fuel oil or LPG; and energy intensity. EIA's South Atlantic region in the Commercial Building Energy Consumption Survey (CBECS) includes DC, MD, VA, DE, WV, NC, SC, GA, and FL.
Process and Fugitive Emissions

Natural Gas Fugitive Emissions

Natural Gas Fugitive Emissions accounts for emissions resulting from local natural gas system losses within the community. The Fugitive Emissions from Natural Gas emission calculations use a ClearPath calculator. The fugitive emissions are calculated based on a leakage rate for total annual natural gas consumption. The ClearPath calculator uses a leakage rate of 0.3 percent. Data from the Metropolitan Washington Annual Utility survey needs to first be collected and analyzed for the inventory year prior to completing these steps.

Hydrofluorocarbon Emissions

Hydrofluorocarbons (HFCs) are a type of GHG and are comprised of several organic compounds composed of hydrogen, fluorine, and carbon. HFCs are produced synthetically and are commonly used in air conditioning and refrigerants. HFC emissions in this inventory represent GHG emissions from substitutions for ozone depleting substances. The U.S. EPA annual inventory reports on GHG emissions calculates nationwide emissions for substitutes for ozone depleting substances. Total U.S emissions from substitutes for ozone depleting substances are scaled locally by population to estimate regional values. Local data on substitutes for ozone depleting substances is not available. It would take extensive research and local surveys to develop this data.

TRANSPORTATION AND MOBILE EMISSIONS

On-Road and Off-Road Mobile Emissions

On-Road Mobile Emissions represent exhaust and evaporative emissions of carbon dioxide (CO2), nitrous oxide (N2O), and methane (CH4) from on-road passenger and freight motor vehicles. The mobile off-road equipment data category includes all mobile source emissions that do not operate on roads, excluding commercial marine vehicles, railways, and aircraft. The MSA inventory uses EPA's National Emissions Inventory (NEI) data for on-road mobile emissions and Off-road mobile emissions estimates. COG region inventories typically use EPA MOVES model for these calculations; however, data and modeling are not available for the full MSA.

Passenger Air Travel

Passenger air travel emissions account for commercial aircraft emissions from major commercial airports serving the MSA. The Passenger Air Travel emission calculations generally follow the USCP recommended methodology as outlined in Appendix D, TR.6.D from Version 1.2 of the Protocol. COG's approach uses the best available data to estimate air travel passenger emissions by airport and includes personal travel and business travel by people who live, work, or were visiting an MSA jurisdiction. This includes all air passengers leaving from Ronald Reagan Washington National Airport (DCA) and Washington Dulles International Airport (IAD). COG estimates air travel passenger emissions for air passengers leaving from Baltimore-Washington International Thurgood Marshall Airport (BWI) by allocating emissions by the percent of passengers traveling from COG member jurisdictions to the airport.

To estimate emissions per airport, national aircraft emissions are downscaled based on the local to national ratio of revenue passenger miles for BWI, DCA, and IAD. This approach does not account for aircraft emissions and air passengers that are, for instance, flying into IAD and taking a connecting flight elsewhere. For all originating air passengers departing from the region's three commercial airports – BWI, DCA, IAD – the biennial Washington-Baltimore Regional Air Passenger Survey provides readily available origin-destination data for base and forecast years. There is also readily available data on commercial aircraft emissions and passenger miles traveled for the airports serving the region through EPA and the Bureau of Transportation Statistics, respectively.

Commuter Rail

Commuter Rail Transportation calculates emissions resulting from Maryland Transit Administration (MTA) MARC and Virginia Railway Express (VRE) trains carrying commuters from Maryland and Virginia. The Commuter Rail Transportation emission calculations generally follow the USCP recommended methodology as outlined in Appendix D, TR.4 from Version 1.2 of the Protocol. In this approach, emissions are calculated from annual diesel consumption of commuter rail operators.

Diesel consumption of commuter rail systems (code CR) is readily available via the Federal Transit Administration's (FTA) National Transit Database. MTA reports diesel consumption for their full commuter rail operations, some of which occur outside the MSA. MTA annual diesel consumption is attributed to the MSA by the percent of stations located in the MSA – 63 percent of MTA's MARC stations are in the MSA.

WASTE

Solid Waste

Landfill Waste Generation accounts for the emissions resulting from waste generated by the community in a year and disposed of at a landfill. The Landfill Waste Generation emission calculations follow the USCP recommended methodology as outlined in Appendix E, SW.4 from Version 1.2 of the Protocol. The calculations are based on tons of municipal solid waste (MSW) from local jurisdictions going to a landfill and whether the receiving landfills have methane capture. The EPA FLIGHT Tool was used to identify whether a landfill that regularly receives MSW from the region has methane collection. COG also gathered information on landfill methane collection efficiency from jurisdictions or landfill operators.

The Combustion of Solid Waste accounts for the emissions resulting from the tons of MSW generated by the community in a year and disposed of at a waste-to-energy (WTE) facility. The Combustion of Solid Waste Generated by the Community emission calculations follow the USCP recommended methodology as outlined in Appendix E, SW.2.2 from Version 1.2 of the Protocol.

The best available MSW data from local and regional sources was used to calculate these emissions. Unlike other activities in this inventory, there is no regional, state, or federal source of MSW data that comprehensively reports data in the way needed for GHG inventory calculations.

Wastewater

Septic Systems Emissions account for the fugitive emissions resulting from the physical settling and biologic activity during the treatment process in septic tanks. The Fugitive Emissions from Septic Systems calculations follow the USCP recommended methodology as outlined in Appendix F.WW.11 from Version 1.2 of the Protocol. The methodology estimates GHG emissions based on the population served by septic.

Sewer System Emissions accounts for N2O emissions during the treatment process at wastewater treatment plants (WWTPs). The Nitrification/Denitrification Process N2O Emissions from Wastewater Treatment calculations follow the USCP recommended methodology as outlined in Appendix F.WW.7 from Version 1.2 of the Protocol. The methodology estimates GHG emissions based on the population served by sewer.

N2O Effluent Discharge Emissions account for the emissions resulting from treated wastewater that flows out of a treatment facility and is discharged into waterways. The Process N2O from Effluent Discharge to Rivers and Estuaries calculations follow the USCP recommended methodology as outlined in Appendix F.WW.12 from Version 1.2 of the Protocol. The methodology estimates GHG emissions based on the population served by sewer and daily Nitrogen loads. Data inputs on Nitrogen loads are downloaded from EPA Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST). This data represents a simple average of the annual loads recorded by the Bay Program.

The Regional Wastewater Flow Forecast Model (RWFFM) and COG Cooperative Forecasts are leveraged to estimate populations served by sewer and septic. For jurisdictions not included in COG's Cooperative Forecast, population data are acquired from the ACS.

LAND USE

Agriculture

Emissions from agricultural activities include enteric fermentation, manure management, and ag soils. Enteric fermentation accounts for the methane produced from animal digestion in cows, sheep, goats, swine, and horses. Manure management accounts for emissions from management systems that stabilize or store livestock manure. Ag soils account for nitrous oxide (N2O) emissions from animals, crop production, and fertilizer application.

Agricultural sources and activities relevant to the MSA were calculated using EPA's State GHG Inventory Tool. MSA data inputs into the EPA's State GHG Inventory Tool are pulled at the county-scale from CAST. CAST is a web-based nitrogen, phosphorus, and sediment load estimator tool that streamlines environmental planning in the Chesapeake Bay watershed.

Forests and Trees Outside Forests

Forests and trees outside of forests sequester CO2 during photosynthesis and act as a carbon sink. If removed, they can be a source of emissions. ICLEI's Land Emissions And Removals Navigator (LEARN) tool estimates the local GHG impacts of forests and trees outside of forests. This tool provides information on land cover, including forest cover and change. Forested areas are defined as greater than 1-acre while trees outside forests are individual trees or trees in small patches less than 1-acre. LEARN combines methods outlined in the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix J with national and regional data sources to derive a first-order approximation of annual GHG impacts over a given time period. The time period analyzed for forests is 2013-2019 and is applied to the 2020 GHG inventory.

Business-as-Usual Projections

BAU projections account for driving factors such as growth in population, housing and commercial development, and transportation patterns, and estimate the impact they will have on future GHG emissions. BAU projections reflect policies and practices that are currently in place and implemented to-date to reduce GHG emissions, but do not incorporate any additional GHG emission reductions

from anticipated future action. The BAU projections for Residential and Commercial Electricity do not reflect the Renewable Portfolio Standard (RPS) policies that have been adopted in the District of Columbia, the state of Maryland, and the Commonwealth of Virginia. Instead, EPA's 2020 eGRID emission factors have been kept constant out to 2050. The impacts of policies that accelerate the deployment of clean energy, such as RPS policies, are reflected in this PCAP's priority GHG reduction measures. Table 7 provides a summary of BAU assumptions used in the development of BAU projections for this PCAP.

Table 7. BAU Assumptions

Emissions Activity	BAU Assumptions
Residential Energy	COG Cooperative Forecasts Round 10.0 household growth by COG member jurisdiction
	Applied to typical housing mix in each community (Single Family Detached, Attached, Apartments 2-4 Units, Apartments 5+ Units)
	Typical energy use intensity by housing type
Commercial Energy	10.0 Cooperative Forecasts employment growth by COG member jurisdiction
	Historic job growth & commercial construction -> SQFT new construction / job
	New building mix by Core, Inner, Outer areas from COG Commercial Construction Report
	Typical energy use intensity by building type (office, retail, flex/other)
On-Road Mobile Emissions	Adopted Transportation Planning Board projections from Vision 2045
	Transportation Demand Model 2.3.75
	Uses Visualize 2045 Transportation Networks & 9.1a Cooperative Forecasts as inputs
	EPA MOVES2014b
	Incorporates incremental improvements in average fuel economy
Air and Rail Travel	Passenger growth based on COG Regional Air Passenger Origin/Destination Forecast
	Percent increase derived from Transportation Planning Board projections of future ridership
Off-Road Mobile Emissions	Held constant
Agriculture	All sources (soils, livestock, manure) decreased at annual rate of recent loss in farmland (2007-2012) from COG What our Region Grows Report, 2017 (Note: the COG region rate was applied to the full

	MSA in the absence of more specific data for additional MSA jurisdictions)
Waste (Solid Waste and Wastewater), HFCs	Proportional increase with population
Fugitive Natural Gas	Driven by increases in natural gas consumption

GHG Reduction Measure Quantification

The following is a summary of methods used for calculating GHG emission reductions in the COG PCAP. In developing these values, modeling assumptions were made to determine reasonable GHG emissions reductions from the deployment of specific measures. In some instances, already existing modeling efforts were used, these situations are noted below. Additionally, in some cases, there may be areas of overlap between emissions reduction values between measures. For example, electricity emissions factors associated with a progressively cleaner grid were used to determine emissions reduction potential for a range of measures (such as efficiency and electrification). This might result in double counting when comparing it to the clean and renewable energy measure, which also accounts for emissions reductions from cleaner electricity.

ACCELERATE THE DEPLOYMENT OF ENERGY EFFICIENCY SOLUTIONS AND DECARBONIZATION OF RESIDENTIAL, INSTITUTIONAL, MUNICIPAL, AND COMMERCIAL BUILDINGS.

This measure calculated emissions reductions from electrification and energy efficiency in the building sector. Building energy use and building emission projections are based on energy consumption from electricity, natural gas, fuel oil, and propane in existing residential (single-family, multifamily, and mobile homes) and commercial buildings (office, food service, school, hotel, healthcare, retail, and warehouse).

CO_2Sight™ utilizes ICF's Distributed Energy Resources (DER) Planner model for modeling existing buildings. DER Planner is a bottom-up model that is built upon the best practice principles for potential modeling outlined by the National Action Plan for Energy Efficiency in their Guide for Conducting Energy Efficiency Potential Studies. The model can be used to calculate technical, economic, and achievable potential estimates. Together, the CO_2Sight platform and DER Planner estimate energy and emissions changes from a range of decarbonization strategies, including electrification retrofits and energy efficiency.

DER Planner, informed by stock CO_2Sight measures data, has the capabilities to model various energy efficiency, electrification, and building envelope measures in selected building types. This tool allows the analysis of over 80 residential and commercial measures in selected regions applied to the Pennsylvania building characteristics. The model uses key inputs such as equipment stock, participation rate curves, and energy change per measure and estimates potential savings from applying efficient measures available for each building type and end-use. Given the efficient technologies available, this quantifies how much energy could be reduced. To compute total savings potential, the model runs all permutations combining savings per energy efficiency measure unit,

expected measure penetration, and total number of measure units (or total eligible stock) by all adoption types.

By integrating DER Planner and comprehensive datasets such as ResStock and ComStock, CO_2Sight aggregates energy and emissions changes to estimate changes in energy use. The base year and projections for energy consumption in existing buildings are built from the 2022 Annual Energy Outlook (AEO), which represented projected energy user prior to the passage of the IRA, from the U.S. EIA. AEO data are scaled to cover the MSA by scaling AEO Census level data with the ResStock and ComStock building models of North American building stock with county-level resolution. The model calibrates ComStock and ResStock energy consumption to AEO energy consumption on a Census division level. Then the modeling proportionally adjusts county-level energy consumption to the scaled Census division level. Energy use values have been integrated with emissions factors for primary fuels (electricity, gas, propane and fuel oil) to provide total emissions. Results are provided every five years from 2020 to 2050 and interpolated for years in between.

For the MSA, modeling assumed an accelerated electrification scenarios for HVAC as well as Water Heating and Cooking, and a high scenario for building envelope implementation, in alignment with sources outlined below.

As an input into DER Planner, each measure has participation (or technology adoption curves) connected to them. A range of factors can impact whether new electric or efficiency technologies are adopted. This approach builds from NREL's Electrification Future Study,[37] from which many of the adoption curves are provided. It accounts for costs, supporting infrastructure, ownership and availability, health and sustainability (including policies) and other factors that could influence technology change. Adoption curves are also provided from the implementation energy efficiency programs and informed by ICF expertise. For ease of use, users can select prepopulated groupings of participation curves to match the types of energy change they want to model. The groupings are outlined below:

HVAC, Water Heating, and Cooking Pathways

- Business-as-Usual: Small amount of energy efficiency, no specific electrification strategy or fuel switching
- Gas Efficiency: Significant amount of energy efficiency, no electrification, specific emphasis on efficiency for gas equipment. Gas heat pumps in future years.
- Beneficial Electrification: Significant amount of energy efficiency, small amount of electrification for those projects that are presently cost-effective.
- End of Life Electrification: Significant amount of energy efficiency, large amount of electrification when equipment reaches the end of its useful life.
- Accelerated Electrification: Signification amount of energy efficiency, large amount of electrification prior to equipment reaching the end of its useful life.

Water Heating and Cooking Pathways

- Business-as-Usual: Small amount of energy efficiency, no specific electrification strategy or fuel switching

[37] https://www.nrel.gov/analysis/electrification-futures.html

- Gas Efficiency: Significant amount of energy efficiency, no electrification, specific emphasis on efficiency for gas equipment. Gas heat pumps in future years.
- Beneficial Electrification: Significant amount of energy efficiency, small amount of electrification for those projects that are presently cost-effective
- End of Life Electrification: Significant amount of energy efficiency, large amount of electrification when equipment reaches the end of its useful life
- Accelerated Electrification: Signification amount of energy efficiency, large amount of electrification prior to equipment reaching the end of its useful life

Building Envelope Pathways

- Business-as-Usual: Small amount of energy efficiency on building envelope
- Low: Moderate building envelope work, some deep energy retrofits
- High: Significant building envelope work, Significant deep energy retrofits

In addition to HVAC; Water Heating and Cooking Pathway selection being chosen, there are opportunities to influence core energy efficiency work occurring in each pathway including:

- Full lighting retrofits and lighting controls
- Smart Thermostats and Building Automation Systems
- New energy efficient appliances
- New energy efficient HVAC equipment

CO_2Sight uses ICF's Integrated Planning Model (IPM) to generate a trajectory of grid emissions factors associated with the electricity grid. Emissions factors for this measure were derived from the Net Zero Electricity Grid measure. Values from EPA's Center for Corporate Climate Leadership GHG Emission Factors Hub were used for natural gas and propane reductions.[38]

ACCELERATE THE DEPLOYMENT OF CLEAN AND RENEWABLE ENERGY.

The potential GHG emission reductions from increased distributed solar adoption were estimated using a combination of NREL datasets, information on existing distributed solar systems in the region, and regional goals for increased adoption of distributed solar. The data are representative of the COG region, rather than the CPRG MSA territory, but is used as a proxy for rooftop solar potential for this measure.

From NREL's dataset on rooftop solar potential in the U.S., an average kW potential for solar per building was derived using data for zip codes in the region. The average system size metric was applied to the 2030 COG goal of 250,000 solar rooftops in the region to estimate the kW solar potential by 2030. The region's population growth rate was used to continue growing the number of rooftop solar systems in the region through 2050. To calculate the kWh of solar output, the capacity factor for residential solar from NREL's annual technology baseline was used. The incremental growth in solar output from current levels, multiplied by the grid emissions factor from the 2023 AEO Reference Case, resulted in the potential avoided emissions from rooftop solar. The grid emissions factor used was the average of the PJMD and PJME AEO regions for CO_2 emissions factors. The CO_2 emissions factors were combined with the CH_4 and N_2O eGRID emission factor data from the SRVC

[38] https://www.epa.gov/climateleadership/ghg-emission-factors-hub

and RFCE regions to estimate a CO_2e emission factor representing the MSA. The results are summarized in Table 8 and Table 9.

Table 8. Summary Results

Summary Outputs	2022 (Existing)	2030	2050
Buildings with Rooftop Solar	72,701	250,000	287,372
Rooftop Solar Capacity (kW)	807,339	2,797,242	3,215,394
Rooftop Solar Output (MWh)	1,050,235	3,638,820	4,182,777

Table 9. Cumulative GHG Reductions Over Time

Cumulative GHG Reductions (MTCO2e)	2025-2030	2025-2050
Distributed Renewables Measure	2,658,847	11,244,812

Data sources used include:

- Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment (2016), NREL Technical Report and dataset
- 2023 Electricity Annual Technology Baseline, NREL
- AEO 2023 Reference Case, electric grid emissions factor data
- EPA eGRID, electric grid emissions factor data, 2020
- COG data collection for existing distributed solar systems in the region
- COG community cooperative forecast, population growth projections

STUDY, PLAN FOR, AND DEPLOY DISTRICT ENERGY AND MICROGRID OPPORTUNITIES.

In 2011 COG worked with FVB Energy Inc to study potential benefits and costs of generalized example district energy systems in the region. This report, "Development of Cost Benefit Information and Business Case for Integrated Community Energy Solutions, Final Report" analyzed the benefits of the application of various generalized example district energy system types to a comparison building. Table 10 presents information from this study in terms of energy consumption differences between applied district systems and the comparison building, emission factors used for the year 2025, and conversion factors used to arrive at annual GHG emissions and GHG reductions for different system types.

To calculate the cumulative GHG reductions over time, varying emission factors for the grid were applied, consistent with other measures analyzed. For the comparison building, grid emission factors were held constant over time.

Table 10. DE System Types

Annual DE System Energy Consumption	Boilers and chillers	Engine CHP	Turbine CHP	Combined cycle CHP	Biomass Boiler	GSHP	Waste Heat	Solar
Gas (mmbtu)	339,845	1,335,623	1,118,251	1,442,068	49,319	94,763	150,313	261,856
Grid power (mmbtu)	256,223	(1,266,944)	(737,520)	(1,493,840)	215,443	489,447	256,223	256,223
Annual Comparison Building Energy Consumption								
Gas (mmbtu)	335,616	335,616	335,616	335,616	335,616	335,616	335,616	335,616
Grid power (mmbtu)	254,853	254,853	254,853	254,853	254,853	254,853	254,853	254,853
% Change in Annual Energy Consumption with DE System	1%	-88%	-36%	-109%	-55%	-1%	-31%	-12%
Conversion and Emission Factors								
kwh/mmbtu	293.071070							
mtCO2e/mmbtu (gas)	0.053115							
mtco2e/kwh (grid power, 2025)	0.00027							
mtco2e/kwh (grid power, BAU, 2025)	0.00029							
Annual DE System GHG Emissions								
Gas ($mtCO_2e$)	18,051	70,941	59,395	76,595	2,620	5,033	7,984	13,908
Grid power ($mtCO_2e$)	20,130	(99,535)	(57,942)	(117,361)	16,926	38,453	20,130	20,130
Annual Comparison BAU Building GHG Emissions								
Gas ($mtCO_2e$)	17,826	17,826	17,826	17,826	17,826	17,826	17,826	17,826
Grid power ($mtCO_2e$)	21,711	21,711	21,711	21,711	21,711	21,711	21,711	21,711
% Reduction in Annual GHG Emissions with DE System	-3%	-172%	-96%	-203%	-51%	10%	-29%	-14%

PROVIDE AND PROMOTE NEW AND EXPANDED OPPORTUNITIES TO REDUCE VMT THROUGH PUBLIC TRANSPORTATION, NON-MOTORIZED TRAVEL, MICROMOBILITY, SHARED TRAVEL OPTIONS, AND DEVELOPMENT.

The measure models the resulting GHG emissions reduced if the MSA achieves the VMT reductions modeled for scenario MS.4 of the *TPB Climate Change Mitigation Study of 2021: Additional Transportation Scenarios Analysis*. This scenario models a variety of strategies to reduce VMT, including land use changes, reduction in transit travel times, telework, and increased walk and bike access, and uptake of micromobility. These strategies result in VMT reduction for passenger vehicles only. The same baseline VMT, vehicle population, energy consumption, and emissions by fuel type and vehicle source type from EPA MOVES4 used for the low- and zero- emissions measures were used for this measure as well. This analysis sourced data from EPA MOVES4, the TPB Climate Change Mitigation Study of 2021 Additional Transportation Scenarios Analysis (June 2022),[39] and eGRID.

ACCELERATE THE DEPLOYMENT OF LOW- AND ZERO-EMISSIONS TRANSPORTATION, FUELS, AND VEHICLES.

The measure models the resulting GHG emissions reduced if the MSA meets the ZEV targets outlined in scenario VT.1 of the TPB Climate Change Mitigation Study of 2021:

- 50% of new light-duty vehicle (LDV) sales are ZEVs in 2030, with 100% by 2040,
- 30% of new medium/heavy-duty (MHD) truck sales ZEVs in 2030, with 100% by 2050, and
- 50% of buses on the road are ZEVs in 2030, with 100% in 2050.

The model uses outputs from the EPA Motor Vehicle Emissions Simulator (MOVES4) to project baseline VMT, vehicle population, energy consumption, and Scope 1 emissions for on-road transportation in the MSA by fuel type (gasoline, diesel, ethanol (E-85), compressed natural gas, and electricity), vehicle source type, and model year. Default input values were used. Scope 2 emissions from electricity consumption by EVs were found using the following equation:

$$Scope\ 2\ Emissions = Electricity\ Consumption\ \times\ Electricity\ Emission\ Factor$$

The electricity emission factor was held at 2020 eGRID levels through 2050 for the baseline.

To model GHG emission reductions in the policy scenario, for each model year, a fraction of VMT was designated as fuel type “electricity” or “hydrogen” based on the ZEV sales curve. The resulting energy consumption was found using the following equation:

$$Energy\ Consumption = VMT\ \times Energy\ Efficiency$$

where energy efficiency was in units of kJ/mi for battery-electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs). Implied BEV energy efficiencies from the MOVES4 baseline results were used. FCEV energy efficiencies were sourced from the California Advanced Clean Fleets (ACF) rule. Scope 1 emissions were found by reducing baseline internal combustion engine vehicle (ICEV) emissions by

[39] ICF, Fehr and Peers, and Gallop Corporation. “TPB Climate Change Mitigation Study of 2021, Additional Transportation Scenarios Analysis: TPB Survey Identified Scenarios.” June 2022. file:///C:/Users/18745/Downloads/CCMS_2021_Additional_Transportation_Scenarios_Analysis__-_TPB_Survey_Identified_Scenarios_v5.pdf

the ZEV sales fraction. Scope 2 emissions were found using Equation (1). Electricity emission factor projections were sourced from EIA's AEO for the MSA region.

The following additional key assumptions were made throughout the analysis:

- ZEVs exist in the vehicle fleet for the same length of time as ICEVs.
- ZEV activity/use is identical to an ICEV.
- The annual ZEV sales fraction applies to every fuel type.
- Long-haul medium and heavy-duty vehicles (MHDVs) ZEVs are modeled as FCEV and all other MHDVs ZEVs are modeled as BEV.
- All LDVs ZEVs are modeled as BEVs.
- All BEV populations 2021 and earlier are EPA MOVES4 default.
- The methodology in some cases required re-allocating MOVES4 baseline projected electric vehicle back to internal combustion engine vehicles. Where this was necessary, LDVs were designated as gasoline, and MHDVs were designated as diesel.
- The hydrogen supply is assumed to be 50% green hydrogen and 50% blue hydrogen.

This analysis sourced data from EPA MOVES4, eGRID, and EIA AEO, and electricity emission factors used were consistent with the factors from IPM used in other measures.

ACCELERATE THE DEPLOYMENT OF OFF-ROAD/NON-ROAD ELECTRIC EQUIPMENT.

To estimate GHG emission reductions from this measure, off-road GHG emissions were assumed to remain constant, as presented in the MSA BAU. To estimate cumulative reductions, in each year, a percent reduction from BAU was then applied. This percent reduction was derived from the modeling from the COG 2030 CEAP, by calculating the 2030 CEAP COG region BAU off-road emissions in a given year to the 2030 CEAP COG region GHG reduction scenario off-road emissions in that same year. The annual percent reduction was held constant from 2030 through 2050.

REDUCE GHG EMISSIONS FROM WASTE AND WASTEWATER TREATMENT.

For the waste sector, the same method was applied as was used for off-road emissions, building off an approach that scales COG 2030 CEAP GHG reductions to the larger MSA region. For the wastewater treatment sector, GHG emission reductions were estimated calculating an average annual percent GHG emission reduction across from wastewater treatment across the MSA states (MD, VA, WV) from EPA's state-level non-CO_2 GHG projections and mitigation assessments[40] and then applying those annual percent reductions to the MSA BAU for wastewater treatment.

ACCELERATE THE EXPANSION OF THE REGIONAL TREE CANOPY AND REDUCE TREE CANOPY LOSS.

For this measure the main tools used were:

- i-Tree MyTree (Accessed through https://www.itreetools.org/. This tool is used for assessing the carbon sequestration potential of trees, specifically in Maryland.

[40] EPA. "Non CO_2 Greenhouse Gas Data Tool." https://cfpub.epa.gov/ghgdata/nonco2/

- ICLEI LEARN: Utilized via https://icleiusa.org/LEARN/. This tool is used for estimating tree canopy cover percentage in the MSA, employing 1-meter resolution data from the University of Vermont and the Chesapeake Conservatory land cover data.

The main assumptions are derived from legislative goals set forth by Washington, D.C. and Maryland.

- In Washington, D.C., the goal is to increase tree canopy coverage from 35% to 40%. The goal was within Sustainable DC—a planning effort to make the District of Columbia the greenest, healthiest, and most livable city in the nation. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Draft_Urban_Tree_Canopy_Plan_Final.pdf
- The 5 Million Trees Initiative was mandated by Maryland legislation through the Tree Solutions Now Act of 2021. Part of this legislation included a historic directive to plant 5 million native trees on public and private land by 2031. https://news.maryland.gov/dnr/2023/06/01/five-million-trees-please-maryland-rolls-out-5-million-trees-initiative/

Tree canopy cover percentage for the MSA is estimated using the ICLEI LEARN tool, using 1-meter resolution data from the University of Vermont and the Chesapeake Conservatory land cover data to assess tree cover in "settlement" areas.

Carbon sequestration potential of native trees in Maryland is determined using i-Tree MyTree, which utilizes county coordinates within each MSA Maryland County and designates the trees as "new planting" and in "partial sun" with a 1-inch diameter.

Data used included:

- Urban and Rural Areas Census data for 2010 and 2020: Obtained from the U.S. Census Bureau's website at https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html
- Native Tree Species in Maryland: https://msa.maryland.gov/msa/mdmanual/01glance/html/trees.html

APPENDIX B. METROPOLITAN WASHINGTON CLIMATE AND ENERGY PLANS AND TARGETS

REGIONAL

- Transportation Planning Board Visualize 2045, 2022 update, goals are specific to the on-road transportation sector:
  - 50% below 2005 levels by 2030
  - 80% by 2050
- Metropolitan Washington 2030 Climate and Energy Action Plan, 2020
  - 50% below 2005 levels by 2030
  - 80% by 2050

DISTRICT OF COLUMBIA

- Carbon Free DC, 2023
  - 60% Reduction in emissions by 2030 compared to 2006 baseline
  - 50% Reduction in per capita energy use by 2032 compared to 2006 baseline
  - 50% Energy from renewables by 2032

MARYLAND

City of Bowie

Updated Climate Action Plan, 2020

- 50% by 2030 below 2015 levels

Charles County

- Community climate plan began development in 2023

Frederick County

- Climate Emergency Resolution, 2020
  - 50% from 2010 levels by 2030
  - 100% by 2050
- Sustainable Frederick County, 2017
  - 25% reduction below 2007 levels by 2025

City of Greenbelt

- Sustainability Plan Framework, 2013
  - Meet State of MD and COG goals (COG goals noted above and MD goal of 25% below 2006 levels by 2020)

City of Laurel

- Phase II of developing a Sustainable Community Implementation Framework kicked off in 2023

Montgomery County

- Montgomery County Climate Action Plan, 2021
  - 80% below 2005 levels by 2027
  - 100% below 2005 levels by 2035

Prince George's County

- Climate Action Plan, 2022
  - 80% below 2008 levels by 2050

City of Rockville

- Climate Action Plan, 2022
  - 50% reduction below 2005 levels by 2030
  - Zero GHG emissions on or before 2050

City of Takoma Park

- Sustainability and Climate Action Plan, 2019
  - Does not establish new GHG goals but instead works toward being consistent with state, County, and COG plans.
- Sustainable Energy Action Plan, 2014
  - Does not establish new GHG goals but instead works toward being consistent with state and County plans.

State of Maryland

- Maryland Climate Pollution Reduction Plan, 2023
- The 2030 Greenhouse Gas Reduction Act (GGRA) Plan, 2021
  - The Act established the goals of 40% reduction below 2006 levels by 2030.
  - The Plan calls for achieving the target of 50% reduction below 2006 levels by 2030.
- The Climate Solutions Now Act (CSNA), 2022
  - The CSNA adjusted statewide GHG emission goals to include net zero carbon emissions by 2045.
  - The CSNA also calls for a reduction of statewide GHG emissions by 60% below 2006 levels by 2031.

VIRGINIA

City of Alexandria

- Energy and Climate Change Action Plan, 2023
  - Does not establish new GHG goals but affirms commitment to Paris Climate Agreement goals.
- Eco-City Alexandria Environmental Action Plan, 2019
  - 50% below 2005 levels by 2030
  - 80 – 100% below 2005 levels by 2050

Arlington County

- Community Energy Plan Roadmap, 2022 (years 1-2), updated for years 3-5 in 2024

    - Supports CEP goal of county-wide carbon neutral by 2050
  - Community Energy Plan Update, 2019
    - County-wide carbon neutral by 2050, compared to 2007 levels
- Energy Assurance Plan, 2023 (resilience)
- Carbon Neutral Transportation Master Plan (2024)

City of Falls Church

- Community Energy Action Plan (CEAP), 2023
  - 50% below 2005 levels by 2030
  - 80% below 2005 levels by 2050
  - Net zero emissions by 2050

Fairfax County

- Resilient Fairfax Climate Adaptation and Resilience Plan, 2022
- CECAP Implementation Plan, 2022
  - Does not establish new GHG goals but instead works toward meeting CECAP goals
- Community-wide Energy and Climate Action Plan (CECAP), 2021
  - By 2030, 50% below 2005 levels
  - By 2040, 75% below 2005 levels
  - By 2050, carbon neutral

Loudoun County

- Loudoun County Energy Strategy, 2023
  - Supports state goal to become net zero by 2045 and achieve a carbon-free grid by 2050
- Loudoun County Energy Strategy, 2009
  - County-wide goal to reduce GHGs from 3.85 million metric ton to 3.0 million metric ton by 2040
  - Government operations goal to reduce emissions 15% between 2007 and 2012

City of Manassas

- Draft Climate Action Plan, 2023
  - 50% GHG reduction from 2005 levels by 2030
  - 80% reduction from 2005 levels by 2050

Prince William County

- Community Energy and Sustainability Master Plan, 2023
  - By 2030, 50% below 2005 levels
  - By 2035, use 100% renewable electricity county-wide
  - By 2050, achieve carbon neutrality in government operations

Commonwealth of Virginia

- Virginia Clean Energy Plan, 2022

    - Ensure access to abundant, reliable, affordable, and clean energy so all Virginians can live, work and raise a family in a growing and thriving Commonwealth.
- Virginia Clean Economy Act, 2020
    - Mandates Dominion Energy Virginia and Appalachian Electric Power, produce 100% renewable electricity by 2045 and 2050, respectively.
    - Sets energy efficiency standards.
- Virginia 2018 Energy Plan
    - Plan mentions state commitment to Under2Coalition goal of reducing pollution and keeping global temperature rise under 2°C.

WEST VIRGINIA

- State of West Virginia 2018-2022 State Energy Plan, 2017

APPENDIX C. IDENTIFICATION OF LIDACS IN THE WASHINGTON-ARLINGTON-ALEXANDRIA, DC-VA-MD-WV MSA

Table 11. Census Block IDs for the MSA

City/County	State	Census Block ID	City/County	State	Census Block ID
District of Columbia	DC	11001000501	Prince George's County	MD	24033804001
District of Columbia	DC	11001001002	Prince George's County	MD	24033804002
District of Columbia	DC	11001001803	Prince George's County	MD	24033804002
District of Columbia	DC	11001001803	Prince George's County	MD	24033804102
District of Columbia	DC	11001001803	Prince George's County	MD	24033804102
District of Columbia	DC	11001001804	Prince George's County	MD	24033804300
District of Columbia	DC	11001001804	Prince George's County	MD	24033804300
District of Columbia	DC	11001001804	Prince George's County	MD	24033804400
District of Columbia	DC	11001001901	Prince George's County	MD	24033804400
District of Columbia	DC	11001001901	Prince George's County	MD	24033804600
District of Columbia	DC	11001001901	Prince George's County	MD	24033804801
District of Columbia	DC	11001001902	Prince George's County	MD	24033804801
District of Columbia	DC	11001002001	Prince George's County	MD	24033804801
District of Columbia	DC	11001002001	Prince George's County	MD	24033804802
District of Columbia	DC	11001002002	Prince George's County	MD	24033804802
District of Columbia	DC	11001002101	Prince George's County	MD	24033804900
District of Columbia	DC	11001002101	Prince George's County	MD	24033804900
District of Columbia	DC	11001002102	Prince George's County	MD	24033805000
District of Columbia	DC	11001002102	Prince George's County	MD	24033805000
District of Columbia	DC	11001002201	Prince George's County	MD	24033805000
District of Columbia	DC	11001002201	Prince George's County	MD	24033805101
District of Columbia	DC	11001002202	Prince George's County	MD	24033805101
District of Columbia	DC	11001002400	Prince George's County	MD	24033805201
District of Columbia	DC	11001002501	Prince George's County	MD	24033805201
District of Columbia	DC	11001002501	Prince George's County	MD	24033805202
District of Columbia	DC	11001002503	Prince George's County	MD	24033805202
District of Columbia	DC	11001002504	Prince George's County	MD	24033805202
District of Columbia	DC	11001002702	Prince George's County	MD	24033805500
District of Columbia	DC	11001002702	Prince George's County	MD	24033805500
District of Columbia	DC	11001002704	Prince George's County	MD	24033805601
District of Columbia	DC	11001002801	Prince George's County	MD	24033805601
District of Columbia	DC	11001002801	Prince George's County	MD	24033805601
District of Columbia	DC	11001002802	Prince George's County	MD	24033805602
District of Columbia	DC	11001002802	Prince George's County	MD	24033805602
District of Columbia	DC	11001002802	Prince George's County	MD	24033805602

District of Columbia	DC	11001002900	Prince George's County	MD	24033805700
District of Columbia	DC	11001002900	Prince George's County	MD	24033805700
District of Columbia	DC	11001003000	Prince George's County	MD	24033805700
District of Columbia	DC	11001003000	Prince George's County	MD	24033805801
District of Columbia	DC	11001003200	Prince George's County	MD	24033805801
District of Columbia	DC	11001003200	Prince George's County	MD	24033805802
District of Columbia	DC	11001003200	Prince George's County	MD	24033805802
District of Columbia	DC	11001003200	Prince George's County	MD	24033805904
District of Columbia	DC	11001003400	Prince George's County	MD	24033805904
District of Columbia	DC	11001003400	Prince George's County	MD	24033805906
District of Columbia	DC	11001003500	Prince George's County	MD	24033805906
District of Columbia	DC	11001003500	Prince George's County	MD	24033805907
District of Columbia	DC	11001003600	Prince George's County	MD	24033805907
District of Columbia	DC	11001003702	Prince George's County	MD	24033805908
District of Columbia	DC	11001003802	Prince George's County	MD	24033805909
District of Columbia	DC	11001004100	Prince George's County	MD	24033806000
District of Columbia	DC	11001004300	Prince George's County	MD	24033806000
District of Columbia	DC	11001004702	Prince George's County	MD	24033806000
District of Columbia	DC	11001004703	Prince George's County	MD	24033806100
District of Columbia	DC	11001004703	Prince George's County	MD	24033806501
District of Columbia	DC	11001004703	Prince George's County	MD	24033806501
District of Columbia	DC	11001004703	Prince George's County	MD	24033806501
District of Columbia	DC	11001004704	Prince George's County	MD	24033806601
District of Columbia	DC	11001004704	Prince George's County	MD	24033806601
District of Columbia	DC	11001004801	Prince George's County	MD	24033806601
District of Columbia	DC	11001004801	Prince George's County	MD	24033806602
District of Columbia	DC	11001004802	Prince George's County	MD	24033806602
District of Columbia	DC	11001004802	Prince George's County	MD	24033806602
District of Columbia	DC	11001004901	Prince George's County	MD	24033806711
District of Columbia	DC	11001004902	Prince George's County	MD	24033806712
District of Columbia	DC	11001005004	Prince George's County	MD	24033806713
District of Columbia	DC	11001005004	Prince George's County	MD	24033806713
District of Columbia	DC	11001005203	Prince George's County	MD	24033806713
District of Columbia	DC	11001005501	Prince George's County	MD	24033806714
District of Columbia	DC	11001005503	Prince George's County	MD	24033806714
District of Columbia	DC	11001005601	Prince George's County	MD	24033806800
District of Columbia	DC	11001005601	Prince George's County	MD	24033806900
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District of Columbia	DC	11001006804	Prince George's County	MD	24033807000
District of Columbia	DC	11001007100	Prince George's County	MD	24033807000

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District of Columbia	DC	11001007301	Prince George's County	MD	24033807404
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District of Columbia	DC	11001007504	Arlington County	VA	51013102003
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Prince George's County	MD	24033800210	Warren County	VA	51187020400
Prince George's County	MD	24033800210	Warren County	VA	51187020400
Prince George's County	MD	24033800211	Warren County	VA	51187020400
Prince George's County	MD	24033800211	Warren County	VA	51187020500
Prince George's County	MD	24033800218	Warren County	VA	51187020500
Prince George's County	MD	24033800408	Warren County	VA	51187020500
Prince George's County	MD	24033800412	Warren County	VA	51187020500
Prince George's County	MD	24033801003	Warren County	VA	51187020601
Prince George's County	MD	24033801404	Warren County	VA	51187020602
Prince George's County	MD	24033801404	Alexandria City	VA	51510200102
Prince George's County	MD	24033801405	Alexandria City	VA	51510200102
Prince George's County	MD	24033801405	Alexandria City	VA	51510200102
Prince George's County	MD	24033801409	Alexandria City	VA	51510200104
Prince George's County	MD	24033801500	Alexandria City	VA	51510200104
Prince George's County	MD	24033801500	Alexandria City	VA	51510200104
Prince George's County	MD	24033801702	Alexandria City	VA	51510200105

Prince George's County	MD	24033801702	Alexandria City	VA	51510200105
Prince George's County	MD	24033801704	Alexandria City	VA	51510200106
Prince George's County	MD	24033801704	Alexandria City	VA	51510200109
Prince George's County	MD	24033801704	Alexandria City	VA	51510200109
Prince George's County	MD	24033801707	Alexandria City	VA	51510200301
Prince George's County	MD	24033801707	Alexandria City	VA	51510200302
Prince George's County	MD	24033801707	Alexandria City	VA	51510200302
Prince George's County	MD	24033801808	Alexandria City	VA	51510200304
Prince George's County	MD	24033801901	Alexandria City	VA	51510200304
Prince George's County	MD	24033801906	Alexandria City	VA	51510200304
Prince George's County	MD	24033801906	Alexandria City	VA	51510200305
Prince George's County	MD	24033802001	Alexandria City	VA	51510200305
Prince George's County	MD	24033802002	Alexandria City	VA	51510200406
Prince George's County	MD	24033802103	Alexandria City	VA	51510200408
Prince George's County	MD	24033802104	Alexandria City	VA	51510200408
Prince George's County	MD	24033802107	Alexandria City	VA	51510200408
Prince George's County	MD	24033802107	Alexandria City	VA	51510200409
Prince George's County	MD	24033802204	Alexandria City	VA	51510200409
Prince George's County	MD	24033802301	Alexandria City	VA	51510200409
Prince George's County	MD	24033802301	Alexandria City	VA	51510200409
Prince George's County	MD	24033802301	Alexandria City	VA	51510200500
Prince George's County	MD	24033802404	Alexandria City	VA	51510200500
Prince George's County	MD	24033802404	Alexandria City	VA	51510200500
Prince George's County	MD	24033802404	Alexandria City	VA	51510200600
Prince George's County	MD	24033802501	Alexandria City	VA	51510200703
Prince George's County	MD	24033802600	Alexandria City	VA	51510200802
Prince George's County	MD	24033802600	Alexandria City	VA	51510201100
Prince George's County	MD	24033802700	Alexandria City	VA	51510201204
Prince George's County	MD	24033802700	Alexandria City	VA	51510201205
Prince George's County	MD	24033802700	Alexandria City	VA	51510201205
Prince George's County	MD	24033802804	Alexandria City	VA	51510201206
Prince George's County	MD	24033802805	Alexandria City	VA	51510201206
Prince George's County	MD	24033802805	Alexandria City	VA	51510201206
Prince George's County	MD	24033802901	Alexandria City	VA	51510201602
Prince George's County	MD	24033802901	Alexandria City	VA	51510201802
Prince George's County	MD	24033802901	Alexandria City	VA	51510201805
Prince George's County	MD	24033803001	Fairfax City	VA	51600300100
Prince George's County	MD	24033803100	Fairfax City	VA	51600300100
Prince George's County	MD	24033803100	Fairfax City	VA	51600300200
Prince George's County	MD	24033803200	Fairfax City	VA	51600300500
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Prince George's County	MD	24033803300	Fredericksburg City	VA	51630000301
Prince George's County	MD	24033803300	Fredericksburg City	VA	51630000400

Prince George's County	MD	24033803300	Fredericksburg City	VA	51630000400
Prince George's County	MD	24033803403	Fredericksburg City	VA	51630000500
Prince George's County	MD	24033803403	Fredericksburg City	VA	51630000500
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Prince George's County	MD	24033803403	Manassas City	VA	51683910202
Prince George's County	MD	24033803508	Manassas City	VA	51683910202
Prince George's County	MD	24033803508	Manassas City	VA	51683910202
Prince George's County	MD	24033803509	Manassas City	VA	51683910202
Prince George's County	MD	24033803509	Manassas City	VA	51683910301
Prince George's County	MD	24033803525	Manassas City	VA	51683910302
Prince George's County	MD	24033803602	Manassas City	VA	51683910401
Prince George's County	MD	24033803602	Manassas City	VA	51683910401
Prince George's County	MD	24033803605	Manassas City	VA	51683910401
Prince George's County	MD	24033803606	Manassas City	VA	51683910401
Prince George's County	MD	24033803606	Manassas Park City	VA	51685920100
Prince George's County	MD	24033803606	Manassas Park City	VA	51685920100
Prince George's County	MD	24033803608	Manassas Park City	VA	51685920100
Prince George's County	MD	24033803608	Manassas Park City	VA	51685920201
Prince George's County	MD	24033803610	Jefferson County	WV	54037972300
Prince George's County	MD	24033803612	Jefferson County	WV	54037972300
Prince George's County	MD	24033803612	Jefferson County	WV	54037972300
Prince George's County	MD	24033803613	Jefferson County	WV	54037972401
Prince George's County	MD	24033803613	Jefferson County	WV	54037972401
Prince George's County	MD	24033803613	Jefferson County	WV	54037972401
Prince George's County	MD	24033803700	Jefferson County	WV	54037972402
Prince George's County	MD	24033803700	Jefferson County	WV	54037972505
Prince George's County	MD	24033803801	Jefferson County	WV	54037972505
Prince George's County	MD	24033803803	Jefferson County	WV	54037972505
Prince George's County	MD	24033803803	Jefferson County	WV	54037972506
Prince George's County	MD	24033803900	Jefferson County	WV	54037972701
Prince George's County	MD	24033803900	Jefferson County	WV	54037972701
Prince George's County	MD	24033803900	Jefferson County	WV	54037972701
Prince George's County	MD	24033804001			

APPENDIX D. PROJECT IDEAS SUBMITTED TO COG

This list of project ideas in Table 12 is from fall of 2023 and may not be exhaustive of projects or programs that COG may be including in a CPRG implementation grant application. The ideas presented here were used as a starting point to develop PCAP measures, and some may be carried into COG's implementation grant application.

Table 12. Submitted Project Ideas

Submitting Organization	Project Concept
Public	Consumer education campaigns for household food waste reduction ("prevention")
Alexandria	Direct installation and ownership of solar energy generation systems on city-owned and managed facilities
Alexandria	Deep energy retrofits for low-income multifamily housing
Alexandria	Healthy Homes improvements, capacity building, and monitoring
Alexandria	VFA facility capital planning software, climate mitigation overlay
Alexandria	Regional collaboration for passive-design and building performance education, training, and certification pathways
Arlington County	Energy performance for LIDAC multifamily & commercial buildings
Arlington County	Energy performance for non-LIDAC multifamily & commercial buildings
Arlington County	MUSH (Municipal, University, Schools & Hospitals) program for energy performance
Arlington County	Regional education and training program on advanced building design and retrofits
Arlington County	Energy efficiency, solar and storage for non-profits and places of worship
Arlington County	Finance mechanisms
Arlington County	Technical assistance and education
Charles County	Mulching facility relocation and composting facility
Charles County	Landfill gas (LFG) to energy
Charles County	Landfill convenience center and waste transfer station
Charles County	County fleet EV transition
Charles County	Urban tree canopy program expansion
City of Frederick	Tree canopy incentive program
D.C. DOEE	Regional composting program
Fairfax County	Technical and financial assistance to property owners implementing energy efficiency updates
Fairfax County	Resilience hubs pilot program
Fairfax County	Clean energy clearinghouse/ "concierge" service
Fairfax County	Boost low-income weatherization and energy efficiency programs
Frederick County	Solar power purchase agreement and community solar
Frederick County	Pilot projects for non-diesel alternatives and data center back up space
Frederick County	Solar and microgrids for county buildings
Frederick County	Reimbursements for energy efficiency upgrades, solar, and EVs
Frederick County	Weatherization and energy efficient retrofits to LIDAC multifamily buildings

Frederick County	Reducing VMT through transit systems
Frederick County	Urban reforestation and green infrastructure
Frederick County	Implementation of biodiesel for fleet that cannot be electrified
Frederick County	EVs for county fleet
Frederick County	BEPS internal
Frederick County	BEPS external
Loudoun County	Electrified and efficient equipment "road show"
Loudoun County	Studies and business plan for district energy for commercial and residential buildings
Montgomery College	Smart grid, ice thermal storage, natural refrigerants, Rockville Campus and Takoma Park Silver Spring Campus
Montgomery County	Urban shade tree planting project
Montgomery County	Installation of enhanced diversion technologies at the Montgomery County Shady Grove Transfer Station to manage approximately 450,000 tons of waste that was not recycled and that otherwise will go to the Regional Residuals Facility or a landfill
Montgomery County	Community health worker climate-based community outreach and engagement, in Spanish
Montgomery County	Reforest open areas and enhance and expand existing forest and forested stream buffers on private properties. The project will work with private property owners to stop mowing and add forest plantings to expand and enhance forest coverage around the county
Montgomery County	133 affordable housing properties and 32 additional multifamily properties in overburdened and underserved neighborhoods to complete modernizing upgrades to save energy and improve quality of life
Montgomery County	Smart meter electrical panel upgrade program for EEAs, water heater loaner program, heat pumps for income-qualified residents with delivered fuel
Montgomery County	Support incentives and turn-key solutions to install EV charging infrastructure at multi-unit dwellings as well as other public and commercial sites needed to support the equitable and rapid adoption of electric vehicles
Montgomery County	Microgrid/resiliency hub and renewable energy "green" power production at four county owned locations
Montgomery County	Increase size of Capital Bikeshare e-bike fleet
Montgomery County	Provide funding to farmers or composting companies for the construction of an on-farm food scrap composting facility.
Montgomery County	Provide funding to farmers for the construction of an accessory solar array that will provide electricity to the agricultural operation.
Montgomery County	Increase the amount of funding in the Office of Agriculture (OAG)'s Soil Amendment Program, which provides county farmers with free deliveries of LeafGro, the compost produced at the County-operated yard trim composting facility in Dickerson
Montgomery County	Leaf blower rebate program
Montgomery County	Yard Trim Composting Program, installation of a dry fermentation anaerobic digester system will produce significant quantities of methane for use as Renewable Natural Gas for fuel or part of the process to produce hydrogen fuel for buses, trucks, and cars
Montgomery County Green Bank (MCGB)	MCGB BEPS Readiness Program - ASHRAE energy audit and guaranteed financing for projects identified in audit as economical

Montgomery County Green Bank	MCGB Energize Multifamily Program - Mezzanine finance loan to owners and developers who are restricted by senior lending.
Montgomery County Green Bank	MCGB Building Decarbonization Bond - Conduit capital markets issuance to support BEPS Readiness (above) and Energize Multifamily (above) by using grant capital for a guarantee.
Montgomery County Green Bank	MCGB Resiliency Hub Accelerator - Financing support from MCGB plus grant support to manage storage economics.
Montgomery County Green Bank	MCGB Resiliency Bond -Conduit capital markets issuance to support Resiliency Hub Accelerator (above) using grant capital for a guarantee.
Montgomery County Public Schools	Retrofit schools in equity areas with energy efficient upgrades and decarbonization measures to improve the indoor learning environment
Montgomery County Public Schools	Install agrivoltaics at Loiderman Reach Hub
Montgomery County Public Schools	Convert 35 additional fleet (non-bus) vehicles to clean energy & add messaging on fleet about Climate Actions
Montgomery County Public Schools	Install additional electric vehicle charging stations for fleet
Montgomery County Public Schools (MCPS)	Completely decarbonize some MCPS schools
Montgomery County Public Schools	Real-time energy/utility (electric, water, gas) monitoring enhancements at all schools so real-time consumption can be viewed and acted upon by students, staff, and other building users. Students have expressed a desire for their real-time data to be available for them to be able to act.
NVRC	Expand Solarize NoVA
Prince George's County	Solar PV grants for Energy Resiliency Communities (ERC)
Prince George's County	Implementation of Solar PV and Solar Thermal Hot Water Systems for public housing properties
Prince George's County	Zero-emission bus and supporting infrastructure (microgrid, battery storage, charging stations)
Prince George's County	Circular tree canopy program
Prince George's County	Accelerate purchase of EVs for gov ops
Prince George's County	Assist affordable housing building owners to comply with BEPS
Prince George's County	BEPS for Government buildings
Prince George's County	Infrastructure and technical monitoring upgrades at Prince George's County's municipal landfills
Prince William County	Regional tree canopy grant program
Rockville	Renovation and conversion to efficient electrification of 100 affordable residential units
Rockville	LED streetlight conversion
Rockville	Heavy-Duty fleet electrification - replace three shuttle buses and seven heavy-duty vehicles with electric models (pending market availability)

Rockville	Heavy-Duty fleet EV charging - DC Fast Charging to serve 10 heavy-duty fleet vehicles
Rockville	Rockville Swim and Fitness Center Energy Efficiency and Renewable Energy Upgrades (Lighting, variable frequency pumps, solar hot water, solar panels, electrification, and energy efficiency strategy to meet Montgomery County and Maryland BEPS)
Rockville	Expansion of Montgomery County Residential Electrification Incentives
Rockville	Expansions of solar rooftops and parking lot canopies on City of Rockville facilities
Rockville	Upgraded efficient and electric appliances, solar, and energy efficiency of 100 apartments and town homes owned by Rockville Housing Enterprises (RHE) property at Scarborough Square
Rockville	Upgraded roofs, energy efficiency, insulation, and air sealing, windows, and doors at RHE Scarborough Square town homes and apartments.
Rockville	EV Charging stations at RHE properties (at three multifamily apartment/town home developments and 29 scattered single-family homes)
Rockville	City of Rockville Facility LED Light Retrofits
Rockville	Landscape equipment electrification (public and private)
Rockville	Mobile EV charger for fleet
Rockville	Energy Audits and Electrification Plan for City Facilities to meet County and State BEPS. Only one of about 10 facilities has received a Level 2 energy audit in the last 18 years.
Rockville	Implementing electrification for HVAC and other City appliances, energy efficiency upgrades at 10 facilities.
Rockville	Reforestation at RedGate Park Arboretum to plant 5,000 trees and 2,500 shrubs.
Rockville	Greenspace Master Plan to maximize sequestration of City-owned lands
Rockville	Curbside Food Waste Compost Program. A local transfer and regional commercial compost site would need to be identified.
Rockville	Bikeshare Program Expansion to Twinbrook metro and neighborhood
Rockville	Establish Carshare or E-carshare Program
Rockville	Multiple Bicycle and Pedestrian Safety and facility expansion Projects
Rockville	Transit projects: MD 355 BRT construction serving Rockville (County project currently under design); MD 586 BRT construction serving Rockville (County project currently under design)
Rockville	Outreach, Education, Engagement with diverse communities and messaging materials coordinated by County, State, or COG to advance IRA incentives, energy efficiency, electrification, EVs, bike/ped/transit, waste reduction/compost, and sequestration.
Takoma Park	Solar canopies in city-owned parking lots
Takoma Park	Technical assistance program to help municipalities divest from fossil fuels
Takoma Park	Multifamily Building Improvement Grant (MFBIG) to make electrification/efficiency upgrades
Takoma Park	Commercial Building Improvement Grant to make electrification/ efficiency upgrades
Takoma Park	Clean Building Workforce Development Program
Takoma Park	Capital Area Resiliency Hub creation - retrofit existing buildings like schools or community centers with solar, battery storage, generators, etc.
Takoma Park	Multifamily EV charging station program

Takoma Park	Municipalities Building Performance Support Program - support gov building efficiency upgrades
University of Maryland/Prince George's County	Retrofitted solar microgrid
WMATA	Enhanced bus service i.e., WMATA's Better Bus Network Redesign Visionary Network implementation and other regional transit service improvement projects that will align service with regional development and travel patterns and increase access to frequent service that is easier to use
WMATA	Bus priority infrastructure projects i.e., dedicated bus lanes/clear lanes, transit signal priority and access efforts across the region
WMATA	First/last mile improvements and use that support access to transit and other active transportation modes
WMATA	Zero-emission buses and supporting infrastructure (i.e., battery storage, charging stations)
WSSC Water	The implementation of aeration control improvements across all six Water Resource Recovery Facilities (WRRFs) including integration of blowers and upgrades/replacements of aeration systems.
WSSC Water	Capture and recovery of ammonia product from liquid portion of solids stream at Piscataway Maryland Bio-Energy WRRF to recycle as fertilizer and reducing treatment volume and methanol and electricity use.
WSSC Water	Water and Wastewater Pump Optimization: Develop a process/system to monitor operation of pumps and provide actionable information on performance and operational condition for operating efficiency and reduce minimal energy usage.
WSSC Water	Install sewer thermal exchange equipment and solar array at the Anacostia, Maryland Depot to provide low-carbon heating, cooling, and hot water at this facility.
WSSC Water	Continue fleet electrification plan through acquisition of 60 electric vehicles and 13 electric forklifts as well as charging infrastructure available for both employees and the public at our facilities throughout Prince George's and Montgomery County Maryland.
WSSC Water	Install a microgrid at the Potomac water filtration plant consisting of 9 MW of natural gas engine generation plus 860 kW of solar. Include carbon capture of exhaust gas and removal and sequestration of carbon off-site.

APPENDIX E. COMMUNITY CLIMATE PRIORITIES SURVEY RESULTS

To capture a larger perspective of communities in the MSA, COG disseminated the CPRG Community Climate Priorities survey to assess community-wide climate priorities. The survey was shared through multiple online channels, extending beyond formal committees to include distribution through social media, the COG CPRG and main COG websites, local representatives, and community-based/non-governmental organizations. The survey gained responses from 86 participants from 13 different jurisdictions within the MSA, encompassing a diverse range of individuals, organizations, coalitions, and agencies.

COMMUNITY PRIORITIES

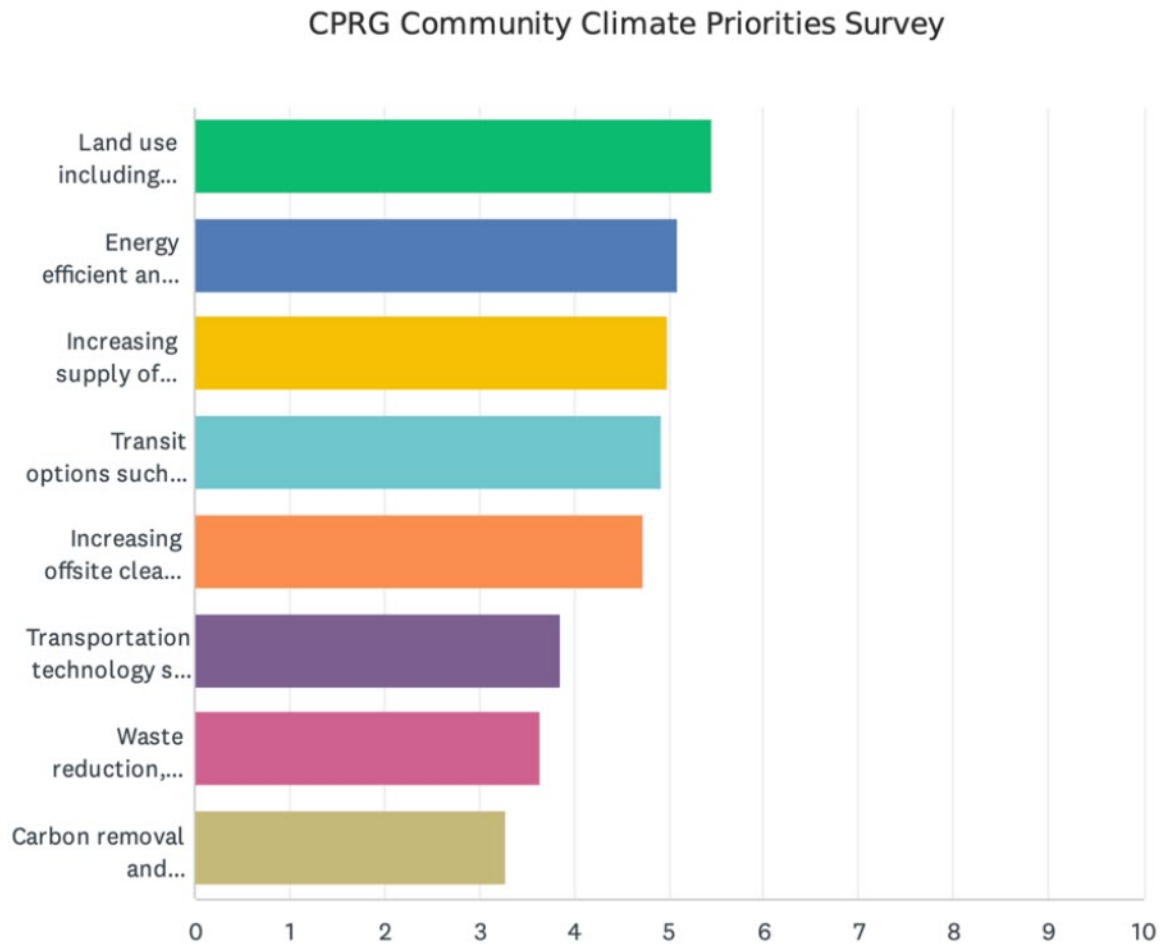
Participants were assigned the task of prioritizing GHG reduction strategies based on their perceived importance in mitigating climate change. The rankings of these strategies were averaged to generate an overall score. The following outlines the ranked strategies based on community input, listed from highest to least priority:

1. **Land Use** (including development planning, land conservation, and environment protection): 23.26% (Score 5.45)
2. **Energy Efficient and Clean Energy Buildings**: 17.44% (Score 5.09)
3. **Increasing Supply of On-site Clean Energy** (e.g., rooftop solar): 10.47% (Score 5.00)
4. **Transit Options** (such as increased use of public transportation, bike and pedestrian travel options, and reduction of travel): 17.44% (Score 4.93)
5. **Increasing Off-site Clean Energy** (e.g., community solar, utility-supplied energy): 9.30% (Score 4.74)
6. **Transportation Technology** (such as clean fuels and Low/Zero-Emission Vehicles): 5.81% (Score 3.86)
7. **Waste Reduction, Composting, and Recycling**: 11.63% (Score 3.64)
8. **Carbon Removal and Sequestration** (including green infrastructure such as trees and wetlands): 4.65% (Score 3.28)

These results are also displayed in Figure 9.

These rankings reflect the community's prioritization of strategies to mitigate climate change. Land use, energy efficient buildings, and on-site clean energy supply ranked as top priorities, with an emphasis on sustainable development and clean energy initiatives.

Figure 9. Results from COG's Community Climate Priorities Survey



EQUITY AND LIDAC PRIORITIES

The community responses outlined two overarching themes in response to questions that polled equity impact priorities. There was a notable emphasis on environmental justice, particularly concerning the needs of LIDACs. Concerns included air and water quality, greenspace availability, and overall quality of life that underscored the importance of ensuring that climate initiatives benefit people who have historically faced disproportionate environmental burdens.

Community engagement and empowerment emerged as significant aspects of equity impacts. The responses highlighted the community's call for public support, ensuring investment returns to communities, and involving communities in project planning and decision-making. This theme also encompassed a focus on creating employment opportunities, supporting local initiatives such as community composting and neighborhood farming, and fostering a sense of ownership and agency within historically underserved populations. Together, these themes conveyed the community's perspective on the most important equity impacts to achieve in the context of climate action. When assessed on what emissions reduction projects would have the most positive impact on communities that are low-income, disadvantaged, and overburdened, or have been historically underrepresented in planning processes, respondents outlined initiatives tailored to the unique needs of these communities. Key strategies identified included the promotion of non-car travel, featuring expanded bike lanes, improved bus availability, and pedestrianized streets aimed at enhancing safety and accessibility. Additionally, there was a strong emphasis on reuse and repair

initiatives, such as community-engaged compost programs and durable materials reuse infrastructure, with the goal of reducing waste and promoting local employment.

Affordable housing near transit emerged as a significant strategy, with respondents emphasizing the importance of funding allocation for such initiatives. Respondents also emphasized the importance of implementing energy efficiency projects in multifamily and commercial buildings as a crucial step toward reducing energy consumption and emissions. In summary, respondents delineated a comprehensive set of emissions reduction projects addressing transportation, waste management, energy efficiency, and community development, reflecting a commitment to sustainability and economic well-being within these communities.

BARRIERS

Respondents identified several barriers hindering their organizations from advancing climate change initiatives and energy efficiency planning. The most prevalent challenges included limited access to program funding, cited by 37.21% of respondents, followed closely by the high cost of alternatives at 36.05%. Time constraints were identified by 34.88% of respondents, while 29.07% specified other barriers not covered in the provided options. Limited knowledge was noted as a challenge by 20.93% of respondents, and 19.77% indicated limited access or inconvenience of programs as a barrier. These findings underscore a range of impediments that individuals and organizations encounter, providing valuable insights into considerations of the multifaceted challenges associated with advancing climate mitigation initiatives and energy efficiency planning.

Some survey respondents highlighted personal challenges such as time constraints and limited knowledge, emphasizing the need for more accessible and user-friendly information and resources. Others mentioned specific barriers related to their expertise or organizational focus, such as the lack of transparency on data center energy use, obstacles in rezoning industrial space, and challenges related to living in an apartment where residents may feel limited control over larger-scale initiatives.

Additionally, respondents underscored financial considerations, including the high capital cost, the need for concierge services to guide individuals through the process, and limited access to utility services and infrastructure. These nuanced insights highlight the diverse array of obstacles faced by organizations, emphasizing the importance of tailored solutions to address their unique circumstances.

PROJECT EMPHASIS

When responding to the question about advancing projects within COG's eight identified areas for climate action strategies, participants provided a diverse range of project ideas aligned with the key focus areas: Planning, Equity, Clean Electricity, Zero Energy Buildings, Zero-Emission Vehicles, Mode Shift and Travel Behavior, Zero Waste, and Sequestration.

Their input reflected emphasizing the need for projects that span urban planning, social equity, renewable energy, sustainable infrastructure, transportation, waste management, and carbon sequestration. The following insights offer valuable perspectives on the types of initiatives respondents believe should be prioritized to address the multifaceted challenges posed by climate change within the COG region.

The community responses reflected several key themes that resonated across the spectrum of climate action strategies within COG's identified areas.

- **Equity and Inclusive Clean Energy Transition:** A recurring priority was the promotion of equitable clean energy transitions, particularly in LIDACs. The responses advocated for green job opportunities, diverse representation, and inclusive decision-making processes to ensure the benefits of clean energy initiatives reached everyone.
- **Renewable Energy:** Another prevalent theme was the commitment to advancing renewable energy. This involved a push for increased use of renewable energy sources, such as solar.
- **Sustainable Transportation:** This recurring theme of sustainable transportation focused on zero-emission vehicle (ZEVs), robust charging infrastructure, and enhanced public transit options.
- **Waste Reduction and Recycling Initiatives:** Respondents expressed a collective commitment to a circular economy, emphasizing waste reduction, recycling initiatives, and legislative support for reuse infrastructure. Additionally, there was a shared focus on climate resilience through community planning, increased green spaces, and stormwater management solutions.

These common themes underscored the community's strong emphasis on inclusivity, environmental sustainability, and climate resilience in shaping climate action strategies.

CONCLUSION

COG values community input and will continue to engage with the public more broadly within the MSA on the development of the CCAP, with a focus on addressing environmental justice concerns and supporting historically underrepresented and overburdened communities. While all input from the Community Climate Priorities survey was carefully considered in developing PCAP measures, not all suggestions could be feasibly included as designated measures. Survey responses were used in conjunction with ongoing and planned project activities from participating jurisdictions, serving as a resource to confirm regional climate priorities. COG will use the responses of this survey to inform the CCAP and its wider Community Engagement Plan for the CCAP and continue to seek engagement from a wider, more diverse audience within its climate mitigation planning processes.

Thank you to all community members who participated in shaping the climate priorities for the metropolitan Washington region.

APPENDIX F. STAKEHOLDER AND COMMUNITY REPRESENTATIVES

Some of the organizations that attended meetings or engaged with COG, or which COG initiated outreach, include those listed in Table 13.

Table 13. COG CPRG Steering and Technical Committees

Committee	Organization	Jurisdiction
Steering Committee Members	Arlington County, Office of Sustainability and Environmental Management and Office of Climate Coordination and Policy	Virginia
	Charles County, Climate Resilience and Sustainability	Maryland
	City of College Park, Department of Planning and Community Development	Maryland
	City of Falls Church, Environmental Sustainability Programs	Virginia
	City of Frederick, Office of Sustainability	Maryland
	City of Gaithersburg	Maryland
	City of Greenbelt, Public Works	Maryland
	City of Manassas, Planning and Development	Virginia
	Clarke County, Environmental and Water Resources	Virginia
	Culpeper County	Virginia
	D.C. Department of Energy & Environment (DOEE)	District of Columbia
	Frederick County, Division of Energy and Environment	Maryland
	Loudoun County, Department of Building & Development	Virginia
	Maryland Department of Environment (MDE)	Maryland
	Maryland Department of Transportation (MDOT)	Maryland
	Montgomery County, Climate Change	Maryland
	Prince George's County, Department of Environment	Maryland
	Prince William County, Environmental and Energy Sustainability	Virginia
	Rappahannock County, Community Development	Virginia
	Town of Bladensburg	Maryland
	Virginia Department of Environmental Quality (DEQ)	Virginia
	Virginia Department of Transportation (VDOT)	Virginia
	Washington Suburban Sanitary Commission (WSSC Water)	Maryland
Technical Committee Members	Arlington County, Energy Program	Virginia
	City of Fairfax, Public Works and Environment	Virginia
	City of Falls Church, Environmental Sustainability Programs	Virginia
	City of Laurel, Environmental Programs	Maryland
	City of Rockville, Environment Commission	Maryland
	City of Takoma Park, Public Works	Maryland

	Connected DMV, Climate and Energy	District of Columbia
	DC Water	District of Columbia
	D.C. DOEE	District of Columbia
	Fairfax County, Environmental and Energy Coordination	Virginia
	Frederick County, Department of Climate and Energy	Maryland
	Loudoun County, Energy Program	Virginia
	MDE	Maryland
	Maryland Department of Transportation (MDOT)	Maryland
	Montgomery County Department of Environmental Protection	Maryland
	Prince George's County, Department of Environment	Maryland
	Virginia Department of Environmental Quality (DEQ)	Virginia
	Virginia Department of Transportation (VDOT)	Virginia
	Northern Virginia Regional Commission (NVRC)	Virginia
	Washington Metropolitan Area Transit Authority (WMATA)	Regional
	Washington Suburban Sanitary Commission (WSSC Water)	Maryland

COG and TPB Committees

- Built Environment and Energy Advisory Committee (BEEAC)
- Chief Equity Officers Committee (CEOC)
- Climate Energy and Environmental Policy Committee (CEEPC)
- Food and Agriculture Regional Member (FARM) Policy Committee
- Metropolitan Washington Air Quality Committee (MWAQC)
- Metropolitan Washington Air Quality Committee Technical Advisory Committee (MWAQC-TAC)
- National Capital Region Transportation Planning Board (TPB)
- Regional Electric Vehicle Deployment (REVD) Working Group
- Transportation Planning Board Community Advisory Committee (TPB-CAC)
- Transportation Planning Board Technical Committee (TPB-Tech)

Industry, Utilities, Other Government Partners, and Stakeholders

- D.C. Sustainable Energy Utility (DCSEU)
- District of Columbia City Council
- Dominion Energy
- Potomac Electric Power Company (Pepco)
- Frederick County Division of Solid Waste and Recycling
- Fredericksburg Planning Commission
- Georgetown, George Mason, George Washington, and Catholic Universities
- Greater Washington Region Clean Cities Coalition (GWRCCC)
- George Washington Regional Commission
- Institute for Local Self-Reliance
- Maryland Clean Energy Center (MCEC)

- Maryland Department of Agriculture
- Maryland Energy Administration (MEA)
- Maryland Energy Innovation Institute
- Maryland Forestry Foundation (MFF)
- Montgomery County Solid Waste Advisory Committee
- Neighborhood Sun
- Northern Shenandoah Valley Regional Commission
- NVRC
- Members of the public
- Prince George's County Solid Waste Advisory Commission
- Prince William County Public Schools (PWCPS)
- Rappahannock Electric Cooperative
- Southern Environmental Law Center (SELC)
- Virginia Clean Cities Coalition
- Virginia Department of Environmental Quality (DEQ)
- Virginia Energy
- Virginia Property Assessed Clean Energy (PACE) Authority
- Washington Gas (WGL)
- Washington Metropolitan Area Transit Authority (WMATA)
- WSSC Water
- Agricultural, Working Lands, Food, and Solid Waste regional stakeholder group

LIDAC-Related and Equity Focused Organizations

- Common Grain Alliance (CGA)
- Faith Alliance for Climate Solutions (FACS)
- GWRCCC
- Hola Cultura
- Institute for Local Self-Reliance (ILSR)
- Montgomery County Food Council (MoCoFC)
- Neighborhood Sun
- Prince George's County Food Equity Council
- Prince George's Soil Conservation District
- Sierra Club, Virginia Chapter
- Southern Environmental Law Center
- University of Maryland (UMD)
- Voters for Animals

Tribal Representatives

- Accokeek Foundation
- Patawomeck Indian Tribe in Virginia

PRIORITY CLIMATE ACTION PLAN

For the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area

March 1, 2024

Prepared by the Hampton Roads Planning District Commission to meet the requirements of the U.S. Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant (CPRG) program.

Disclaimer & Acknowledgements

The Hampton Roads Planning District Commission (HRPDC) developed this Priority Climate Action Plan (PCAP) to meet the requirements of the U.S. Environmental Protection Agency's (EPA) Climate Pollution Reduction Grant (CPRG) program. The CPRG program provides funding to states, local governments, tribes, and territories to develop and implement plans for reducing greenhouse gas emissions and other harmful air pollution.

This PCAP was developed by staff from the HRPDC and its contractor ICF with support and input from:

- Localities and communities across the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area (MSA)
- Virginia Port Authority (VPA)
- Hampton Roads Sanitation District (HRSD)
- Southeastern Public Service Authority (SPSA)
- Virginia Department of Environmental Quality (DEQ)

This project has been funded wholly or in part by the United States EPA under assistance agreement number 95317901 to HRPDC. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.

HRPDC would like to acknowledge the key staff that supported this effort including Whitney Katchmark, Greg Grootendorst, Quan McLaurin, Simone Elmore, Ben McFarlane, Pavithra Parthasarathi, Eric Walberg, Nikki Johnson, and the support provided by consultants at ICF and PRR.

HRPDC deeply appreciates the contributions of the following external stakeholders who served as CPRG committee members during the PCAP process.

CPRG Steering Committee

- Olivia Askew, City of Hampton
- Brian Ballard, NAVFAC Mid-Atlantic
- Thomas Ballou, Virginia DEQ
- Nicole Benson, City of Chesapeake
- Tammie Clary, Town of Smithfield
- Michele DeWitt, City of Williamsburg
- Michael Ervin, Albemarle Commission
- Julia Gales, City of Newport News
- Megan Hale, City of Norfolk
- Alleyn Harned, Virginia Clean Cities
- Vince Maiden, Virginia State Energy Office
- Brett Malone, Virginia Tech Corporate Research Center
- Julie Manzari, Dominion Energy
- Tyla Matteson, York River Group Sierra Club
- Kevin Parker, HRSD

- Jennifer Privette, City of Newport News
- Brian Smith, Hampton Roads Transit
- Matt Smith, Hampton Roads Alliance
- Daniel Wagner, Virginia Department of Rail & Public Transportation (DRPT)

CPRG Technical Committee

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- Michele DeWitt, City of Williamsburg
- Bill Griffiths, City of Chesapeake
- Megan Hale, City of Norfolk
- Cynthia Harris, City of Hampton
- Gina Harris, City of Portsmouth
- Lori Herrick Bordon, City of Virginia Beach
- Ryan Hersey, Virginia Beach City Public Schools
- Wayne Jones, City of Suffolk
- Darryll Lewis, City of Suffolk
- Samantha McNeil, York County
- Trevor McPhail-Vuono, Virginia Beach City Public Schools
- Elizabeth Mertz-Guinn, York County
- Laura Nusz, City of Poquoson
- Mark Podolinsky, City of Virginia Beach
- Jennifer Privette, City of Newport News
- Amy Ring, Isle of Wight County
- Jo Anna Ripley, James City County
- Erin Rountree, City of Suffolk
- Daniel Slater, Hampton City Schools
- Aaron Small, City of Williamsburg
- Scott Smith, City of Hampton
- Carol Steele, Gloucester County

HRPDC also expresses its sincere gratitude to its Community Advisory Committee and the multiple other stakeholders across the Hampton Roads MSA that contributed to this process.

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Abbreviations

ACCII	Advanced Clean Cars II
ACEEE	American Council for an Energy Efficient Economy
ACF	Advanced Clean Fleets
AEO	Annual Energy Outlook
AFV	Alternate fuel vehicles
BAU	Business-as-Usual
BEV	Battery electric vehicles
BIPOC	Black, Indigenous, and People of Color
BMP	Best management practices
CAC	Community Advisory Committee
CCAP	Comprehensive Climate Action Plan
CEJST	Climate & Economic Justice Screening Tool
CMAQ	Congestion Mitigation and Air Quality

COMET	Carbon Management & Emissions tool
CPRG	Climate Pollution Reduction Grant
DEQ	Department of Environmental Quality
DER	Distributed Energy Resources
DERA	Diesel Emissions Reduction Act
DHCD	Department of Housing and Community Development
DOT	Department of Transportation
ECH	Empty container handlers
EE	Energy efficiency
EIA	Energy Information Administration
EJ	Environmental justice
EPA	Environmental Protection Agency
ERP	Elizabeth River Project
ESL	English as a Second Language
EV	Electric vehicle
EVSE	Electric vehicle supply equipment
FCEV	Fuel cell electric vehicles
FEMA	Federal Emergency Management Agency
FLIGHT	Facility-Level Information on Greenhouse gases Tool
GHG	Greenhouse gas
GRP	Gross Regional Product
GWP	Global warming potential
HAP	Hazardous air pollutants
HFC	Hydrofluorocarbon
HIEE	Housing Innovations in Energy Efficiency
HRPDC	Hampton Roads Planning District Commission
HRSD	Hampton Roads Sanitation District
HRT	Hampton Roads Transit
HRTPO	Hampton Roads Transportation Planning Organization
HUD	Housing and Urban Development
HVAC	Heating, ventilation, and air-conditioning
ICEV	Internal combustion engine vehicle
IIJA	Infrastructure Investment and Jobs Act

ILA	International Longshoremen Association
IRA	Inflation Reduction Act
IRS	Internal Revenue Service
LDV	Light Duty Vehicles
LIDAC	Low-income, disadvantaged communities
LMOP	Landfill Methane Outreach Program
LULUCF	Land Use, Land-Use Change and Forestry
MHDV	Medium- and Heavy-Duty Vehicle
MOU	Memorandum of Understanding
MSA	Metropolitan Statistical Area
MSW	Municipal solid waste
NAACP	National Association for the Advancement of Colored People
NEVI	National Electric Vehicle Infrastructure
NIT	Norfolk International Terminals
NOAA	National Oceanic and Atmospheric Administration
NREL	National Renewable Energy Laboratory
NSU	Norfolk State University
OSBM	Office of State Budget and Management
PACE	Property assessed clean energy
PCAP	Priority Climate Action Plan
POV	Port of Virginia
PPA	Power Purchase Agreements
PPCY	Pinners Point Container Yard
PRM	Primary Recyclable Materials
PV	Photovoltaic
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
RET	Retrofit
RFP	Request for Proposal
ROB	Replace on burnout
RSWMP	Regional Solid Waste Management Plan
SCC	State Corporation Commission
SIT	State Inventory Tool
SPSA	Southeastern Public Service Authority

UTR	Utility tractor rigs
VaNLA	Virginia Natural Landscape Assessment
VCEA	Virginia Clean Economy Act
VDOT	Virginia Department of Transportation
VIG	Virginia International Gateway
VMT	Vehicle miles traveled
VOC	Volatile organic compounds
VPA	Virginia Port Authority
VPPSA	Virginia Peninsulas Public Service Authority
VPSA	Virginia Peninsulas Public Service Authority
WARM	Waste Reduction Model
ZEV	Zero emissions vehicle

1. Executive Summary

This document is the PCAP for the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area (Hampton Roads MSA) and is the first deliverable for the MSA under the EPA CPRG program.

The HRPDC has a strong interest in improving resiliency to flooding and sea level rise and in promoting cleaner air and water for its residents. Therefore, HRPDC submitted an application, workplan, and budget to the U.S. EPA for a CPRG planning grant under the Inflation Reduction Act (IRA). The planning grant was used to develop a Hampton Roads MSA-wide PCAP and will be used to develop a Comprehensive Climate Action Plan (CCAP) and a subsequent Status Report.

The PCAP: The PCAP identifies immediately impactful, cost-effective actions and projects that target priority greenhouse gas (GHG) emissions source sectors and can be implemented to reduce GHG and co-pollutant emissions in the near-term. This plan includes a simplified GHG inventory developed using downscaled state-level data and publicly available datasets such as in the EPA MOVES tool. Descriptions and analysis of priority GHG reduction measures included in the plan were identified through stakeholder input. Under the conditions of the CPRG planning grant, the PCAP has been developed and submitted to the EPA by the deadline of March 1, 2024. The following seven priority GHG reduction measures were identified as part of this PCAP:

- **Measure 1:** Create programs to support and incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching.
- **Measure 2:** Reduce energy consumption and increase building decarbonization through programs to support, incentivize, and install energy efficiency and electrification measures.
- **Measure 3:** Develop an electric vehicle (EV) procurement plan and electric vehicle supply equipment (EVSE) deployment strategy to support the adoption of EVs.
- **Measure 4:** Reduce vehicle miles traveled and support alternative modes of transportation through bike/pedestrian infrastructure investments.
- **Measure 5:** Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.
- **Measure 6:** Reduce GHG emissions through improved equipment efficiencies, increased methane capture at waste and wastewater facilities, and organic waste diversion.
- **Measure 7:** Increase opportunities for carbon sequestration through tree planting, protecting, and restoring high-carbon coastal habitats, wetlands, and forest lands.

The CCAP: The CCAP is a longer-term plan that identifies strategies to reduce GHG and co-pollutant emissions that aligns with statutory goals and requirements for reducing these emissions in an efficient and environmentally responsible manner. This plan will cover all source sectors in an MSA-wide GHG inventory and will provide substantial outreach and input opportunities, with a specific intention to engage with traditionally disadvantaged communities. The CCAP will be developed and submitted to the EPA no later than two years after the award of the planning grant (summer-fall 2025).

The Status Report: The Status Report is a document that will be developed by HRPDC to report on CCAP progress. The Status Report will be delivered in 2027 and will include:

- The implementation status of the quantified GHG reduction measures from the CCAP.
- Relevant updated analyses or projections supporting CCAP implementation.
- Next steps and future budget or staffing needs to continue CCAP implementation.

The main goal of the Status Report is to provide updates on the CCAP's progress and access future needs of the project. The report will highlight successes and challenges throughout the project and act as a checkpoint for HRPDC.

2. Introduction

The IRA, signed into law on August 16, 2022, directs federal funding to reduce carbon emissions, lower healthcare costs, fund the Internal Revenue Service (IRS), and improve taxpayer compliance. The IRA contains eight titles, each with some provisions that directly or indirectly address issues related to climate change, including reduction of U.S. GHG emissions and promotion of activities for adaptation and increasing resilience to climate change impacts.[1] The IRA provides billions of dollars in grant and loan programs for a range of clean energy and climate action programs.

The CPRG program, authorized under Section 60114 of IRA, provides $5 billion in grants to states, local governments, tribes, and territories to develop and implement ambitious plans for reducing GHG emissions and other harmful air pollution. The program consists of two phases: planning and implementation. The planning phase provides $250 million in noncompetitive planning grants for state and local agencies to develop PCAPs to identify emissions reduction measures. The implementation phase provides $4.6 billion of competitive grant funding for eligible applicants to implement GHG reduction measures identified in an applicable PCAP developed under a CPRG planning grant.

Definitions for Common Terms

- **Greenhouse Gas (GHG) Emissions:** Per EPA's CPRG planning guidance, GHGs are limited to the air pollutants carbon dioxide (CO_2), hydrofluorocarbons (HFCs), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).
- **GHG Reduction Measure:** Per EPA's CPRG guidance, implementable actions that reduce GHG emissions or enhance carbon removal. Measures that enhance "carbon removal" are those that increase the removal of carbon dioxide from the atmosphere through, for example, the uptake of carbon and storage in soils, vegetation, and forests. Such measures may include actions related to management of lands in their current use, or as lands are converted to other uses.
- **Benefits (air quality):** Improvements in air quality (e.g., criteria air pollution and air toxics) due to a GHG reduction measure.
- **Co-Benefits:** Positive effects beyond the stated goal of a GHG reduction measure (e.g., improved public health outcomes, economic benefits, increased climate resilience).
- **Low Income Disadvantaged Communities (LIDACs):** Historically marginalized communities that have fewer socioeconomic resources and less capacity to adapt to climate change. These communities face disproportionately high economic, social, and health disadvantages that are often associated with environmental racism and systemic oppression.

[1] CRS. 2022. *Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change.* https://crsreports.congress.gov/product/pdf/R/R47262.

The HRPDC is the designated lead organization for the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Area's (MSA's) participation in the CPRG planning phase and led the development of this PCAP. HRPDC coordinated closely with the lead organization for the Virginia state-level CPRG planning grant, Virginia DEQ, to align priorities and engage with stakeholders.

HRPDC conducted region-wide stakeholder outreach as part of this PCAP development, including soliciting project ideas from localities, hosting a special meeting of its Community Advisory Committee, and disseminating a survey for locality staff, community-based organization representatives, and committee members. These engagement efforts helped to identify priority sectors and GHG reduction actions, and they informed HRPDC's understanding of the benefits and impacts most important to its regional community. Additionally, these engagement efforts served as a basis to establish further and more meaningful engagement with the public, with attention to low-income, disadvantaged communities (LIDACs) that will take place during development of the CCAP. These stakeholder outreach and engagement efforts are detailed in Section 2.

Purpose and Scope of the PCAP

The PCAP seeks to identify innovative and high impact projects to reduce GHG and other air pollutant emissions in the near-term in Hampton Roads. By identifying regional priorities for climate action efforts, the PCAP sets the stage for its first CCAP effort which will be initiated in Spring 2024. Per HRPDC's approved workplan, the geographic scope of this PCAP is the Hampton Roads MSA (the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Area), along with Southampton County and the City of Franklin, which is shown in Figure 1.

Figure 1: HRPDC-covered jurisdictions that are within and outside of the Hampton Roads MSA

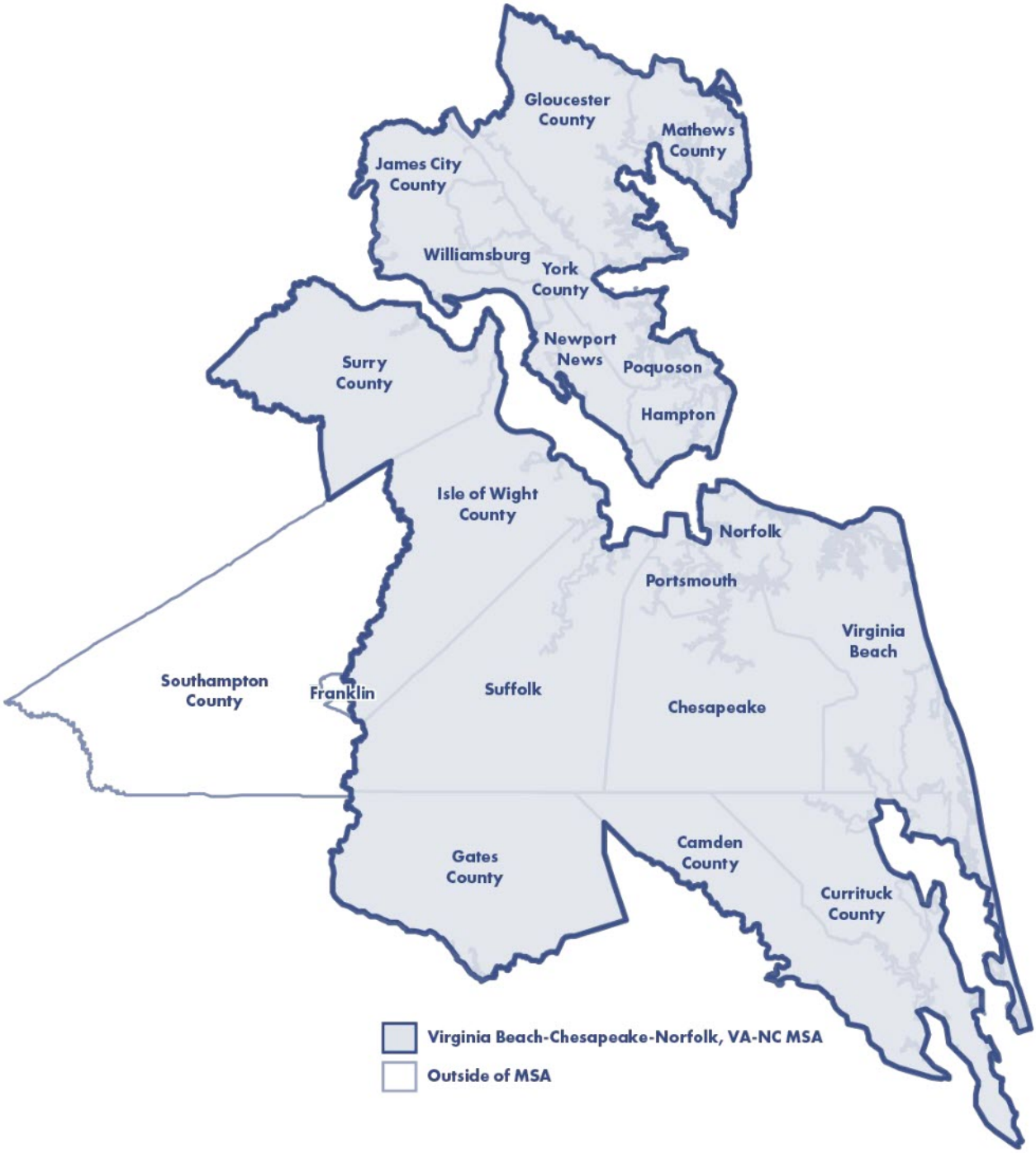


Table 1 summarizes the information included in this PCAP, in line with EPA CPRG planning guidance.

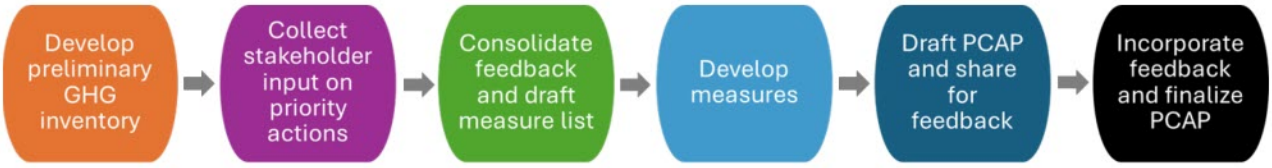
Table 1: Overview of HRPDC's PCAP

PCAP Required Element	PCAP Section
GHG Inventory	Section 4
Priority Quantified GHG Reduction Measures	Section 5
Benefits Analysis	Section 5
Review of Authority to Implement	Measure-specific information in Section 5
Low Income Disadvantaged Communities Benefits Analysis	Sections 3 (engagement with LIDACs), 4 (identification of LIDACs & discussion of climate risks to LIDACs) and 5 (LIDAC benefits for each measure)
PCAP Encouraged/Not Required Elements	
GHG Emissions Projections	Some projections were included in reduction quantification (Appendix B). Refined projections to be included in the CCAP
GHG Reduction Targets	Not included, to be included in the CCAP
Workforce Planning Analysis	Not included, to be developed further in the CCAP process
Intersection with Other Funding	Section 4 and measure-specific information in Section 5

Approach to PCAP Development

HRPDC used a multi-step process to set priorities and develop information for the priority measures identified in this PCAP, as outlined in Figure 2.

Figure 2: Process for developing the Hampton Roads MSA's PCAP



Step 1. HRPDC developed a simplified GHG inventory, based on downscaled state inventory data and on-road transportation data from the EPA MOVES4 model, to determine key sectors and sources for immediate emission reduction measures. HRPDC chose this approach because, while some localities within the MSA have GHG inventory and locally based data, access to this type of data was inconsistently available across the MSA. This is the first GHG inventory developed for the MSA region and will be expanded upon for the CCAP.

Step 2. HRPDC sought input from local governments within the MSA planning region, regional MSA organizations, Virginia DEQ, and other stakeholders. This input was collected via group meetings and discussions, one-on-one meetings, a LIDAC survey, and email communications. Within this step, HRPDC sought priority project and action ideas to reduce GHG emissions in the MSA.

Step 3. HRPDC compiled and reviewed the ideas gathered from stakeholders in Step 2 and grouped them by relevant GHG inventory sector. HRPDC identified themes among the ideas and reviewed them to ensure relevance to the CPRG program goals. HRPDC then grouped similar ideas to form the broader priority GHG reduction measures that are presented in this PCAP.

Step 4. After developing a consolidated list of measures and sharing with stakeholders for review, HRPDC worked internally and with local governments and other stakeholders to develop the required information for each priority GHG reduction measure. In parallel, HRPDC analyzed data and collected other non-measure-specific information to support this PCAP, such as using EPA's EJ Screen and the Climate & Economic Justice Screening Tool (CEJST) to identify LIDACs in the MSA and better understand their demographics and risks.

Step 5. HRPDC prepared this PCAP using the gathered and developed information and shared the draft PCAP for feedback with stakeholder committees.

Step 6. HRPDC reviewed the feedback and comments and incorporated edits to finalize the PCAP.

Limitations of this PCAP

As the CPRG program represents the first regional climate planning effort for the Hampton Roads MSA, there was limited existing climate data available for incorporation in this plan. The condensed PCAP timing also did not allow for the full extent of outreach, engagement, and analysis typical of HRPDC's planning efforts. As a result, this PCAP required drawing heavily on existing work, publicly available regional and statewide datasets, and streamlined engagement approaches. More detailed and robust engagement and data collection will be conducted as a part of the CCAP development.

3. Stakeholder Engagement

As the lead organization for the Virginia Beach-Norfolk-Newport News, VA-NC MSA, HRPDC recognizes the importance of engaging with many entities in the PCAP and CCAP processes. To support engagement efforts, two key stakeholder committees were created to guide the CPRG process: a Steering Committee and a Technical Advisory Committee.

Government, Stakeholder, and Public Engagement

Steering Committee: Members of the Steering Committee include local representation of Hampton Roads localities to provide local context and advise on measures and strategies to be incorporated in the PCAP. The committee will continue to be involved through the CCAP process.

Technical Advisory Committee: The participants in the Technical Advisory Committee include industry experts and local and regional planning professionals in land use, transportation, climate, and energy. Members provide local context and advise on measures and strategies to be incorporated in the PCAP. The committee will continue to be involved through the CCAP process.

The Hampton Roads Community Advisory Committee (CAC) was also engaged. The CAC includes 30 representatives from Hampton Roads' member jurisdictions and services who act as an advisory committee to the HRPDC and the Hampton Roads Transportation Planning Organization (HRTPO)

boards. The CAC ensures that the voices and perspectives of the public are received and considered in planning processes.

Media coverage to the general public will be included throughout the CCAP process. Coverage by local news station WHRO has begun. The HRPDC will continue to invite reporters to committee meetings and share social media posts. Appendix A includes an article from October 4, 2023 announcing HRPDC's climate planning effort: *"State and local officials are making new climate action plans to slash emissions"* written by Katherine Hafner.

Additional engagement with state agencies, other Virginia MSAs, and stakeholders was also done to support the PCAP. Table 2 shows a record of all stakeholder meetings that occurred as part of the PCAP process.

Table 2: PCAP Stakeholder Meetings

Date	Meeting Description	Type of Entity Engaged
June 1, 2023	HRPDC Regional Environmental Committee	Stakeholder
September 20, 2023	Presentation to the Sierra Club	Stakeholder
September 25, 2023	Virginia state/MSA coordination (DEQ, MWCOG, PlanRVA, HRPDC)	State & other MSAs
August 21, 2023	Virginia state/MSA coordination (DEQ, MWCOG, PlanRVA, HRPDC)	State & other MSAs
October 18, 2023	One-on-one stakeholder meeting (HRSD)	Stakeholder
October 23, 2023	Virginia state/MSA coordination (DEQ, MWCOG, PlanRVA, HRPDC)	State & other MSAs
November 1, 2023	Chief Administrative Officers committee of HRPDC	Stakeholder
November 27, 2023	Virginia state/MSA coordination (DEQ, MWCOG, PlanRVA, HRPDC)	State & other MSAs
November 28, 2023	State of Transit Meeting	Stakeholder
November 29, 2023	CPRG Technical Committee	Committee
December 2023	Email communication with Virgina Department of Energy on potential weatherization measures	Stakeholder
December 2023	Email communication with SPSA on potential waste measures	Stakeholder
December 1, 2023	CPRG Steering Committee	Committee
December 11, 2023	One-on-one stakeholder meeting (Department of Housing & Community Development [DCHD])	Stakeholder
December 12, 2023	One-on-one stakeholder meeting (Dominion)	Stakeholder
December 18, 2023	CPRG Steering Committee	Committee
December 19, 2023	One-on-one stakeholder meeting (Virginia Energy Efficiency Council)	Stakeholder
December 20, 2023	CPRG Technical Committee	Committee
December 20, 2023	One-on-one stakeholder meeting (Project HOMES)	Stakeholder

December 28, 2023	One-on-one stakeholder meeting (VA Tech Center)	Stakeholder
January 3, 2024	CPRG Technical Committee	Committee
January 4, 2024	CPRG Steering Committee	Committee
January 4, 2024	One-on-one stakeholder meeting (Port of VA)	Stakeholder
January 11, 2024	CAC	Community
January 17, 2024	CPRG Technical Committee	Committee
January 19, 2024	CPRG Steering Committee	Committee
February 6, 2024	CPRG Joint Steering & Technical Committee	Committee
February 21, 2024	CPRG Technical Committee	Committee
February 22, 2024	CPRG Steering Committee	Committee

LIDAC Engagement

Community engagement is key to ensuring that all community members can benefit from GHG reduction measures, especially in LIDACs that have limited infrastructure to support communication or have faced historic disinvestment and underrepresentation.

The Hampton Roads MSA partners identified stakeholder groups to engage across all measures. During the PCAP process, HRPDC conducted engagement to help identify key LIDAC stakeholders and points of contact and began building more robust engagement channels for climate action work. Stakeholder mapping efforts were conducted in January and February of 2024, as part of a CAC meeting and via a survey that was sent to CPRG committee members (Steering, Technical, and Community Advisory).

From the LIDAC survey, over a three-week period, 22 responses were received from organizations throughout the MSA. The questionnaire report, including all comments, is included in Appendix A Community Engagement Information.

Six focus areas were included in the survey: Transportation and Mobility, Community Resilience, Buildings and Infrastructure, Energy (electricity generation), Waste, Recycling and Composting, and Agriculture, Natural, and Working Lands. The focus area of Transportation and Mobility was ranked as highest importance followed by Community Resilience, then Buildings and Infrastructure. Within these focus areas, climate change resiliency, reducing energy consumption, and climate change impact on LIDAC communities are top areas of concern. Overall, the participants emphasized the importance of engaging members of LIDACs in meaningful ways, ensuring that input is included in the CCAP, and communicating how the plans will positively impact their neighborhoods. Comment themes included:

- Prioritize expanding clean transportation modes and EV infrastructure
- Increase funding for weatherization, retrofits, and solar installations in LIDACs
- Increase public education and create broader public awareness
- Apply efficient electrification in LIDAC residential areas as well as public buildings
- Tree canopy restoration

Questionnaire respondents identified community groups that they are in communication with and will help HRPDC engage more extensively during the CCAP process. These groups range from neighborhood organizations and advocacy groups to municipal departments and local chapters of regional or national organizations. A preliminary list includes:

- American Council for Energy Efficient Economy
- Bon Secours Hospital
- Butterfly Village
- Chesterfield Heights Civic League
- Craddock community in Portsmouth
- Deep South Center for Environmental Justice
- Eastern Branch community in Norfolk
- Eastern Virginia Medical School
- Elizabeth River Project
- Emory University Hercules Research Project
- Environmental Defense Fund
- ForKids
- Friends of Indian River
- Georgia Institute of Technology
- Healthy Portsmouth
- Hampton Roads ECO District
- Hampton City Neighborhood Services Department
- Hampton Roads Community Action Program
- Ingleside Civic League
- Interfaith Power and Light
- James City County Neighborhood Development
- Justice40 Accelerator
- Justice40 Network Hub
- Lambert's Point in Norfolk
- National Association for the Advancement of Colored People (NAACP)
- National Environmental Justice Institute
- Norfolk Diversity Equity and Inclusion, Housing and Community Development, and Neighborhood Services Departments
- Norfolk State University
- Old Dominion University: Institute for Coastal Adaptation and Resilience (CAR)
- Park Place in Norfolk
- People's Solar Power Initiative
- Portsmouth Office of Social Services
- Portsmouth Health Department
- Sierra Club – Chesapeake Bay
- Sierra Club – York River
- Sierra Club – Virginia Chapter
- Solar United Neighbors
- Southern Alliance for Clean Energy
- Southern Environmental Law Center
- University of Maryland Climate and Environmental Justice Initiative
- University of Virginia
- United Civic League of Cavalier Manor
- U.S. Department of Energy National Renewable Energy Laboratory
- Virginia Organizing

- Virginia Environmental Justice Collaborative
- Virginia Beach City Council, School Board and General Assembly
- Virginia Beach Tea Party
- Virginia Wesleyan University

Future CCAP Engagement

During PCAP development, HRPDC strived for inclusivity and building relationships with sister agencies, localities throughout the MSA, industry partners, and community groups representing LIDACs. HRPDC will continue to broadly engage the public during the development of the CCAP, with a focus on addressing environmental justice concerns and supporting historically underrepresented and overburdened communities. HRPDC will use the responses of the LIDAC survey distributed to the technical and steering committees and the CAC to inform the CCAP Community Engagement Plan and will continue to seek input from a diverse audience.

Furthering the initial engagement performed for the PCAP, development of the CCAP will provide an opportunity for active community engagement that solicits input and feedback on proposed programs, projects, and measures. Goals for CCAP community engagement are:

1. Collaborate with key stakeholders throughout Hampton Roads to inform the plan with priority projects and programs for implementation funding eligibility.
2. Meaningfully engage LIDAC members in the CCAP development.
3. Inform and create awareness of the CCAP process with the public throughout Hampton Roads.

4. Climate Work and Context for Hampton Roads

Simplified GHG Inventory

Prior to this effort, the Hampton Roads MSA did not have a GHG inventory at the MSA level. A simplified GHG inventory was developed, focusing on the key sectors of Energy (Residential & Commercial), Transportation (including ports), Waste, and Sequestration. The simplified inventory covers all the priority GHG reduction measures and was prepared using the following data and resources:

- EPA's Landfill Methane Outreach Program (LMOP) Landfill and Project Database
- EPA's Facility-Level GHG Emissions Data
- U.S. Census Bureau Population Data
- Virginia State Inventory Tool (SIT) GHG Inventory
- North Carolina SIT GHG Inventory
- Port of Virginia GHG Inventory
- HRSD Landfill Data

Key sectors covered by the simplified inventory include Energy, Transportation Waste & Wastewater, and Land Use, Land-Use Change and Forestry (LULUCF).

Energy

The energy sector consists of emissions from electricity generation proportional to consumption, fossil fuel combustion, and stationary energy combustion used to power buildings, including all sectors (i.e., residential, commercial, and industrial). Public buildings are included within these sectors depending on their use.

Transportation

The transportation sector consists of both on-road and offroad mobile source emissions and electricity consumption from transportation sources. The Hampton Roads MSA is also home to a major seaport, which has numerous facilities (Figure 3).

Figure 3: Map of Virginia Port Authority Facilities



Waste & Wastewater

This sector covers emissions both from solid waste facilities such as landfills and waste combustion along with governmental and industrial wastewater facilities.

Land Use, Land-Use Change and Forestry

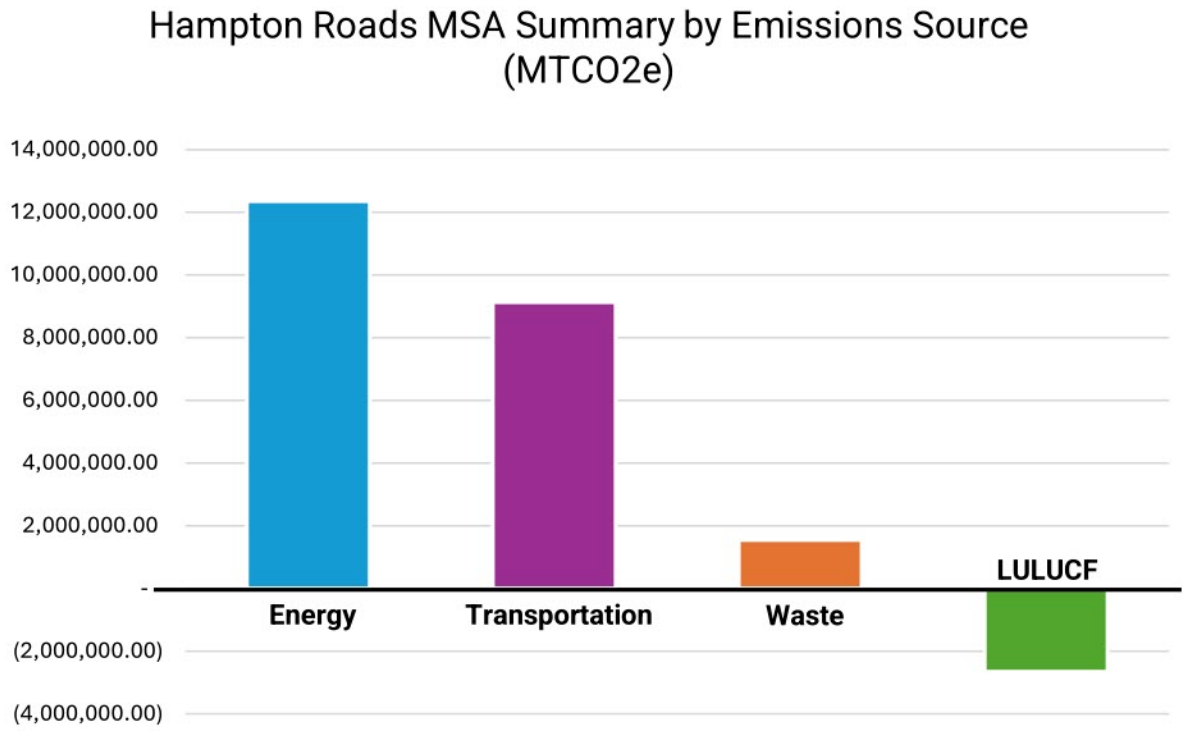
LULUCF represents the net carbon flux from vegetation and other land use. Sequestration of carbon from these sources offset emissions from other sectors, reducing net emissions in the MSA each year.

Table 3 and Figure 4 show the results of the simplified GHG inventory for the Hampton Roads MSA across all sectors analyzed.

Table 3: Simplified GHG Inventory Results from the Hampton Roads MSA

TOTAL EMISSIONS BY SOURCE ($MTCO_2e$)	2019
Total Energy	**12,359,426**
Residential	4,259,861
Commercial	4,661,097
Industrial	3,438,468
Total Transportation	**9,135,675**
Heavy-Duty Vehicles (HDV)	2,187,109
Light Duty Vehicles (LDV)	5,698,517
Motorcycles	37,166
Buses	137,455
Ports	1,075,428
Total Waste	**1,549,624**
Landfill Emissions	1,165,388
Waste Combustion	211,155
Wastewater Emissions	173,081
Total LULUCF	**(2,660,299)**
Urban Trees	(743,539)
Forest Lands: Forest Fires	4,581
Settlement Soils	4,917
Agricultural Soils	274,915
Landfilled Scraps	(62,934)
Forest Land Remaining Forest Land	(1,947,891)
Land Converted to Forest Land	(190,348)
Total Emissions	**20,384,426**

Figure 4: Simplified GHG Inventory Results by Sector



Appendix B discusses the methodology both for the development of the simplified GHG inventory and for estimated GHG reductions for the proposed priority GHG reduction measures.

Current Climate Goals, Programs, Plans and Policies

Many regions and communities within the Hampton Roads MSA and key infrastructure assets are vulnerable to changing climatic conditions, particularly regarding flooding and sea level rise. Local and regional bodies have also developed climate action and related planning and funding initiatives. To date, HRPDC has developed a Green Infrastructure Plan and a Coastal Resiliency Program that includes actions to address regional challenges related to flooding and sea level rise.

Lying within Virginia, the Hampton Roads MSA is covered by state-level climate goals, such as those included in Senate Bill 94, establishing statewide GHG emissions reduction goals across Virginia's economy that reach net-zero emissions by 2045, and the clean energy goals in the Virginia Clean Economy Act of 2020 (VCEA). In alignment with the VCEA, Virginia has also passed a number of recent bills to support equitable climate actions, including Clean Cars Act (House Bill 1965) and the Environmental Justice Act, all of which affect GHG emissions in the Hampton Roads MSA as they continue to come into effect. Several statewide efforts to plan for and fund increased climate resilience investments may also be applicable to the MSA region, including:

- Virginia Coastal Resilience Master Plan[2]
- Virginia Department of Conservation and Recreation: Guidance for Local Floodplain Ordinances[3]
- Virginia Strategy for Safeguarding Species of Greatest Conservation Need from the Effects of Climate Change[4]
- Funding mechanisms such as the Community Flood Preparedness Fund and the Resilient Virginia Revolving Fund[5]

With a few counties in North Carolina, the Hampton Roads MSA is also covered by Executive Order 80: North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy and the climate goals therein.

LIDAC Climate Risks

Hampton Roads MSA LIDACs

A core component of the CPRG and much of the IRA through the Justice40 Initiative is to ensure that benefits from climate action are experienced by LIDACs as these communities are particularly vulnerable to risks and impacts from climate change. This section discusses climate risks for LIDACs within the Hampton Roads MSA and highlights how HRPDC has engaged with these communities and stakeholders to date via other planning processes. Additional details about LIDAC engagement to date are described in Section 3, and Appendix A details plans for future engagement with LIDACs. Per CPRG requirements, LIDACs within the MSA are identified by Census Block ID using EPA's EJScreen tool and the CEJST.[6]

LIDAC Identification

HRPDC identified LIDACs within the MSA area using EJScreen to visualize Census Block Groups that the EPA designates as disadvantaged and by using CEJST and its indicators of qualifying characteristics (i.e., factors such as health considerations, housing and income, legacy pollution, etc.) for Census tracts within the MSA. Figure 5 shows these LIDAC census block groups in the Hampton Roads MSA, as identified by EJ Screen while Figure 6 shows these LIDAC Census tracts in the Hampton Roads MSA, as identified by CEJST, highlighting them in blue. A full list of LIDAC Census tract IDs can be found in Appendix C.

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[2] Commonwealth of Virginia. 2021. *Virginia Coastal Resilience Master Plan Phase 1.* https://www.dcr.virginia.gov/crmp/plan.
[3] Virginia DCR. 2023. *Floodplain Management Regulations and Ordinances.* https://www.dcr.virginia.gov/dam-safety-and-floodplains/fpordnce.
[4] Virginia DWR. 2024. *Virginia's Strategy for Safeguarding Species of Greatest Conservation Need from the Effects of Climate Change..* https://dwr.virginia.gov/wildlife/wildlife-action-plan/safeguarding-species-from-climate-change/.
[5] Virginia DCR. 2024. *Community Flood Preparedness Fund Grants and Loans.* https://www.dcr.virginia.gov/dam-safety-and-floodplains/dsfpm-cfpf.
[6] The EPA defines a disadvantaged community in the following manner: 1) if it is disadvantaged according to the Climate and Economic Justice Screening Tool (CEJST); 2) if the census block is at or above the 90th percentile for any of EJScreen's Supplemental Indexes compared to the nation or state; 3) any geographic area within Tribal lands and indigenous areas as included in EJScreen. Taken from: U.S. EPA Office of Air and Radiation. "Climate Pollution Reduction Grants Program: Technical Reference Document for States, Municipalities and Air Pollution Control Agencies. Benefits Analyses: Low-Income and Disadvantaged Communities," April 27, 2023. https://www.epa.gov/system/files/documents/2023-05/LIDAC%20Technical%20Guidance%20-%20Final_2.pdf.

Figure 5: LIDAC Census block groups in the Hampton, Roads MSA, as identified by EJScreen

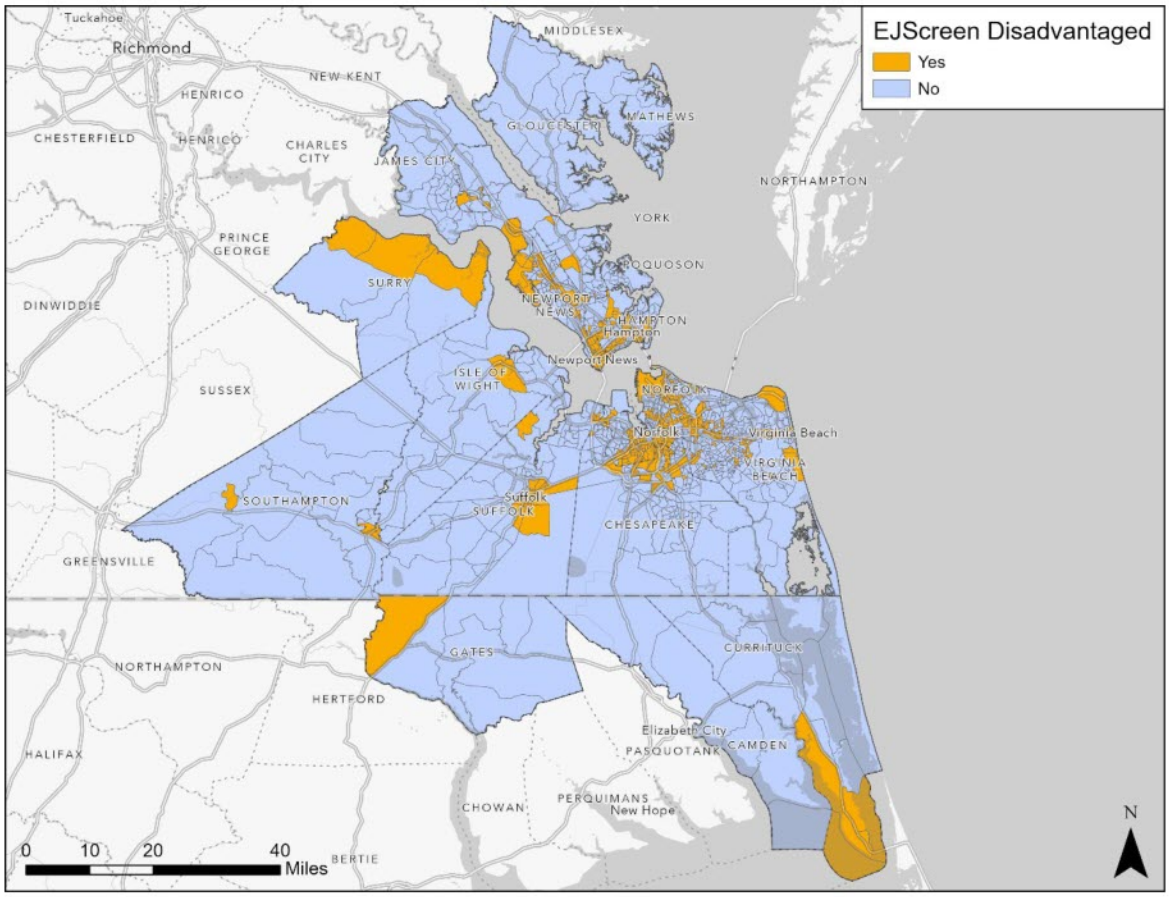
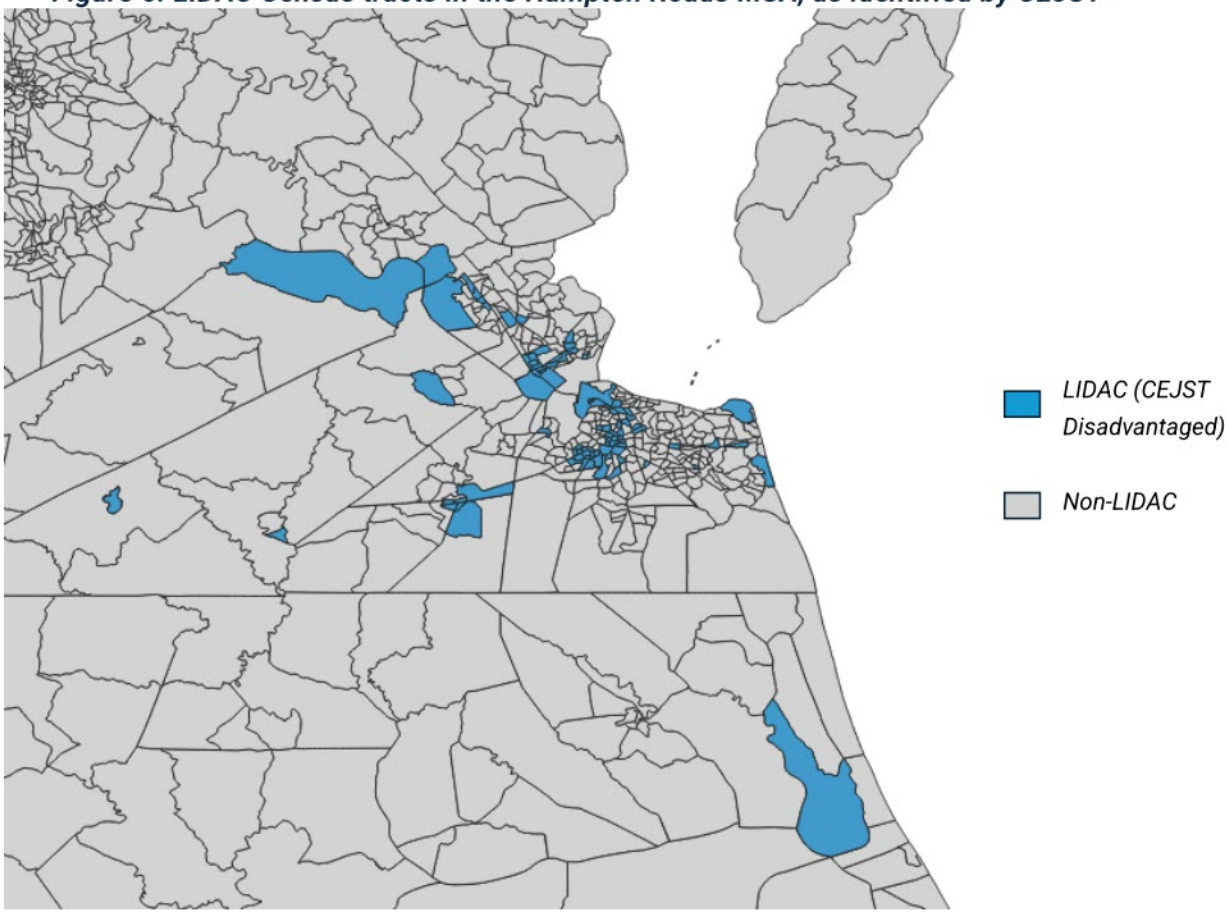


Figure 6: LIDAC Census tracts in the Hampton Roads MSA, as identified by CEJST



Climate Impacts and Risks to LIDACs

The climate risks most prevalent in the U.S. include extreme weather events (hurricanes, extreme rainfall, etc.), extreme heat and urban heat island effects, flooding, sea level rise, drought, and wildfires. Social systems inequitably distribute negative impacts from these climate risks on BIPOC (Black, Indigenous, and People of Color) individuals and communities, low-income households, unhoused individuals, rural communities, and agricultural workers.[7] Not only do these communities feel the most severe impacts of climate change, but they are often also the least able to prepare for and respond to said impacts due to a lack of resources and socio-political power. According to a 2021 EPA analysis, racial and ethnic minorities are particularly vulnerable to climate change impacts, especially Black and African American individuals.[8]

Minority and low-income communities are more likely to suffer the consequences of climate change due to heightened exposure to climate risks and inaccessibility to resources, such as adequate infrastructure and proper insurance. Many factors contribute to this inequality, including historical discriminatory practices in housing, education, and employment. Pre-existing health status and living

[7] U.S. Global Change Research Program. 2023. *Ch. 20. Social systems and justice. In: Fifth National Climate Assessment*. https://doi.org/10.7930/NCA5.2023.CH20

[8] EPA. 2021. *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency, EPA 430-R-21-003.* www.epa.gov/cira/social-vulnerability-report

conditions are two key components of climate vulnerability – components which, in the United States, are often determined by economic access, social policies, political influence, and structural racism.[9]

The most prevalent climate risks and their potential impacts include:



Extreme Heat. Exposure to extreme heat can cause heat exhaustion, heat stroke, and can contribute to deaths from a range of cardiovascular diseases such as heart attacks and strokes. Between 2004 and 2018, an average of 702 people died annually of heat-related deaths in the United States (though this is likely underreported). Older adults, young children, people of color, outdoor workers, those with poorer health, and low-income individuals are more at risk of heat-related death. Additionally, higher temperatures will lead to increased energy demand and higher energy costs. Individuals belonging to LIDACs will be less able to afford these increased costs, thus exacerbating heat-related health risks.[10]



Extreme Weather Events (Hurricanes, Extreme Rainfall, Etc.). Extreme rain events will likely increase in frequency and intensity throughout the century. This will cause more intense flooding, harming primarily households without homeowners or renters' insurance or that cannot afford the necessary infrastructure repairs. In addition to flooding, heavy precipitation can cause landslides, which can further damage infrastructure. Flooding can also impact human health by increasing mold production and exposure to waterborne diseases, particularly affecting those in poor living conditions and lacking access to safe and reliable drinking water.[11] Impacts from these storms will continue to be felt most significantly in densely populated areas along tidal rivers.



Sea Level Rise. Sea level rise will cause severe flooding, damaging infrastructure. Underserved and minority communities may be unable to afford the costs of repairing damages or relocating if their homes become completely inundated. American Indian individuals are more likely to live in areas at risk for future inundation.[12] Additionally, saltwater intrusion from sea level rise can make drinking water unsafe for coastal communities, leading to dangerous impacts on health.[13]



Drought. Drought can contribute to water scarcity, causing major food insecurity and threatening farming livelihoods. Food insecurity leads to hikes in food prices and potentially civil unrest and mass migration. All of these impacts will be felt most strongly by minority and low-income communities.[14]

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[9] Patnaik, A., Son, J., Feng, A., Ade, C., 2020. *Racial Disparities and Climate Change.* https://psci.princeton.edu/tips/2020/8/15/racial-disparities-and-climate-change

[10] EPA, 2023. Climate Change and Heat Islands. https://www.epa.gov/heatislands/climate-change-and-heat-islands#:~:text=When%20people%20are%20exposed%20to%20extreme%20heat%2C%20they,attacks%2C%20strokes%2C%20and%20other%20forms%20of%20cardiovascular%20disease.

[11] EPA. 2021. *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency, EPA 430-R-21-003.* www.epa.gov/cira/social-vulnerability-report

[12] EPA. 2021. *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency, EPA 430-R-21-003*. www.epa.gov/cira/social-vulnerability-report

[13] Shammi, M., Rahman, M., Bondad, S.E., Bodrud-Doza, M., 2019. *Impacts of Salinity Intrusion in Community Health: A Review of Experiences on Drinking Water Sodium from Coastal Areas of Bangladesh.* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6473225/

[14] U.S. Global Change Research Program. 2023: *Ch. 11. Agriculture, food systems, and rural communities. In: Fifth National Climate Assessment*. https://doi.org/10.7930/NCA5.2023.CH11

Prevalent Climate Risks within the Hampton Roads MSA

Within the Hampton Roads MSA, the most prevalent climate risks are extreme heat, extreme precipitation, storms, and sea level rise. Average temperatures in Virginia have already risen over 1.5° F since the beginning of the 20th century. The number of days over 95°F is projected to drastically increase.

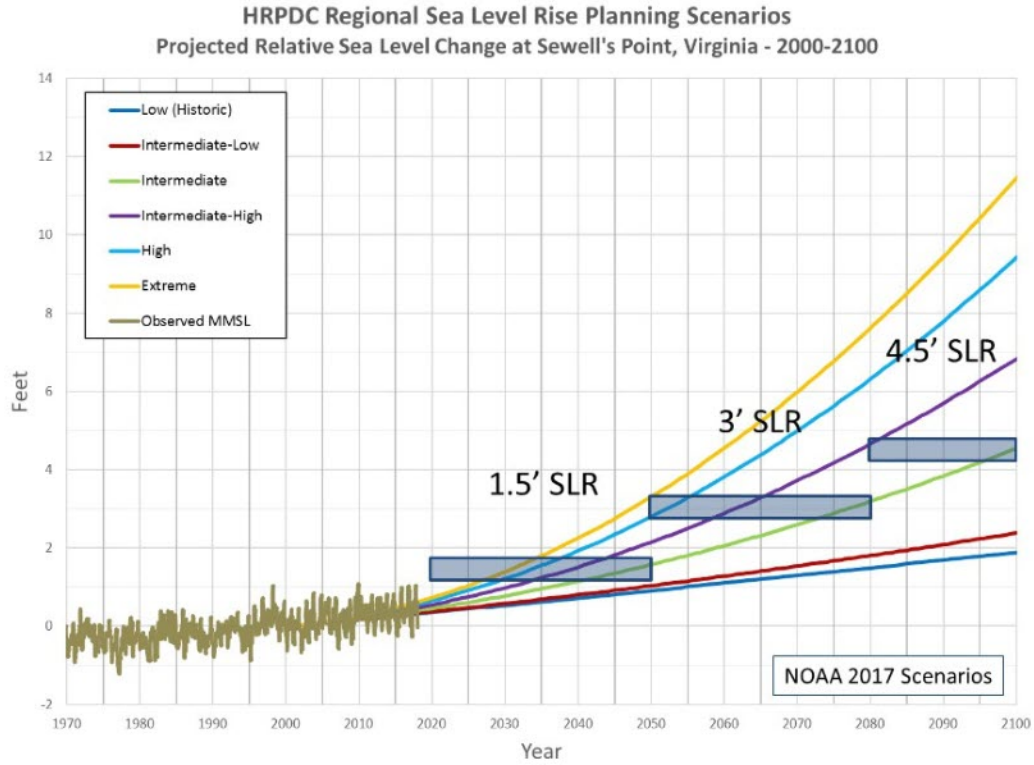
Since 2000, average annual precipitation in Virginia has increased slightly. Summer precipitation was above average during the 2015–2020 period. Annual precipitation is projected to increase across Virginia by 5–10%, as is the frequency and intensity of extreme precipitation events (defined as days with two or more inches of precipitation), threatening the Hampton Roads MSA. The 5-day maximum precipitation (the maximum amount of rainfall occurring within five consecutive days) is currently 148.9 mm; by 2050, this is projected to increase to 159.8 mm under a high emissions scenario.[15] The area is also susceptible to hurricanes and storms, which are expected to increase in severity in the future. Because the region has a low-lying geography, flooding will be a significant risk.[16]

Sea level rise is happening more rapidly along Virginia's coast, much of which is in the Hampton Roads MSA, than in other coastal areas because the land is sinking. Since 1927, sea level has risen 18 inches along the Virginia coast, causing an increase in the extent of the coastal floodplain and tidal floods associated with nuisance-level impacts.[17] The National Oceanic and Atmospheric Administration (NOAA) projects that mean sea level could rise by 0.75 to 1.67 feet between 2000 and 2040 and by 1.25 to 3.25 feet between 2000 and 2060.[18] In fact, Hampton Roads has the second largest U.S. population center at risk of sea level rise. Over 400,000 homes in Virginia are at risk for storm surge, most of which are in identified disadvantaged communities in the Hampton Roads region. Acknowledging this risk, HRPDC developed a Sea Level Rise Planning and Policy Approach in 2018 to provide recommendations to localities to incorporate sea level rise scenarios into planning, engineering, and design efforts.[19] HRPDC's identified sea level rise planning scenarios are shown in Figure 7.

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[15] ICF Consulting, proprietary ClimateSight Analysis. 2024.
[16] Hampton Roads PDC. 2010. *Climate Change in Hampton Roads.* https://research.fit.edu/media/site-specific/researchfitedu/coast-climate-adaptation-library/united-states/east-coast/virginia/McFarlane-et-al.-2010.-CC-Impacts-in-Hampton-Roads-Phase-1.pdf
[17] NOAA Tides and Currents https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8638610
[18] Global and Regional Sea Level Rise Scenarios for the United States, https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html
[19] Hampton Roads PDC. 2018. *HRPDC Sea Level Rise Planning Policy and Approach.* https://www.hrpdcva.gov/uploads/docs/05A_Attachment%20-%20HRPDC%20Sea%20Level%20Rise%20Planning%20Policy%20and%20Approach%20-%20Adopted%20101818.pdf

Figure 7: HRPDC Regional Sea Level Rise Planning Scenarios



Together, HRPDC and HRTPO have also identified 2023 legislative priorities establishing dedicated funding sources for flood prevention projects and establishing a state structure for coordination on flooding in as 2023 legislative priorities.

Several cities in the Hampton Roads MSA have higher rates of poverty, unemployment, and housing insecurity than the rest of the state of Virginia. Statewide, the average poverty rate is 10.6%. In Norfolk, Hampton, Newport News, and Portsmouth, the poverty rate is over 15%. Furthermore, there are huge racial disparities; in Norfolk (where the poverty rate reaches almost 19%), the average annual income of white adults is twice as much as that of Black adults. Hampton Roads also lags behind the rest of Virginia when it comes to housing security. In Portsmouth, 17% of residents are severely cost-burdened (meaning over 50% of their income is spent on housing), and 21% in Norfolk, while the state average is 12.5%. Additionally, 7,660 cost-burdened renters in Norfolk are Black and 4,110 are white, even though the area is majority white. Unemployment is also higher in Hampton Roads compared to the state average.[20]

Residents of LIDACs along with low-income, housing insecure, and unemployed communities outside of LIDACs in Hampton Roads will be at far greater risk from the climate hazards listed above. For example, extreme heat can lead to numerous heat-related illnesses and health issues. Since 2015, there has been an increase in heat-related hospital visits. Unhoused people and those who work outside will be more exposed to rising temperatures, leading to declines in health. Additionally, people

[20] WHRO. *New Data Tool Shows Socioeconomic Inequities Around Hampton Roads*. https://whro.org/news/local-news/20066-new-data-dashboards-show-socioeconomic-inequities-around-hampton-roads

in rural areas may not be able to access cooling centers, leaving them more exposed. A 2022 study found that while 65% of Virginians have convenient access to a cooling center, less than 7% of Virginians living below the federal poverty level do. Locations of cooling centers highlight the disparities between wealthier, urban areas and lower-income, rural areas.[21]

Many low-income and minority communities are located close to toxic waste sites, such as the Superfund sites in the MSA including the four sites in Portsmouth, four in York, three in Suffolk, and one each in Chesapeake, Newport News, Norfolk, and Virgina Beach. As climate change increases the risk of storms, the likelihood of a toxic waste site being compromised and leaking rises as well. This could lead to a whole host of health problems for nearby residents, including respiratory illness and cancer.[22] Flooding introduces microbial and chemical loads in surface waters, negatively impacting the health of residents. Flooding in LIDAC communities will introduce a slew of health issues, including mental health problems for those repeatedly exposed.[23] These health impacts are particularly consequential as healthcare for low-income and unemployed people is unstable and often inaccessible altogether.[24]

Sea level rise is a major threat to low-income and disadvantaged communities as well. Currently, expected damages from flooding in the Hampton Roads MSA in a given year are around $12 million; with an increase of 0.5 meters, damages could go up to $50 million annually and $100 million annually with an increase of 0.75 meters. LIDACs often lack the resources to compensate for infrastructure damages and loss due to flooding.

A 100-year storm event would also severely hurt the Gross Regional Product (GRP) of the Hampton Roads economy. Without sea level rise, a 100-year storm event would cause the GRP to decline $611 million, but with a sea level rise of 0.5 meters the GRP would decline over $1 billion, and over $2 billion with a rise of 0.75 meters.[25] Economic hits will impact everyone in the region; however, LIDACs are less able to recover from economic challenges.

Review of Available Public Climate Funding Sources

There are significant state and federal funding opportunities available that Hampton Roads localities and HRPDC can request or apply for to support climate actions in the region. State and federal funding

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[21] Allen M, Hoffman J, Whytlaw JL, Hutton N. 2022. *Assessing Virginia cooling centers as a heat mitigation strategy*. doi: 10.5055/jem.0671. PMID: 35792811.

[22] University of Virginia. 2021. *A Path Toward Environmental Equity in Hampton Roads*. Sampaio_Gabriel_A_Path_Toward_Environmental_Equity_in_Hampton_Roads (3).pdf

[23] University of Virginia. 2023. *Impacts of Sea Level Rise and Flooding on Low-Income Communities in Hampton Roads, Virginia.* bing.com/ck/a?!&&p=76cb6cfb584fad66JmltdHM9MTcwNjgzMjAwMCZpZ3VpZD0yYjFkNjdlMy0wNzE1LTZkNmUtMjVkNi03NDg3MDZkNzZjZjMmaW5zaWQ9NTE4NQ&ptn=3&ver=2&hsh=3&fclid=2b1d67e3-0715-6d6e-25d6-748706d76cf3&psq=Impacts+of+Sea+Level+Rise+and+Flooding+on+Low-Income+Communities+in+Hampton+Roads%2c+Virginia&u=a1aHR0cHM6Ly9saWJyYWV0ZC5saWIudmlyZ2luaWEuZWR1L2Rvd25sb2Fkcy9kNTA0cm00NHc_ZmlsZW5hbWU9Qm93bWFuX0FuZHJld19TVFNfUmVzZWFyY2hfUGFwZXIucGRm&ntb=1

[24] U.S. Department of Health and Human Services. Nd. *Poverty.* https://health.gov/healthypeople/priority-areas/social-determinants-health/literaturesummaries/poverty#:~:text=Unmet%20social%20needs%2C%20environmental%20factors,for%20people%20with%20lower%20incomes.&text=For%20example%2C%20people%20with%20limited,for%20expensive%20procedures%20and%20medications.

[25] William & Mary Law School. 2016. "The Cost of Doing Nothing: A Sea Level Rise Synopsis for the Hampton Roads Region." Virginia Coastal Policy Center. https://law.wm.edu/news/stories/2016/documents/Summary%20Costs%20of%20Doing%20Nothing%20and%20Final%20Hampton%20Roads%20SLR%20Report.pd

allocated to and administered by states is a key component of climate action, including but not limited to climate and energy related components of the IRA and the Infrastructure Investment and Jobs Act (IIJA). There are many federal formula funding opportunities under the IRA and IIJA that are being administered by Virginia and subgranted to localities that Hampton Roads could utilize for regional climate action. Examples of these include:

- Assistance for Latest and Zero Building Energy Code Adoption
- Carbon Reduction Program
- Energy Efficiency and Conservation Block Grant
- High Efficiency Electric Home Rebate Program
- Home Energy Performance-Based, Whole-House Rebate Program
- Surface Transportation Block Grant Program

The MSA has received direct federal funding appropriations for initiatives related to transportation and energy. Hampton Roads Transit (HRT) received funds to upgrade transit facilities to prepare for transit fleet electrification. The Transportation District Commission of Hampton Roads developed several federal legislative and public policy priorities in alignment with these federal funding opportunities, including supporting regional multi-model infrastructure and services, fleet and infrastructure electrification, and addressing transportation systems gaps for underserved, overburdened, or disadvantaged communities. [26] Virginia businesses, residents, and local governments are also eligible for federal tax incentives, primarily in the form of income and investment tax credits for various clean energy and emission reduction technologies. These typically reduce tax liability based on a percentage of project cost, up to defined dollar limits.

There are several funds created through Virginia state legislation to support decarbonization initiatives in the region, including the Hampton Roads Regional Transit Program and Fund, managed by the Hampton Roads Transportation Accountability Commission. Hampton Roads has received other state grants supporting climate actions, including the Growth and Opportunity for Virginia grant program, recently awarded to Hampton Roads for a demonstration site for clean energy transition to green hydrogen. Localities in Hampton Roads can also apply for grant programs funded by the state such as the Department of Forestry's Virginia Trees for Clean Water. Localities are also taking steps to identify other strategies to fund climate action, such as through PACE (property assessed clean energy) to allow for financing of renewable energy by commercial, nonprofit, and multifamily properties.

Current Gaps in Action and Funding

As described above, there are a significant number of funding opportunities available, particularly for actions related to energy efficiency, renewable energy, and building and transportation electrification. However, some gaps remain, particularly for the industrial and commercial sectors, and the MSA is evaluating the currently available funding opportunities to leverage grant programs and continue to fill gaps in local and state funding with federal funds. HRPDC will continue to coordinate closely with

[26] Hampton Roads Transit. Nd. *Transportation District Commission of Hampton Roads Federal Legislative and Public Policy Priorities 2022-2023.* 2023-federal-legis-priority.pdf (gohrt.com)

localities, regional partners, and the state to identify funding opportunities that can flow to initiatives in Hampton Roads and deliver regional benefits.

5. Priority Climate Actions

The priority GHG reduction measures developed by HRPDC target the energy, buildings, transportation, ports, waste and wastewater, and natural and working lands (such as forestry and wetlands) sectors. These measures are designed not only to directly reduce GHG emissions and improve air and water quality, but also to provide other benefits including:

- Improving public health;
- Creating safer and more reliable infrastructure;
- Generating workforce development opportunities; and
- Reducing costs for governments, organizations, and community members.

These additional benefits are discussed in the following section.

Benefits and Co-Benefits Analysis

The initiatives outlined in this PCAP will contribute to achieving local, state, and national climate objectives while reducing co-pollutants, such as criteria air pollutants and hazardous air pollutants, that adversely affect the Hampton Roads MSA and its environment. Decreasing fossil fuel (i.e., coal, natural gas, petroleum, propane) use in buildings, vehicles, and electric power generation, in addition to more clean and efficient industrial practices, will lower emissions and generate environmental, public health, and socioeconomic advantages. In the short term, the reduction of co-pollutants will enhance both indoor and outdoor air quality, diminishing hazardous air pollutants, toxins, and other harmful substances. The immediate alleviation of these pollutants can positively impact the physical and economic wellbeing of communities. In the long run, the reduction of GHGs will mitigate the impacts of climate change. The pollutants reduced by the following PCAP measures are outlined in Table 4.

Table 4: Air Pollutants and GHGs Reduced by PCAP Measures

Type of Pollutant	Categories of Related Measures
Carbon Dioxide	Energy, Transportation, Waste
Carbon Monoxide	Energy, Transportation
Methane	Energy, Transportation, Waste
Sulfur Dioxide	Energy, Transportation
Nitrogen Oxides	Energy, Transportation
Volatile Organic Compounds	Transportation
Sulfur Hexafluoride	Energy, Transportation
Particulate Matter (e.g., PM2.5)	Energy, Transportation
Heavy Metals	Energy, Transportation
Nitrous Oxide	Energy, Transportation
Hydrocarbons	Transportation
Other Hazardous Air Pollutants (HAPs) and air toxics	Energy, Transportation

These co-pollutants are also described throughout the PCAP Measures section. The co-benefits, detailed below, impact all communities where programs and projects related to the PCAP measures may be implemented.

Public Health Benefits

Reducing GHG and co-pollutant emissions has and will continue to have profound implications for public health of residents of the Hampton Roads MSA. The combustion of fossil fuels contributes to outdoor and indoor air pollution which, in turn, poses significant health risks. In the United States, roughly 87% of people's lives are spent indoors, so indoor exposure to combustion pollutants, such as natural gas for cooktops or heating, has the potential for substantial health effects.[27] In instances of long-term exposure, these health effects can include premature mortality, adverse birth outcomes, cognitive decline, and gastrointestinal inflammatory disease. Short-term exposure can lead to asthma and respiratory symptoms.[28]

Furthermore, the adverse health impacts extend to climate impacts such as extreme heat events. Nearly two-thirds of the U.S. population resides in areas susceptible to health risks related to extreme heat, including heat-related illnesses and cardiovascular conditions. See Section 3 for more information on climate-related risks, particularly for LIDACs.

Socioeconomic Benefits

The implementation of the priority GHG reduction measures in this PCAP can bring significant socioeconomic advantages, especially among LIDACs. One major shift will be increased high-quality energy related jobs to the state as it builds renewable energy infrastructure. The development of clean energy technologies, such as energy efficiency upgrades to buildings, solar installations, and EV charging infrastructure, necessitates skilled individuals proficient in installing and maintaining such hardware. Offering clean energy job training, especially within environmental justice communities, both supports resilient and clean infrastructure and generates economic opportunities.

Clean energy can be developed to improve grid resilience (e.g., through battery storage), reducing the risk of blackouts and promoting energy independence.[29] Consequently, these investments mitigate the economic and physical impact of extreme weather events.

GHG emissions contribute to more frequent and severe extreme weather events, resulting in substantial financial costs and economic impacts. Reducing greenhouse gas emissions over the long term can help lessen occurrences of events like extreme precipitation and storms. This, in turn, can prevent additional costs such as higher insurance premiums, expenses for repairing structural damage, and losses in crops and natural resources. The reduction of extreme weather events also alleviates costs related to medical bills and premature deaths. In 2022 alone, the U.S. faced 18

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[27] U.S. EPA. 1989. *Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001C.* https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=9100LMBU.TXT
[28] Health Effects Institute. 2020. *Health Effects Institute Annual Report 2020: Valuing Science Informing Decisions.* https://www.healtheffects.org/system/files/hei-annual-report-2020.pdf
[29] NREL. 2018. *Distributed Energy Planning for Climate Resilience.* https://www.nrel.gov/docs/fy18osti/71310.pdf

extreme weather and climate events costing over $1 billion, making the reduction of these costs crucial for individual, community, and overall economic wellbeing.[30]

Electrifying and decarbonizing energy end-use sectors and enhancing efficiency through properly designed measure implementation can offer financial relief to individuals and businesses, especially for low-income and disadvantaged residents. Energy efficiency retrofits will lower overall household energy use, therefore lowering energy bills. This reduction in energy cost burden eases financial stress for households and businesses, allowing resources to be redirected to better individual economic situations and stimulate the economy.

Additionally, the PCAP measures promote and require public education, community engagement, and social inclusion. Actions to implement measures – such as enhanced multi-modal transportation options – foster social capital, encourage community engagement, and contribute to the overall socioeconomic wellbeing of Hampton Roads residents.

Implementation Schedule

Table 5 depicts a proposed timeline of milestones for implementation of the PCAP measures, which are described later in this section. Note that this timeline is subject to change as measures will be undertaken where feasible and when funding is available.

Table 5: Proposed Timeline

Milestone	Timeframe
2024	
Deliver final PCAP to EPA, which includes stakeholder input on measures	March 1, 2024
CPRG Implementation Grant Deadline	April 1, 2024
Identify key actions to take under each measure	Throughout 2024
2025	
Coordinate resources across jurisdictions and take initial actions across the PCAP measures	Early 2025
Estimate GHG emissions reductions from measure actions	Early 2025
Estimate LIDAC benefits from measure actions	Early 2025
Deliver final CCAP to EPA	May 1, 2025
2026	
Continue implementing measure actions	Early 2026
Implement pilot programs and short-term strategies for GHG reductions	Mid 2026
Secure approval and budget for ongoing GHG reductions	Mid-late 2026
2027	
Deliver Status Report to EPA	Mid-2027
Continue to implement measures and reduce GHGs; Track progress across the MSA	2027 onward

[30] NOAA. 2023. *2022 U.S. billion-dollar weather and climate disasters in historical context.* https://www.climate.gov/news-features/blogs/beyond-data/2022-us-billion-dollar-weather-and-climate-disasters-historical

PCAP Measures

HRPDC, with input from key stakeholders, has identified seven priority measures that are implementation ready and will reduce GHG emissions in the short-term. The measures were developed through the process outlined in Section 2. The PCAP measures, and the relevant GHG inventory sectors for each, are identified in Table 6. The following section describes each priority measure in detail.

Table 6. Summary of PCAP Measures and Related GHG Inventory Sector(s)

PCAP Measure	GHG Sector(s)
Measure 1: Create programs to support and incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching.	Energy
Measure 2: Reduce energy consumption and increase building decarbonization through programs to support, incentivize, and install energy efficiency and electrification measures.	Energy
Measure 3: Develop an EV procurement plan and EVSE deployment strategy to support the adoption of EVs.	Transportation
Measure 4: Reduce vehicle miles traveled and support alternative modes of transportation through bike/pedestrian infrastructure investments.	Transportation
Measure 5: Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.	Ports, Transportation
Measure 6: Reduce GHG emissions through improved equipment efficiencies, increased methane capture at waste and wastewater facilities, and organic waste diversion.	Waste & Wastewater
Measure 7: Increase opportunities for carbon sequestration through tree planting, protecting, and restoring high-carbon coastal habitats, wetlands, and forest lands	LULUCF

Measure 1.

Create programs to support and incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching.

Facilitating the transition to clean energy is a key priority for the MSA. This measure emphasizes fostering a shift toward clean energy solutions, encompassing onsite renewable energy, energy storage system deployment, and fuel switching. Each local government within the MSA will lead the development of actions to implement this measure within their jurisdiction. Implementing these actions in public operations and in public facilities can set an example for the surrounding community to adopt renewable energy, storage, and alternative fuels. This measure will result in public health benefits such as improved air quality, as well as increased employment opportunities in the clean energy sector.

Additional information about the actions to support this measure can be found in the City of Norfolk's Climate Action Plan and the VCEA.

Progress to Date and Future Activities and Milestones

The Hampton Roads Regional Economic Development Strategy identified developing offshore wind and other coastal energy solutions as a priority for diversifying the economy of the MSA.[31]

Municipalities in the MSA have begun supporting this action. The City of Norfolk has established solar energy expansion goals in its Climate Action Plan, has achieved SolSmart gold-level designation, and provides a website with numerous solar resources.[32] Additionally, the Hampton Roads Alliance partnered with Xodus Group and BW Research to conduct a major offshore wind supply chain study for the Hampton Roads area in Virginia. The project pinpointed Hampton Road's supply chain assets and uncovered any gaps, helping the Alliance in its efforts to support the U.S. offshore wind industry in Hampton Roads and identify key opportunities for economic expansion. Locality level and distributed energy generation efforts will work in concert with the renewable energy portfolio standards in the VCEA and will increase renewable energy generation and use throughout the Hampton Roads MSA.

HB 1919 authorized Virginia localities to establish local green banks to promote the investment in clean energy technologies and provide financing for clean energy technologies.[33]

In support of activities under this measure, Virginia launched SolSmart, a no-cost technical partner program, with support from the Solar Foundation to bring solar-specific resources and technical assistance to localities across Virginia, including those in the Hampton Roads MSA.[34] Virginia also established a shared solar program in 2020, which provides customers of Dominion Energy Virginia (all of the MSA region is in Dominion Energy service territory) the opportunity to participate in shared solar projects. Localities within the MSA have also made progress on solar deployment efforts.

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[31] Hampton Roads PDC. 2021. *Regional Economic Development Strategy.* https://www.hrpdcva.gov/library/view/348/regional-economic-development-strategy-(reds)/
[32] City of Norfolk. Nd. *Solar Resource Webpage.* Solar | City of Norfolk, Virginia - Official Website
[33] Virginia's Legislative Information System. 2021. *HB 1919 Local green banks; authorizes a locality, by ordinance, to establish.* https://lis.virginia.gov/cgi-bin/legp604.exe?211+sum+HB1919
[34] Virginia Energy. 2021. *SolSmart. Virginia DOE.* https://www.energy.virginia.gov/renewable-energy/SolSmart.shtml

Examples include the adoption of a solar energy policy by the City of Chesapeake that was recently updated in 2022. The policy "promotes the installation and use of accessory solar energy systems by designating them a permitted use in all of the City's zoning districts."[35] Solar installations have also been added to five schools and two administrative buildings in Newport News, while the City of Williamsburg is planning of installing solar panels on municipal buildings. The City of Norfolk has also installed solar panels on two fire stations and is in the permitting process for installation on a closed landfill.[36] Additionally, the City of Hampton has also added clean energy solutions to its draft Energy Assurance Plan.

In addition to continuing the activities described above, the following potential example actions are considered for Measure 1 implementation. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- **Install renewable energy and energy storage systems**. Renewable energy could include onsite solar or micro-wind turbines on residential, commercial, and industrial buildings. Public buildings (including HRSD/wastewater facilities) can lead by example to encourage other constituents throughout the MSA to also adopt clean energy improvements.

- **Set regional goals for local implementation of renewable energy and energy storage systems.** Regional goals can establish a feasible timeline for the implementation of solar panels on public, residential, and commercial buildings.

- **Develop materials to assist localities in adopting policies to streamline permitting for renewable energy systems in support of clean grid targets in VCEA.** Regional planning organizations can provide tools to localities to expedite and streamline the permitting process for utility-scale solar and storage systems.

- **Support education and workforce development programs for clean energy and buildings.** Such programs should emphasize engaging LIDAC communities in the growing clean energy workforce.

- **Identifying potential opportunities for hydrogen production and use as an alternate fuel**. Produced hydrogen could end up supporting numerous sectors in decarbonization planning.

Geographic Coverage

As this measure will be carried out by cities, counties, and substate government agencies across the MSA, all areas within the MSA and in neighboring regions will benefit from steps to decarbonize the regional energy supply. The actions within this measure are focused on the entire MSA area. The overall measure is specific to the MSA and not meant to encompass a broader or smaller geographic area.

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[35] City of Chesapeake. 2022. *City of Chesapeake Solar Energy Policy.* Solar-Energy-Policy-Update-PDF (cityofchesapeake.net)
[36] City of Norfolk. 2022. *Campostella Landfill Redevelopment Proposal.* www.norfolk.gov/5667/Compostella-Landfill-Redevlopment-Propo

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Create programs to incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching.	314,807	1,582,098

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

Increasing clean and renewable energy will lead to reduced emissions of CO, NOx, SO_2, PM, and other air toxics and pollutants, such as ozone.

LIDAC Benefits

As this measure will be carried out by cities, counties, and substate government agencies across the MSA, all LIDACs within the MSA will benefit from steps to decarbonize the energy supply, local government operations fuel uses, and reduce GHG emissions across the MSA.

This measure may result in environmental benefits for LIDACs, where air pollution has historically been concentrated. Public health benefits can result from improved air quality. Active engaging with LIDACs will be needed to ensure that renewable energy improvements are located in and directly benefit these communities. Additional economic benefits may result from employment opportunities in the clean energy industry that will likely be realized. Increased resilience will also result where energy storage measures and distributed/on-site solar are implemented. Other benefits to members of LIDAC communities may include reduced utility bills through access to more efficient energy and energy infrastructure.

Renewable energy training workforce training programs could also be developed to specifically engage LIDACs in the growing clean energy workforce.

Implementation Considerations

Key Implementing Agency(ies)

- **Local governments and municipalities.** State and local government agencies such as the Virginia Department of Energy and North Carolina Department of Environmental Quality's State Energy Office can provide implementation support and share best practices for the transition to renewable energy.
- **Dominion Energy.** Dominion Energy, the electric utility for the MSA, will be key for ensuring that the electrical grid infrastructure is able to support the electrification of processes and an increased supply of renewable energy. Per the VCEA, Dominion Energy is required to produce 100% renewable energy by 2045.

- **Community-based organizations** such as Solar United Neighbors can increase awareness of solar opportunities and support customers interested in solar projects.
- **Private sector partners.** Private sector partners such as engineers, installers, and maintenance personnel will be needed for successful implementation of renewable energy projects.

Authority to Implement

City and county governments within the MSA can implement clean energy projects in their own operations within their respective jurisdictions. This measure falls under the local governments' regulatory authority to protect public health and welfare.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
Energy Efficiency and Conservation Block Grant	Federal – Formula
State Energy Program	Federal – Formula
Greenhouse Gas Reduction Fund	Formula – Competitive

Potential Metrics

Potential metrics to measure progress under this measure are listed below.

Output metrics:

- kW of renewable energy installed on government property
- kW of renewable energy installed on residential and commercial buildings

Outcome metrics:

- New workers in the clean energy workforce
- Percent increase in renewable energy usage
- Percent in public building energy needs met by renewable energy

Measure 2.

Reduce energy consumption and increase building & facility decarbonization through programs to support and incentivize energy efficiency and electrification measures.

Energy used in the building sector for heating, cooling, and electricity accounts for a significant portion of GHG emissions in the Hampton Roads MSA. This measure will implement projects and policies to promote energy efficiency and clean energy supply to buildings in the Hampton Roads MSA. Managers of public buildings can lead the implementation of this measure by establishing energy reduction goals and by installing energy efficiency improvements and beneficial electrification infrastructure. This leadership can encourage residential and commercial building owners to implement the same actions, and building owners can share best practices for operation to improve energy efficiency.

Each local government within the MSA will lead the development of actions to implement this measure within their jurisdiction. The benefits of increasing energy efficiency and decarbonizing the energy used in commercial buildings will include improved air quality and decreased GHG emissions, which will result in improved public health. There will be a particular emphasis on sharing the benefits of policies with LIDACs. This measure covers all buildings including residential and commercial buildings, along with industrial facilities, schools, and local government/agency buildings.

Progress to Date and Future Activities and Milestones

Certain municipalities in the MSA have already made progress regarding this measure. For example, in 2019, the City of Norfolk set targets in the City Climate Action Plan to reduce municipal building energy usage by 5% per year to achieve a 45% reduction by 2030 and to reduce overall building energy use citywide by 3% per year to achieve a 30% reduction by 2030.[37] The City of Norfolk also participates in the United States Department of Energy's Better Buildings Challenge and has committed to reducing energy in 127 buildings by 20% by 2032.[38] Additionally, the City of Norfolk and the City of Virginia Beach both participate in Commercial Property Assessed Clean Energy (C-PACE) program uses low-cost financing mechanisms to support energy efficiency improvements.[39] [40] Virginia also has state programs supporting activities under this measure that localities within the MSA can utilize. The Housing Innovations in Energy Efficiency (HIEE) fund, administered by the Department of Housing and Community Development (DHCD), provides capital for energy efficiency upgrades to both new and existing housing.[41]

Virginia enacted the High-Performance Buildings Act in 2021 to drive more efficient, resilient, and future-proof buildings.[42] The law updated the building performance standards for state/public buildings by adding EV charging and infrastructure and utility metering requirements and created new

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[37] City of Norfolk. 2019. *Mayor's Advisory Commission on Climate Change Mitigation and Adaptation Climate Action Plan.* https://www.norfolk.gov/DocumentCenter/View/56485/Mayors-Advisory-Commission-on-Climate-Change-Mitigation-and-Adaption-Climate-Action-Plan-2019?bidId=

[38] U.S. Department of Energy Better Buildings. N.d. *City of Norfolk*. https://betterbuildingsolutioncenter.energy.gov/parters/city-norfolk-va

[39] Virginia PACE Authority. 2024. *Local Programs*. https://virginiapace.com/local-programs/

[40] WTKR. 2023. *Virginia Beach joins program for commerical energy efficiency improvements*. https://www.wtkr.com/news/virginia-beach-joins-program-for-commercial-energy-efficiency-improvements

[41] Virginia DHCD. Nd. *Housing Innovations in Energy Efficiency. Virginia DOE*. https://www.dhcd.virginia.gov/hiee

[42] Code of Virginia. 2012. § 2.2-1183. Article 8. High Performance Buildings Act. § 2.2-1182. Definitions. https://law.lis.virginia.gov/vacodefull/title2.2/chapter11/article8/

building performance standards for local governments. Virginia has also supported energy efficiency efforts at state agencies and other public facilities through Virginia Energy's Energy Savings Performance Contracting Program, which allows state agencies and local government entities to enter contracts with energy service companies to reduce energy costs through efficiency measures.[43] In June 2021, the program celebrated over $1 billion in cumulative energy savings across the Commonwealth. To date the City of Virginia Beach and Virginia Beach City Schools have participated in the program and other localities in the Hampton Roads MSA could pursue future participation.

Additionally, numerous LED lighting conversions have been completed in facilities and streetlights across the MSA, notably in Suffolk, Virginia Beach, Norfolk, Poquoson, York County, Williamsburg, and Hampton. The City of Newport News recently established a new Green Building Design policy, and the Norfolk Green Fund has a revolving loan fund that has been established to support departmental efforts to complete energy efficiency projects. Some localities such the Cities of Norfolk and Hampton have also begun conducting energy audits of city facilities. Additionally, municipalities have been working with Dominion and using the Department of Energy's Weatherization Assistance Program to provide technical assistance to low-income households for installing retrofits.[44]

In addition to continuing the activities described above, the following example actions are considered for Measure 2 implementation. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- **Develop benchmarking, operations, and maintenance resources that can be used by public agencies and localities.** These could include sharing of best practices and/or development of sample ordinances.

- **Lead by example.** Make public building efficiency and electrification upgrades to encourage residential and commercial building owners to make upgrades to their buildings. Buildings could also cover HRSD facilities, landfills, and other public facilities.

- **Provide resources to incentivize building energy code updates for new commercial and residential buildings.** This could include financial resources, sample building code language, or other resources where appropriate.

- **Develop performance standards.** Energy efficient performance standards and best practices for all new public facilities can be implemented to reduce emissions.

- **Provide rebates or other support for building energy improvements for private buildings, including commercial, residential, and industrial sectors.** This could include expanding access to C-PACE and other financing programs throughout the MSA.

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[43] Virginia Energy. 2021. *Energy Savings Performance Contract.* Virginia DOE. https://www.energy.virginia.gov/energy-efficiency/PerformanceContracting.shtml

[44] HRClimateHub. Nd. *Efficiency and HVAC advice*. https://www.hrclimatehub.org/energy-efficiency/efficiency-and-hvac-advice/

- **Transition streetlights to LED and install LEDs in other facilities and buildings.** This includes retrofitting city buildings with LED lighting; energy efficient appliances and boiler; and heating, ventilation, and air-conditioning (HVAC) control systems.

Geographic Coverage

As this measure will be carried out by Cities and Counties across the MSA, all areas within the MSA and in neighboring regions will benefit from steps to increase energy efficiency and decarbonize energy supply in buildings across the MSA. The actions within this measure are focused on the entire MSA area. The overall measure is specific to the MSA and not meant to encompass a broader or smaller geographic area.

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Reduce energy consumption and increase building decarbonization through programs to support and incentivize energy efficiency and electrification measures.	456,399	5,143,558

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

Reduced use of combustion fuels on site (e.g., natural gas, propone) will have localized indoor and outdoor air quality benefits (e.g., reduced emissions of PM2.5, CO, SO_2, and NO_X). Transitioning to electric equipment may result in increased emissions from electricity generation (e.g., $PM_{2.5}$, CO, SO_2, NO_X, VOCs, ozone), but this may be offset through the use of clean and renewable generating resources (see Measure 1).

LIDAC Benefits

As this measure will be carried out by Cities and Counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to improve energy efficiency and decarbonize buildings across the MSA. All LIDAC Census tracts (per the 2010 U.S. Census) in the MSA will be impacted by this measure (Source: CEJST). A list of the LIDAC Census tract IDs is found in Appendix C.

This measure provides health and economic benefits to LIDACs. Clean energy improvements such as energy efficiency can reduce utility bill costs and thus decrease energy burden[45] (which is especially relevant to LIDACs). Additionally, increasing energy efficiency reduces the need for energy production from power plants, thereby reducing associated air pollution in overburdened communities, leading to public health benefits. It may also increase the number of employment opportunities available to LIDACs, as jobs in installing and maintaining clean energy improvements will increase.

[45] Energy burden- the percent of household income spent on home energy bills.

Implementation Considerations

Key Implementing Agency(ies)

- **State and local government agencies.** The Virginia Department of Housing and Community Development, Virginia Department of Environmental Quality, Virginia State Corporation Commission, North Carolina Department of Environmental Quality, North Carolina Utilities Commission, and other state agencies can support implementation. Relevant local government organizations (such as the Department of Public Works) in the Virginia Beach and Norfolk areas can provide support and share best practices when implementing this measure.
- **Dominion Energy.** The utility provider for the MSA, Dominion Energy provides existing energy efficiency programs to ratepayers that could be expanded.
- **Property owners.** Individual property owners may choose to voluntarily improve their building envelopes and adopt new technologies to improve energy efficiency.
- **Private sector partners.** Private sector partners such as contractors and equipment manufacturers service providers can partner to provide the skills and equipment needed to retrofit buildings.

Authority to Implement

Local governments have the authority to install energy efficiency projects on their own buildings. However, to enact specific energy efficiency projects, policies, and/or pilot programs, local governments may need to gain approval from additional regulatory and budgetary agencies as needed.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
Energy Efficiency and Conservation Block Grant	Federal- Formula
State Energy Program	Federal- Formula
Greenhouse Gas Reduction Fund	Federal- Competitive
Green and Resilient Retrofit Program	Federal
Weatherization Assistance Program	Federal- Competitive
National Electric Vehicle Infrastructure Formula Program	Federal- Formula

Potential Metrics

Potential metrics to measure progress under this measure are listed below.

Output metrics:

- Number of public buildings retrofitted
- Square footage of public buildings retrofitted
- Amount of money spent on resources to incentivize building energy code updates for new commercial and residential buildings
- Number of heat pumps installed
- Number of higher efficiency HVAC systems installed
- Number of residential units that receive energy efficiency and/or electrification measures
- Number of residential homes, units, or commercial buildings in LIDACs that receive energy efficiency and/or electrification retrofits or upgrades

Outcome metrics:

- MWH energy use reduced
- Money (in dollars per year) saved on utility bills
- GHG emissions reduced

Measure 3.

Develop EV procurement plans and EVSE deployment strategies to support the adoption of EVs.

On-road transportation is a significant source of GHG emissions in the Hampton Roads MSA. To reduce these emissions, this measure focuses on fostering the widespread adoption of EVs through the development of a regional charging network and the procurement of EVs. As part of this measure, public agencies can lead by example by procuring electric vehicles for government fleets, including school buses, public works trucks, and maintenance vehicle, and for public transit fleets, thus demonstrating the viability of EVs to residents and local businesses.

Widespread use of EVs would also require an expanded network of fast and reliable EV charging stations to support charging demand. Therefore, this measure includes the planning and deployment of EV charging infrastructure. Expanded markets for biofuels, and for other alternative/zero emissions fuels such as hydrogen are also included to promote fuel switching for vehicle types that are harder to electrify.

The benefits of this program may include improved air quality and increased opportunities for employment in EV deployment. Many of the counties in the Hampton Roads MSA lie within Virginia, which has zero emissions vehicle (ZEV) adoption standards that require manufacturers to increase the proportion of EVs available for sale, which may help scale EV deployment.

Progress to Date and Future Activities and Milestones

Numerous localities in the MSA have already begun investments in EVs and EVSE, and this measure would support and expand such actions. HRT operates six electric public buses.[46] Additionally, as of December 2023, there were 261 EV Charging stations in Hampton Roads, including some constructed by James City County, Newport News, and York County. Virginia Beach and Norfolk had the highest number of EV charging stations out of the cities in the MSA. One of the strategies identified in the City of Norfolk's Climate Action Plan focused on encouraging businesses to adopt EVs and develop EV charging infrastructure.[47] Locality efforts to fund additional EV and charging infrastructure include the City of Hampton's application to the DOT's Charging and Infrastructure Grant program and Gloucester County's application with Bay Transit to support an EV charging station.

Virginia is investing in statewide EV infrastructure, a key factor in widespread EV adoption, with significant funding through the National Electric Vehicle Infrastructure (NEVI) Program, including along alternative fuel corridors within the MSA, such as Interstate 64. The Commonwealth provides several incentives to residents and public agencies related to EVs and alternative fuels. The Congestion Mitigation and Air Quality Improvement (CMAQ) program offers up to $10,000 to state agencies and local governments for the incremental cost of new or converted alternate fuel vehicles (AFVs).[48] The Virginia Department of Motor Vehicles established an Electric Vehicle Rebate Program

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[46] Hampton Roads Transit. 2024. *HRT is Modernizing with Advanced EV Technology*. https://gohrt.com/2021/05/hrt-goes-electric/
[47] City of Norfolk. 2019. *Mayor's Advisory Commission on Climate Change Mitigation and Adaptation.* https://www.norfolk.gov/DocumentCenter/View/56485/Mayors-Advisory-Commission-on-Climate-Change-Mitigation-and-Adaption-Climate-Action-Plan-2019?bidId=
[48] Virginia Clean Cities. 2024. *CMAQ Vehicle Fuel Conversion Incentive Program.* https://vacleancities.org/reports-2/cmaq-incentive-program/

in 2022 effective until 2027 that offers rebates of $2,500 for residents who purchase EVs, new or used, from participating dealers.[49] However, the program has not been funded by the General Assembly.[50]

In addition to continuing the activities described above, the following example actions are considered for Measure 3 implementation. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- **Plan for and map of optimal locations for EVSE on commercial corridors, shelters, evacuation routes, etc**. This map could show both public and private property areas of interest.
- **Develop goals for agency and locality fleets and transit for EV procurement.** These goals could be based on current vehicle turnover policies and operational requirements.
- **Identify opportunities for paired deployment of renewable energy systems and EVSE at public facilities.**
- **Make investments to meet turnover and charging goals, including the purchase of EVs and EVSE for use by local agencies.**
- **Support broader EV adoption and explore opportunities for public use of EVSE.** Expansion to the regional charging network could be targeted for public fleet use and for use by private residents.

Geographic Coverage

As this measure will be carried out by Cities and Counties across the MSA, all areas within the MSA and in neighboring regions will benefit from steps to deploy EVs across the MSA. The actions within this measure are focused on the entire MSA area. The overall measure is specific to the MSA and not meant to encompass a broader or smaller geographic area.

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Develop an electric vehicle (EV) procurement plan and electric vehicle supply equipment (EVSE) deployment strategy to support the adoption of EVs.	1,571,396	58,727,298

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

This measure will improve air quality through reduced emissions of nitrogen oxides (NOx), volatile organic compounds (VOCs), fine particle pollution (PM2.5), and sulfur dioxide (SO_2) as a result of transition away from fossil fuel based internal combustion engines. When paired with clean and

[49] Code of Virginia. 2021. *Article 8. Electric Vehicle Rebate Program. § 45.2-1726.* https://law.lis.virginia.gov/vacodefull/title45.2/chapter17/article8/
[50] Virginia Energy. 2021. *Sustainable Transportation.* https://energy.virginia.gov/renewable-energy/Transportation.shtml

renewable electricity, air pollution benefits will be amplified. According to a study from the American Lung Association, potential improvements in air quality as a result of Advanced Clean Cars II and a non-combustion power grid could result in health benefits of $25 billion, 2,340 avoided premature deaths, 60,600 avoided asthma attacks, and 299,00 avoided lost days of work.[51]

LIDAC Benefits

As this measure will be carried out by Cities and Counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to deploy a strategy to support the adoption of EVs across the MSA. A list of the LIDAC Census tract IDs is found in Appendix C.

Benefits for LIDACs within the MSA may include improved air quality resulting from potential reductions in vehicular emissions, especially as public transit fleets and buses transition to EVs, as well as potential health improvements including reductions in new asthma cases, hospital admissions, and emergency department visits. Additional benefits could include reduced noise pollution and reduction in fuel use by disadvantaged communities, particularly for LIDACs that are highway adjacent. Job training programs could also be focused in LIDACs to support the deployment of new charging and fueling infrastructure installation and maintenance; but these benefits may be balanced out by the potential decline in existing jobs for internal combustion engine maintenance.

Cost barriers to accessing EVs and ZEVs still exist for LIDACs, so programs and incentives may be expanded or designed to help overcome these barriers.

Implementation Considerations

Key Implementing Agency(ies)

- **Dominion Energy.** Engaging with the utility for the MSA will be important to ensure electrical grid stability and reliability to support increased electric loads from electrification.
- **Regional planning organizations.** Regional planning organizations can coordinate the implementation of EVSE network plans
- **State and local government organizations.** Organizations such as the North Carolina Department of Transportation and Virginia Department of Transportation can use federal funding to build EV charging networks and implement community-wide buying co-ops for EVs for public and private fleets as well as personal vehicles.
- **Private sector partners.** Private businesses and landowners can partner in adopting EVs and building publicly accessible charging stations on their land.

Authority to Implement

Local governments within the MSA have the authority to implement projects, per this measure, within their respective jurisdictions. This measure falls under the local governments' regulatory authority to

[51] American Lung Association. 2023. *Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity.* https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf

protect public health and welfare. To enact specific decarbonization projects, policies, and/or pilot programs, local governments may need to gain approval from a legislative bodies or other administrative authority that oversees budgets and/or regulations.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
Clean Energy Vehicle Tax Credit	Federal
Previously Owned Vehicle Tax Credit	Federal
Clean Commercial Tax Credit	Federal
Alternative Fuel Vehicle Refueling Property Tax Credit	Federal
NEVI Formula Program	Federal
Charging and Fueling Infrastructure Grants	Federal
Diesel Emissions Reduction Program	Federal
Clean Heavy-Duty Vehicle Program	Federal

Potential Metrics

Potential metrics to measure progress under this measure are listed below.

Output metrics:

- Number of new fast chargers installed
- Number of EVs purchased for public fleets

Outcome metrics:

- Percent of new vehicles sales that are EVs
- Percentage of government fleets that are EVs

Measure 4.

Reduce vehicle miles traveled and support alternative modes of transportation through bike/pedestrian infrastructure investments.

This measure aims to reduce vehicle miles traveled (VMT) by enabling access to alternative modes of transportation such as bicycle and pedestrian trails. Updates to infrastructure such as changes to roadway design, implementation of priority bus/transit lanes, and the creation and maintenance of pedestrian and bicycle pathways.

Progress to Date and Future Activities and Milestones

The HRTPO published the 'Regional Active Transportation Plan'[52] in 2020 and the 'Transportation Improvement Program 2024-2027'.[53] The Regional Active Transportation Plan identified the following recommendations to improve multimodal transportation in the MSA: adopting 'Complete Streets Policies', improving pedestrian and cyclist safety, and designating half-mile zones around school buildings for pedestrian infrastructure.

Additionally, the Birthplace of America Trail is a planned multi-use that will connect the Virginia Capital Trail with the South Hampton Roads Trail in Eastern Virginia, aiming to be a significant piece of active transportation infrastructure in the Hampton Roads MSA.[54] Planning and preliminary design for the trail has been conducted as has initial community outreach. Construction of the trail extension has not yet begun. Gloucester, VA is also developing a multimodal path along Main Street that is currently under development. Additionally, the City of Hampton has also received $13 million from Federal Emergency Management Agency (FEMA) and $4 million from VDOT for trail maintenance and development.

The state provides several resources and policies supporting the advancement of alternative modes across Virginia. In 2004, Virginia adopted a Policy for Integrating Bicycle and Pedestrian Accommodations, which provides a framework for VDOT to accommodate bicyclists and pedestrians in the planning, funding, design, construction, operation, and maintenance of Virginia's transportation network.[55] VDOT also developed a Bicycle Policy Plan in 2011 and Pedestrian Policy Plan in 2014 to advance these elements from the 2004 policy.[56,57] These are supported by implementation guidance for design and construction of active infrastructure, as well as annual reports that track improvements in bicycle and pedestrian accommodations.[58]

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[52] Hampton Roads TPO. 2020. *Linking Hampton Roads: A Regional Active Transportation Plan.* Linking Hampton Roads: A Regional Active Transportation Plan | Active Transportation | Transportation Planning | Hampton Roads Transportation Planning Organization - The Heartbeat of Hampton Roads (hrtpo.org)
[53] Hampton Roads TPO. 2023. *Transportation Improvement Program FY 2024-2027.* Final FY 24-27 TIP (fliphtml5.com)
[54] Newport News. Nd. *UPC #121108 Birthplace of America Trail – Yorktown Rd SUP (From Chelsea Place to NN Park).* Project Status - City of Newport News (nnva.gov)
[55] VDOT. 2004. *Policy for Integrating Bicycle and Pedestrian Accommodations.* https://www.vdot.virginia.gov/media/vdotvirginiagov/about/programs/biking-and-pedestrian/bike_ped_policy.pdf
[56] VDOT. 2011. *State Bicycle Policy Plan.* https://www.vdot.virginia.gov/media/vdotvirginiagov/about/programs/biking-and-pedestrian/bike_ped_policy.pdf
[57] VDOT. 2014. *State Pedestrian Policy Plan*. https://www.vdot.virginia.gov/media/vdotvirginiagov/about/programs/biking-and-pedestrian/SPPP_FINAL_OnLine_LowRes.pdf
[58] VDOT. 2024. *Bicycle and Pedestrian Accommodations.* https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/transportation-and-mobility-planning/bicycle-and-pedestrian-accommodations/

The Virginia Department of Rail and Public Transit offers several grant programs to reduce VMT across the Commonwealth,[59] such as the Commuter Assistance Program, a statewide grant program for programs and projects that are both efficient and effective at increasing ridership on transit, vanpools, and carpooling.[60]

In addition to continuing the activities described above, the following example actions are considered for Measure 4 implementation. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- **Plan and/or map optimal locations for bike/pedestrian facilities and connecting infrastructure.** This map could be based on commercial corridors, schools, employment centers, transit routes, etc. and will show both public and private property areas of interest.
- **Support construction of bike/pedestrian facilities and regional trails.** Connecting existing trails to support a regional network could further facilitate VMT reductions.
- **Develop programs to support micromobility options.** Support could be financial or could ease permitting and local planning for options such as e-bikes or other micromobility options.

Geographic Coverage

As this measure will be carried out by cities and counties across the MSA, all areas within the MSA and in neighboring regions will benefit from steps to expand micromobility across the MSA.

The actions within this measure are focused on the entire MSA area. The overall measure is specific to the MSA and not meant to encompass a broader or smaller geographic area.

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Reduce vehicle miles traveled and support alternative modes of transportation through bike/pedestrian infrastructure investments.	41,418	371,149

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

Co-benefits associated with improving infrastructure may include improved safety outcomes for cyclists and pedestrians, reduced transportation costs and increased wellbeing and physical health from the use of trails and other forms of active transportation.

[59] Virginia DRPT. 2024. *Our Grant Programs.* https://drpt.virginia.gov/our-grant-programs/.
[60] Virginia DRPT. 2024. *CAP (Commuter Assistance Program).* https://drpt.virginia.gov/our-grant-programs/cap-commuter-assistance-program/.

LIDAC Benefits

As this measure will be carried out by Cities and Counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to reduce VMTs and invest in bike and pedestrian infrastructure across the MSA. Appendix C includes a list of the LIDAC Census tract IDs.

Similar to Measure 3, benefits for LIDACs within the MSA may include improved air quality and health benefits that could result from potential reductions in vehicular emissions. Health benefits could also include potential reductions in new asthma cases, hospital admissions, and emergency department visits. Additional benefits may include reduced noise pollution from decreased vehicle traffic, improved access to services and amenities, increased access to more reliable and resilient transportation alternatives, and increased wellbeing and physical health from the use of active transportation. Safety could also increase in high-traffic corridors due to the increased dedicated bike/pedestrian infrastructure, and LIDAC residents could experience reduced costs of travel due to greater access of non-vehicular options.

Implementation Considerations

Key Implementing Agency(ies)

- **State and local government agencies.** Agencies such as the Virginia Department of Transportation, North Carolina Department of Transportation, and local governments can implement programs.
- **HRTPO.** As a regional planning organization, HRTPO will work to align multimodal transportation infrastructure with overarching transportation goals in the region.
- **Community groups and nonprofit organizations.** Community-based organizations can provide insight into the transportation patterns and needs of the community when developing multimodal infrastructure.
- **Private sector partners:** Private sector partners, such as land use owners, developers, and businesses play a key role in development decisions and design that affect the viability of using alternatives to driving.

Authority to Implement

City and county governments in the MSA have the authority to implement public transportation projects, policies, and/or pilot programs. To enact specific decarbonization projects, policies, and/or pilot programs, local governments may need to gain approval from a City or County Council or other administrative authority that oversees budgets and/or regulations.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
Surface Transportation Block Grant	Federal – Formula
Bicycle and Pedestrian Safety Program	Virginia Department of Transportation

Potential Metrics

Potential metrics to measure progress under this measure are listed below.

Output metrics:

- Completed project count and length of:
  - Shared use paths
  - Sidewalks
  - Bike lanes
  - Paved shoulder
  - Paved unpaved road
  - Other bike/pedestrian facilities
  - Bike/pedestrian design features

Outcome metrics:

- VMT per capita
- Additional miles of bicycle or pedestrian lanes added

Measure 5.

Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.

This measure focuses on reducing offroad transportation GHG emissions primarily through actions to decarbonize operations and electrifying ports. On the shoreline of ports, the measure could involve deploying shore power (electric power supplied to docked ships to reduce idling), installing renewable energy, and switching to electric forklifts and other cargo handling equipment, among other activities.

As a state entity, the VPA will be implementing this measure for its facilities across the state, in alignment with the Virginia PCAP, not just for its facilities and operations within the boundary of the Hampton Roads MSA.

Progress to Date and Future Activities and Milestones

In 2013, EPA awarded $750,000 to the VPA to replace diesel cargo handling equipment with hybrid diesel-electric equipment.[61] The port replaced three Tier 1 shuttle carriers with Tier IV diesel-electric carriers three to five years ahead of schedule. The updated shuttles are more fuel-efficient, cleaner, quieter, and save on costs. VPA announced their commitment to become net zero by 2040, and in 2022 released a sustainability report detailing their progress and future decarbonization targets.[62] This includes a goal to source all their energy from clean sources by 2024. VPA has replaced diesel carrier shuttles with hybrid shuttles and plans to electrify yard tractors, develop an offshore wind energy hub, and implement a living shoreline project.

In addition to continuing the activities described above, additional example actions for Measure 5 implementation are listed below. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- **Source clean energy for port operations.** As discussed above, VPA has met their 2024 goal of utilizing 100% clean energy sources.
- **Continue to fund the port's green operator dray truck replacement program.**
- **Design, deploy and use programs and incentives to decarbonize ports/port electrification.**
- **Explore expanding I64 barge operations to reduce VMT of port-supporting vehicles.** The barge provides an alternative to truck transport and saves on emissions compared to diesel dray trucks.
- **Evaluate potential for the provision of shore power or alternative fuels to reduce emissions from oceangoing vessels.**
- **Fund port equipment transitions to lower emissions models**.

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[61] EPA. 2023. *Virginia Port Authority Hybrid Shuttle Carriers Reduce Costs and Air Emissions.* https://www.epa.gov/ports-initiative/virginia-port-authority-hybrid-shuttle-carriers-reduce-costs-and-air-emissions
[62] The Port of Virginia. 2022. *Sustainability Report: Net-Zero by 2040*. https://www.portofvirginia.com/wp-content/uploads/2023/09/Port-of-VA-Sustainability-Report_2023_12pgs.pdf

Geographic Coverage

This measure aligns with statewide port emissions reductions goals, though only the following Port of VA-operated facilities are located in the Hampton Roads MSA, VPA will be holistically reducing emissions and implementing actions throughout all of its facilities.

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.	34,295	116,164

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

Shifting away from diesel will reduce emissions of NOx, PM2.5, CO, and other air toxics. Reduction in ground level ozone will also be realized.[81]

LIDAC Benefits

As this measure will be carried out by Cities and Counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to reduce emissions from port operations across the MSA. A list of the LIDAC Census tract IDs is found in Appendix A.

Within the Hampton Roads MSA, overlaps between locations of ports and LIDACs exist. Through implementing this measure, benefits for port adjacent LIDACs will include improved air quality and health benefits resulting from potential reductions in offroad emissions, as well as potential reductions in new asthma cases, hospital admissions, and emergency department visits and reduced light and noise pollution.

Implementation Considerations

Key Implementing Agency(ies)

- **VPA.** VPA owns and operates (through its private operating subsidiary, Virginia International Terminals, LLC) four general cargo facilities Norfolk International Terminals, Portsmouth Marine Terminal, Newport News Marine Terminal, and the Virginia Inland Port in Warren County. The port also leases and operates the Viginia International Gateway and Richmond Marine Terminal (outside the MSA).
- **Dominion Energy.** The utility provider for the MSA, Dominion plays a crucial role in helping to connect and manage loads and renewable energy opportunities for port operations.
- **Trade groups.** Trade groups will implement the infrastructure updates specified in this measure.

- **Private sector partners.** Private companies and landowners with property near port infrastructure may need to be engaged to coordinate land-use planning. VPA has good relationships with other private sector partners including original equipment manufacturers which play a vital role in efforts covered by this measure.
- **Community colleges.** VPA works with Tidewater Community College to provide necessary training for technical operators and maintenance technicians.
- **Regional planning agencies.** The HRPDC has previously provided support to VPA.

Authority to Implement

VPA has the authority to modify its infrastructure and acquire low-emission equipment and systems used within their facilities as described under this measure.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
Alternative Fuel Vehicle Refueling Property Tax Credit	Federal – Formula
EPA Diesel Emissions Reduction Act (DERA) The VPA's hybrid shuttle carriers program has received funding from the EPA through DERA. This program provides incentive funding for projects focused on reducing diesel emissions from old heavy-duty diesel engines that do not meet the newest highway and nonroad engine emission standards	Federal – Formula
EPA Clean Ports Program The IRA provides $3 billion to fund zero-emission port equipment and technology and to help ports develop climate action plans to reduce air pollutants	Federal – Competitive
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) This federal grant program also offers $1.5 billion in funding for projects at the state and local levels. The eligibility requirements of RAISE allow project sponsors to obtain funding for projects that may be harder to support through other U.S. DOT grant programs	Federal – Competitive
Clean Heavy-Duty Vehicle Program	Federal – Formula
Clean Vehicle Tax Credit	Federal – Formula

Potential Workforce Development Activities

The MSA may need to conduct workforce development activities to train equipment operators and maintenance technicians to enable the electrification of port infrastructure.

Potential Metrics

For the Port of Virginia, VPA is already tracking the following metrics:

- CO_2e tons per 10,000 twenty-foot equivalent unit (TEU)
- Fuel gallons per 10,000 TEU
- Percent electric equipment
- Virginia International Gateway turn-time
- Norfolk International Terminals turn-time

Measure 6.

Reduce GHG emissions through improved equipment efficiencies, increased methane capture at waste facilities, and organic waste diversion.

In the Hampton Roads MSA, the waste sector, which includes landfills, waste incineration, and wastewater treatment facilities, accounts for a notable quantity of GHG emissions, including both methane and carbon dioxide. Though not the highest emitting sector in the MSA, waste emissions are still significant and addressing them will provide multiple benefits to communities, including reduced air pollution in LIDACs.

This measure aims to decrease GHG emission by increasing waste diversion rates through programs such as composting, use of alternative technologies to remove recyclable materials and organics from the waste stream, improved handling of organics (possibly including use of pyrolysis to produce biochar), process improvements, and sharing resources and best practices. Proposed actions within this measure focus on increased access to composting and support of other waste diversion practices, sharing of resources and waste management best practices along with waste facility process and efficiency improvements. Expanded methane-capture technology installation and waste technology innovations are also included. These actions and programs will reduce emissions from the waste sector.

Progress to Date and Future Activities and Milestones

In 2022, the SPSA member localities recycled 381,000 short tons of Primary Recyclable Materials (PRM). Also in 2022, the member localities of the Virginia Peninsulas Public Service Authority (VPPSA) recycled 121,000 short tons of PRM. HRPDC published a Regional Solid Waste Management Plan (RSWMP) in 2020 with the RSWMP for Southeastern Virginia 2020-2025 that specifies that municipal governments within the MSA are implementing recycling programs to divert solid waste to varying degrees. Some municipalities, such as Norfolk, Franklin, and Virginia Beach offer curbside recycling collection programs on a biweekly or monthly basis, while municipalities such as the City of Portsmouth and Chesapeake have discontinued curbside recycling programs and only operate recycling drop-off locations. The Isle of Wight County, City of Norfolk, and City of Virginia Beach operate some composting programs for yard waste, while other municipalities do not yet offer composting services or send yard waste to the landfill.

There is a renewable natural gas facility operating at the Suffolk landfill using methane captured at the landfill.[63] In addition, the Big Behel Landfill in Hampton has a methane capture system.

In addition to continuing the activities described above, additional potential example actions for Measure 6 implementation are discussed below. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

[63] WHRO. 2023. *From trash to fuel: Hampton Roads landfill aims to cut carbon footprint while making natural gas*. https://whro.org/news/local-news/42114-spsa-landfill-renewable-natural-gas-facility

- **Support composting and other waste diversion programs**. This measure could entail creating or implementing waste diversion programs and providing resources for localities regarding such programs.
- **Utilization of automated systems to remove recyclable and organic materials from the waste stream.** These measures would likely be coupled with pyrolysis to produce biochar from organic waste.
- **Expand and/or upgrade methane capture systems at landfills and expand the beneficial use of digester methane gas.**
- **Develop a Model Ordinance and support programs to reduce construction and demolition waste through building reuse, deconstruction, and material diversion and reuse.** Model ordinances can help expand waste best practices more easily to other jurisdictions.
- **Pilot projects the HRSD wastewater treatments facilities including PdNA treatment and exploration of pyrolysis at the Atlantic Treatment Plant to convert a portion of biosolids into biochar.**
- **Closing incineration facilities to decrease emissions from waste burning.**

Geographic Coverage

As this measure will be carried out by Cities and Counties across the MSA, all areas within the MSA and in neighboring regions will benefit from steps to increase equipment efficiency and decarbonize the waste sector across the MSA.

The actions within this measure are focused on the entire MSA area. The overall measure is specific to the MSA and not meant to encompass a broader or smaller geographic area.

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Reduce waste-related emissions through improved equipment efficiencies, increased methane capture at waste facilities, and organic waste diversion.	776,894	7,419,118

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

Co-benefits of this measure include GHG emissions reductions, improved indoor and outdoor air quality resulting in improved public health, and cost savings to municipal governments where waste processes improve efficiency or where waste volume is decreased.

LIDAC Benefits

As this measure will be carried out by Cities and Counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to reduce waste-related emissions across the MSA. A list of the LIDAC Census tract IDs is found in Appendix A.

This measure will result in co-benefits for LIDACs. It will result in improved air quality, which will improve public health outcomes, especially for those marginalized communities that have historically shouldered a disproportionate amount of air pollution from the waste sector.

Implementation Considerations

Key Implementing Agency(ies)

- **HRSD.** Providing wastewater treatment to 18 Cities and Counties in southeastern Virginia, HRSD will be crucial in implementing wastewater process improvements as part of this measure.
- **Local government organizations.** Local government organizations such as Public Works Departments and other relevant agencies such as SPSA and Virginia Peninsulas Public Service Authority (VPSA) that manage landfills, solid waste management, and wastewater management.
- **State government agencies.** Agencies such as the VA Department of Professional Occupational Regulation provide licensing for wastewater facilities.
- **Private sector partners.** Privately owned waste treatment facilities can be voluntarily involved in emissions savings measures, or implementers can incentivize their involvement.

Authority to Implement

HRSD and landfill facility operators have the authority to implement improvements at their facility locations. City and county governments in the MSA have the authority to implement waste projects, policies, and/or pilot programs. To enact specific decarbonization projects, policies, and/or pilot programs, local governments may need to gain approval from a City or County Council or other administrative authority that oversees budgets and/or regulations.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
EPA Solid Waste Infrastructure Recycling Grant Program	Federal
EPA Consumer Recycling Education and Outreach Grant Program	Federal
U.S. Department of Agriculture Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loans and Grants	Federal

Potential Workforce Development Activities

Workforce development may be needed to train waste facilities staff in new processes and provide licensing for updated measures. Staff capacity may also need to be increased at composting and wastewater treatment facilities.

Potential Metrics

Potential metrics to measure progress under this measure are highlighted below.

- Weight of waste diverted from landfills or incineration facilities
- Weight of materials composted

Measure 7.

Increase opportunities for carbon sequestration through tree planting, protecting, and restoring high-carbon coastal habitats, wetlands, and forest lands.

Maintaining natural lands and habitats throughout the Hampton Roads MSA is essential to support critical ecosystem services such as cleaning air and water resources. In addition, natural lands have the potential to sequester carbon, further reducing atmospheric carbon. This measure focuses on increasing carbon capture and sequestration through policies, practices, and programs by expanding tree plantings and through additional studies of the potential opportunities for increased sequestration through the MSA. Actions included in this measure aim to increase tree canopy in the short term and explore and plan for supplementary long-term strategies to increase carbon sequestration in coastal areas, estuaries, and maritime ecosystems.

Implementing carbon sequestration strategies will significantly reduce total GHG emissions in the MSA and will yield social economic, and environmental benefits for all residents, including LIDACs. Wetlands and coastal habitats are prevalent in the Hampton Roads MSA and are of particular interest for the sequestration studies in this measure.

Progress to Date and Future Activities and Milestones

At the state level, significant progress has been made in increasing opportunities for carbon capture and sequestration in restored and preserved natural lands. The Virginia Natural Landscape Assessment (VaNLA) is a network of natural lands that was developed by the Virginia Natural Heritage Program within the Virginia Department of Conservation and Recreation.[145] The VaNLA provides a landscape-scale geospatial analysis for identifying, prioritizing, and linking natural lands using land cover data from satellite. The VaNLA has many potential applications and can be used in the Hampton Roads MSA to aid carbon sequestration studies and planning efforts, helping implement this measure through the identification and prioritization of large core areas for carbon sequestration potential.

Additionally, as part of the Chesapeake Bay Phase III Watershed Implementation Plan, Virginia DEQ quantified carbon sequestration co-benefits of best management practices (BMPs) using the Department of Agriculture's Carbon Management & Emissions tool (COMET). These BMPs can be used at the MSA level and cover natural (e.g., tree and forest practices) and working land areas (e.g., tilling and grazing) in both rural and urban settings. Using existing BMPs will help amplify the success of carbon sequestration efforts for localities throughout the Hampton Roads MSA. The MSA has also submitted an application for a NOAA grant to determine the carbon sequestration potential for the Back River Estuary.

Additionally, the City of Chesapeake recently developed an industrial waterfront study to combat sea level rise and plans to create recreation and conservation zones in the creeks and naturalized areas of the Southern Branch of the Elizabeth River.[64]

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[64] City of Chesapeake. 2024. *Chesapeake Industrial Waterfront Study.* https://www.cityofchesapeake.net/DocumentCenter/View/16752/Chesapeake-Industrial-Waterfront-Study-Draft-PDF?bidId=

In addition to continuing the activities described above, additional potential example actions for Measure 7 implementation are discussed below. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- **Study and evaluate opportunities for enhancing carbon sequestration throughout the Hampton Roads MSA, including on public lands and port facilities.**
- **Support the expansion of tree canopy and greenspace.** Support could include establishing expansion goals and potential implementation strategies for tree canopies in urban and rural areas. Additional tree canopy expansion programs could also be developed at the locality or regional levels.
- **Support ongoing state efforts to enhance carbon stocks in wetlands, coastal lands, and coastal estuaries.** Coastal ecosystems are particularly prevalent and important in the Hampton Roads MSA, and this measure will help support implementation of DEQ's Chesapeake Bay Phase III Watershed Implementation Plan identified actions in the MSA.
- **Explore opportunities to protect and restore high-carbon coastal habitats and wetlands and protect, restore, use, and develop agricultural and forest lands.**
- **Support source water protection efforts.**

Geographic Coverage

The actions within this measure are focused on the entire MSA area. The overall measure is specific to the MSA and not meant to encompass a broader or smaller geographic area. Sequestration opportunities in urban, suburban, and rural lands will be explored.

Quantified GHG Reductions ($MTCO_2e$)

PCAP Measure	GHG reductions (MTCO2e), 2025-2030	GHG reductions (MTCO2e), 2025-2050
Increase opportunities for carbon sequestration through natural and working lands, including forestry, wetlands, and coastal ecosystems.	8,480	61,489

Details about the GHG reduction calculations approach are provided in Appendix B.

Benefits

Protection and restoration of natural and working lands will reduce CO_2 emissions and improve air and water quality of the surrounding areas. Tree planting will have similar effects and can also support reduced urban heat island effect through natural cooling as well as improve stormwater management and reduce flooding.

LIDAC Benefits

As this measure will be carried out by Cities and Counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to reduce VMTs and invest in bike and pedestrian infrastructure across the MSA. A list of the LIDAC Census tract IDs is found in Appendix A.

Implementation of this measure will also result in benefits to LIDACs across the MSA, such as improved air and water quality due to increased filtration by trees, an increase in employment opportunities in tree care and maintenance, and improved resilience to increases in temperature as trees protect against the urban heat island effect. Residents may also see a decrease in the cost burden of energy to cool their homes during high temperature days as an increased tree canopy provides cooler temperatures throughout the neighborhood and specifically to dwellings with yard and street trees. Increased greening and tree planting can also increase wellbeing and improve mental health.

Implementation Considerations

Key Implementing Agency(ies)

- **Local governments and municipalities.** Operate land and conservation programming and policies within their jurisdictions. These entities can also support tree planting programs and goals.
- **Virginia DEQ.** Provides programming, funding opportunities, and technical assistance in conservation and maintenance of natural and working lands.
- **Virginia Department of Forestry.** Provides programming, funding opportunities, and technical assistance for forest conservation.
- **DCNR.** Provides programming, funding opportunities, and technical assistance in conservation and maintenance for Virginia's state parks and natural area preserves.
- **Local universities.** Studies on carbon reductions from natural sequestration and capture can support funding and potential programming.
- **Local non-governmental environmental organizations.** The Nature Conservancy, the Sierra Club, Chesapeake Bay Foundation, Wetlands Watch, James River Association, Elizabeth River Project, Virginia Forestry Association, and other NGOs provide programming, funding opportunities, and technical assistance in conservation and maintenance of natural and working lands.
- **Private sector partners.** Private landowners will be key partners for implementing changes to land use and forestry practices on their land to increase the region's carbon sequestration capacity.
- **Local organizations and nonprofits.** Local and community-based organizations and nonprofits provide valuable insight into strategically positioning trees to support LIDACs.

Authority to Implement

The responsibility for expanding, preserving, or developing tree canopy on public land usually lies with the governing body of the jurisdiction that owns the land, such as a state natural resources or forestry agency. To enact specific natural sequestration projects, policies, and/or pilot programs, local governments may need to gain approval from a city or county council or other administrative authority that oversees budgets and/or regulations.

Intersection with Other Funding

Potential funding sources to support implementation of this measure are shown in the table below.

Program/Grant Name	Funding Source
Urban and Community Forestry Grants	Federal – Competitive

Potential Metrics

Potential metrics to measure progress under this measure are highlighted below.

Output metrics:

- Acreage of planned implemented BMPs
- Number of trees planted

Outcome metrics:

- Tons of CO_2e sequestered from baseline
- Percent of green space in restored and preserved natural lands

6. Moving Forward

Implementation Grants

Hampton Roads will be eligible to participate in the general competition for CRPG implementation grants, competing against states, municipalities (including other MSAs), tribes, tribal consortia, and territories for up to $4.6 billion in funding.[65] Implementation grant applications are due April 1, 2024, with awards anticipated by the end of 2024.

Comprehensive Climate Action Plan

Recipients of a PCAP planning grant must submit a CCAP two years after the date of the PCAP award (July 2025). The CCAP expands upon the PCAP, adding more information and a finer level of details to information in the PCAP. Hampton Roads' CCAP will include additional modeling to map priority measures. Per EPA's guidance, the CCAP should cover all significant GHG sources and sinks in relevant sectors, create both short-term and long-term GHG emission reduction targets, and articulate a comprehensive set of measures to achieve the targets.[66] The CCAP must include the following sections:

- GHG Inventory
- GHG Emissions Projections

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[65] US EPA. 2023. *CPRG Implementation Grants*. https://www.epa.gov/inflation-reduction-act/cprg-implementation-grants.
[66] US EPA. 2023. *Climate Pollution Reduction Grants Program: Formula Grants for Planning*. EPA CPRG Planning Grants Program Guidance for States-Municipalities-Air Agencies 03-01-2023

- GHG Reduction Targets (short- and long-term)
- Quantified GHG Reduction Measures (comprehensive)
- Benefits Analysis
- Low-Income/Disadvantaged Communities Benefits Analysis
- Review of Authority to Implement
- Intersection with Other Funding Availability
- Workforce Planning Analysis
- Next Steps/Future Budget and Staffing Needs

Additionally, at the end of the four-year grant period (approximately mid-2027), states must submit a Status Report. This report must include:

- The implementation status of the quantified GHG reduction measures from the CCAP;
- Relevant updated analyses or projections supporting CCAP implementation;
- Next steps and future budget or staffing needs to continue CCAP implementation.

Appendix A: Community Engagement Resources

LIDAC Survey

The following is the survey report for the LIDAC questionnaire that was distributed to the Technical Committee, Steering Committee and CAC.

Respondents

Twenty-two responses were received as of February 6th, 2024.

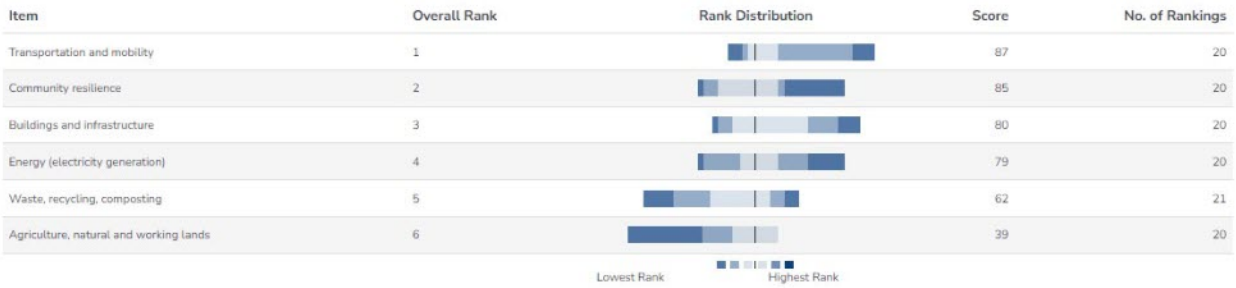
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Darryll D Lewis	City of Suffolk	Virginia		dlewis@suffolkva.us	01.30
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Ruth McElroy Amundsen	Norfolk Solar	Norfolk		rma@cox.net	02.04
25		Virginia Beach	CAC		02.04
Garry Harris	Sustainability Solutions Group and Institute/ Center for Sustainable Communities	Hampton Roads/ Southside/ Portsmouth	CAC	gharris@htsenterprise.com	02.05

	ECO District Hampton Roads				
Edith White	Hampton Roads Community Action Program			edithwhite@hrcapinc.org	02.05
Hunter Noffsinger	Sierra Club Virginia Chapter	Hampton Roads	Steering committee	hunter.noffsinger@sierraclub.org	02.06
Mark Geduldig-Yatrofsky	HRPDC/TPO	Virginia	CAC	magyforthepeople@cox.net	02.06
Ava Lovain	VA DEQ	RVA (central office)	Steering	Anna.lovain@deq.Virginia.gov	02.06
Tom Ballou	Virgia DEQ	Statewide	CPRG Steering Committee	Thomas.ballou@deq.Virginia.gov	02.06
Scott Smith	Hampton	Hampton Roads	CPRG Technical and Steering Committee	Scott.smith@hampton.gov	02.06
Jennifer Privette	City of Newport News	Hampton Roads - Peninsula	Steering/technical	privettejo@nnva.gov	02.06
Megan Hale	City of Norfolk	Hampton Roads		megan.hale@norfolk.gov	02.06
Andrea Case	James City County	Peninsula		andrea.case@jamescitycountyva.gov	02.07
Barbara Gavin	Elizabeth River Project	Elizabeth River Watershed	None- forwarded to me by committee member	bgavin@elizabethriver.org	02.07

Anne Creasy	Sierra Club Virginia Chapter	Norfolk + All of Hampton Roads	Planning	ann.creasy@sierraclub.org	02.08
Dianna Lynn Howard	Virginia Beach Tea Party	VA	CAC	dianna.howard@cox.net	02.08
Tyla Matteson	Sierra Club (3)	Hampton Roads	CPRG Stakeholder	tmatteson1@mindspring.com	02.09

Question Responses

1. Please rank the six proposed focus areas, based on their importance for the community in which your organization works:



2. Do you have specific recommendations for climate action strategies, projects, or actions, based on these focus areas?

Comment Themes:

- Solar
  - Increase funding for rooftop repairs, retrofitting roofs for solar panel installations, and solar installations.
  - Increase funding for educating communities about utilizing funding sources for solar installations.
  - Establish a community solar program.
  - Increase coordination around reducing regulatory hurdles.
- Transportation
  - Expand clean transportation modes and supporting infrastructure.
  - Increase the number of charging stations for EVs.
  - Electrify fleets.
  - Install EV charging stations in LIDACs.
- Buildings
  - Implement energy efficiency programs, retrofits, and standards for affordable housing, government-owned buildings, commercial, residential, and schools.
- Natural Land Usage
  - Create and expand carbon capture on natural lands.

    - Increase reforestation, tree canopy restoration.
- Energy
    - Advance waste-to-energy programs.
    - Further transition from non-clean or non-renewable energy sources to clean and renewable energy sources.
    - Invest in modernizing battery storage for renewable energy sources.
    - Apply efficient electrification in LIDAC residential areas as well as public buildings.
- Programs and funding
    - Identify funding for upgrading or providing weatherization resources in LIDACs.
    - Move to performance-based contracting.
    - Conduct public residential education on energy programs and opportunities.

Lamont City of Newport News	Waste to energy
City of Virginia Beach	I think Hampton Roads needs to work together. Whether it be energy, transportation, waste reduction or community resilience we would be better working as one.
Norfolk Solar	Fight Dominion efforts to stifle solar, both through the SCC James City County's, solar-friendly legislation, and shareholder resolutions and input at shareholder meetings. Educate more people on how to use investor dollars to install solar at no cost to sites. Implement solar consumer protections such as other states have. Remove solar limits in VA such as the cap on PPAs for solar installs less than 50 kW, and the limit on overall net-metered renewable and distributed solar. Encourage all cities go to the SolarAPP+ for solar permitting – eliminate permitting barriers. Eliminate the requirement that Dominion has instituted to submit the insurance declarations page for any solar install before the NMIN is submitted. Legislate to take away Dominion's power to set up barriers to weatherization and bill payment programs – currently there is no oversight on implementation – Dominion is supposed to spend millions per year on weatherizing low-income homes, and yet very few people sign up because Dominion has made the process so convoluted. Set up a better system for splitting the money for weatherization between DHCD and Dominion funds – no one understands the current system, and Dominion takes advantage of that. I highly recommend that folks attend the annual Dominion shareholder meeting (usually first week in May). I think it is really eye-opening to attend their shareholder meeting and see what really matters to them when they are speaking out of the public eye.

	Go to Performance Based Contracting so that utilities have an incentive to use less electricity. Create legislation that all RFPs for certain kinds of work (e.g., solar installs, offshore wind, weatherization, municipal renovation, energy efficiency retrofits) must include clauses that lead to hiring of minorities and/or members of marginalized communities. Can be done by specifying in RFP that percentage of hires must be from Enterprise Zones, Qualified Opportunity Zones, low-income residents (as per HUD definition), marginalized neighborhoods, minorities, HBCU graduates, etc. Write legislation that utilities have to include EV battery storage as a consideration in their 10-year plan. Dominion had as of their last IRP [Integrated Resource Plan] expressly excluded all consideration of EV batteries as a storage option in their IRP (which covers the next 15 years). Legislate some efficiency practices such as that public buildings like municipal offices and banks keep air-conditioning set at or above 78F in the summer, and should not maintain a temperature above 55F in winter when unoccupied (from federal rules). Require that state and federal agencies in Virginia supply a certain number of EV charging stations at the workplace (e.g., 1 per 500 employees to start). Require that state pension plans divest from fossil fuels Norfolk (as an example) currently does not have the personnel time available to do many of the things that our commission has put in our draft Climate Action Plan. Coordinate local environmental and social justice groups, as well as local colleges, to help with the time required to start up many of the obvious and easy ways to reduce carbon. Find funding for roof repair for roofs that need renovation before solar install Find seed funding to start first minority-owned solar installation company in Virginia
#25	More education to equip the community for what they can do and not just wait for government to act.
Sustainability Solutions Group and Institute	-Expand Weatherization, HRRS Rating and Residential Energy Efficiency Improvements -Advance Community Scale Solar and Expanded Roof Top Options -Bolster Utility Scale Energy Efficiency Program -Advance Long Term Duration Energy Storage -Clean Transportation Deployment including EVs, Clean Transit -Reforestation and Tree Planting and Natural Forest Maintenance -Advance Waste to Energy Concepts including Landfills -Advance Carbon Capture and Industrial Emissions Abatement -Standup an Education and Behavioral Energy Use Program

	-Look Beyond Carbon Reductions; Review Health Inequities, Access, Equity Among Carbon Reduction Formulation -Conduct a Comprehensive Carbon Drawdown Approach and Analysis, Solution Building -Develop a Business Compact That Advances Energy Efficiency Solutions Advance Community Resilience Hub Concepts and Deployment -Measure Air Pollution Hot Spots and Pollution Sources -Access for Cumulative Impacts at Community and Neighborhood Level from Pollution Sources
Hampton Roads Community Action Program	Increased education efforts. structural changes to homes to withstand impact of impact at no cost to residents. Access to charging stations.
Sierra Club	- All new schools and other public buildings should be built with solar-ready roofs and should be expected to have solar installed unless an energy analysis demonstrates no savings over time. - Establish a Community Solar Program that benefits low-income renters - Work with other state and local leaders and electric-sector stakeholders to develop a regional high-voltage, long-distance transmission plan to deliver 100% renewable energy to the metropolitan area - Relying on local or state law (where permissible), the metro region should establish its own climate bank to fund zero-emissions technologies in low-income and disadvantaged communities. Establishing such a climate bank can extend the availability of the funding under the IRA in perpetuity - Electrify all city vehicle fleets: The Inflation Reduction Act (IRA), Infrastructure Investment & Jobs Act (IIJA), and other federal and state programs provide significant funding to convert city vehicle fleets to electric vehicles. Local government leaders should consider CPRG funds as an opportunity to electrify municipal vehicle fleets that have not been funded through other programs. - Clean School Bus Program: IIJA provided significant funding to create a new EPA Clean School Bus program to replace existing buses with zero-emission and low-emission models. Local government leaders could consider partnerships with School Districts to use CPRG funds to speed up and expand the transition to clean, zero-emission electric buses. - Investing in clean transit: Utilize IIJA funding to purchase and/or lease zero-emission and low-emission transit buses and to construct or lease supporting facilities and equipment. - Investing in transit infrastructure: Local leaders could fund the construction of cost-effective transit infrastructure that will measurably increase transit ridership by improving speed or reliability, such as dedicated bus-only lanes. - Whole-home electric retrofit program: Establish a municipal whole-home retrofit program using CPRG Implementation Grants for electrification and leveraging other funding sources for holistic health and safety

	improvements and energy efficiency, with a focus on low-income households and environmental justice communities. - Public building retrofits: Adopt a municipal goal – to lead by example – to retrofit all public buildings to be all-electric and energy efficient by 2040. This can also include roof-top solar and EV readiness. - Embodied carbon frameworks: Adopt a framework for reducing embodied carbon in new construction, including an assessment of embodied carbon in buildings and infrastructure projects, targets for reduction, and a timeline and strategies for meeting those targets (e.g., municipal procurement of low-carbon materials, support for local reuse markets, building deconstruction requirements, historic buildings preservation requirements, waste diversion requirements, or embodied carbon requirements in building codes). - Implement a pilot or planning process to target areas for decommissioning all gas infrastructure and replace with neighborhood electrification, with an emphasis on environmental justice and low-income communities. - Programs and policies to accelerate the incorporation of efficient electric technologies and electric vehicle charging at new single-family, multi-unit, or affordable residential buildings and commercial buildings, including building codes related to electric vehicle charging
HRPDC/TPO	Push the envelope on switching away from fossil fuel power for transportation, energy production, and heating/cooling. Impose penalties for wasteful use of fossil fuels (e. g., vehicle engine idling). Discontinue government subsidies for fossil fuel exploration/production.
York County	Building efficiency
VA DEQ (2)	High potency ghg reductions Clean transportation modes and infrastructure Clean power generation Natural lands carbon capture strategies
Hampton	Reduce GHG emissions from vehicles Identify sequestration potential of coastal marshes
City of Newport News	Public building energy efficiency, regional EV infrastructure development, renewable energy, coastal resilience, transportation hubs
City of Norfolk	Expanding renewable energy access (solar, wind) and resiliency through battery storage.

	Improving government building energy efficiencies by upgrading HVAC, lighting, building green certified - focusing in LIDAC areas. Responding the EV infrastructure study by installing chargers for public/fleet use. Electrifying light duty fleet vehicles.
James City County	I would like to see work on electrification and greening our grid - adding more renewables, etc.
Elizabethe River Project	The Watershed Action Plan for the Elizabeth River prioritizes fair and equitable restoration of the Elizabeth River reducing unfair pollution burdens on underserved communities. That includes supporting a regional expansion of carbon reduction and energy efficiency goals as well as facilitating community resilience and adaptation to face rising sea levels. Another goal in the plan is for the VIMS [Virginia Institute of Marine Science] and HRPDC to potentially lead a region-wide strategy meeting with localities to create and adopt a regional plan for adapting to sea level rise. ERP and NSU are currently partnering to create a model of creative practices for engagement and empowerment of under resourced communities to address environmental challenges. An overall reduction in excess nutrients and sediments entering the river to reduce algae blooms and improve water clarity is another goal in the plan, along with assisting localities with meeting their TMDL [Total Maximum Daily Load] goals.
Sierra Club (2)	Investing in clean transit: Utilize IIJA funding to purchase and/or lease zero-emission and low-emission transit buses and to construct or lease supporting facilities and equipment. Investing in transit infrastructure: City leaders could fund the construction of cost-effective transit infrastructure that will measurably increase transit ridership by improving speed or reliability, such as dedicated bus-only lanes. Implement a pilot or planning process to target areas for decommissioning all gas infrastructure and replace with neighborhood electrification, with an emphasis on environmental justice and low-income communities. Incentive programs for implementation of end-use energy efficiency measures in existing government-owned, commercial, and residential buildings Incentive programs for the purchase of certified energy-efficient appliances, heating and cooling equipment, lighting, and building products to replace inefficient products

	Programs and policies to accelerate the incorporation of efficient electric technologies and electric vehicle charging at new single-family, multi-unit, or affordable residential buildings and commercial buildings, including building codes related to electric vehicle charging Implementation of a building energy performance management program for government-owned buildings Implementation of a new benchmarking and building performance standards Programs to promote recovery and destruction of high-global warming potential (GWP) hydrofluorocarbons (HFCs) used in existing appliances, air conditioning systems, and commercial chillers
Virginia Beach Tea Party	There is only 2 choices adapt or retreat.
Sierra Club (3)	The Virginia Chapter Sierra Club has sent you several documents which we recommend. The most important actions will be to significantly lower GHG emissions, as we realize only about 5 years remain in our earth's climate budget, after which some tipping points will be reached and could not be reversed. For Hampton Roads to do their share, a good reference is the Decarbonization Plan for Virginia by the VA Chapter Sierra Club written in January 2024. The link is: https://vasierra.club/DecarbonizationPlan.pdf

3. Is there anything you would like to tell us about these focus areas or how you chose to rank them? (Why you chose highest or lowest priorities, missing focus areas, etc.)

Comment Themes:

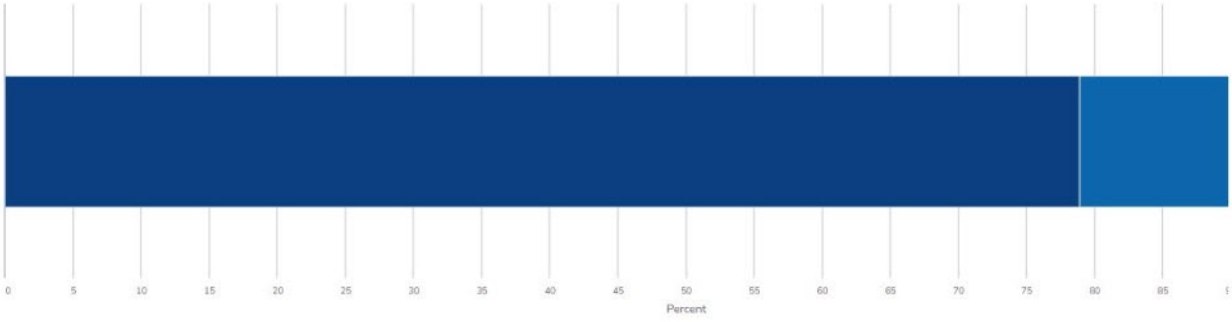
- Climate change resiliency, reducing energy consumption, and climate change impact on LIDAC communities are the top areas of concern.
- Other focus areas:
    - Education
    - Reducing energy consumption
    - Solar
    - Waste Usage (recycling, composting)
    - Weatherization

York County	No
Diversity, Equity and Inclusion-	Limited community feedback

City of Hampton	
Norfolk Solar	I think the two biggest issues are climate change and wealth inequality. Installing solar in low-wealth areas helps with both. See https://solartoday.mydigitalpublication.com/archive/?m=23867&i=803714&p=1&ver=html5 pg 50 of the Fall 2023 issue
Sustainability Solutions Group and Institute	Ranking Beyond Carbon Benefits Leading with Equity and Justice Measure Effectiveness; Per Ton of CO2 removal capability Technical Achievability Potential Achievability Health Benefits Reductions in Energy Burden Advancement in Energy Democracy Preservation of our Natural Resources Community Resilience
Hampton Roads Community Action Program	Climate change disproportionately impacts underserved communities so building resiliency is a natural first step.
Sierra Club	Weatherization and energy efficiency for low-income families will help address high energy costs while also reducing energy consumption, thus reducing greenhouse gas emissions. This should be a very high priority.
HRPDC/TPO	Public education, health, and housing are missing from the list. Education is about our climate crisis is fundamental. Housing is a significant element in fighting climate change, and the adverse health impacts of climate change are numerous. We have connections to a variety of civic organizations across the region and are working to make additional connections.
VA DEQ (2)	Based on largest emissions sectors
Hampton	1 coastal Resilience is most significant impact to our community 2. Little agriculture in our City
City of Newport News	Projects are both local and regional in needs

City of Norfolk	Ranked agriculture, natural and working lands last due to lack of areas in Norfolk. Waste, recycling and composting are extremely important, but less so than the other four categories. Transportation/mobility and Buildings/Infrastructure could be equally ranked. There's a big focus in Norfolk on reducing government building energy consumption; as we committed to 20% reduction by 2032. Resilience is our top focus area, primarily looking at flood prevention during major storm events, but also in social resilience (i.e. building food security)
James City County	Our sustainability team tends to do a lot with recycling so that is why I ranked it first.
Sierra Club (2)	One of the most effective ways to reduce carbon, is to first ensure energy isn't being wasted. Improving building and transportation efficiency is key in reducing carbon, followed quickly by looking at electricity generation and grid needs.
Virginia Beach Tea Party	Everything is about energy it fuels the machines that tills the land for food production, you can't get goods to market without trucks, it fuels the materials that power our homes, industries, business, phones, computers it is the #1 thing that powers the world we know.
Sierra Club (3)	The quickest way to lower carbon emissions is with solar, solar storage and wind energy. This clean energy will replace the energy from fossil fuels. We need a regional climate action plan to install electrification which will power electric vehicles, and heat and cool our homes and buildings. A low priority is nuclear energy, due to its prohibitive costs and lack of adequate protection from leakage. Another lower priority is planting trees and natural sequestration, although good long-term actions, will not allow us to meet carbon reduction goals in time.

4. Is your organization working or connected with any low-income or disadvantaged communities that you recommend we engage with?



Value	Percent	Responses
Yes	78.9%	15
No	21.1%	4

Totals: 19

5. Is your organization willing to partner with us in the future to connect or engage with these communities? (Please select all that apply)

Yes, and the best contact in our organization is:

#25	Edith White edithwhite1@hrcapinc.org
Sierra Club (3)	Ann Creasy, Hunter Noffsinger, Eileen Woll, VA Chapter Sierra Club staff

6. Please tell us what you can about the communities you are connected to and any organizations or representatives you collaborate with to engage them.

Comment Themes:

- Communities in Virginia Beach, Norfolk, Newport News, and Portsmouth came up multiple times
- LIDAC communities within the Hampton Roads area
- Others that came up multiple times:
    - Sierra Club
    - Lamberts Point community

Norfolk Solar	Encourage going directly to civic league meetings in under-resourced communities.
#25	See www.hrcapinc.org
Sustainability Solutions Group and Institute	Multiple Portsmouth Neighborhoods Healthy Portsmouth Bon Secours Old Dominion

	ICAR EVMS Virginia Wesleyan NAACP Sierra Club of Virginia Virginia Organizing United Civic League of Cavalier Manor ECO District Hampton Roads National Environmental Justice Institute Georgia Institute of Technology. Portsmouth Office of Social Services Portsmouth Health Department Virginia Environmental Justice Collaborative Southern Alliance for Clean Energy Interfaith Power and Light People's Solar Power Initiative ACEEE Justice40 Accelerator Justice40 Network Hub University of Maryland Climate and Environmental Justice Initiative NASA Emory University Hercules Research Project US Department of Energy National Renewable Energy Laboratory University of Michigan Energy Equity Project Southern Environmental Law Center Environmental Defense Fund Deep South Center for Environmental Justice
Hampton Roads Community Action Program	Low to mid income levels. Higher rate of unemployment. Communities want positive change to improve conditions and benefit from plans to improve neighborhoods.
Sierra Club	We are heavily engaged in Norfolk with several communities, including the Lambert's Point community. We are also engaged in several communities in Portsmouth.
HRPDC/TPO	We have connections to a variety of civic organizations across the region and are working to make additional connections.
VA DEQ (1)	We have an EJ email list but I do not think it's divided by region of Virginia. Request public input through mixed media
VA DEQ (2)	LIDAC areas throughout the state

Hampton	City has a Neighborhood Services Division in Community Development Department that handles community outreach and engagement.
City of Newport News	Diverse and represent various interests and populations
City of Norfolk	The City of Norfolk works closely with a variety of community partners through our Office of Diversity, Equity and Inclusion, Neighborhood Services and the Department of Housing and Community Development.
James City County	I would have to check with our Neighborhood Development team.
Elizabethe River Project	Elizabeth River Project, Norfolk State University and University of Virginia have partnered to work with communities in the southside of Norfolk as well as Park Place. Community advocates and the civic leagues are critical to that relationship building. Organizations like ForKids, GEAR recovery and Butterfly Village are all amazing partners. More longstanding relationships in Ingleside and Chesterfield heights have been supported by the civic leagues and city officials. Friends of Indian River are critical to engaging property owners in the Eastern Branch and our work in Craddock in Portsmouth has been focused on building trust and a sense of community at Paradise Creek Nature Park.
Sierra Club (2)	We have members across Hampton Roads in many communities esp in Norfolk, Virginia Beach, Hampton, Newport News, and Williamsburg. Lamberts Point in Norfolk, East End in Newport News. St.Pauls area of Norfolk are some key communities we work in.
Virginia Beach Tea Party	City Council, School Board, General Assembly and Congress engaging with those that affect our daily lives running up the cost of living here in VB.
Sierra Club (3)	The York River Group and Chesapeake Bay Group of the VA Chapter Sierra Club has worked with many of the localities in the HRPDC area with an annual Climate Solutions Roundtable, where representatives from the localities present initiatives on reducing greenhouse gas emissions. We also work on air quality and water quality issues involving these localities, to include coal dust from the coal facilities in Newport News and Norfolk. We worked with

	Virginia Organizing on improvements to the public bus system to accommodate residents who depend on reliable bus service.

7. Is there anything else you'd like to tell us as we plan our future public and LIDAC engagement (other groups we should try to reach, suggestions for meaningful engagement, etc.)?

Comment Themes:

- LIDAC, English as a Second Language (ESL), and other diverse community groups should be engaged.
- Ensure that the reason for engaging with diverse community groups is stated clearly at the beginning of the interaction (information sharing v. collecting responses) and result in including the input.
- Use multiple formats to collect responses (surveys, webinars, paid ads, etc.).

Norfolk Solar	See point above in #2 about requiring hiring of LIDAC in RFPs
#25	Hispanic and Filipino organizations should be at the table too and ESL community
Sustainability Solutions Group and Institute	Ensure end goal is around Empowerment, Issue Ownership, Capacity Building and not just information sharing or tokenism
Hampton Roads Community Action Program	Climate pollution is a health issue. An area of future engagement is to tie to social determinants of health.
Sierra Club	Other groups that may provide helpful insights are Virginia Organizing, New Virginia Majority, Chesapeake Climate Action Network
VA DEQ (1)	Request public input through mixed media
VA DEQ (2)	Online education information webinars an surveys have worked best
Hampton	Office of Diversity, equity and inclusion. 757-727-6899
City of Norfolk	Depending on the direction this moves in, I can facilitate connections with other departments and/or community organizations for LIDAC engagement.

James City County	Make sure you are clear on the purpose (i.e. inform vs input) so that residents are not disheartened if their ideas are not incorporated into the project.
Elizabethe River Project	I would be happy to be engaged in this planning process if it would be helpful and if it is open to non-committee members. Thank you.
Sierra Club (2)	comprehensive information on key ideas and programs Sierra Club is encouraging localities to consider, ideas for grant use: https://docs.google.com/document/d/1km81r6MLZguyya2EAQBtA54Pu9XvIKf1KCIJxzh09zA/edit?usp=sharing
Virginia Beach Tea Party	We need to look at ourselves and the communities we live in and be the change we want to see, we can't depend on government to solve our problems.
Sierra Club (3)	We sent this questionnaire to a number of groups that work with LIDAC communities, to include: Lamberts Point Civic League - Norfolk, Park Place Civic League - Norfolk, Norfolk Solar, Virginia Organizing, Chesapeake Climate Action Network, Chesapeake Bay Foundation, Virginia League of Conservation Voters, Elizabeth River Project, NAACP state and Hampton Branch. We are happy to continue to reach out again to these groups and to other groups for meaningful engagement.

PUBLIC ENGAGEMENT: NEWS COVERAGE

The following news article was published on October 4 by WHRO.



Pollution from a paper mill in western Virginia. (Image by Andriy Blokhin via Shutterstock)

State and local officials are making new climate action plans to slash emissions

Written by Katherine Hafner Category: Local News Published: 04 October 2023

Officials at the state and local level are embarking on an ambitious effort to identify the Commonwealth's major sources of climate pollution – and take steps to address them.

It's part of the Biden administration's goal to rapidly reduce the country's contribution to climate change.

State and Hampton Roads agencies have received a total of $4 million in federal pollution reduction grants to draw up plans to reduce greenhouse gas emissions.

This level of climate planning will be a new undertaking for the state, said Tom Ballou, air quality planning manager with the Virginia Department of Environmental Quality.

"We've done it piecemeal," Ballou said. "This is the first time we're going to try to pull everything together in a comprehensive plan."

The Climate Pollution Reduction grants are funded by the Inflation Reduction Act, passed by Congress last year. The law directs hundreds of billions of dollars toward clean energy investments and other measures to combat climate change.

The program is in line with the Biden administration's goal of halving the country's greenhouse gas emissions from their 2005 peak by 2030, said Shaun Eagan, spokesperson for the U.S. Environmental Protection Agency, which is administering the grants.

Greenhouse gases trap heat in the atmosphere, which drives global warming. The United States emits more than 6,000 million metric tons each year, according to the EPA. A majority is carbon dioxide, from burning fossil fuels like coal and natural gas.

Other major greenhouse gases include methane, nitrous oxide and gases used in refrigerants or industrial uses.

Eagan said in an email that the money is meant to encourage the development of comprehensive climate pollution plans "that will reduce pollution, maximize investment benefits and build clean energy economies over the next decade."

Before local officials can make a plan to cut Hampton Roads' carbon footprint, they need to know exactly how much carbon pollution is currently emitted — and from where.

That will be a first for the region, said Whitney Katchmark, who's spearheading the $1 million effort for the Hampton Roads Planning District Commission.

"We haven't really looked, as a region, at reducing greenhouse gases (or) getting a handle on sources," Katchmark said.

The commission will use the grant money to estimate emissions from key local sources, like vehicle transportation, landfills and the energy used to heat and cool homes and businesses.

Katchmark said she's not yet sure whether the assessment will also include sources like container ships docked at the Port of Virginia or planes and ships at local military installations, which would impact the region's overall emissions.

"We've got some unique situations," she said.

At the state level, the Virginia Department of Environmental Quality has been tracking greenhouse gas emissions for more than 20 years, Ballou said.

Statewide emissions dropped by about 21% between 2005 and 2021. That decrease was mainly driven by the transition from emissions-heavy coal-fired power plants toward cleaner-burning fuels like natural gas, and the increased use of solar power, Ballou said.

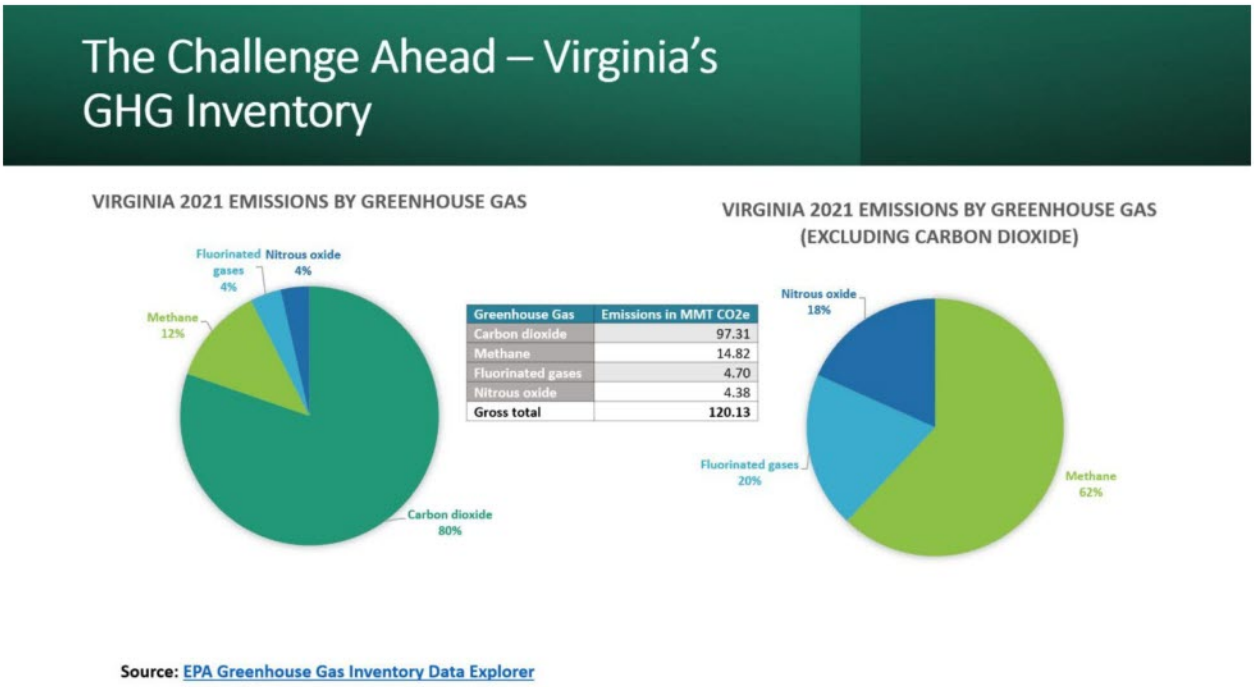


Image via Virginia DEQ

A chart displays Virginia's greenhouse gas emissions by type.

Transportation is Virginia's largest source of climate pollution, accounting for more than 40% of statewide emissions. It's followed by the electric power sector at 21% and other industries with 16%.

The state's new inventory will build on those efforts, Ballou said, using computer modeling tools in line with those used by the EPA. And Virginia will now have to determine steps to actually reduce those emissions.

Both state and local leaders must submit a Priority Climate Action Plan to the EPA in March, outlining specific projects to cut emissions. It's a tight timeline that's forcing officials to scramble a bit, Ballou said.

The EPA will then use those plans to decide which states and localities receive additional funding next year to implement their plans.

Ballou said he doesn't yet know which strategies Virginia will pursue.

In its grant application to the EPA, state officials said they will likely focus on reducing methane, a powerful greenhouse gas generated from sources like landfills; and sulfur hexafluoride, a potent gas that often comes from the electric power sector.

They also proposed targeting sources with high energy demands, like data centers.

In practice, that could mean capturing methane from decomposing waste at landfills, or trying to lower emissions at microchip manufacturers, they wrote.

Katchmark said Hampton Roads officials may propose electrifying local government vehicles or upgrading wastewater treatment plants to use less energy.

"We'll just see what we can build in terms of enthusiasm, and how hard some of the different implementation strategies are," she said.

Mike Dowd, DEQ's air and renewable energy division director, said the EPA is focused on getting "the biggest bang for the buck," as well as ensuring that a significant percentage of the benefits go to lower-income or disadvantaged communities.

A large portion of the state falls into that category, including most of the Eastern Shore and many areas in western Virginia.

Virginia is embarking on the new effort at the same time as it is scheduled to pull out of the multi-state Regional Greenhouse Gas Initiative, which is a cap and trade program designed to reduce carbon emissions.

The initiative requires power plants of a certain size to pay for their carbon emissions in order to incentivize lowering them. Regular auctions of those credits have so far raised more than $650 million for climate adaptation programs in Virginia.

Gov. Glenn Youngkin's administration has sought to pull the state out of the program, citing increased energy bills. The state's air board voted to do so this summer, and Virginia is now set to end its participation at the end of this year. Environmental groups are fighting in court to stop the state from leaving, arguing that state lawmakers must weigh in.

Ballou and Dowd declined to comment on how leaving the initiative could impact the state's new climate plans, citing the ongoing litigation.

Katchmark said it's somewhat daunting to take on a huge, global issue like climate change. But she sees a lot of opportunities for local action. Taken together, they can add up.

"It's probably the collective combination of all these efforts that make a difference," she said. "Certainly we can look at areas where there are a lot of vehicle traffic or stationary air pollution and try to make a dent in reducing that."

Eagan, with the EPA, said the agency has not imposed specific reduction targets for grant recipients.

Ballou said the state is emphasizing public outreach as part of the planning process. Virginians can learn more and access a recent presentation about the state grant on the DEQ's website.

Appendix B: GHG Inventory & Reduction Calculation Methodology

In alignment with HRPDC's EPA-approved work plan, GHG modeling covers the Hampton Roads MSA plus Southampton County and the City of Franklin. The following is a summary of methods used for calculating emissions reductions in the Hampton Roads MSA PCAP. In developing these values, modeling assumptions were made to determine reasonable GHG emissions reductions from the deployment of specific measures. In some cases, there may be areas of overlap for emissions reduction values between measures. For example, some emissions reductions from port vehicles (Measure 5) may be covered by modeling for community-wide ZEV modeling under Measure 3. Modeling for these measures is anticipated to be revised as part of the CCAP process.

GHG Inventory & Business-as-Usual Projection Methodology

The Hampton Roads MSA GHG inventory assesses the GHG emissions for 2019 from the buildings, transportation, waste, and land use, LULUCF sectors. The Business-as-Usual (BAU) scenario projects the 2019 emissions under BAU conditions through 2050.

Buildings. The HRPDC acquired state-level building energy and electricity use sector emissions data from EPA's SIT and then scaled the state-level data down to the counties using the following equation:

$$County\ building\ data_{2019} = \frac{County\ population_{2019}}{State\ population_{2019}} \times State\ building\ data_{2019}$$

The applicable SIT data was used depending on which state a county in the MSA was located in, either Virginia or North Carolina. The BAU projections were compiled by growing the MSA-level building data by a rate of growth calculated from the U.S. Energy Information Administration's (EIA) Short-Term Energy Outlook. EIA's Short-Term Energy Outlook provides energy consumption by sector and source from 2019 to 2050. HRPDC calculated a yearly growth rate and applied it to the 2019 inventory data to project BAU energy sector emissions through 2050.

Transportation. HRPDC used EPA's emission modeling system, Motor Vehicle Emission Simulator (MOVES3), to calculate the emissions from the transportation sector. MOVES3 has on-road vehicle projection data for vehicle population, VMT, energy consumption, and tailpipe GHG emissions by vehicle type and fuel type for internal combustion engine vehicles. It accounts for projected fuel efficiency improvements for internal combustion engine vehicles as a result of existing policies. HRPDC ran MOVES3 with default settings to create the 2019 inventory and BAU projections for population, VMT, energy consumption, and emissions from on-road vehicles.

HRPDC developed ports emissions estimates in alignment with the methodology used in the statewide PCAP for Virginia that was prepared by DEQ. The 2021 U.S. Army Corps of Engineers Entrances and Clearances data was used to develop the number of ship calls in conjunction with Lloyd's Register of Ships produced by IHS Global Limited. For loads and hoteling times, the 2021 Port of Los Angeles was used. Port of Los Angeles is the like port both in ship calls and cargo movements. The 2011 Port of Virginia inventory was used to derive the in bay, RSZ and maneuver times and speeds. For ocean going vessels, the Port of Virginia ratio of calls for the various terminals was used to divide

the Port of Virginia calls (and associated emissions) among the appropriate terminals. For all other sectors, the Port of Los Angeles emissions data was used and ratioed using cargo data from the U.S. Army Corps of Engineers Waterborne Cargo data for the various Virgina ports and for the Port of Los Angeles. For harbor craft, only tug movements were used.

Waste. The Hampton Roads MSA calculated landfill emissions for 2019 using data from EPA's LMOP. LMOP data presents annual and cumulative municipal solid waste (MSW) tonnage, the total capacity of the landfill, and whether the landfill has a gas capture system. The 2019 LMOP data did not include a value for annual tons of MSW generated, and therefore LMOP 2021 data were used as a proxy for 2019 data. The following equation was used to calculate the emissions from each landfill:

$$Emissions = MSW_{annual} \times (Methane_{EF} \times Methane_{GWP}) \times (1 - O_{rate}) \times (1 - G_{capture})$$

Table 7: Variable values for GHG Inventory, Wast Sector

Variable	Value	Description
Emissions	Calculated	Annual emissions for the landfill in $MTCO_2e$.
MSW_{annual}	Retrieved from LMOP data	Annual tons of MSW buried.
$Methane_{EF}$	0.0648	Methane emission factor based on EPA Waste Reduction Model (WARM) assumptions.
$Methane_{GWP}$	28	The AR5 GWP of CH_4.
O_{rate}	0.1 for landfills without gas capture; 0.2 for landfills with gas capture	Oxidation rate based on EPA WARM assumptions.
$G_{capture}$	0 for landfills without gas capture systems; 0.6 for landfills with gas capture systems	Gas capture rate based on EPA WARM assumptions.

Waste combustion facility data was acquired from EPA's Greenhouse Gas Reduction Program Facility-Level Information on Greenhouse gases Tool (FLIGHT). Additional waste combustion data was retrieved from HRSD for biosolid incineration facilities at wastewater treatment plants.

Wastewater emissions data was acquired from EPA's SIT and scaled down from the state to the MSA using the following formula:

$$Hampton\ Roads\ MSA\ wastewater\ data_{2019} = \frac{Hampton\ Roads\ MSA\ population_{2019}}{State\ population_{2019}} \times State\ wastewater\ data_{2019}$$

The applicable SIT data was used depending on which state a county in the MSA was located in, either Virginia or North Carolina. The sum of emissions from all landfills, waste combustion facilities, and wastewater facilities within the Hampton Roads MSA in 2019 was used to represent the total emissions from waste for 2019 for the MSA. The waste data were scaled down from the MSA level to the counties using the following formula:

$$County\ waste\ data_{2019} = \frac{County\ population_{2019}}{Hampton\ Roads\ MSA\ population_{2019}} \times Hampton\ Roads\ MSA\ waste\ data_{2019}$$

The BAU projections were calculated using an average annual population growth rate across the MSA using U.S. Census 2019 population data and 2050 population projection data from either North Carolina's Office of State Budget and Management (OSBM), Hampton Roads' 2050 Socioeconomic Forecast, or the Weldon Cooper Center at the University of Virginia. The county-level waste emissions data from 2019 were grown by the average annual population growth rate.

LULUCF. The HRPDC acquired state-level LULUCF sector emissions data from EPA's SIT and then scaled the state-level data down to the counties. State inventories were downscaled through land area proportions relative to state totals and population proportions relative to state total population.

State total forested land, and forested lands in each MSA county were found and then the fraction was used to downscale per county by using the National Landcover Database's (NLCD) 2021 Land Cover Data. This process was repeated for land converted to forest land and forestland converted to other land. For landfilled yard trimmings and food scraps the U.S. Census data for county and state was used to develop a fraction of the total population in each county. For forest fires, LandFire data was used to find the proportion of burned area in MSA counties relative to state totals and was used to downscale CH4 and N2O emissions. N2O from settlement soils was downscaled through MSA counties developed land area proportions relative to state totals. Agriculture Soil Carbon Flux was downscaled through MSA counties crop land area proportions relative to state totals.

Urban Tree inventory was calculated through determining the amount of sequestration of carbon over time by multiplying the percent urban tree canopy by the urban area found from Census to get the urban tree area, and then multiplied by the average net C emission per area tree cover.

GHG Reductions Methodology

The methodologies, assumption and data sources used for calculating the GHG reductions for each measure are discussed below, by measure.

Measure 1: Create programs to support and incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching.

The measure models the resulting GHG emissions reductions from achievement of increased distributed solar adoption, representing the general potential for distributed clean resource additions in the MSA. Total technical potential for rooftop solar in the Hampton Roads MSA was aggregated from Project Sunroof's estimates of the technical potential in each of the counties and cities in the MSA.[67]

Existing rooftop solar capacity assumptions were sourced from PJM's 2023 Load Forecast for the DOM zone and then grown to meet the assumed 2050 level.[68] To determine an adoption rate for future solar adoption, the most aggressive 2050 adoption scenario from National Renewable Energy

[67] Google. 2024. *Project Sunroof*. https://sunroof.withgoogle.com/
[61] PJM. 2023. *2023 Load Forecast*. https://wired.pjm.com/-/media/library/reports-notices/load-forecast/2023-load-report.ashx

Laboratory's (NREL) Storage Futures Study (20%) was applied to the technical potential.[69] To calculate the kWh of solar output, the capacity factor for residential solar from NREL's annual technology baseline corresponding to the geography of Hampton Roads MSA was used. The incremental growth in solar output from current levels, multiplied by grid emissions factors, resulted in the potential avoided emissions from rooftop solar.

Key modeling assumptions included:

- Constant technical potential per building over time
- No incremental rooftop PV installation beyond existing in BAU case
- Linear growth of PV installations between 2023 and 2050 in Policy Case
- BAU emissions factors (2020 eGRID held flat)
- PCAP Policy emission factors (2020 eGRID grown based on 2023 Annual Energy Outlook (AEO) Reference Case)

Data sources utilized include:

- Storage Futures Study: Distributed Solar and Storage Outlook: Methodology and Scenarios (2021), NREL.
- 2023 Load Forecast, PJM (2023).
- Project Sunroof data explorer, (June 2019), Google.
- Annual Technology Baseline, Residential PV (2023), NREL.
- Electric Grid Emission Factor Projections for PCAP Use, AEO 2023.
- EPA eGRID, 2020.

Measure 2: Reduce energy consumption and increase building decarbonization through programs to support, incentivize, and install energy efficiency and electrification measures.

Building energy use and building emission projections are based on energy consumption from electricity, natural gas, fuel oil, and propane in existing residential (single-family, multifamily, and mobile homes) and commercial buildings (office, food service, school, hotel, healthcare, retail, and warehouse). The base year and projections for energy consumption in existing buildings are built from the 2022 AEO, which represented projected energy user prior to the passage of the IRA, from the U.S. EIA. AEO data is scaled to the Hampton Roads Metropolitan Area counties by scaling AEO Census level data with the ResStock and ComStock building models of North American building stock with county-level resolution. The tool first calibrates ComStock and ResStock energy consumption to AEO energy consumption on a Census division level. It then proportionally adjusts county-level energy consumption to the scaled Census division level.

Energy use values have been integrated with emissions factors for primary fuels (electricity, gas, propane and fuel oil) to provide total emissions. Results are provided every five years from 2020 to 2050 and interpolated for years in between. For the Hampton Roads Metro Area, modeling assumed a beneficial electrification scenarios for HVAC measures and Water Heating and Cooking measures,

[69] NREL. 2024. *Storage Futures Study*. https://www.nrel.gov/analysis/storage-futures.html

and a Low scenario for Building Envelope measures implementation in alignment with sources outlined below.

Calculating Energy Changes

CO_2Sight utilizes ICF's Distributed Energy Resources Planner (DER Planner) model for modeling existing buildings. DER Planner is a bottom-up model that is built upon the best practice principles for potential modeling outlined by the National Action Plan for Energy Efficiency in their Guide for Conducting Energy Efficiency Potential Studies.[70] The model can be used to calculate technical, economic, and achievable potential estimates. Together, the CO_2Sight platform and DER Planner estimate energy and emissions changes from a range of decarbonization strategies, including electrification retrofits and energy efficiency, as presented in these results.

Building characteristics and energy use data for modeling buildings are derived from ResStock[71] and ComStock[72] datasets provided by the NREL. These datasets integrate large public and private data sources statistical sampling, detailed sub-hourly building simulations, and high-performance computing. By synthesizing multiple sources into a single resource, these data allow for a granular understanding of the housing and commercial stock and the impacts of building technologies in different communities and businesses. These data are comprehensive and widely used across similar analyses and modeling efforts, and thus allow for the development of comparable results. The ResStock and ComStock energy use data are calibrated to match the EIA's AEO dataset.

DER Planner, informed by stock CO_2Sight measures data, has the capabilities to model various energy efficiency, electrification, and building envelope measures in selected building types. This tool allows the analysis of over 80 residential and commercial measures in selected regions applied to the Hampton Roads Metro Areas Cities and Counties' building characteristics. The model uses key inputs such as equipment stock, participation rate curves, and energy change per measure and estimates potential savings from applying efficient measures available for each building type and end-use. Given the efficient technologies available, this quantifies how much energy could be reduced. To compute total savings potential, the model runs all permutations combining savings per EE measure unit, expected measure penetration, and total number of measure units (or total eligible stock) by all adoption types (ROB and RET).[73]

By integrating DER Planner and comprehensive datasets such as ResStock and ComStock, CO_2Sight aggregates energy and emissions changes to estimate changes in energy use. ICF's program experience and available national data sources inform these measures' impacts on energy use.

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[70] EPA. 2007. *National Action Plan for Energy Efficiency. Guideline for Conducting Energy Efficiency Potential Studies*. https://www.epa.gov/sites/production/files/2015-08/documents/potential_guide_0.pdf
[71] NREL. Nd. *ResStock Analysis Tool*. https://www.nrel.gov/buildings/resstock.html
[72] NREL. Nd. *ComStock*. https://comstock.nrel.gov/
[73] Measures' adoption type definitions:

- **Replace on Burnout (ROB** is Replace On Burnout and implies that the technology will be adopted when the previous technology needs to be replaced.
- **Retrofit (RET)** implies that the technology is adopted before the previous technology needs to be replaced.

Electricity, Natural Gas and Propane Emissions Factors

Values from EPA's Center for Corporate Climate Leadership GHG Emission Factors Hub were used for natural gas, fuel oil, and propane reductions.[74] Electricity Grid emissions factors were derived from SRVC's values from eGRID[75] and held steady for modeling.

Table 8. Fuel Emission Factors (kg CO_2e/MMBTU)

Fuel	Emission Factors
Natural Gas	53.06
Fuel Oil	73.96
Propane	62.39

Measure Intensities and Participation Curves

As an input into DER Planner, each measure has participation (or technology adoption curves) connected to them. A range of factors can impact whether new electric or efficiency technologies are adopted. This approach builds from NREL's Electrification Future Study[76], from which many of the adoption curves are provided. It accounts for costs, supporting infrastructure, ownership and availability, health and sustainability (including policies) and other factors that could influence technology change. Adoption curves are also provided from the implementation energy efficiency programs and informed by ICF expertise.

For ease of use, users can select prepopulated groupings of participation curves to match the types of energy change they want to model. The groupings are outlined below:

HVAC, Water Heating and Cooking Scenarios

- Business-as-Usual
    - Small amount of energy efficiency, no specific electrification strategy or fuel switching
- Gas Efficiency
    - Significant amount of energy efficiency, no electrification, specific emphasis on efficiency for gas equipment. Gas heat pumps in future years.
- Beneficial Electrification
    - Significant amount of energy efficiency, small amount of electrification for those projects that are presently cost-effective
- End of Life Electrification
    - Significant amount of energy efficiency, large amount of electrification when equipment reaches the end of its useful life
- Accelerated Electrification
    - Signification amount of energy efficiency, large amount of electrification prior to equipment reaching the end of its useful life

[74] EPA. Nd. *GHG Emission Factors Hub.* https://www.epa.gov/climateleadership/ghg-emission-factors-hub
[75] EPA. *Emissions & Generation Resource Integrated Database (eGRID).* https://www.epa.gov/egrid
[76] NREL. Nd. *Electrification Futures Study.* https://www.nrel.gov/analysis/electrification-futures.html

Water Heating and Cooking Scenarios

- Business-as-Usual
    - Small amount of energy efficiency, no specific electrification strategy or fuel switching
- Gas Efficiency
    - Significant amount of energy efficiency, no electrification, specific emphasis on efficiency for gas equipment. Gas heat pumps in future years.
- Beneficial Electrification
    - Significant amount of energy efficiency, small amount of electrification for those projects that are presently cost-effective
- End of Life Electrification
    - Significant amount of energy efficiency, large amount of electrification when equipment reaches the end of its useful life
- Accelerated Electrification
    - Signification amount of energy efficiency, large amount of electrification prior to equipment reaching the end of its useful life

Building Envelope Scenarios

- Business-as-Usual
    - Small amount of energy efficiency on building envelope
- Low
    - Moderate building envelope work, some deep energy retrofits
- High
    - Significant building envelope work, Significant deep energy retrofits

In addition to HVAC; Water Heating and Cooking Pathway selection is being chosen, there are opportunities to influence core Energy Efficiency work occurring in each pathway including:

- Full lighting retrofits and lighting controls
- Smart Thermostats and Building Automation Systems
- New EE appliances
- New EE HVAC equipment

Key data sources for this modeling included:

- ComStock and ResStock data sets
- EPA's ENERGYSTAR Equipment performance thresholds
- ICF's building modeling experience informed by industry standards
- Various state's Technical Reference Manual
- NREL's Electrification Future Study[77]
- DOE's equipment purchasing profiles

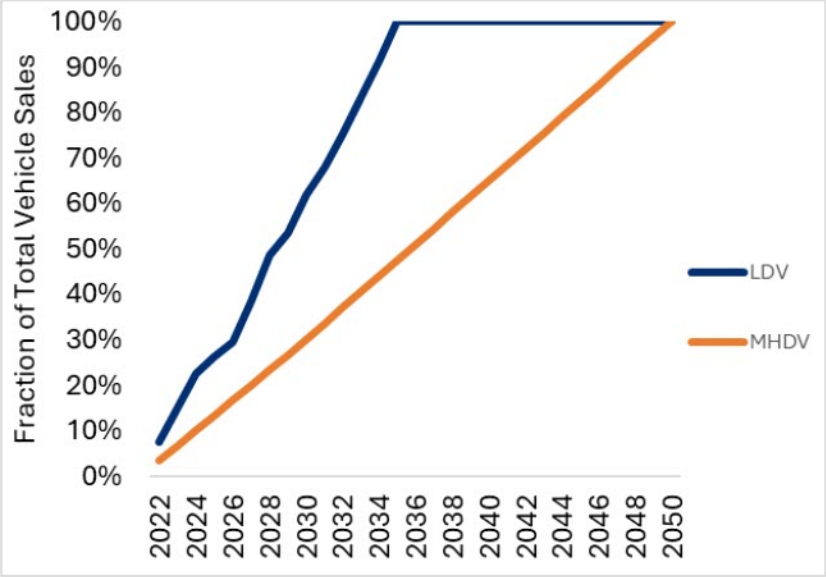
[77] NREL. Nd. *Electrification Futures Study*. Electrification Futures Study Technology Data | NREL Data Catalog

- PNNL's Building Retuning materials
- Montgomery County Maryland's Building Energy Performance Standards Development – Technical Analysis

Measure 3: Develop an electric vehicle (EV) procurement plan and electric vehicle supply equipment (EVSE) deployment strategy to support the adoption of EVs.

This measure models the resulting GHG emissions reduced if the Hampton Roads MSA meets the ZEV sales targets outlined by California's Advanced Clean Cars II (ACCII) rule for LDVs and the Multi-State Zero-Emission Medium- and Heavy-Duty Vehicle (MHDV) Memorandum of Understanding (MOU). Virginia is one of 14 states (including Washington, D.C.) that has adopted California's ACCII rule and is one of 18 states (including Washington, D.C.) that has signed the MOU. The figure below shows the sales targets assumed for LDVs and MHDVs.

Percent sales of vehicles that are zero-emission vehicles



The model uses outputs from the EPA Motor Vehicle Emissions Simulator (MOVES4) to project baseline VMT, vehicle population, energy consumption, and Scope 1 emissions for on-road transportation in the MSA by fuel type (gasoline, diesel, ethanol (E-85), compressed natural gas, and electricity), vehicle source type, and model year. Default input values were used.

Scope 2 emissions from electricity consumption by EVs were found using the following equation:

$$Scope\ 2\ Emissions = Electricity\ Consumption \times Electricity\ Emission\ Factor \quad (1)$$

The electricity emissions factor was held at 2019 eGRID levels for the SRVC subregion, which includes the Hampton Roads MSA, through 2050 for the baseline.

To model GHG emissions reductions in the policy scenario, for each model year, a fraction of VMT was designated as fuel type "electricity" or "hydrogen" based on the ZEV sales curve. The resulting energy consumption was found using the following equation:

$$Energy\ Consumption = VMT \times Energy\ Efficiency, \quad (2)$$

where energy efficiency was in units of kJ/mi for battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs). Implied BEV energy efficiencies from the MOVES4 baseline results were used. FCEV

energy efficiencies were sourced from the California Advanced Clean Fleets (ACF) rule making. Scope 1 emissions were found by reducing baseline internal combustion engine vehicle (ICEV) emissions by the ZEV sales fraction. Scope 2 emissions were found using Equation (1). Electricity emissions factor projections were sourced from EIA's AEO for the PJM/Dominion Region.

The following additional key assumptions were made throughout the analysis:

- ZEVs exist in the vehicle fleet for the same length of time as ICEVs.
- ZEV activity/use is identical to an ICEV.
- The annual ZEV sales fraction applies to every fuel type.
- Long-haul MHDVs ZEVs are modeled as FCEV and all other MHDVs ZEVs are modeled as BEV.
- All LDVs ZEVs are modeled as BEVs.
- All BEV populations 2021 and earlier are EPA MOVES4 default.
- The methodology in some cases required re-allocating MOVES4 baseline projected EV back to ICEVs. Where this was necessary, LDVs were designated as gasoline, and MHDVs were designated as diesel.
- The hydrogen supply is assumed to be 50% green hydrogen and 50% blue hydrogen.

This analysis sourced data from EPA MOVES4, eGRID, EIA AEO, the California ACF and ACCII rulemakings, and the Alliance for Automotive Innovation.

Measure 4: Reduce vehicle miles traveled and support alternative modes of transportation through bike/pedestrian infrastructure investments.

This measure models resulting VMT and GHG emissions reduced if the Hampton Roads MSA enhances its active transportation infrastructure by improving pedestrian networks, expanding bike networks, and implementing an electric bikeshare program throughout the MSA. The measure assumes these strategies only result in light-duty passenger vehicle VMT reduction. The potential VMT reduction due to each of these actions was calculated based on the methodology outlined in the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity,*[78] a document compiled for the California Air Pollution Control Officers Association to provide methods for estimating GHG reductions resulting from various measures.

The resulting passenger VMT reduction across the MSA is shown in the following table. Larger reductions are possible when this measure is paired with other items such as improved transit-oriented development, congestion and/or VMT pricing, encouragement of teleworking, and other disincentives for driving, which are not quantified as part of this PCAP measure and will be further reviewed as part of the CCAP process.

Table 9: VMT Reduction Assumptions

Strategy Name	Potential VMT Reduction by 2030	Potential VMT Reduction by 2050

[78] California Air Pollution Control Officers Association. 2021. *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity.* https://www.airquality.org/ClimateChange/Documents/Handbook%20Public%20Draft_2021-Aug.pdf

Provide Pedestrian Network Improvement	-0.25%	-0.50%
Expand Bikeway Network	-0.0026%	-0.0053%
Implement Electric Bikeshare Program	N/A	-0.0073%

Where calculation input data from specific plans were not available, conservative estimates were made for each active transportation strategy based on the maximum input value listed in the *Handbook*.

The following additional key assumptions were made throughout the analysis:

- VMT reduction only applies to passenger vehicles.
- VMT reductions are taken from the baseline discussed in Measure 3.
- Maximum VMT reductions are assumed to be achieved in 2050. Half of maximum reductions are achieved by 2030, except for electric bikeshare which is assumed to be implemented after 2030.

This analysis sourced data from EPA MOVES4, eGRID, FWHA NHTS 2017 Statistics, and the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity*

Measure 5: Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.

The GHG reduction calculations represented for ports target specific potential projects at select port facilities and locations. These include a set number of equipment and system upgrades and replacements for forklifts, vans, cruisers, shuttles, pickups, buses, and battery systems.

For the battery systems a 12 MW battery storage system and a 5 MW system at different facilities was modeled. To calculate the avoided/reduced emissions that will be garnered by these investments, the following assumptions were made: the 12 MW system would shave demand by a minimum of 8 hours each over 2 daily 2-hour peak demand windows, while the 5 MW system would shave 4 MWh twice a day as well. This amounts to 16 MWh daily per larger system and 8 MWh daily at PPCY that would no longer need to be generated. Assuming the terminals work 360 days a year, this amounts to an annual avoidance of 8,640 MWh of grid generation. Emission factors to support this calculation were taken from EPA's eGRID Power Profiler.

For other equipment, including forklifts, vans, cruisers, shuttles, pickups, and buses, the analysis assumes replacing diesel equipment with zero emission battery electric alternatives. All the equipment replacement emission reduction estimates below have been made utilizing the EPA's Diesel Emissions Quantifier tool.

Data and tools used include:

- U.S. Army Corps of Engineers Entrances and Clearances Data

- U.S. Army Corps of Engineers Waterborne Cargo and Trips Data Files (Manuscript Files)
- Port of Los Angeles Inventory of Air Emissions 2021
- EPA Diesel Emissions Quantifier (DEQ)
- Electricity emission factors from eGRID and emission factors for electricity as a result of Measure 6 were also integrated.

Measure 6: Reduce waste-related emissions through improved equipment efficiencies, increased methane capture at waste and wastewater facilities, and organic waste diversion.

Emissions reductions for this measure were modeled for the closure of three HRSD combustion facilities by 2030, along the timeline estimated by HRSD. Additional reductions were modeled for waste diversion rates increasing from 40% to 60% by 2050, reducing the amount of waste received by landfills and therefore emissions from landfills.

Data sources for this analysis included:

- EPA LMOP: https://www.epa.gov/lmop
- HRSD Combustion Facility Data
- Virginia Annual Recycling Summary Report, Virginia DEQ
- U.S. Census Population Data, https://www.census.gov/data/datasets/time-series/demo/popest/2020s-counties-total.html
- North Carolina Population Growth 2040-2050, Office of State Budget and Management, https://www.osbm.nc.gov/facts-figures/population-demographics/state-demographer/countystate-population-projections/population-growth-2040-2050
- Hampton Roads 2050 Socioeconomic Forecast, HRPDC
- Virginia Population Projection, Weldon Cooper Center at the University of Virginia, https://www.coopercenter.org/virginia-population-projections

Key models and tools that were used in the analysis included:

- EPA Greenhouse Gas Reduction Program (GHGRP) FLIGHT, https://ghgdata.epa.gov/ghgp/main.do
- EPA SIT, https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool

Measure 7: Increase opportunities for carbon sequestration through natural and working lands, including forestry, wetlands, and other coastal ecosystems.

Reductions for this measure were modeled from increased tree planting, including the planting of 25,000 trees across the region by 2030 with a representative target of planting 5,000 trees per year, a Hampton County local initiative. The number of trees planted by 2030 per locality was scaled by population by using Hampton County's initiative as a model. Each locality was assumed to host tree giveaway programs across the HRPDC. Planting is assumed to start in 2025.

Native tree species were assumed to be planted based on their distribution (within the region) and if the tree habitat included a wide variety of soil types to ensure the species could be planted anywhere within the MSA. Carbon sequestration potential of native trees in Hampton Roads MSA was

determined using i-Tree MyTree, which utilizes county coordinates within the MSA and designates the trees as "new planting" and in "partial sun" with a 1-inch diameter.

Data sources and modeling tools used for this measure include:

- Native Tree Species in Hampton Roads MSA: Common Native Trees of Virginia: Identification Guide, https://dof.virginia.gov/wp-content/uploads/Common-Native-Trees-ID-spreads_pub.pdf
- i-Tree MyTree: Accessed through https://www.itreetools.org/. This tool is utilized for assessing the carbon sequestration potential of trees, specifically in Hampton Roads MSA.

Appendix C: LIDAC Census Information

LIDAC Census Tracts- as identified by CEJST

Census tract 2010 ID	County Name	State/Territory
51093280105	Isle Of Wight County	Virginia
51095080102	James City County	Virginia
51175200300	Southampton County	Virginia
51550020100	Chesapeake City	Virginia
51550020300	Chesapeake City	Virginia
51550020500	Chesapeake City	Virginia
51550020700	Chesapeake City	Virginia
51620090200	Franklin City	Virginia
51650010400	Hampton City	Virginia
51650010601	Hampton City	Virginia
51650010602	Hampton City	Virginia
51650010701	Hampton City	Virginia
51650011300	Hampton City	Virginia
51650011800	Hampton City	Virginia
51650011900	Hampton City	Virginia
51650012000	Hampton City	Virginia
51700030100	Newport News City	Virginia
51700030300	Newport News City	Virginia
51700030400	Newport News City	Virginia
51700030500	Newport News City	Virginia
51700030600	Newport News City	Virginia
51700030800	Newport News City	Virginia
51700030900	Newport News City	Virginia
51700031200	Newport News City	Virginia
51700031300	Newport News City	Virginia
51700032006	Newport News City	Virginia
51700032117	Newport News City	Virginia
51700032126	Newport News City	Virginia
51700032128	Newport News City	Virginia
51700032212	Newport News City	Virginia
51700032225	Newport News City	Virginia
51700032226	Newport News City	Virginia
51700032300	Newport News City	Virginia
51710000901	Norfolk City	Virginia
51710000902	Norfolk City	Virginia
51710001100	Norfolk City	Virginia
51710001300	Norfolk City	Virginia
51710001400	Norfolk City	Virginia

Census tract 2010 ID	County Name	State/Territory
51710002700	Norfolk City	Virginia
51710002900	Norfolk City	Virginia
51710003100	Norfolk City	Virginia
51710003300	Norfolk City	Virginia
51710003400	Norfolk City	Virginia
51710003501	Norfolk City	Virginia
51710004100	Norfolk City	Virginia
51710004200	Norfolk City	Virginia
51710004300	Norfolk City	Virginia
51710004400	Norfolk City	Virginia
51710004500	Norfolk City	Virginia
51710004600	Norfolk City	Virginia
51710004700	Norfolk City	Virginia
51710004800	Norfolk City	Virginia
51710005000	Norfolk City	Virginia
51710005100	Norfolk City	Virginia
51710005500	Norfolk City	Virginia
51710005701	Norfolk City	Virginia
51710005800	Norfolk City	Virginia
51710005901	Norfolk City	Virginia
51710005903	Norfolk City	Virginia
51710006000	Norfolk City	Virginia
51710006200	Norfolk City	Virginia
51740210500	Portsmouth City	Virginia
51740211100	Portsmouth City	Virginia
51740211400	Portsmouth City	Virginia
51740211500	Portsmouth City	Virginia
51740211700	Portsmouth City	Virginia
51740211800	Portsmouth City	Virginia
51740211900	Portsmouth City	Virginia
51740212000	Portsmouth City	Virginia
51740212100	Portsmouth City	Virginia
51740212300	Portsmouth City	Virginia
51740212400	Portsmouth City	Virginia
51740212600	Portsmouth City	Virginia
51740213101	Portsmouth City	Virginia
51740980100	Portsmouth City	Virginia
51800065100	Suffolk City	Virginia
51800065300	Suffolk City	Virginia
51800065400	Suffolk City	Virginia
51800065500	Suffolk City	Virginia
51800075501	Suffolk City	Virginia

LIDAC Block as by EJ

Census tract 2010 ID	County Name	State/Territory
51800075601	Suffolk City	Virginia
51810041002	Virginia Beach City	Virginia
51810043200	Virginia Beach City	Virginia
51810044806	Virginia Beach City	Virginia
51810045200	Virginia Beach City	Virginia
51810045810	Virginia Beach City	Virginia
51810046221	Virginia Beach City	Virginia
37053110402	Currituck County	North Carolina
51181860100	Surry County	Virginia

Census Groups- identified Screen

County	Block Group ID
Chesapeake City	515500200031
Chesapeake City	515500201001
Chesapeake City	515500201002
Chesapeake City	515500201003
Chesapeake City	515500201004
Chesapeake City	515500202001
Chesapeake City	515500202002
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RICHMOND, VA METRO AREA METROPOLITAIN STATISTICAL AREA PRIORITY CLIMATE ACTION PLAN

Prepared for the U.S. EPA under the Climate Pollution Reduction Grants (CPRG) Program, Section 60114(a) of the Inflation Reduction Act

March 1, 2024

DISCLAIMER

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PlanRVA, established in 1969 following adoption of the Regional Cooperation Act by the VA General Assembly, is the convener, planner, and shaper of Central Virginia's future. PlanRVA focuses on promoting regional cooperation and collaboration among localities and with the private sector and community organizations to address shared challenges through holistic solutions that sustain regional growth. PlanRVA manages regional programs and initiatives in partnership with affiliate organizations in the areas of community development, emergency management, the environment, and transportation.

This Priority Climate Action Plan (PCAP) for the Richmond, VA Metropolitan Statistical Area (MSA) was developed to meet the requirements of the Climate Pollution Reduction Grants program (authorized under section 60114(a) of the Inflation Reduction Act 60114), and it provides a set of priorities for the MSA that will enable governments and other stakeholder in the region to seek competitive implementation funding through the Climate Pollution Reduction Grants program, Inflation Reduction Act 60114(b).

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Acronyms

ACCII	Advanced Clean Cars II
AEO	Annual Energy Outlook (from EIA)
BAU	Business-as-usual
BEPS	Building Energy Performance Standards
BEV	Battery electric vehicle
CAP	Climate Action Plan
CBO	Community-based organization
CCA	Community Choice Aggregation
CCAP	Comprehensive Climate Action Plan
CEJST	Climate and Economic Justice Screening Tool
CPRG	Climate Pollution Reduction Grants
CVWMA	Central Virginia Waste Management Authority
DEQ	Virgina Department of Environmental Quality
DER	Distributed Energy Resources
EPA DEQ	Diesel Emissions Quantifier
ECH	Empty container handler
eGRID	Emissions and Generation Resource Integrated Database (EPA)
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
DOE	U.S. Department of Energy
EV	Electric vehicle
FCEV	Fuel cell electric vehicle
GHG	Greenhouse gas (emission)
HVAC	Heating, ventilation, and air conditioning
ICEV	Internal combustion engine vehicle
IRA	Inflation Reduction Act
LDV	Light-duty vehicle
LIDAC	Low-Income and Disadvantaged Community
LMOP	Landfill Methane Outreach Program (EPA)
MHDV	Medium and heavy-duty vehicle
MOVES	MOtor Vehicle Emission Simulator (EPA)
MPO	Municipal planning organization
MSA	Metropolitan Statistical Area
MSA	Metropolitan Statistical Area
MSW	Municipal solid waste
NIT	Norfolk International Terminal
NREL	National Renewable Energy Laboratory
PCAP	Priority Climate Action Plan
PDC	Planning district commission
PPA	Power purchase agreement
PPCY	Pinners Point Container Yard
RET	Retrofit
ROB	Replace on burnout
RRTPO	Richmond Regional Transportation Planning Organization
SIT	State Inventory Tool
VCEA	Virginia Clean Economy Act
VDOT	Virginia Department of Transportation
VIG	Virginia International Gateway
VMT	Vehicle miles traveled
VPA	Virgina Port Authority
WARM	Waste Reduction Model (EPA)

Introduction

PlanRVA developed this Priority Climate Action Plan (PCAP) to meet the requirements of the U.S. Environmental Protection Agency's (EPA) Climate Pollution Reduction Grants (CPRG) program. The CPRG program provides funding to states, local governments, Tribes, and territories to develop and implement plans for reducing greenhouse gas (GHG) emissions and other harmful air pollution.

CPRG Program Overview

The Inflation Reduction Act (IRA), signed into law on August 16, 2022, directs federal funding to reduce carbon emissions, lower healthcare costs, fund the IRS, and improve taxpayer compliance. The IRA contains provisions that directly or indirectly address issues related to climate change, including reduction of greenhouse gas (GHG) emissions and promotion of adaptation and resilience to climate change impacts.[1]

The CPRG program, authorized under Section 60114 of the IRA, provides $5 billion in grants to states, local governments, Tribes, and territories to develop and implement plans for reducing GHG emissions and other harmful air pollution. The program consists of two phases: planning and implementation. The planning phase provided $250 million in noncompetitive planning grants for state and local agencies to develop climate action plans (CAPs) to identify emissions reduction measures. The implementation phase provides $4.6 billion for competitive implementation grants to eligible applicants to implement GHG reduction measures identified in a PCAP, which is the first deliverable of a CPRG planning grant.

PlanRVA coordinated with the State of Virginia and the Hampton Roads and Washington, D.C. MSAs in developing this PCAP.

Box 1. Definitions

Greenhouse Gas (GHG): the air pollutants carbon dioxide, hydrofluorocarbons, methane, nitrous oxide, perfluorocarbons, and sulfur hexafluoride.

GHG Reduction Measure: policies, programs, actions, or projects that reduce GHG emissions or enhance carbon removal.

Co-Benefits: positive effects beyond the stated goal of a GHG reduction measure (e.g., improved public health outcomes, economic benefits, and increased climate resilience).

Low-Income Disadvantaged Communities (LIDACs): communities with residents that have low incomes, limited access to resources, and disproportionate exposure to environmental or climate burdens. For the purposes of this report, LIDACs were identified using the Environmental Justice Screening and Mapping Tool and the Climate and Economic Justice Screening Tool. These tools identify LIDACs by assessing indicators for categories of burden: air quality, climate change, energy, environmental hazards, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Per CPRG, Tribes are also considered LIDACs.

[1] CRS. "Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change," October 3, 2022. https://crsreports.congress.gov/product/pdf/R/R47262

PCAP Overview and Scope

This PCAP covers the geographic area outlined in Figure 1. Richmond Metropolitan Statistical Area. The Metropolitan Statistical Area (MSA) is Census-defined and extends beyond PlanRVA's usual geography. The region also includes the following Tribes: Chickahominy, Chickahominy Eastern Division, Rappahannock, Pamunkey, and Upper Mattaponi. The state of Virginia has developed its own PCAP and PlanRVA is coordinating with state CPRG leads at the Virginia Department of Environmental Quality to align GHG reduction priorities.



Figure 1. Richmond Metropolitan Statistical Area

This PCAP identifies high priority, ready-to-implement, GHG reduction measures that will provide significant GHG reductions and other benefits to the MSA and the communities within it. A measure being included within the MSA's PCAP is a pre-requisite for eligible agencies and organizations within it to compete for implementation grant funding in the second phase of the CPRG program. Accordingly, the measures identified in this PCAP are designed to be broad enough to encompass regional and local priorities for addressing climate pollution.

The PCAP serves as a starting point for a larger, more comprehensive climate planning effort to be conducted through 2024 and 2025 to develop the Comprehensive Climate Action Plan (CCAP).

PlanRVA has included within this PCAP the information outlined below in Table 1. In this table, the location of each piece or type of information required for the PCAP is also identified.

Table 1. Location of CPRG PCAP Requirements in this PCAP

PCAP Required Elements	PCAP Section
GHG Inventory	Simplified GHG Inventory and Appendix C. Richmond MSA GHG Inventory and BAU Projections
Quantified Priority GHG Reduction Measures	Priority Climate Action Plan Measures and Appendix D. Approaches for Quantifying GHG Reductions from PCAP Measures
Low-Income and Disadvantaged Community (LIDAC) Benefits Analysis	Richmond LIDAC Identification and Appendix B. Identification of LIDACs in Richmond MSA Climate Risks to Metropolitan Richmond's LIDACs PCAP Measure LIDAC Impacts Summary LIDAC Engagement
Benefits Analysis	Priority Climate Action Plan Measures
Review of Authority to Implement	Priority Climate Action Plan Measures
PCAP Encouraged/Not Required Elements	
GHG Emissions Projections	Appendix C
GHG Reduction Targets	Will be addressed in the CCAP
Intersection with Other Funding	Will be addressed in the CCAP
Workforce Planning Analysis	Will be addressed in the CCAP

Approach to PCAP Development: Stakeholder Engagement

During the PCAP development, PlanRVA conducted significant outreach and engagement with stakeholders and community representatives throughout the greater Richmond MSA with an emphasis on connecting with those communities most impacted by air pollution.

Specific outreach efforts included the creation of a digital public relations toolkit, email and personal outreach to an extensive list of local media (print, TV and radio, and digital), and individual outreach to more than 50 local and regional community organizations that regularly engage with local and regional communities.

Active engagement has included stakeholder phone calls and meetings; in-person "intercepts," focus groups, and conversations with residents; a detailed online survey targeting residents throughout the region; and coordination between PlanRVA and local and regional community leaders to ensure that both regional perspectives and local needs are reflected in the plan.

These activities are summarized in Table 2 below.

Table 2. Public Engagement and Outreach Summary

Date	Outreach Type	Stakeholders	Summary Activity	Summary Metrics
January 19, 2024	Outreach Email	Community and Nonprofit Organizations serving LIDACs	An initial email was sent to 55 organizations with an overview of the climate mitigation initiative and 5 specific ways to stay engaged or support the effort.	27 organizations responded with requests for more details.
January 31, 2024	Zoom Meeting	11 Community and Nonprofit Organizations	A one hour Zoom overview of the climate mitigation initiative and the five specific ways their organizations could stay engaged or support the process.	Participants expressed an interest in receiving updates going forward and in sharing the survey with their stakeholders and in the possibility of helping organize focus groups or engagement activities in the year ahead.
January 23 – February 7, 2024	Individual Meetings	9 Community and Nonprofit Organizations	Individual discussions about engagement possibilities, including focus groups and intercepts.	All organizations were interested in an active role going forward. One focus group and three intercept opportunities were initiated.
February 1 – 9, 2024	In-person intercepts	Residents of LIDACs in Richmond and Hopewell	In-person engagement of residents outside of three libraries, including a brief 5-question survey.	39 residents completed the survey.
January 19 – February 9, 2024	GHG Emissions Survey	MSA-wide communities	A survey was distributed in English and Spanish to engage the broader community, and to gather perspectives and insights on the ways in which airborne pollution is visibly impacting residents – and to gather their initial ideas on ways to mitigate pollution in their neighborhood.	More than 800 residents completed the survey, and more than 300 of them provided contact information to stay engaged in the process.
January 14 – onward	Website	MSA-wide communities	Main regional CPRG website that includes project updates, stakeholder news, and email contact. Website was also linked to the CPRG GHG Emissions Survey.	1,400 visits from users from January 14 to February 10.

Date	Outreach Type	Stakeholders	Summary Activity	Summary Metrics
December 15, February 2, and February 16, 2024	CPRG Steering Committee Meetings	MSA Localities	Locality representatives were presented with the project plan, methodology, preliminary data, public feedback results, and the draft PCAP report. Reduction measure and implementation grant ideas were solicited through active discussion.	Members provided input and feedback on the GHG reduction measures, stakeholder engagement, and the PCAP report.

Stakeholder Engagement

CPRG Steering Committee. PlanRVA formed a CPRG Steering Committee to advise on GHG emissions reduction priority projects, programs, and measures. Committee members include high-level staff from localities and from neighboring planning district commissions (PDCs) with localities included in the Richmond MSA. The priority projects provided by these groups informed the measures included in this PCAP. Steering Committee meetings were held from December 2023 through February 2024. Committee members reviewed PCAP and CCAP requirements, reviewed implementation grant evaluation criteria, held discussions on prioritizing projects, programs, and measures, and informed broader stakeholder engagement activities. The Committee will continue to meet to advise on the CPRG program through 2027, when the program concludes.

Industry, Government Partners, and Stakeholders. PlanRVA met with stakeholder groups not already represented by the Steering Committee including the Central Virginia Waste Management Authority (CVWMA), Greater Richmond Transit Company (GRTC), and EPA Region 3 Regional Tribal Operations Committee along with other tribal staff. We also met with other regional grantees to coordinate the state and MSA PCAPs, including VA Department of Environmental Quality, Metro Washington Council of Governments (MWCOG), and Hampton Roads PDC (HRPDC).

Community Engagement

Identification and Initial Outreach. In the development of the PCAP, the primary focus was two-fold: to engage the broader regional population (through media awareness and survey) and to connect with community organizations most engaged in the region's LIDACs to explore ways to collaborate going forward.

PlanRVA began by developing a list of the community-based organizations (CBOs) it knew served residents in the LIDACs most impacted by transportation- and waste-related air pollution. That initial list grew to 55 organizations, each of which was contacted by email with information about the CPRG and a request to collaborate going forward. In the end, 27 organizations responded with an interest in learning more about the CPRG and in further engagement. PlanRVA hosted a virtual meeting with 11 of the organizations and met individually with 9

organizations, providing an overview of the CPRG program and discussing opportunities for immediate support for the PCAP (e.g., sharing the community survey) as well as longer-term collaboration for engagement support during the CCAP process. Additional information on these meetings and organizations can be found in Appendix A.

Website. The Climate Resilient RVA (ClimateResilientRVA.org) website was designed to provide an initial starting point for all outreach and engagement efforts. It provides basic information about the CPRG program and development of the PCAP, including local media coverage of the initiative. The website has been a critical part of the outreach efforts, providing local media and community partners with a starting place to understand the key phases of the CPRG and PCAP. From January 14 to February 10, the website received more than 1,400 visits from users. The website directed visitors to the community survey (discussed below), included a Spanish-language page, and provided a general email contact.

GHG Emissions Community Survey. PlanRVA developed an online survey to quickly engage the broader community and generate initial perspectives on the community's experiences with air pollution from transportation and waste. Over three weeks in January and February of 2024, more than 800 residents responded, representing 17 of the 18 localities. More than a third of respondents indicated a desire to remain engaged going forward. The survey was available in both English and Spanish and was well-publicized across the region through outreach and engagement efforts. Over half of the survey respondents provided specific feedback in response to being asked for "one project idea" they would like to see completed in their community "to address pollution from transportation sources or waste." Individual responses were recorded and broad themes communicated to the Steering Committee. Desiring safer and more reliable public transportation options and addressing litter and plastic pollution were common threads in the open-ended question responses.

Shorter, in-person surveys were also conducted with 39 residents during intercepts outside of three local libraries serving LIDACs in the cities of Hopewell and Richmond.

Media Outreach. The success described above was made possible in part by a robust media strategy. For the PCAP, the media outreach focused on traditional media (print, television, and radio), an increasing regional portfolio of hyper-local Internet news sites, and social media platforms. Multiple local Internet news sites were also engaged to leverage their social media connections and daily e-news mailings to connect an increasingly diverse audience of people who care deeply about what is happening in their neighborhood. News outlets that covered the community engagement process included RIC Today, Good Morning RVA, Black Virginia News, RVA Hub, and the Commonwealth Times.

Social media/digital outreach: The team invested in social media advertising to promote the website and survey to people living within the Richmond MSA. The English-language ad set resulted in 451 link clinks and 35,000 post impressions. Another Spanish-language ad set included 205 link clicks and 25,000 post impressions. Local jurisdictions within the MSA also shared information about the survey on Facebook and Instagram channels, as well as in newsletters

LIDAC Engagement

A central component of the PCAP engagement strategy involved leveraging existing relationships, building new relationships, and creating meaningful space for the voices of residents and other stakeholders to be amplified and heard to help shape initiatives that can have a tangible impact on the community. PlanRVA conducted outreach across a range of stakeholders and communities, including with the five tribes in the MSA. PlanRVA looks forward to renewed and deeper engagement and partnership opportunities with Tribes during the CCAP process.

While many of the above discussed PCAP outreach and engagement activities did not specifically target LIDACs, emphasis was placed on reaching a diverse and varied audience (e.g., through multilingual documents). To engage with LIDACs more specifically during the limited timeframe, in-person outreach was conducted near libraries serving LIDACs to supplement the online community survey. The survey was available in Spanish as well as English, and 34% of respondents reported income below statewide median income levels. Looking forward to the CCAP process, PlanRVA is committed to increased engagement with residents most impacted by air pollution and climate change in ways that are transparent, equitable, and accessible.

Continued Engagement

During the PCAP development, PlanRVA strove for inclusivity and strengthening relationships with neighboring PDCs, localities, regional authorities, Tribes, and CBOs. As indicated above, PlanRVA will build on this work during CCAP development. A main focus going forward will be working with our local partners to create meaningful spaces for high school and college-aged community members, those who live and work in the LIDACs that are most impacted by air pollution and least able to respond to climate change impacts, and the CBOs most invested in supporting the most marginalized corners of the community. By bringing these voices to the center of the conversation about emissions, climate change, and community, residents will have an opportunity to shape the changes that will improve the quality of their communities. Surfacing their concerns in ways that help address historical and systemic environmental injustices—the result of historical *de jure* and *de facto* practices and policies—is essential for moving forward together.

PlanRVA also plans to leverage the website to create a vital resource for everyone in the Richmond region interested in tracking activities and data related to the CCAP and broader efforts in the region to tackle climate change. The website will be updated throughout the CCAP process in 2024 and 2025 to include GHG inventory data, project-specific information, opportunities for input and feedback, and other details on the planning and implementation of this work. PlanRVA also anticipates that the website will be increasingly leveraged to drive public engagement, grow awareness around other local efforts to reduce GHG emissions, and publicize engagement events and activities that will provide the public with specific ways to engage and shape the work locally and regionally, including additional surveys. PlanRVA expects to develop one or more community surveys to support the development of the CCAP and to increasingly engage residents in a dialogue about change in their neighborhoods and communities. Listening sessions, intercepts, and collaborations with neighborhood

organizations are tools PlanRVA will likely use during CCAP development. The response to the initial PCAP survey exceeded expectations and indicates that the broader community is eager to be engaged in a discussion about GHG emissions and climate change and to help shape regional efforts to improve their communities.

Approach to PCAP Development: Priority GHG Reduction Measures

PlanRVA used a multi-step process to develop priority GHG reductions measures identified in this PCAP, as outlined in Figure 3. Stakeholder engagement activities (discussed above and below) were done continuously throughout this process.

Figure 3. Approach to developing the Richmond MSA PCAP



1. PlanRVA used multiple mechanisms to collect ideas for GHG reduction priorities across the MSA. PlanRVA reviewed existing plans and climate actions and policies across the region, held a working session with Steering Committee members, distributed a community-wide survey, and conducted calls and listening sessions with stakeholders (see Appendix A for more information). PlanRVA also created a website with an option to provide comments.[2]
2. PlanRVA compiled information from existing plans and responses from the Steering Committee and other stakeholder conversations and filtered them for relevance for the CPRG program goals. PlanRVA then grouped similar ideas by relevant sector and theme (e.g., vehicle electrification or active transportation) to form broader GHG reduction measure categories that could be readily implemented.
3. The draft list of GHG reduction measures was shared with the Steering Committee and local governments for review. Specifically, PlanRVA asked for a review and feedback to identify any potential gaps reviewers saw in line with their priorities, especially related to CPRG implementation grants. Using this feedback, PlanRVA finalized the list of GHG reduction measures presented in this PCAP. PlanRVA also coordinated with other MSAs and the state to ensure alignment where needed for potential coalition implementation grant projects.
4. After developing a consolidated list of measures and sharing for review, PlanRVA worked internally with its contractors and with other local governments and stakeholders to develop the required information for each measure, such as quantified GHG reductions, authority to implement, LIDAC benefits analysis, and other information (e.g., available funding and key implementors). Additional information on quantification of GHG reductions may be found in Appendix D.

[2] http://www.ClimateResilientRVA.org

5. PlanRVA drafted the PCAP using information from the previous steps and shared a version with the CPRG Steering Committee for review and feedback, which was incorporated into the final PCAP report.

Richmond's Climate Context

Simplified GHG Inventory

Prior to this effort, the Richmond MSA did not have a GHG inventory representing all cities and counties, nor had most localities ever inventoried their own emissions. For the PCAP, a simplified GHG inventory was completed covering key sources of emissions for the Richmond MSA. The simplified inventory sectors represent all the priority GHG reduction measures.

Looking forward to the CCAP, PlanRVA will conduct comprehensive community-wide emissions inventories covering all sectors and pollutants, including industry, electricity generation and/or use, transportation (on- and off-road), commercial and residential buildings, agriculture, natural and working lands, and waste and materials management. Other GHGs (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) will also be included, along with a co-pollutant analysis (e.g., fine particulate matter, nitrogen oxides, sulfur dioxide, volatile organic compounds, air toxics, etc.).

The PCAP simplified inventory assesses the GHG emissions for 2019 from the buildings, on-road transportation, ports, and waste generation sectors. A simplified 2019 inventory was also compiled for GHG emissions from local government operations. In addition to the GHG inventories, business-as-usual (BAU) projections were drafted from 2019 through 2050. Appendix C discusses the methodology for both the development of the simplified 2019 GHG inventory and the BAU GHG projections for each sector out to 2050.

The inventory and projections were prepared using the following data and resources:

- EPA's Landfill Methane Outreach Program (LMOP) Landfill and Project Database
- EPA's Facility Level GHG Emissions Data
- US Census Bureau Population Data
- Virginia State Inventory Tool (SIT) GHG Inventory
- North Carolina SIT GHG Inventory
- Port of Virginia GHG Inventory
- Municipal building emissions and fuel usage data from Henrico County
- Municipal fuel usage data from Hanover County
- Municipal fuel usage data from Chesterfield County
- Municipal building and vehicle fleet emissions data from Richmond City

Buildings. The buildings sector consists of direct fuel use emissions and indirect electricity use emissions for residential, commercial, and industrial buildings.

On-Road Transportation. The transportation sector consists of on-road mobile source emissions and electricity consumption emissions.

Off-Road Transportation (Ports). This sector consists of emissions from ocean-going vessels, cargo, and other operations at the Richmond Marine Terminal.

Waste Generation. This sector covers landfill emissions data for all facilities within the Richmond MSA.

Municipal Operations. The Municipal Operations sector consists of direct fuel use and indirect electricity use emissions from municipal buildings (including schools) as well as emissions from municipal vehicle fleets.

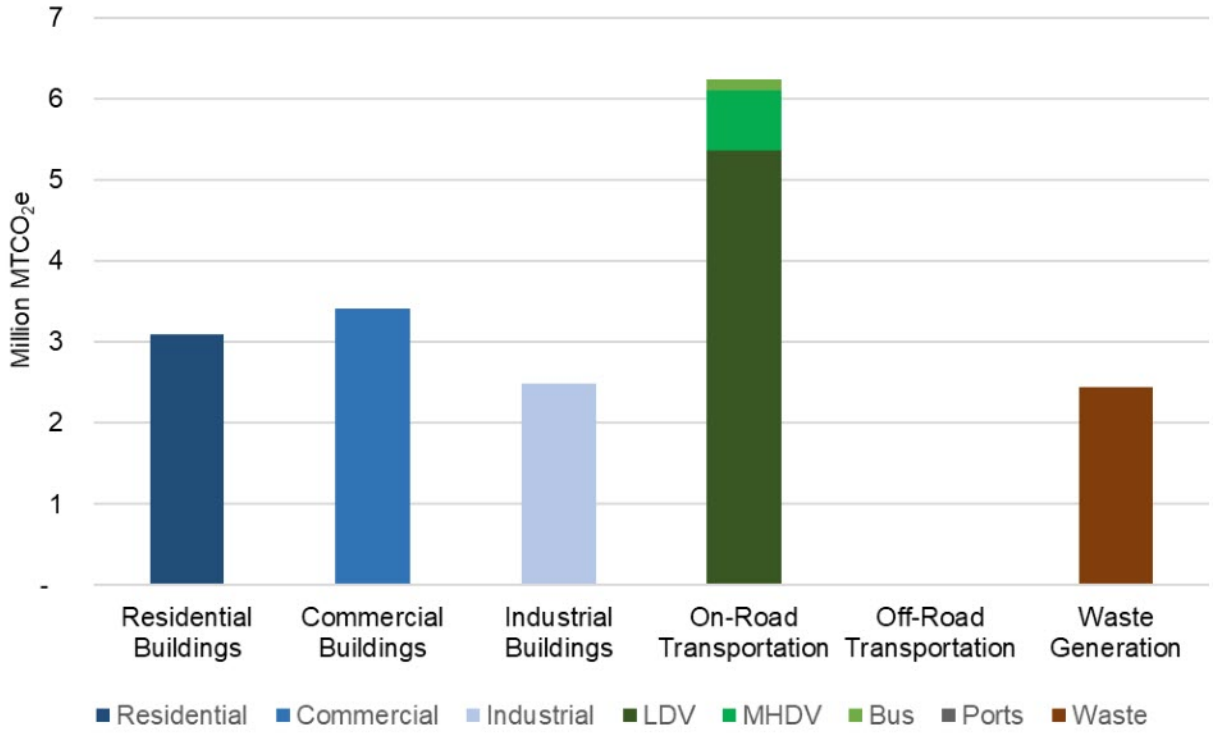
Table 3, Figure 4, and Figure 5 below show the results of the simplified GHG inventory for the Richmond MSA across the sectors assessed in metric tons of carbon dioxide equivalent ($MTCO_2e$). Building sector emissions data are broken down by direct emissions (on-site fuel use) and emissions from purchased electricity. On-Road Transportation sector emissions data are broken down by vehicle type. The waste generation sector reflects emissions from municipal solid waste that was landfilled in 2019. GHG emissions from municipal operations are a subset of the broader community-wide emissions in the building and on-road transportation sectors and reflect GHG emissions from government, public, and school buildings and vehicle fleets. Appendix C discusses the methodology for both the development of the simplified 2019 GHG inventory and the BAU GHG projections for each sector out to 2050.

Table 3. Simplified GHG Inventory Results from the Richmond MSA

TOTAL EMISSIONS BY SECTOR ($MTCO_2e$)	**2019**
Total Buildings	**8,990,990**
Residential - Direct	944,510
Commercial - Direct	923,379
Industrial - Direct	1,683,599
Residential - Electricity	2,146,725
Commercial - Electricity	2,483,230
Industrial - Electricity	809,547
Total Transportation	**6,234,586**
Light Duty Vehicles	5,355,146
Medium- and Heavy-Duty Vehicles	745,571
Buses	124,267
Motorcycles	9,108
Total Ports	**10,890**
Total Waste Generation	**2,440,482**
Landfill Emissions	2,440,482
Total Emissions	**17,676,948**

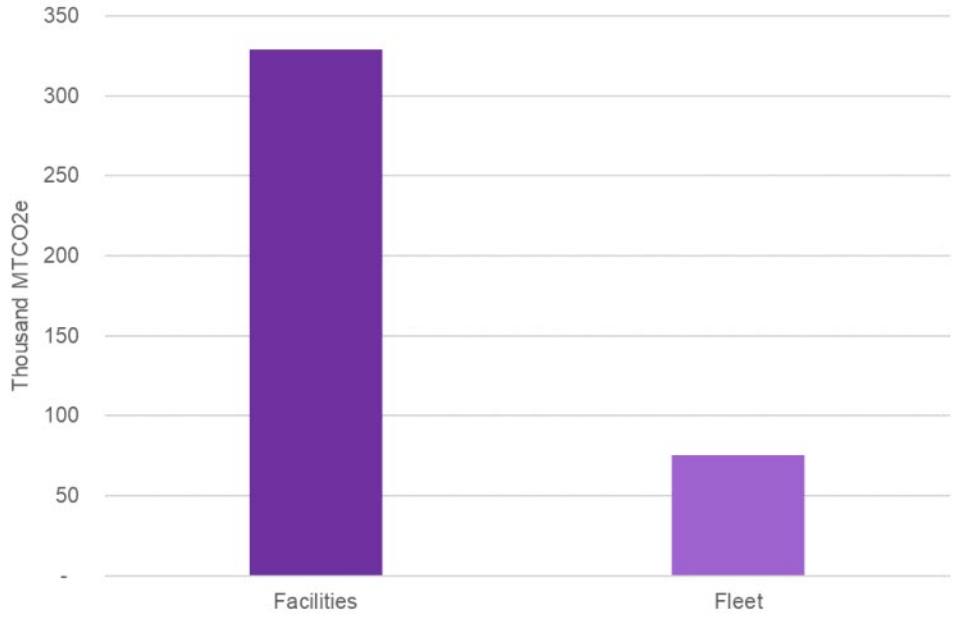
Total Municipal Operations	**404,432**
Municipal Facilities	329,110
Municipal Vehicle Fleet	75,322

Figure 4. Richmond MSA Simplified Community GHG Inventory Results by Sector, 2019



Note: Emissions from ports (off-road transportation) are too small to be seen in ***Figure 4****.*

Figure 5. Richmond MSA Simplified Municipal GHG Inventory Results by Sector, 2019



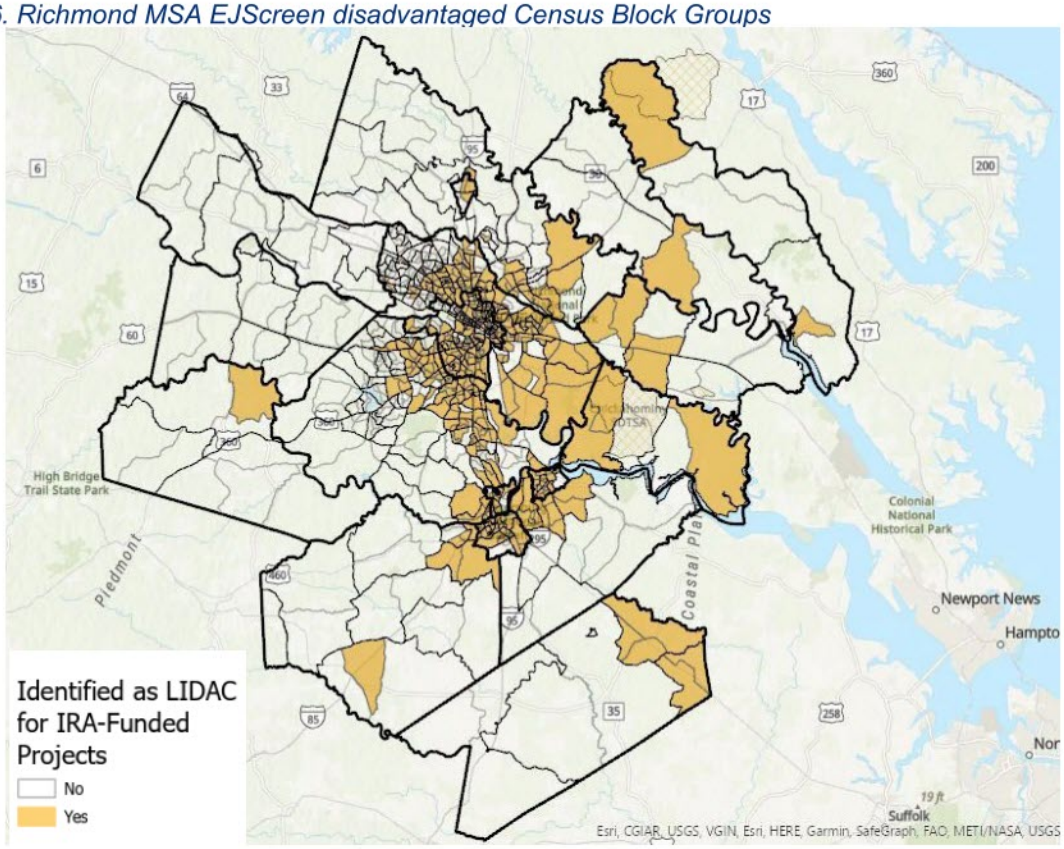
Richmond MSA LIDACs

A core component of the CPRG and much of the IRA is to provide benefits to LIDACs as these communities are particularly vulnerable to risks and impacts from climate change. Per CPRG requirements, this section identifies LIDACs in the state by Census Block ID using EJScreen (an EPA environmental justice screening tool), discusses the climate risks for LIDACs within the Richmond MSA, and presents how PlanRVA has meaningfully engaged with LIDACs in the development of this PCAP and how it will continue to engage these communities in the future.[3]

Richmond LIDAC Identification

PlanRVA utilized EJScreen to visualize and identify Census Block Groups that the EPA designates as disadvantaged in the state (see Figure 6). In Richmond, 52% of the population is located within a disadvantaged Census Block Group. Out of the 890 Census Block Groups, 500 are considered disadvantaged according to EJScreen (or 56%). A full listing of the Census Block IDs that are identified as LIDACs in Richmond is included in Appendix B.

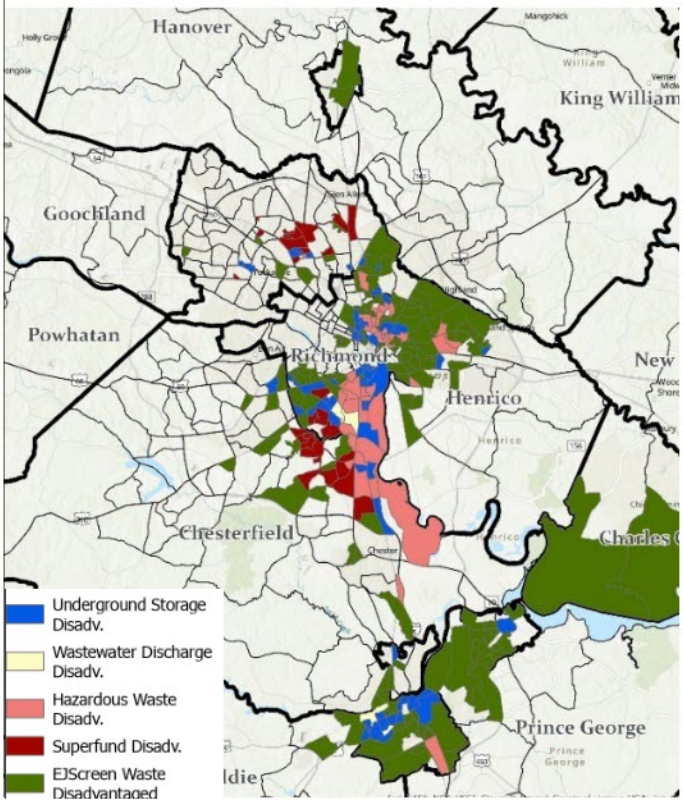
Figure 6. Richmond MSA EJScreen disadvantaged Census Block Groups



[3] The EPA defines a disadvantaged community in the following manner: 1) if it is disadvantaged according to the Climate and Economic Justice Screening Tool (CEJST); 2) if the census block is at or above the 90th percentile for any of EJScreen's Supplemental Indexes compared to the nation or state; 3) any geographic area within Tribal lands and indigenous areas as included in EJScreen.
U.S. EPA Office of Air and Radiation. "Climate Pollution Reduction Grants Program: Technical Reference Document for States, Municipalities and Air Pollution Control Agencies. Benefits Analyses: Low-Income and Disadvantaged Communities," April 27, 2023. https://www.epa.gov/system/files/documents/2023-05/LIDAC%20Technical%20Guidance%20-%20Final_2.pdf.

Because the PCAP focuses on the waste and transportation sectors, per feedback from the Steering Committee and other stakeholders (see Appendix A), Plan RVA also analyzed specific EJScreen indicators related to these sectors.

Figure 7. EJScreen Waste Disadvantaged Census Blocks in Richmond MSA, overlayed with Waste-Related Disadvantaged designations from CEJST



Using EJScreen, PlanRVA identified Census Block Groups that were specifically disadvantaged for waste-related reasons (symbolized green in Figure 7). In addition, PlanRVA overlayed waste-disadvantaged data from the Climate and Economic Justice Screening Tool (CEJST), providing a broader look at certain types of potential waste concerns, including communities with superfund or hazardous waste sites.[4] This information will help direct CCAP engagement and overall implementation efforts related to waste programs, as not all communities disadvantaged for waste-related reasons are designated as LIDACs, but they do face unique issues with potential air and water quality concerns.

As can be seen in Figure 8 below, a bivariate analysis of particulate matter 2.5µm (PM2.5) exposure and the demographic index shows that the urban center and surrounding areas of Richmond stand out as areas of concern. Particulate matter pollution comes primarily from burning gasoline and diesel in internal combustion engine vehicles. The combination of high PM2.5 exposure and the concentration of disadvantaged communities highlights an environmental justice challenge in Richmond MSA. The adverse health effects associated with prolonged exposure to PM2.5, such as respiratory issues and cardiovascular diseases, are exacerbated in these communities, where access to healthcare and resources may already be limited.

[4] EJScreen considers communities identified as disadvantaged in CEJST as one of its criteria. If a community is labeled as disadvantaged in CEJST, it is also recognized as disadvantaged in EJScreen.

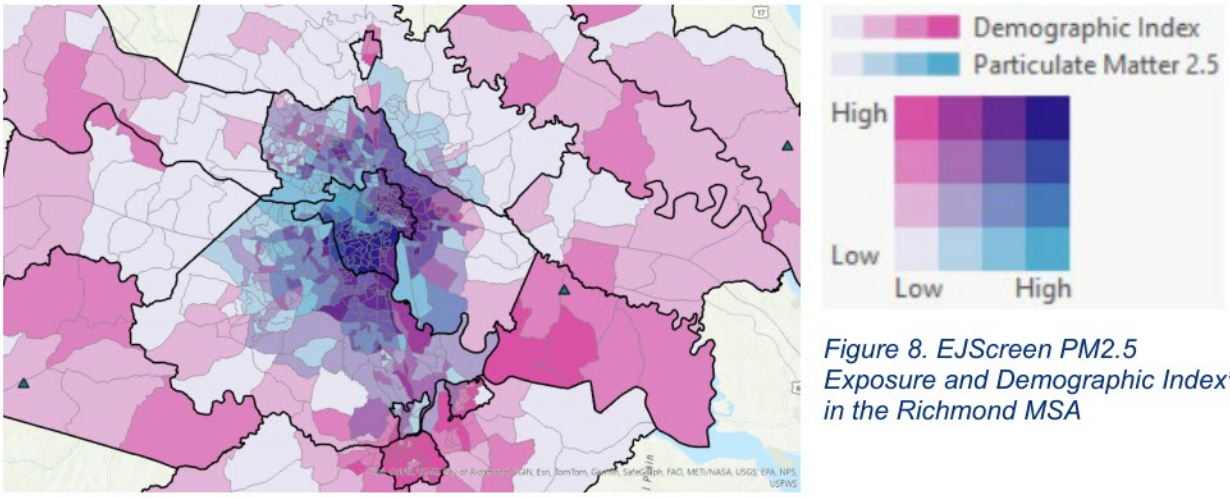


Figure 8. EJScreen PM2.5 Exposure and Demographic Index[5] in the Richmond MSA

Climate Risks to Metropolitan Richmond's LIDACs

Social systems inequitably distribute negative impacts from climate risks on Black, Indigenous, and People of Color (BIPOC) individuals and communities, low-income households, unhoused individuals, rural communities, and agricultural workers. Not only do these communities experience the most severe impacts of climate change, but they are also the least able to prepare for and respond to these impacts due to a lack of resources and socio-political power. According to a 2021 EPA analysis, racial and ethnic minorities are particularly vulnerable to climate change impacts, especially Black and African American individuals.

Due to limited access to resources, such as adequate infrastructure and insurance, minority and low-income communities are more likely to suffer the consequences of climate change with heightened exposure to climate risks. Many factors contribute to this inequality, including historical discriminatory practices in housing, education, and employment. Pre-existing health status and living

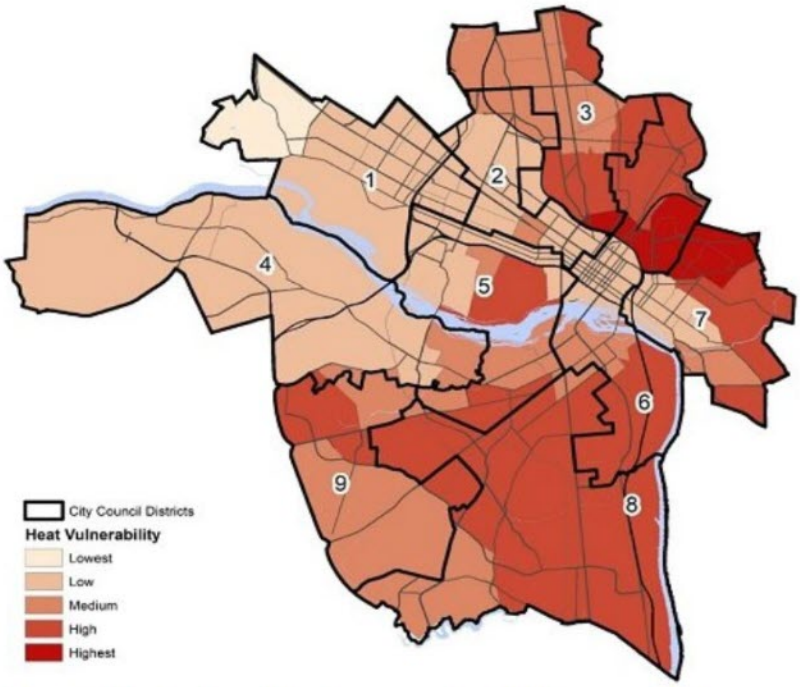
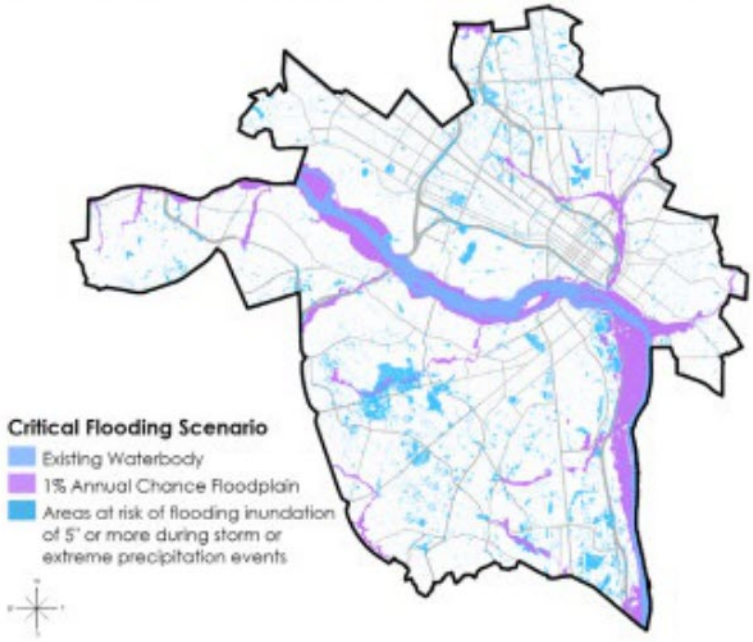


Figure 9. Heat vulnerability by census tract (RVAgreen 2050 Climate Equity Index, 2019)

[5] The Demographic Index in EJScreen is a combination of percent low-income and percent minority.

conditions are two key components of climate vulnerability that are often determined by economic power, social policies, political influence, and structural racism.

Figure 10. Map of Flood Risk by Census Tract (RVAgreen 2050



The Richmond MSA, like many parts of the United States, may face challenges of extreme weather events, extreme heat, flooding, sea level rise, drought, and wildfires due to climate change. However, because of the socio-economic landscape and local factors of the MSA, a closer examination is needed to identify which of these risks pose the most imminent and severe threats to disadvantaged communities. A majority of the LIDACs in the Richmond MSA are located within the City of Richmond, so it is necessary to take a close look at the city's climate risks and how they interact with disadvantaged communities. In 2022, the City of Richmond created RVAgreen 2050: an equity-centered climate action and resilience planning initiative led by the Office of Sustainability. To understand the specific risks facing Richmond, a Climate Vulnerability and Risk Assessment was conducted.

Richmond is seeing continued increases in annual average daily maximum temperatures. By 2070, annual average daily maximum temperatures may increase to as much as 77˚F under a high emissions scenario (as compared to the baseline of 68.5˚F for the 1961–1990 period).[6] There have been more and more days reaching 95˚F or higher as well. Historically, Richmond has seen 9 days per year over 95˚F. By 2100 (under a high emissions scenario), this could rise to 74 days. Future heat waves will be more intense as well.[7]

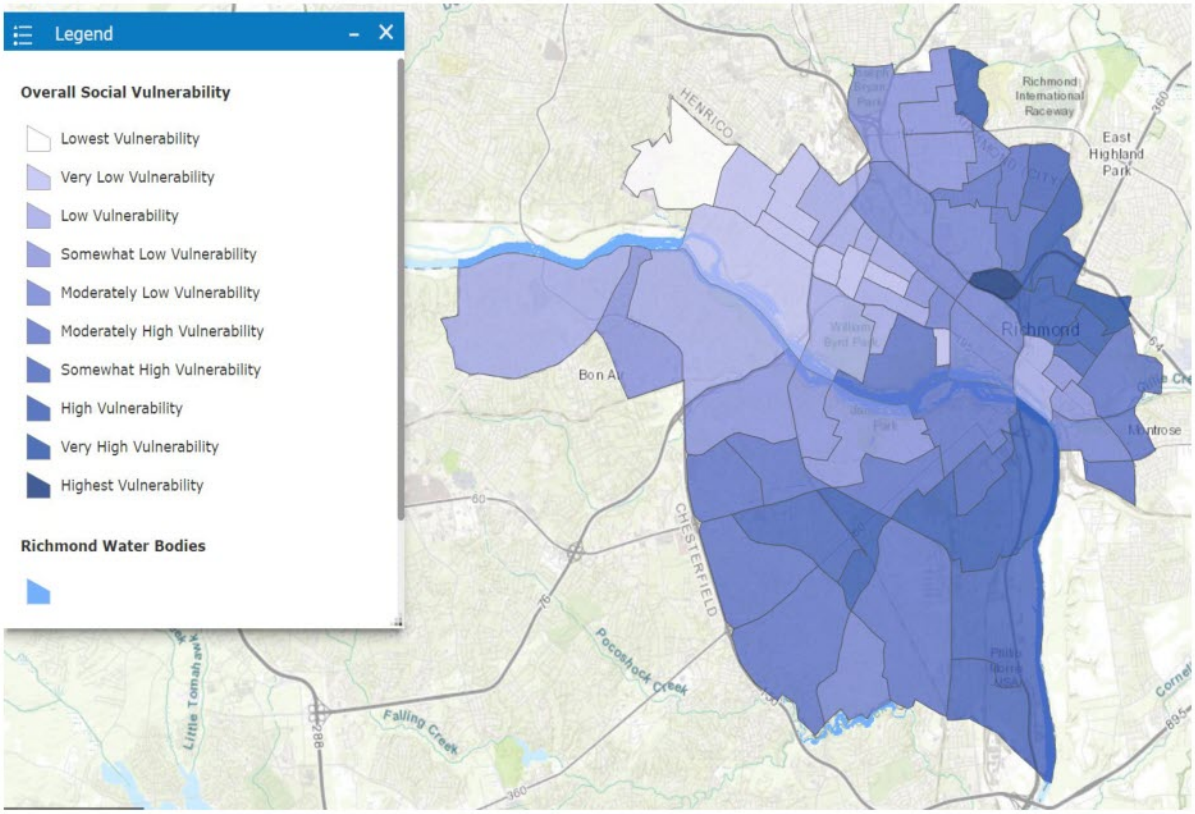
Average annual precipitation is projected to increase in the winter and spring, with winter precipitation levels increasing by 15% under a blender scenario by the 2080s. [8] The annual number of extreme precipitation events is projected to increase as well.[9] Virginia is facing sea level rise at a greater-than-average rate than the rest of the world due to post-glacial rebound, a

[6] A high emissions scenario refers to a Shared Socio-economic Pathway (SSP) that represents the upper boundary of radiative forcing (for example, SSP5-8.5 represents a pathway with an additional radiative forcing of 8.5 W/m2 by 2100). Under a high emissions scenario, there is intensified exploitation of fossil fuel resources and a more energy-intensive global lifestyle (Böttinger, M. and Kasang, D. The SSP Scenarios. Deutsches Klimarechenzentrum.)
[7] City of Richmond. RVA Green 2050. 2022. https://www.rvagreen2050.com/virtual-resilience-hub
[8] A blended scenario refers to a scenario which uses a combination of moderate and high global emissions scenarios.
[9] Extreme precipitation events are defined as events with more than 2 inches of precipitation in 24 hours

process where melting ice sheets cause once-covered land to lift up, and land around the periphery (like Virginia) to sink.[10] Since 1880, global sea levels have risen 7–8 inches, while sea levels along the Virginia coast have risen 17 inches between 1930 and 2020. By 2100, global sea level is projected to rise another 1–4 feet. Although Richmond is more inland and will thus be less impacted by sea level rise, some communities along the James River may be affected. Beyond the city, farmland and riverside properties in Prince George, Charles City, New Kent, King William, and King and Queen counties are vulnerable to sea level rise.

The city created the Climate Equity Index to understand how social and demographic factors are tied to the climate vulnerabilities described above.[11] Figure 11 shows the Index's social vulnerability map, which visualizes relative climate vulnerability (due to a combination of climate impacts, demographics, built assets, and natural resources) across Richmond's census tracts. The neighborhoods most adversely impacted by climate change risks, such as extreme heat and flooding, are the East End, Southside, and Northside. These neighborhoods are also most impacted by wealth inequity, underlying health conditions, and lack of transportation access.

Figure 11. Richmond MSA social vulnerability map by census tract from the RVAgreen Climate Equity Index



[10] Woods Hole Oceanographic Institution. 2018. Why is Sea Level Rising Faster in Some Places Along the U.S. East Coast Than Others? https://www.whoi.edu/press-room/news-release/why-is-sea-level-rising-higher-in-some-places-along-u-s-east-coast-than-others/

[11] The Index uses a list of 15 demographic variables from the CDC Social Vulnerability Index as well as an additional 24 geographic factors based on research for a total of 39 factors. These 39 factors impact an individual's or community's vulnerability to climate change – particularly heat, severe storms, and flooding.

Priority Climate Action Plan Measures

The Richmond MSA has identified seven priority, implementation-ready measures that will reduce GHG emissions in the short- and long-term. The measures were developed through the process outlined in the Approach to PCAP Development: Priority GHG Reduction Measures section. A list of CPRG project and program ideas submitted to PlanRVA is included in Appendix A, though this list is not comprehensive of all potential projects and programs that may be pursued under a measure.

The PCAP measures and the potential cumulative GHG emissions reductions for each are identified in Table 4 below, followed by an overview of implementation milestones (see Appendix D for details on the GHG reduction quantification methodology). The following sections provide an overview of potential benefits and a summary of potential impacts to LIDACs. Each priority measure is then described in detail, including the measure description, geographic coverage, key implementing agency(ies), implementation actions, authority to implement, and potential impacts to LIDACs.

Table 4. Summary of PCAP Measures and Related GHG Inventory Sector(s)

PCAP Measure	Sector(s)	Cumulative GHG Reductions ($MMTCO_2e$)
1. Support, incentivize, and provide assistance for the rapid adoption, equitable installation, and use of Zero-Emission Vehicles	On-Road Transportation	2025–2030: 1.08 2025–2050: 45.02
2. Expand equitable transit access.	On-Road Transportation	2025–2030: 0.02 2025–2050: 0.67
3. Provide and promote new and expanded opportunities to reduce vehicle miles traveled through micromobility options and connected multimodal infrastructure.	On-Road Transportation	2025–2030: 0.14 2025–2050: 1.47
4. Reduce GHG emissions from solid waste.	Solid Waste	2025–2030: 2.29 2025–2050: 24.64
5. Implement decarbonization strategies for municipal operations.	Local Government Operations	2025–2030: 0.42 2025–2050: 7.29
6. Accelerate and support the deployment of energy efficiency solutions and incentivize the transition to clean energy of residential and commercial buildings	Buildings	2025-2030: 0.77 2025-2050: 6.31
7. Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.	Off-Road Transportation	2025–2030: 0.010 2025–2050: 0.031

The majority of the potential GHG reductions will occur in the long run, particularly for the waste diversion and ZEV adoption measures. However, the implementation of actions and projects across all PCAP measures will begin in the near term (i.e., pre-2030), albeit subject to available staffing, funding, and other resources. Depending on the funding available, it may take more time to ramp up actions and secure additional funding and resources for implementation. Successful implementation of the measures will require significant coordination and partnerships across all key implementing agencies/actors, and PlanRVA intends to further develop those relationship and partnerships throughout the CCAP and implementation phases

of the CPRG program. Table 5 below summarizes the general timeline for implementing the CPRG program and PCAP measures in the near-term.

Table 5. CPRG Implementation Milestone Summary

Milestone	Timeframe
2024	
Deliver PCAP to EPA, which includes stakeholder input on measures.	March 1, 2024
Submit CPRG Implementation Grant applications.	April 1, 2024
CCAP development, which will include identifying additional measures, broad engagement activities, and quantifying emission, cost, benefit, workforce, and LIDAC impacts.	Mid–Late 2024
2025	
Coordinate resources across jurisdictions and take initial actions across the PCAP measures where feasible.	2025
Finalize CCAP, which will include identifying additional measures, broad engagement activities, and quantifying emissions, cost, benefit, workforce, and LIDAC impacts, and deliver to EPA.	Summer 2025
2026	
Continue implementing CPRG measure actions where feasible.	2026+
Secure local government approval and budget for ongoing GHG reductions, in addition to seeking additional outside funding opportunities.	2026+
Track progress toward GHG reduction targets and other milestones, and collect data as needed to prepare the Status Report.	2026+
2027	
Deliver Status Report to EPA.	Mid-2027
Continue to implement measures and reduce GHGs at the county level and for municipal operations. Track progress across the Richmond MSA.	2027+
2030	
Complete initial stage of implementing PCAP actions; actual timing and specific projects implemented will depend on available staffing, funding, and other resources.	2030+

PCAP Measure Co-Benefits

The measures outlined in the PCAP will not only reduce GHG emissions but will also reduce co-pollutants and provide several co-benefits across the Richmond MSA region. Potential benefits include reduced noise and air pollution, physical and mental health improvements, economic development and job creation, and community capacity building.

The reduction of GHG emissions and other co-pollutants through decreased fossil fuel (e.g., coal, natural gas, and petroleum) use in vehicles and electric power generation, combined with increased waste diversion and improved landfill management practices will have near- and long-term public health and socioeconomic co-benefits for the region. In the near term, benefits include improving indoor and outdoor air quality and reducing hazardous air pollutants, toxins, and other pollutants. Reducing these types of pollutants can immediately benefit the physical and economic wellbeing of communities. In the long term, reducing GHGs will mitigate the

effects of climate change and further bolster regional public health and socioeconomic wellbeing.

The pollutants impacted by the PCAP measures include those listed in Table 6 below.

Table 6. PCAP Measures and Related Pollutant Types

Pollutant	Air Pollutant Type	Categories of Related Measures
Carbon Dioxide (CO2)	GHG	All
Hydrofluorocarbons (HFCs)	GHG	Buildings, Transportation
Methane (CH4)	GHG	All
Nitrous Oxide (N2O)	GHG	Buildings, Transportation
Carbon Monoxide (CO)	Co-pollutant: Criteria Air Pollutant	Buildings, Transportation
Lead	Co-pollutant: Criteria Air Pollutant	Buildings, Transportation
Nitrogen Oxides (NOx)	Co-pollutant: Criteria Air Pollutant	Buildings, Transportation
Particulate Matter (e.g., PM2.5)	Co-pollutant: Criteria Air Pollutant	Buildings, Transportation
Sulfur dioxide (SO2)	Co-pollutant: Criteria Air Pollutant	Buildings, Transportation
Ozone	Co-pollutant: Criteria Air Pollutant	Buildings, Transportation
Volatile Organic Compounds (VOCs)	Co-pollutant: VOCs	Buildings, Transportation
Other hazardous air pollutants (HAPs)	Co-pollutant: Air Toxics	Buildings, Transportation

Public Health Co-Benefits. Improved public health is a significant and direct co-benefit of reducing GHG and co-pollutant emissions in the region. Health risks arise from both outdoor and indoor air pollution caused by the combustion of fossil fuels, like coal, natural gas, and petroleum, and consequent release of GHGs, hazardous air pollutants (HAPs), toxins, and other pollutants. In the United States roughly 87 percent of people's lives are spent indoors, so indoor exposure to combustion pollutants, such as natural gas for cooktops or heating, has the potential for substantial health effects.[12] Exposure to co-pollutants from the combustion of coal, natural gas, and petroleum are linked to a litany of physical health concerns, including illness and premature mortality. A large body of research on the detrimental health effects of exposure to air pollution provides strong evidence that long-term exposure to ambient particulate matter (i.e., PM2.5), ambient ozone, and household air pollution contributes to premature mortality and increased risk of illness. Evidence is also growing on the association between long-term exposure to air pollution and adverse birth outcomes, cognitive declines, and gastrointestinal inflammatory diseases. Short-term exposure to high levels of air pollution can also exacerbate asthma and cardiopulmonary symptoms.[13]

This PCAP includes measures that will directly reduce GHG and co-pollutant emissions from the combustion of fossil fuels by promoting energy efficiency, electrification, and adoption of clean

[12] U.S. EPA. 1989. Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001C. Washington, DC.
[13] Health Effects Institute. 2020. *Health Effects Institute Annual Report 2020: Valuing Science Informing Decisions.* https://www.healtheffects.org/system/files/hei-annual-report-2020.pdf

energy in municipal buildings; promoting the use of zero-emission vehicles and actions to reduce vehicle miles traveled; and by promoting actions to reduce landfill emissions in the waste sector. These public health co-benefits particularly support LIDACs, which have been shown to face the highest risk of air pollution and poor transportation resources.[14] Measures in this PCAP will also improve public health by making bicycle and pedestrian transportation safer.

Economic and Workforce Co-Benefits. Implementing these PCAP measures and actions will also have several social and economic, or socioeconomic, benefits for the MSA population, particularly for LIDACs. A key co-benefit of efforts to reduce GHGs is the expansion of the clean energy workforce. The growth of clean energy technologies, such as solar installations and EV charging infrastructure, requires trained individuals who understand how to install and maintain this hardware. Clean energy jobs training, especially for individuals in LIDACs, supports the supply chain of climate infrastructure and technology while also generating jobs and economic opportunities for communities. Installation of clean energy technologies, including distributed resources (e.g., rooftop solar PV installations and battery storage), creates more redundancy in the grid and lessens the likelihood of blackouts.[15] Therefore, these investments and clean energy workforce trainings enhance climate resilience and curb the economic impact of extreme weather events.

Many of the PCAP measures address energy use in buildings and in the transportation sector. Electrifying these fossil fuel-driven sectors and enhancing efficiencies reduces the percentage of budget or income that goes toward energy costs. Electric vehicles have lower maintenance and fuel costs than internal combustion engine vehicles.[16] Efficiencies and electrification of municipal buildings and fleets reduces the amount of public funds that must be used for energy costs alone. Reducing the energy cost burden, particularly for LIDAC residents, reduces financial stress for households and businesses, and allows funds to be used elsewhere to stimulate the economy.[17]

Community Co-Benefits. In addition to creating jobs and lowering financial stress, these measures also benefit society and the economy by promoting public education and fostering a sense of community. All the measures described in this PCAP were developed through stakeholder engagement and will be built upon during the CCAP to provide public education and outreach to ensure community members can access climate resources. This promotes social inclusion and buy-in from community members and CBOs. Additionally, the measures include actions to expand public transit, better manage waste, and improve pedestrian and bicycle routes. These factors, as well as reduced air pollution and a healthier environment, are key to promoting social inclusion and community gathering, such as opportunities to use green spaces and gather communally outside. Therefore, these measures may improve social capital,

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[14] Ebi, K. L., and Hess, J. J. (2020). Health Risks Due to Climate Change: Inequity In Causes And Consequences. *Health Affairs. 39*(12). https://doi.org/10.1377/hlthaff.2020.01125
[15] Stout, S., Hotchkiss, E., Lee, N., Holm, A., & Day, M. (2018). *Distributed Energy Planning for Climate Resilience.* NREL. https://www.nrel.gov/docs/fy18osti/71310.pdf
[16] U.S. DOE. 2022. Saving Money with Electric Vehicles. https://www.energy.gov/energysaver/articles/saving-money-electric-vehicles
[17] U.S. DOE. 2019. *Low-Income Household Energy Burden Varies Among States — Efficiency Can Help In All of Them*. Energy.gov. https://www.energy.gov/sites/prod/files/2019/01/f58/WIP-Energy-Burden_final.pdf

encourage community members to engage with their community and local economy, and benefit the overall socioeconomic well-being of the Richmond MSA.

PCAP Measure LIDAC Impacts Summary

For the PCAP, PlanRVA qualitatively assessed the potential impacts on LIDACs. Table 7 below summarizes the LIDAC benefits achieved by implementing the PCAP measures. For each measure, it is critical that careful consideration be given to potential LIDAC impacts as programs or actions are designed to minimize any potential negative impacts and maximize the potential benefits to these communities.

Table 7. Summary of Potential LIDAC Benefits from PCAP Measures

LIDAC Benefits from GHG Emissions Reductions	Achieved via this PCAP Measure
Enhanced public health outcomes stemming from reductions in co-pollutants (e.g., GHGs, particulate matter, hazardous air pollutants), leading to declines in illnesses and premature mortality associated with air pollution.	✓ All Measures
Strengthened resilience to climate change events from measures that reduce GHGs and offer climate adaptation co-benefits. GHG emissions drive climate change, so reducing emissions lowers the likelihood of climate events (e.g., extreme heat) and associated risks (e.g., heat-related illness).	✓ All Measures
Greater social capital that arises when communities can enjoy public spaces safely (i.e., without air pollution), have greater access to public resources (e.g., transportation), and overall live healthier lives with improved socioeconomic well-being.	✓ All Measures
More purposeful community engagement and enhanced public awareness of climate-related projects and their outcomes.	✓ All Measures
Less noise pollution (e.g., from vehicle traffic).	✓ Measure 1 ✓ Measure 2 ✓ Measure 3 ✓ Measure 5 ✓ Measure 7
Expanded access to alternative transportation.	✓ Measure 2 ✓ Measure 3
Cost savings associated with the transition from ICE vehicles to EVs due to lower vehicle fuel and maintenance cost.	✓ Measure 1
Increased comfort and quality of space, such as a safer, healthier workplace due to reduced indoor air pollution.	✓ Measure 5 ✓ Measure 6
Establishment of high-quality employment opportunities and workforce development initiatives in LIDAC communities, prioritizing access to the clean workforce and economy for LIDAC workers and small businesses.	✓ Measure 1 ✓ Measure 5 ✓ Measure 6
Bolstered energy security through enhancements in energy efficiency and the adoption of more resilient energy generation technologies.	✓ Measure 5 ✓ Measure 6 ✓ Measure 7

PCAP Measure 1. Support, incentivize, and provide assistance for the rapid adoption, equitable installation and use of Zero-Emission Vehicles.

GHG Reduction Measure Description

Measure 1 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **1.08 MMTCO$_2$e**

Cumulative GHG Reductions from 2025–2050*: **45.02 MMTCO$_2$e**

** See Appendix D for a summary of methods, data, and assumptions.*

To reduce emissions from the transportation sector, this measure focuses on accelerating the transition to electric vehicles (EVs) and developing a regional, equitable charging network. Supplemented by existing federal incentives, this measure will be supported through the creation and expansion of a robust charging network, development of incentive programs, workforce development, and other activities to encourage widespread adoption of EVs. Localities may also electrify their municipal fleets and equipment, such as school buses, public works trucks, refuse trucks, and department vehicles (see also Measure 5). Indirect co-benefits of this project, including improved public health and the creation of clean energy jobs, will spread throughout communities, with a particular emphasis on benefits to historically underserved LIDACs.

Key Implementing Agency(ies)

- **Regional Transportation Planning Organizations (TPOs).** Richmond Regional Transportation Organization (RRTPO) and Tri-Cities TPO can coordinate with PlanRVA to share best practices, align transportation goals and funding, and coordinate with other neighboring transportation networks to identify opportunities for collaboration.
- **Virginia State Government Agencies.** State government agencies such as the Virginia Department of Transportation (VDOT) and the Virginia Department of Motor Vehicles (DMV) will help coordinate the implementation of policies and programs and may be able to provide funding for infrastructure development. The Virginia DMV established the 2022 Electric Vehicle Rebate Program, which offers rebates of $2,500 for people who purchase EVs from participating dealers; this program is not currently funded.[18]
- **Utilities.** Local utilities need to be involved to ensure the electricity grid can support electrification of transportation. They can also provide incentives or assistance for charging installation and may provide specific rate incentives for EV charging. Dominion Energy has piloted similar programs in the past.
- **Local Government organizations.** Local governments can transition fleets to EVs supported by the adoption of green fleet policies and plans. They can devise and adopt incentives to support EV adoption, such as EV-ready building codes, and build out publicly available charging infrastructure. Local governments can also implement community-wide buying co-ops for EVs for public and private fleets as well as personal vehicles.
- **Private sector actors**. Companies can take advantage of incentives and buy/use EV and alternative fuel vehicles and build out the charging infrastructure. For example,

[18] Code of Virginia. 2021. Article 8. Electric Vehicle Rebate Program. § 45.2-1726. https://law.lis.virginia.gov/vacodefull/title45.2/chapter17/article8/

ridesharing companies can procure and offer EVs and provide EV charging infrastructure. In addition, local businesses can coordinate with local governments to bring publicly accessible charging stations to the region.

Authority to Implement

The actions taken under this measure would be predominantly voluntary incentives. Local jurisdictions have the authority to purchase vehicles for their fleets; such purchases have already been started across the MSA. In some instances, purchasing or procurement policies may need to be adjusted to prioritize low- and zero-emissions vehicles (ZEVs). Private and personal purchasing of low emission vehicles and ZEVs does not have any statutory limitations. Local zoning, code or other policy changes may need to be made for charging infrastructure.

Implementation Activities and Milestones

Actions to implement this measure could include, but are not limited to the following:

- Update the 2013 Regional EV Infrastructure Plan (REVI).
- Create incentives and programs for EV and low-emissions vehicles. Incentives can include direct financial incentives or exemptions to certain restrictions (such as high occupancy vehicle (HOV) lane exemptions in Virginia or emissions testing exemption in Virginia).
- Develop and support regional EV and ZEV fueling infrastructure:
    - Conduct regional charging/siting analysis with contractor support and community engagement.
    - Develop incentive programs for EV chargers in multifamily, public, commercial, and rental properties, including affordable housing developments.
    - Create and implement model ordinances that mandate or incentivize clean fuel infrastructure into development and/or provide model zoning code or other policy updates. This may leverage updated requirements in Virginia's High-Performance Buildings Act (HB2001), which includes building performance standard requirements for new public buildings related to EV charging infrastructure.
    - Conduct workforce assessment to understand gaps in the labor market needed to support widespread ZEV and EV adoption. Provide training (e.g., through the Electric Vehicle Infrastructure Training Program) for installation and maintenance of EV charging and fueling infrastructure. Some of these opportunities should be focused in LIDACs to bring benefits to these communities.
    - Conduct regular analysis of the state of clean fuel infrastructure to address any gaps in charging/refueling needs that may hamper the rate of transition. Virginia is investing in statewide EV infrastructure, a key factor in widespread EV adoption, with significant funding through the National Electric Vehicle Infrastructure (NEVI) Program, including along alternative fuel corridors within the MSA.[19]

[19] https://www.fhwa.dot.gov/environment/nevi/ev_deployment_plans/va_nevi_plan.pdf

    - Leverage statewide resources such as Drive Electric Virginia, an initiative to advance EV adoption. Led by Virginia Clean Cities and partnering organizations, the program engages stakeholders to address EV adoption barriers and accelerating plug-in EV use throughout the state.[20]
- Public education and engagement for all actions included above: Education, marketing and outreach (to develop plans and implement incentives and programs), and real-time data will help accelerate the deployment of ZEVs. Targeting education and engagement efforts on LIDACs through partnering with community leaders and CBOs will help bring additional co-benefits to these populations (e.g., air pollution and health benefits, social capital, etc.).

Geographic Coverage

The initiatives outlined in this measure target the entire MSA region.

LIDAC Benefits

Air pollution from burning fossil fuels has historically been concentrated in LIDACs where community members also have reduced access to medical care and other resources due to poverty, disenfranchisement, lack of transportation, etc.[21] This is particularly true for LIDACs that are highway adjacent. Benefits for LIDACs may include improved air quality and health benefits resulting from reductions in tailpipe emissions from internal combustion engine vehicles (ICEVs), including potential reductions in new asthma cases, hospital admissions, and emergency department visits, reduced noise pollution, and reduced cost for vehicle ownership, especially as the second-hand market for EVs grows.[22] Cost barriers to EV ownership will still exist for LIDACs, so programs and incentives may be expanded or designed to help overcome these barriers.

Community members of LIDACs who are currently employed in auto industry related jobs, such as maintenance, repair, and resale, may see opportunities decline as the market transitions to primarily electric vehicles. Job training programs may be targeted at LIDACs to retain those employees in the field and prevent blue-collar LIDAC workers from being left out of the EV transition. Similarly, job training and apprenticeship programs can be targeted to support the deployment of new charging infrastructure, which requires skilled tradesfolk from many disciplines.

Additionally, with the Virginia Clean Economy Act's target for net zero emissions from the electric power sector, electric vehicles are likely to be charged with cleaner sources of electricity generation over time (e.g., solar and offshore wind). These will replace fossil fuel-fired coal and natural gas plants in the region, which contribute to poor air quality and health issues, particularly for adjacent communities.

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[20] Drive Electric Virginia. About. Virginia Clean Cities. https://driveelectricva.org/about/
[21] American Lung Association. 2023. Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity. https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf
[22] Department of Energy. 2022. Saving Money with Electric Vehicles. https://www.energy.gov/energysaver/articles/saving-money-electric-vehiclses

PCAP Measure 2. Expand equitable transit access.

GHG Reduction Measure Description

To address emissions from the transportation sector, this measure aims to expand equitable access to public transit options. Improving public transit is an effective method to reduce emissions by reducing the vehicle miles traveled (VMT) from largely single-occupancy vehicles. Improving access to and the design of transit services can reduce VMT by increasing accessibility to local and regional destinations, such as housing, jobs, and goods/services.

Measure 2 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **0.02 MMTCO$_2$e**

Cumulative GHG Reductions from 2025–2050*: **0.67 MMTCO$_2$e**

** See Appendix D for a summary of methods, data, and assumptions.*

Key Implementing Agency(ies)

- **Local governments and municipalities**. Local governments are responsible for land-use planning and comprehensive planning, transportation planning and transportation-related policies, and local policies and programs that may incentivize or unintentionally disincentivize public transit use and equitable access. Funding for public transit also comes in part from local governments.
- **VDOT and Virgina Department of Rail and Public Transport (VDRPT).** These state agencies will be key partners in transportation infrastructure planning, development, and operations, such as changes to roads to prioritize bus transportation along state routes. Certain road planning decisions could also induce demand for car travel, which could weaken GHG reduction progress.
- **Metropolitan Planning Organizations (MPOs)**. RRTPO and Tri-Cities MPO coordinate transportation planning for most of the Richmond MSA localities. As of January 2024, new federal rules require MPOs to set emissions reduction targets and to publish regular accounting of transportation emissions. RRTPO and Tri-Cities MPO will coordinate with PlanRVA to set a shared target that aligns with the CPRG. MPOs also prioritize transportation initiatives, craft policies for financial programming, and coordinate planning with VDOT and VDRPT, the Central Virginia Transportation Authority, and other partners.
- **Public Transportation Operators.** The GRTC Transit System provides public transit services to Richmond and parts of Chesterfield and Henrico. This includes fixed routes, rapid transit routes, and paratransit services. It also operates RideFinders, which is a regional nonprofit agency that works to reduce the number of single-occupancy vehicle trips. Petersburg Area Transit operates public transit and paratransit services in the Tri-Cities area. Other smaller operators, such as Bay Transit, provide service in the more rural portions of the region.
- **Private sector partners.** Landowners and developers may play a role in development decisions that shape the viability of transit options. Private rail companies (e.g., Amtrak) are also essential players in connecting the MSA to the broader state and region.

Authority to Implement

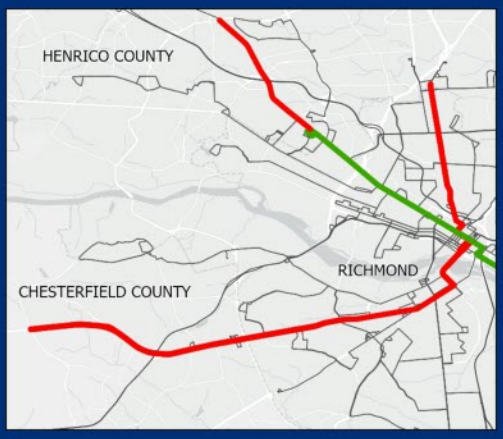
Actions related to public transportation may need approvals from regional or state transportation agencies to be implemented and will need higher levels of authority depending on the scope and scale of changes to public infrastructure. Employers also play a key role in providing company polices to allow for teleworking or incentives for transit ridership. Actions and policies that impact land use can be administered by local jurisdictions though zoning codes and potential changes, and developers can act on where to build based on these policies.

Implementation Activities and Milestones

Actions to implement this measure could include, but are not limited to the following:

- Provide improvements and enhancements in public transit service, including:
  - Expanded bus service/bus rapid transit (BRT)
  - Operational and service enhancements (such as increased route frequency and live bus tracking)
  - Bus stop improvements (such as benches and bus shelters)
  - Transit station improvements (such as mobility hubs that bring together transit, maintenance, and investments to improve reliability and quality of service)
- Assess Park-and-Ride lot locations, and place Park-and-Rides in strategic locations to provide drive-to access for the higher-speed transit services throughout the region.
  - The Virginia Department of Rail and Public Transit has conducted multiple studies and plans on transit modernization, connectedness, road needs, rural micro-transit, rail connectivity, transit equity, and more that could be leveraged to support assessments in the MSA.[23]
- Support land use policies that encourage development near high-capacity transit stations and within activity centers, including design that supports multimodal transit.
- Implement incentives that encourage use of sustainable modes, such as incentives for using transit/reduced or fare-free transit.
- Public education and engagement for all actions included above: Education, marketing and outreach (when developing project plans and implementing incentives), and real-

Box 2. Bus Rapid Transit (BRT) Project Highlight



Partners in the Richmond Region, including GRTC, the City of Richmond, Chesterfield County, Henrico County, and the RRTPO are moving forward with an expansion of the current Pulse BRT that includes a 4-mile extension of the existing Pulse route and an entirely new 16-mile North–South BRT route. The existing Pulse line is green and both BRT expansion projects are shown in red.

(Visit https://arcg.is/W0GLC0 and https://arcg.is/0vLaSW for more)

[23] Virginia DRPT. "All DRPT Studies & Reports – DRPT." Virginia Department of Rail and Public Transportation, 2024. https://drpt.virginia.gov/studies-and-reports/.

time data will help increase use of public transit options. Targeting education and engagement efforts on LIDACs through partnering with community leaders and CBOs will help bring additional co-benefits to these populations (e.g., air pollution and health benefits, social capital, etc.).

Geographic Coverage

The initiatives outlined in this measure target the entire MSA region.

LIDAC Benefits

Air pollution from the burning of fossil fuels has historically been concentrated in LIDACs where community members also have reduced access to medical care and health resources due to poverty, lack of transportation, etc.[24] This is particularly true for LIDACs that are highway adjacent. Benefits for LIDACs from reduced VMT across the region may include improved air quality and health benefits resulting from reductions in tailpipe emissions from ICEVs, including potential reductions in new asthma cases, hospital admissions, emergency department visits, and reduced noise pollution. Members of LIDACs also disproportionately rely on public transportation to reach work, school, medical facilities, and other necessary destinations. Expansion and enhancements of the public transit options may help alleviate certain barriers to educational and job opportunities.

This measure also includes transit-oriented development considerations for land use policies. Transit-oriented development historically leads to gentrification when supportive policies are not implemented to protect underserved homeowners and renters. This measure will require partnership among municipalities, transit agencies, and the development community to truly benefit LIDACs.

[24] American Lung Association. 2023. Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity. https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf

PCAP Measure 3. Provide and promote new and expanded opportunities to reduce vehicle miles traveled through micromobility options and connected multimodal infrastructure.

GHG Reduction Measure Description

This GHG reduction measure will implement projects and policies to reduce emissions in the transportation sector across the MSA by making changes to expand micromobility options (e.g., bike sharing) and active transportation infrastructure (e.g., sidewalks and bike lanes) to reduce single-occupancy vehicle travel in the region. Telework options may also be incentivized to reduce VMT and provide more flexibility.

Measure 3 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **0.14 MMTCO$_2$e**

Cumulative GHG Reductions from 2025–2050*: **1.47 MMTCO$_2$e**

** See Appendix D for a summary of methods, data, and assumptions.*

Key Implementing Agency(ies)

- **Local governments and municipalities.** Localities are responsible for land-use planning and comprehensive planning, transportation planning, development and operations of transportation programs and policies. They are responsible for the design, construction, and maintenance of bike/ped infrastructure. Public Works departments are typically responsible for maintenance of bike/ped infrastructure.
- **Regional planning organizations**. PDCs and MPOs coordinate bike/ped and other micromodal transportation across jurisdictions. They also help bring nonprofit and private stakeholders into the process. Regional planning organizations evaluate and, in some cases, fund active transportation projects.
- **Virginia State Agencies.** VDOT and other state agencies will be key partners in transportation infrastructure planning, development, and operations, especially for projects that span multiple jurisdictions.
- **Private sector partners.** Private sector partners, such as land-use owners, developers, and businesses play a key role in development decisions and design that affect the viability of using alternatives to driving. Business can also implement telecommuting policies, active transportation incentives, and other policies that help manage travel demand. Building developers can incorporate amenities such as bike storage that support micromobility options. Private companies also provide micromobility options on a rental basis, either through contracts with localities or in the free market.

Authority to Implement

The actions associated with making changes to increase pedestrian and bicycle infrastructure can be administered by local jurisdictions. Policies that impact land use can similarly be administered by local jurisdictions though zoning codes and potential changes, and developers can act on where to build based on these policies. Employers also play a key role in providing company policies to allow for teleworking.

Implementation Activities and Milestones

Actions to implement this measure could include, but are not limited to the following:

- Implement infrastructure improvements to support non-motorized travel, such as roadway design that makes walking and biking safer, adding protected bicycle and pedestrian pathways like the Fall Line trail[25] (see Box 3), and adding/repairing sidewalks, and improving crosswalks.
    - On the state level, the Virginia Department of Transportation has developed a Bicycle Policy Plan in 2011 and Pedestrian Policy Plan in 2014 to advance these elements from the 2004 policy.[26,27] These are supported by implementation guidance for design and construction of active infrastructure, as well as annual reports that track improvements in bicycle and pedestrian accommodations.[28] These resources could be leveraged to support strategic improvements in the MSA region.
- Implement incentives that encourage use of sustainable modes, such as rebates for purchasing e-bikes and for employers to adopt telework and alternative transportation options (including ridesharing, public transit, biking, and walking).
- Expand/require the use of transportation planning tools (e.g., ECO-Logical) to measure the impact of projects on surrounding ecosystems and minimize environmental impacts and project costs.[29]
- Implement or expand policies that promote car/ride sharing and reducing vehicle travel, such as through reduced or eliminated parking minimums, parking pricing, and congestion pricing, as well as HOV-3 free and other policies to encourage ride sharing.
- Public education and engagement for all actions included above: Education, marketing and outreach (when developing project plans and implementing incentives), and real-time data will help increase use of public transit options. Targeting education and engagement efforts on LIDACs through partnering with community leaders and CBOs will help bring additional co-benefits to these populations (e.g., air pollution and health benefits, social capital, etc.).

Geographic Coverage

The initiatives outlined in this measure target the entire MSA region.

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[25] Read more about the Fall Line project at falllineva.org.
[26] VDOT. 2011. State Bicycle Policy Plan. https://www.vdot.virginia.gov/media/vdotvirginiagov/about/programs/biking-and-pedestrian/bike_ped_policy.pdf
[27] VDOT. 2014. State Pedestrian Policy Plan. https://www.vdot.virginia.gov/media/vdotvirginiagov/about/programs/biking-and-pedestrian/SPPP_FINAL_OnLine_LowRes.pdf
[28] VDOT. 2024. Bicycle and Pedestrian Accommodations. https://www.vdot.virginia.gov/doing-business/technical-guidance-and-support/transportation-and-mobility-planning/bicycle-and-pedestrian-accommodations/
[29] ECO-Logical is an ecosystem approach to developing infrastructure projects created by the U.S. DOT Federal Highway Administration. It provides a transportation planning framework that leverages stakeholder engagement and agency collaboration to help integrate natural resource and ecological considerations into infrastructure planning, design, review and constructure. PlanRVA is already using the ECO-Logical process for project planning.

LIDAC Benefits

Air pollution from the burning of fossil fuels has historically been concentrated in LIDACs where community members also have reduced access to medical care and health resources due to poverty, lack of transportation, etc.[30] This is particularly true for LIDACs that are highway adjacent. Benefits for LIDACs from reduced VMT across the region may include improved air quality and health benefits, resulting from reductions in tailpipe emissions from internal combustion engine vehicles (ICEVs), including potential reductions in new asthma cases, hospital admissions, emergency department visits, and reduced noise pollution. An improved active transportation system also supports more physical activity. As LIDACs have higher rates of physical inactivity due to social and structural barriers, and related chronic conditions, increased physical activity supports healthier lifestyles, improving physical and mental health outcomes and reducing medical costs.

Benefits from this measure may also include social and physical health, such as greater social inclusion, including in sharing, local, and circular economies and increased access to social and cultural activities, and promotion of exercise when engaging in active transportation. LIDACs also disproportionately suffer from lack of access to reliable transportation and have lower car ownership rates. At the same time, these communities are also less likely to have safe biking

Box 3. Fall Line Project Highlight

Fall Line is a proposed 43-mile trail connecting seven localities between Ashland and Petersburg[1]. Fall Line evolved from the developing network of active transportation routes in the greater Richmond region. Several sections of the planned trail corridor have already been implemented as bike lanes, park trails, or existed in localities' comprehensive and special area plans. A natural corridor for a long-distance trail began to emerge from cooperation among the seven localities connected along the corridor that could provide opportunities for active transportation, recreation, and economic development. The localities include the Town of Ashland, Hanover and Henrico Counties, City of Richmond, Chesterfield County, City of Colonial Heights, and City of Petersburg.



Figure 12 Fall Line project route

[30] American Lung Association. 2023. Driving to Clean Air: Health Benefits of Zero-Emission Cars and Electricity. https://www.lung.org/getmedia/9e9947ea-d4a6-476c-9c78-cccf7d49ffe2/ala-driving-to-clean-air-report.pdf

and walking routes to school or work and may have less access to micromobility options such as bikeshares. Increasing and improving micromobility opportunities may improve LIDAC

access to employment and activity centers and reduce the transportation cost burden to LIDAC households.

PCAP Measure 4. Reduce GHG emissions from solid waste.

GHG Reduction Measure Description

This measure is focused on reducing emissions from the disposal of municipal solid waste in landfills by diverting waste (including organic and recyclable materials) from landfills and implementing programs to reduce the unnecessary consumption of single-use plastics.

Measure 4 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **2.29 MMTCO$_2$e**

Cumulative GHG Reductions from 2025–2050*: **24.64 MMTCO$_2$e**

** See Appendix D for a summary of methods, data, and assumptions.*

Key Implementing Agency(ies)

- **Local government departments of public works and/or water**. Municipal agencies oversee landfills, solid waste management and recycling contracts, wastewater treatment operations and facilities, and other waste related programs. They are empowered by the Virginia State Code to pass recycling and waste ordinances. Local governments will also provide policy implementation.
- **Regional Waste Authorities.** Central Virginia Waste Management Authority (CVWMA) will be a key implementer of alternatives to landfilling MSW and will provide policy implementation. CVWMA does not serve all localities in the MSA.
- **Private sector partners.** All landfills in the region are owned by private companies. Regional waste authorities contract with private companies to collect and transport municipal waste. Commercial composting and waste-to-energy facilities may also be operated by private companies and could be key partners. Owners or operators of solid waste disposal facilities, with some exceptions, shall implement a gas management plan in accordance with the gas control requirements to protect the landfill cap and prevent the migration of landfill gas into structures or beyond the facility boundary.
- **Virginia Department of Environmental Quality**. DEQ reviews and issues permits for the construction, operation, or modification of a solid waste management facility.

Authority to Implement

The implementing authorities for this measure are county government agencies (e.g., Public Works) in partnership, where applicable, with regional waste authorities, private utilities, landfills, and composting facilities, among others. Public waste management, demonstration projects, waste-related policies, and public education campaigns can all be carried out under the existing powers of local governments. Partnerships with the private sector will be required for projects that relate to solid waste management facilities.

Implementation Activities and Milestones

Actions to implement this measure could include, but are not limited to the following:

- Increase solid waste diversion rate to at least 80% while exploring and implementing alternative options to landfilling MSW.
    - Expand existing programs or establish new ones to enable using organic waste for compost, including yard trimmings and food waste, and create/increase curbside pickup of organic waste. Provide technical assistance to regional waste authorities and local governments to determine the best programmatic option for each community, whether it be drop-off sites or curbside pickup, with a particular focus on expanded access to community members in LIDACs.
    - Invest in organics and food composting operations at existing and new solid waste facilities, including composting, mulching, and landfill facilities.
    - Enhance pre- and post-consumer organic waste programs. For example, reduce food waste by redirecting edible food to vulnerable communities.
    - Encourage and increase solid waste diversion from businesses/institutions by scaling pilot projects (see Box 4) and providing incentives.
- Conduct waste education and public service campaigns around options for waste diversion. Targeting education and engagement efforts on LIDAC through partnering with community leaders and CBOs that represent LIDACs will help bring additional benefits to these populations.
- Engage with the business community and other stakeholders to develop and enact policies to reduce the use of single-use packaging (e.g., plastic bags, plastic straws, polystyrene).
- Explore options to incentivize the expansion of landfill gas capture systems as applicable and increased monitoring of off gas from landfills. Additionally, consider options for expanded beneficial use of captured gas from landfills and anaerobic digesters.

Box 4. Hospital Recycling Pilot Program Highlight



Henrico Doctors' Hospital pilot recycling program, which was launched in 2018 and paired with an environmental education program for hospital staff, helped the hospital win the 2023 Virginia Governor's Environmental Excellence Gold Medal Award in Sustainability. With full staff participation, Henrico recycles more than 12,500 pounds of waste each month, about 6% of the hospital's total waste generated. The program has since expanded to two ambulatory surgery centers, leading to 200,000 pounds of recycled waste per year.

Geographic Coverage

The initiatives outlined in this measure target the entire MSA region.

LIDAC Benefits

Benefits for any LIDAC within the MSA located near a landfill or affiliated operations may include improved air quality and therefore health benefits, resulting from potential reductions in landfill emissions. This can also lead to lower overall healthcare costs, fewer impacted days of work, and other economic benefits.

PCAP Measure 5. Implement decarbonization strategies for municipal operations.

GHG Reduction Measure Description

This GHG reduction measure focuses on deploying renewable and low-carbon energy resources, energy efficiency measures, and low-carbon solutions for municipal and school buildings, operations, and fleets. This measure will support existing and new clean energy, efficiency, and decarbonization efforts that demonstrate leadership by example, while also providing an additional co-benefit where these facilities serve as community and public resource centers.

Measure 5 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **0.42 MMTCO$_2$e**

Cumulative GHG Reductions from 2025–2050*: **7.29 MMTCO$_2$e**

** See Appendix D for a summary of methods, data, and assumptions.*

Key Implementing Agency(ies)

- **Local Government organizations**. All local government entities, such as counties, cities, boroughs, townships, and other forms of local government, as well as their respective school districts and public agencies, can set decarbonization goals, develop plans and policies, and update procurement policies and guidance.
- **Regional Planning Organizations (RPOs).** In collaboration with state and local governments, PlanRVA, Crater PDC, and others can provide support and best practices to enable electricity efficiency and decarbonization of buildings and fleets. They may also develop and provide model ordinances and comprehensive plan language and provide technical assistance.
- **Utilities.** Local utilities need to be involved to ensure the electricity grid can support electrification of government operations and the expansion of renewable energy. Utilities may also provide incentives for energy saving practices and energy efficiency upgrades.

Authority to Implement

Local and regional authorities that own and operate specific facilities and fleets have the authority to undertake the actions in this measure and to apply for other funding or internally raise funds to support the project costs. To enact specific decarbonization projects, policies, and/or pilot programs, local governments may need to gain approval from a legislative body or other administrative authority that oversees budgets and/or regulations.

Implementation Activities and Milestones

Many local governments in the region are already taking action to increase the efficiency of public and school buildings and electricity their fleets. Actions to implement this measure will build upon these existing efforts and may include the following:

- Expand and/or create new programs and incentives for retrofits and upgrades to municipal and government buildings, including public schools, government buildings, and operations (e.g., building efficiency and electrification retrofits and street lighting retrofits).
    - Conduct building energy audits and develop facility-specific decarbonization plans. Integrate projects into Capital Improvement Plans (CIPs) for each locality.
    - Provide clean energy feasibility assessments at key facilities (e.g., geothermal heat pumps).
    - Leverage updated requirements in Virginia's High-Performance Buildings Act (HB2001) to create a regionwide example of a green buildings policy for localities to adopt and implement. As part of the policy, consider enacting stricter building energy efficiency goals, such as achieving certain LEED certification levels, for new municipal construction or major retrofits.The policy may also include standards for the addition of enabling infrastructure, such as new electrical systems, solar-ready roofs, or other items to support building electrification, transportation electrification, or new on-site renewable energy and battery storage systems.
    - Leverage state program resources. Virginia has supported energy efficiency efforts at state agencies and other public facilities through Virginia Energy's Energy Savings Performance Contracting Program, which allows state agencies and local government entities to enter contracts with energy service companies to reduce energy costs through efficiency measures.[31]
- Create and implement clean vehicle procurement policies.
    - Conduct fleet assessments and develop ZEV procurement plans with supporting clean fueling infrastructure siting assessments.
    - Install EV chargers and other supporting infrastructure for alternative fuel vehicles at public buildings.
    - Reduce government employee VMT.
- Utilize local renewable energy sources to meet electricity needs.
    - Install renewable energy systems and energy storage (rooftop systems or on publicly owned land).
    - Establish power purchase agreements to provide clean electricity to local government facilities, potentially aggregating demand with other local jurisdictions or large local businesses to reduce cost.
- Workforce development for all actions above: develop new programs or expanding existing ones to provide training, paid internships, and job opportunities for a clean energy workforce. Some of these opportunities should be focused in LIDACs to bring benefits to these communities.

Geographic Coverage

This measure will cover local governments and schools across the entire Richmond MSA.

[31] Virginia Energy. Energy Savings Performance Contract. Virginia DOE. https://www.energy.virginia.gov/energy-efficiency/PerformanceContracting.shtml

LIDAC Benefits

As this measure will be carried out by cities and counties across the MSA, all LIDACs within the MSA and in neighboring regions will benefit from steps to decarbonize local government operations and reduce GHG emissions across the MSA. Reducing air pollution by decarbonizing local government operations has the co-benefit of improving the public health of individuals in LIDACs and the overall community. The reduction of indoor air pollution in public schools serving LIDAC communities particularly benefits children in LIDACs. Therefore, this measure will also lead to economic co-benefits for LIDACs as improved public health results. Furthermore, local government adoption of energy efficiency and clean energy technologies (heat pumps, ZEVs, etc.) will facilitate the expansion of the clean energy workforce. Additionally, increasing local renewable energy sources will help displace fossil fuel-fired coal and natural gas plants in the region, which contribute to poor air quality and health issues, particularly for adjacent communities. Economic savings resulting from this measure also reduce the amount of public funds that must be spent on energy costs alone.

PCAP Measure 6. Accelerate and support the deployment of energy efficient and low-carbon solutions and incentivize the transition to clean energy for residential and commercial buildings.

GHG Reduction Measure Description

This measure focuses on increasing opportunities for owners and users of all building types to access and install technologies to decrease overall energy consumption, increase energy efficiency, shift to renewable energy and energy storage systems, and reduce GHG emissions from the built environment. It covers both market rate and low/moderate income customers and private and public buildings.

Measure 6 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **0.77 MMTCO$_2$e**

Cumulative GHG Reductions from 2025–2050*: **6.31 MMTCO$_2$e**

** See Appendix D for a summary of methods, data, and assumptions.*

Key Implementing Agency(ies)

- **State and Local governments.** The Virginia Department of Housing and Community Development (VDHCD), Virginia Department of Environmental Quality (VDEQ), Virginia State Corporation Commission (VSCC), and other state agencies can support implementation. Relevant local government organizations can provide support and share best practices when implementing this measure.
- **Dominion Energy.** As the main utility provider for the MSA, Dominion Energy provides existing energy efficiency programs for ratepayers that can be expanded. In addition, Dominion Energy will be key for ensuring that the electrical grid infrastructure is able to support the electrification of processes and an increased supply of renewable energy. Per the Virginia Clean Economy Act (VCEA), Dominion Energy is required to produce 100% renewable energy by 2045.

- **Businesses, hospitals, private schools, universities, water utilities, airports, places of worship.** These entities may implement building improvements and design/build decarbonized buildings.
- **Property owners, developers, renters.** As end users, homeowners, property owners, developers, and renters can make behavior changes and decisions that affect building efficiency. While property owners and developers generally have more control over changes to and within buildings, especially at the time of new construction or major renovations, renters can also make behavior and other changes that will result in GHG reductions.
- **Non-profit organizations.** Nonprofits can conduct community engagement, education and outreach, capacity building, research on environmental and social impacts of clean energy projects, and/or developing and installing community renewable energy projects. Project:HOMES provides assistance to low-income homeowners for efficiency upgrades and weatherization, as well as directly addressing the production of affordable housing. Other nonprofits, like Viridiant, also provide energy efficiency upgrade services to low-income households.
- **Contractors and equipment/energy service providers.** These partners provide the services and equipment to decarbonize buildings, and may include architects, engineers, energy auditors, consultants, and more. Workforce development organizations also play a key role in building the pipeline of skilled workers to serve the building sector's decarbonization needs.

Authority to Implement

Virginia law does not currently allow local governments to establish building energy performance standards (BEPS) or related policies such as energy benchmarking. Energy code implementation across the region is governed by state law, which with some variations limits local governments' ability to implement codes different from that adopted at the state level. Notwithstanding the lack of home rule in Virginia to adopt local building codes, cities and counties in the Commonwealth of Virginia have—for as long as 22 years—fashioned and implemented green building incentive programs based on tiers of BEPs and performance certifications. City and county governments within the MSA can implement clean energy projects in their own operations within their respective jurisdictions. Thus, activities within this measure can be implemented or are being implemented through existing voluntary or regulatory programs.

Implementation Activities and Milestones

Actions to implement this measure could include, but are not limited to the following:

- Create voluntary benchmarking and labeling programs for buildings.
- Conduct energy audits and site assessments. By conducting these assessments, implementers can collect information on which areas of the building inventory, if any, need additional support in achieving improved energy efficiency and decarbonization, and have the highest potential to result in energy savings.

- Incentivize net zero building development. Prioritizing low-emissions practices across the lifecycle (in construction, maintenance, and end of life) of new buildings and retrofits to existing buildings can yield more integrated emissions savings.
- Expand or create new programs and incentives for retrofits and upgrades to residential, multifamily, and commercial properties (e.g., building efficiency retrofits including window replacements, insulation, more efficient and/or electric appliances, hybrid or all-electric heat pumps or more efficient gas heat pumps).
- Plan for and address electric panel and electrical transformer upgrades in residential and commercial properties to support electrification and the addition of residential solar.
- To increase local solar adoption:
    - Map solar opportunities across the MSA to determine potential priorities and investments.
    - Incorporate community energy infrastructure needs, goals, and strategies in master plans, comprehensive plans, and small area plans.
    - Provide or promote incentives to encourage installation of solar and battery storage in the community and for battery storage, especially in new buildings.
    - Provide technical assistance and support for negotiating and navigating power purchase agreements and community solar, and examine the possibility of regional demand aggregation.

Geographic Coverage

This measure will reduce GHG emissions across the entire MSA.

LIDAC Benefits

These actions could contribute to reducing energy expenses for private and public entities. Indirect benefits include green energy jobs and training for auditors, construction workers, contractors, and other building trades such as HVAC suppliers and carpenters. Additionally, these measures may encourage infill development, preserve and improve homes and buildings in LIDACs, and improve the resilience of the energy grid.

These measures may result in direct benefits including reduced energy costs from the implementation of energy efficiency measures and educational programs that influence user behavior and result in lower utility bills. The incorporation of microgrids may benefit LIDACs by providing alternative network sources for energy during high demand and increases reliability. This measure will also improve local air quality, leading to a reduction in related health impacts such as asthma.

Potential impacts or dis-benefits for business and residential lease holders include construction noise, fugitive dust, utility interruptions, and in some cases early lease termination to complete construction activities. Following construction, increased rents may be a concern. “Revitalization” projects in LIDACs have often – intentionally or unintentionally – resulted in gentrification and historic and minority populations being priced out of their neighborhoods. Countereffforts should be taken to ensure benefits primarily flow to the original community occupants, although lack of authority, as discussed above, may hamstring such efforts.

PCAP Measure 7. Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.

GHG Reduction Measure Description

This measure focuses on reducing off-road transportation GHG emissions through actions to decarbonize operations and electrify ports. Measure could involve deploying shore power (electric power supplied to docked ships to reduce idling), installing renewable energy, or switching to electric forklifts and other cargo handling equipment, among other activities.

Measure 7 Quantified GHG Reductions

Cumulative GHG Reductions from 2025–2030*: **0.01 $MTCO_2e$**

Cumulative GHG Reductions from 2025–2050*: **0.03 $MTCO_2e$**

** See Appendix D for a summary of methods, data, and assumptions.*

Key Implementing Agency(ies)

As a state entity, the Virgina Port Authority (VPA) will be implementing this measure for its facilities across the state, in alignment with the Hampton Roads and Virgina State PCAP, in addition to its Marine Terminal facility and operations within the boundary of the Richmond MSA.

- **Virginia Port Authority:** VPA owns and /or operates (through its private operating subsidiary, Virginia International Terminals, LLC) four five general cargo facilities in Hampton Roads MSA (Norfolk International Terminals, Virginia International Gateway, Portsmouth Marine Terminal, Newport News Marine Terminal, and the Pinners Point Container Yard),and the Virginia Inland Port in Front Royal), in the Hampton Roads MSA and the Richmond Marine Terminal in the Richmond MSA.
- **Utilities:** Utilities connect and manage load and renewable energy opportunities for port operations.
- **Trade groups.** Trade groups will implement the infrastructure updates specified in this measure.
- **Private sector partners.** Private companies and landowners with property near port infrastructure may need to be engaged to coordinate land-use planning.
- **Community colleges.** The Port of Virginia works with Tidewater Community College to provide necessary training for technical operators and maintenance technicians.

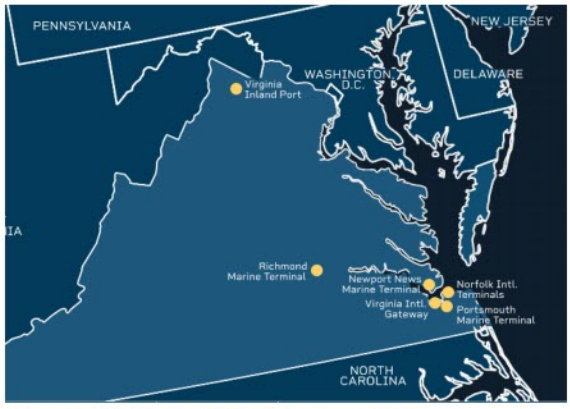


Figure 13. Port of Virginia Locations



Figure 14. Richmond Marine Terminal

Authority to Implement

VPA has the authority to modify its infrastructure and acquire low-emission equipment and systems used within their facilities as described under this measure.

Implementation Activities and Milestones

VPA has committed to become net zero by 2040, and in 2022, they released a sustainability report detailing their progress and future decarbonization targets.[32] This includes a goal to source all their energy from renewable sources by 2024. VPA plans to continue replacing diesel carrier shuttles with hybrid shuttles, electrifying yard tractors, developing an offshore wind energy hub, and implementing a living shoreline project.

In addition to continuing the activities described above, additional example actions for Measure 7 implementation are listed below. These actions are illustrative and not intended to be exhaustive of all actions that could be used to implement this measure.

- Source clean energy for port operations. As discussed above, VPA is on track to meet their 2024 goal of utilizing 100% renewable energy sources.
- Continue to fund the port's green operator dray truck replacement program.
- Provide programs and incentives to decarbonize ports/port electrification.
- Explore expanding barge operations to reduce VMT of port-supporting vehicles.
- Evaluate potential for the provision of shore power or alternative fuels to reduce emissions from oceangoing vessels.
- Continue replacing diesel straddle carriers with hybrid shuttle carriers.

Geographic Coverage

The areas near and around ports (the Richmond Marine Terminal) will be most impacted.

LIDAC Benefits

Within Virginia, as with many parts of the country, there is overlap between locations of ports and the location of LIDACs. LIDACs directly around the Richmond Marine Terminal will primarily be affected, in addition to those in neighboring regions that will benefit from steps to reduce emissions from port operations across the MSA, notably trucking. Through implementing this measure, benefits for LIDACs may include improved air quality and health benefits resulting from potential reductions in off-road emissions, as well as potential reductions in new asthma cases, hospital admissions, and emergency department visits and reduced light and noise pollution.[33]

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[32] The Port of Virginia. 2022. Sustainability Report: Net-Zero by 2040. https://www.portofvirginia.com/wp-content/uploads/2023/09/Port-of-VA-Sustainability-Report_2023_12pgs.pdf

[33] US EPA. “Environmental Justice Primer for Ports: Impacts of Port Operations and Goods Movement.” Overviews and Factsheets, July 31, 2019. https://www.epa.gov/community-port-collaboration/environmental-justice-primer-ports-impacts-port-operations-and-goods.

Moving Forward

CPRG Implementation Grants

Immediately following the finalization of this PCAP, state, regional, municipal, and tribal agencies and consortia are eligible to apply for CPRG competitive funding to implement the targeted measures presented within this plan. The September 20, 2023, CPRG Implementation Notice of Funding Opportunity (NOFO) sets the stage for $4.3 billion of funds that are available through a general competition, potentially resulting in individual grants ranging from $2 million to $500 million each. An additional $300 million will be available to Tribes and territories for implementation. Implementation funding applications are due April 1 and May 1, 2024, with anticipated awards of funding later in 2024.

Other CPRG Planning Grant Deliverables

Recipients of a PCAP planning grant must submit a CCAP two years after the date of the PCAP award (August 9, 2025). PlanRVA will develop a CCAP that builds off the PCAP by providing an expanded GHG analysis covering all significant sources and sinks, creating both short-term and long-term GHG emissions reduction targets and articulating a comprehensive set of measures to achieve the targets. A significant stakeholder and public engagement process will support the development of the CCAP.

Per the CPRG guidance, the CCAP will include the following:

- An updated GHG inventory for the MSA.
- BAU GHG emissions projections and an economy-wide GHG emissions reduction scenario.
- GHG reduction targets for the MSA (short and long term).
- A comprehensive list of GHG reduction measures that address economy-wide emissions. Building on the PCAP, this will include the following for each measure:
    - Quantified estimates of GHG reduction and costs,
    - Key implementing agency or agencies,
    - Implementation schedule and milestones,
    - Expected geographic location if applicable,
    - Quantified estimates of co-pollutant reductions,
    - Quantified analysis of benefits for LIDACs,
    - A review of the statutory or regulatory authority to implement the measure,
    - Identification of funding sources that have been secured for implementation,
    - Metrics for tracking progress, and
    - A workforce planning analysis.

In 2027, PlanRVA will develop and share a CPRG Status Report that will include the following:

- The implementation status of the quantified GHG reduction measures from the CCAP.
- Relevant updated analyses or projections supporting CCAP implementation.
- Next steps and future budget or staffing needs to continue CCAP implementation.

Appendix A. Stakeholder Engagement

Local Document Review of GHG Reduction Measure Input

PlanRVA conducted a review of multiple regional and local documents and pulled out 179 actions related to GHG reduction measures related to transportation, buildings, industrial, waste, agriculture and land use, local government operations, clean energy, and equity. The documents reviewed are listed below. The compiled actions were used in combination with other stakeholder feedback to develop the initial priority GHG reduction measures.

Key documents reviewed:

- Connect RVA 2045
- Connect RVA 2045 StoryMap
- Greater RVA Transit Vision Plan
- Richmond Regional Bicycle & Pedestrian Plan
- Charles City County Comprehensive Land Use Plan
- Powhatan County 2021 Comprehensive Plan
- City of Petersburg Comprehensive Plan
- Chesterfield County Comprehensive Plan
- Central Virginia Waste Management Authority Strategic Plan
- Henrico County Environmental Policy Statement
- City of Richmond Climate Equity Action Plan 2030
- Petersburg Area Transit Strategic Plan
- Richmond Master Plan 2020
- Greater RVA Transit Vision Plan: Near-Term Strategic Technical Analysis
- City of Hopewell Comprehensive Plan
- Henrico County Vision 2026

Steering Committee PCAP GHG Reduction Measure Input

During the kickoff meeting with the Steering Committee, PlanRVA held a brainstorming session to generate potential projects, programs, and actions that are priorities or areas of interest for committee members. This list informed the creation of the priority GHG reduction measures.

Project Description
E-bike incentive program
Fall Line Trail
N/S BRT expansion
Expand EV charging infrastructure
Make public transit free for all riders, permanently
Convert 10% of vehicle trips to bike/ped by 2030; 40% by 2050
Expand and Fund RVA bikeshare to the region
Bike/Ped infrastructure improvements
Invest in Public Transit
Decrease total VMT

Implement VEPGS Renewable Energy Cohort by installing solar farms
Install equipment to 3 major private industries (e.g., air scrubbers)
Relocate and modernize asphalt plant
Finalize industrial sites with utility infrastructure
Reduce or eliminate small gas-powered lawn equipment
Increase and protect urban agricultural space; develop agricultural community land trusts
Provide subsidies or rebates for agrivoltaic installations or PV installs on farm buildings
Increase agriculture soil conservation practices
Install solar shelters over shared bike path
Install solar pavers that can be trail surface
Update codes to promote solar
Convert all streetlights to LED
Install small-scale wind turbines along interstates
Plant X number of trees annually
Develop a Green Infrastructure Plan
Low-income weatherization (continue DHCD program funded by RGGI)/Retrofit homes in LIDACs
Fund roof replacements to solar-ready state
Promote solar installations through PPA model
Improve energy efficiency of and install solar on municipal buildings, school, public facilities
Eliminate SF zoning
Eliminate parking minimums
Require new homes to be EV compatible
Reduce energy burden in LIDAC
Incentivize solar installations on new buildings
Improvements to existing wastewater plants and regional connectivity
Promote circular economy (e.g., Tool libraries)
Increase recycling in health care industry
Capture methane from landfills
Reduce construction and demolition waste
Reduce food waste by redirecting edible food to vulnerable communities
Increase municipal composting
Establish zero-waste business tax credit

Community Engagement Meeting Summary

- PlanRVA hosted a Zoom call with 11 organizations (Diversity Richmond, ART180, Blue Sky Fund, Colonial Heights Food Pantry, Health Brigade, Central Virginia Waste Management Authority, Storefront for Community Design, Dominion Innovation Center, Science Museum of Virginia, The James House, Virginia LISC) to provide an overview of the CPRG and key next steps. Each of these organizations expressed an interest in staying engaged going forward and committed to sharing the GHG Emissions Survey with their stakeholders. Seven of the organizations were interested in helping to convene

focus groups or other engagement activities for their community stakeholders later in the process.

- PlanRVA met individually with nine organizations for one-on-one discussions to provide an overview of the CPRG and key next steps. These organizations—project:HOMES, Latinos in Virginia Empowerment Center, the Community Foundation for a greater Richmond, Greater Richmond Fit4Kids, The James House, Oakwood Arts, Richmond Public Library, Appomattox Regional Library, Neighborhood Resource Center of Fulton—committed to staying engaged and sharing the GHG Emissions Survey with their community stakeholders.
- Of these organizations, three immediately invited PlanRVA to engage their communities at a grassroots level. In-person intercepts were conducted outside of two Richmond Public Library branches (North Avenue and East End) and outside of the Appomattox Regional Library in Hopewell. PlanRVA engaged with 39 residents, each of whom completed a brief survey and received VISA or Amazon gift cards for their investment of time and perspective. In addition, Oakwood Arts (in Richmond's East End) scheduled an in-person focus group with their staff and student interns.
- Thirteen organizations asked to work with PlanRVA later in the spring to organize focus groups or another engagement opportunity for their staff and/or community stakeholders. These included Diversity Richmond, ART180, Colonial Heights Food Pantry, Health Brigade, Storefront for Community Design, Dominion Innovation Center, Science Museum of Virginia, The James House, project:HOMES, Latinos in Virginia Empowerment Center, the Community Foundation for a greater Richmond, Greater Richmond Fit4Kidsand the Neighborhood Resource Center of Fulton.

Community Survey Details

A detailed survey was created in both English and Spanish and well-publicized across the region through our outreach and engagement efforts. The survey was open to the public for three weeks, and 820 individuals representing 17 of the 19 localities in the Richmond MSA (including tribal residents) completed the survey. Of those, 358 respondents indicated an interest in staying engaged (providing their email and/or physical mailing address).

- 89% of survey respondents live in the region's largest localities (Richmond, Henrico, and Chesterfield).
- Just over 9% were under the age of 29. About 64% were aged 30–64, and about 28% were 65 or older.
- 85% of respondents were White or Caucasian.
- 34% of respondents reported income below median income levels.

Key themes from a series of open-ended questions in the survey included the following (*italics are direct quotes from a survey respondent)*:

The impact of transportation issues:

- Safety Concerns: *Most streets in Richmond are not safe for bike travel. Access to public transit is limited due to infrequent bus routes and bus stops without seating or shelter.*

- Lack of Public Transit and Infrastructure: *Would use public transit if it was more convenient and safer (better lighting, benches for waiting, trash/recycling receptacles).*
- Noise and Air Pollution: *The noise is disrupting my sleep at night. Several times a week between 11pm and 4am, very loud ICE vehicles wake me up as they drive by my home.*

The impact of pollution from waste:

- Air Quality and Health Concerns from Landfills: *When I first moved to Petersburg 7 years ago I woke up choking due to the landfill gases; I could not breathe. This caused me to reach out to the city, but they did not report anything to the Virginia Department of Environmental Quality.*
- Physical Hazards and Environmental Blight from Waste: *Road hazards from tire retreads on the interstate. Ninety-five is always littered with tire waste, year-round.*
- Water Pollution and Community Cleanliness: *Litter litter everywhere! I spend a lot of my time walking around picking up trash... Never is there a day where I don't find something on a walk.*

Project ideas to reduce pollution:

- **Enhanced Public Transportation Options**: A desire for more public transportation options, including increased bus routes, better bus services, and initiatives to encourage the use of mass transit to reduce individual car usage.
- **Infrastructure for Pedestrians and Cyclists**: A need for better infrastructure to support walking and biking, such as more sidewalks, bike lanes, and pedestrian-friendly development, to reduce reliance on vehicles.
- **Waste Management Improvements**: Better recycling programs, municipal composting, and education on waste reduction. A need for more frequent trash pickups and proper disposal methods for large items.
- **Greener Energy and Vehicle Options**: A shift toward EVs, including public buses, and support for alternative energy sources. This includes the installation of EV charging stations and incentives for electric car ownership.
- **Reduction of Single-Use Plastics**: A reduction or elimination of single-use plastics, suggesting bans on plastic bags and encouraging the use of recyclable or compostable materials.

Appendix B. Identification of LIDACs in Richmond MSA

County	Census Block ID
Charles City County	510366001001
Charles City County	510366001002
Chesterfield County	510366003002
Chesterfield County	510411001071
Chesterfield County	510411001072
Chesterfield County	510411002091
Chesterfield County	510411002101
Chesterfield County	510411003001
Chesterfield County	510411004033
Chesterfield County	510411004041
Chesterfield County	510411004042
Chesterfield County	510411004051
Chesterfield County	510411004052
Chesterfield County	510411004061
Chesterfield County	510411004071
Chesterfield County	510411004072
Chesterfield County	510411004073
Chesterfield County	510411004091
Chesterfield County	510411004092
Chesterfield County	510411004093
Chesterfield County	510411004094
Chesterfield County	510411004095
Chesterfield County	510411004101
Chesterfield County	510411005051
Chesterfield County	510411005054
Chesterfield County	510411005055
Chesterfield County	510411005062
Chesterfield County	510411005063
Chesterfield County	510411005071
Chesterfield County	510411005081
Dinwiddie County	510411005082
Hanover County	510411005101
Hanover County	510411005102
Hanover County	510411006001
Hanover County	510411006002
Hanover County	510411006003
Hanover County	510411007011
Hanover County	510411007012
Hanover County	510411009071
Hanover County	510411009072
Henrico County	510411009152
Henrico County	510411009201
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Richmond City	517600709012

Appendix C. Richmond MSA GHG Inventory and BAU Projections

For the PCAP, PlanRVA compiled a simplified GHG inventory and associated business-as-usual (BAU) projections. The simplified GHG inventory was only compiled for sectors related to a PCAP measure. A comprehensive GHG inventory will be complete for the CCAP.

The methodology for each is summarized below, with Figure 15, Figure 16, and Figure 17 depicting the GHG inventory and BAU projections for the community and municipal operations. (*Note: Off-Road Transportation emissions are too small to be seen in Figure 15*)

Figure 15. Richmond MSA Community GHG Inventory in 2019

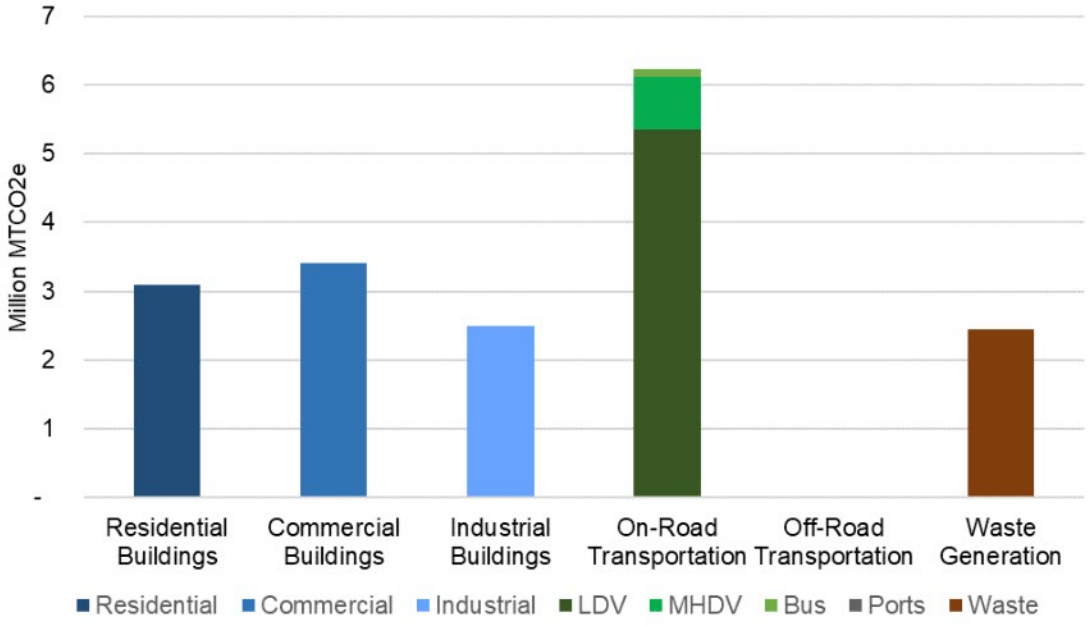
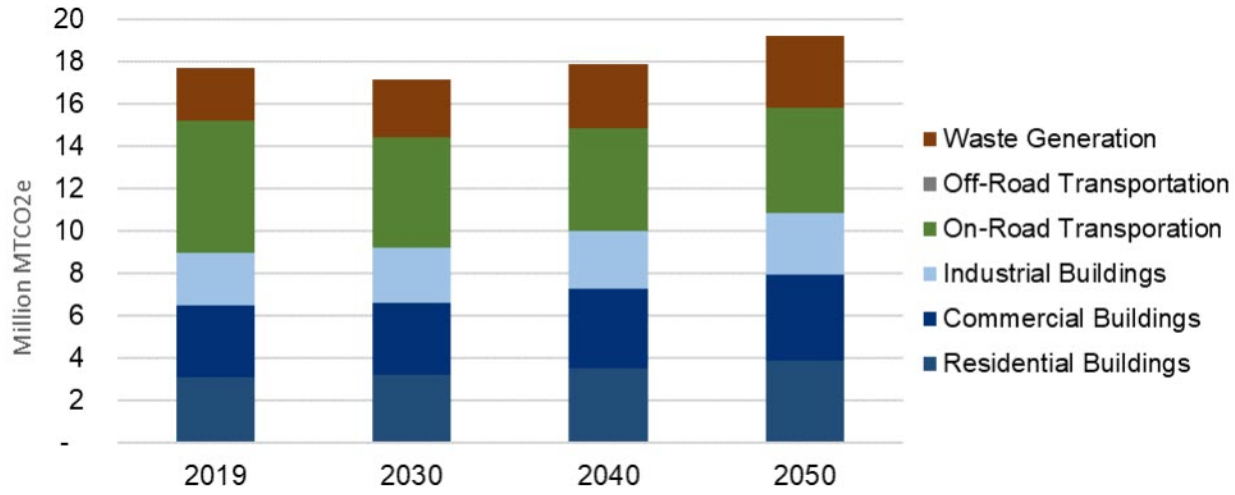


Figure 16. Richmond MSA Community GHG Inventory and BAU Projections



Buildings. PlanRVA acquired state-level building sector emissions data from energy use from EPA's SIT for residential, commercial, and industrial buildings. These state-level data were then scaled to the counties within the MSA based on a population scaling factor using the following equation:

$$County\ building\ data_{2019} = \frac{County\ population_{2019}}{Virgina\ population_{2019}} \times Virginia\ building\ data_{2019}$$

The BAU projections were compiled by growing the MSA-level building data by a rate of growth calculated from the U.S. Energy Information Administration's (EIA) Short-Term Energy Outlook. EIA's Short-Term Energy Outlook provides energy consumption by sector and source from 2019 to 2050. A yearly growth rate was applied to the 2019 inventory data to project building sector emissions from energy use through 2050.

On-Road Transportation. PlanRVA used EPA's emissions modeling system, MOtor Vehicle Emission Simulator (MOVES), to calculate the emissions from the on-road transportation sector. MOVES has on-road vehicle projection data for vehicle population, VMT, energy consumption, and tailpipe GHG emissions by vehicle type and fuel type for ICEVs. It accounts for projected fuel efficiency improvements for ICEVs as a result of existing policies. PlanRVA ran MOVES with default settings to create the 2019 inventory and BAU projections for population, VMT, energy consumption, and emissions from on-road vehicles for each locality in the MSA. This was then scaled to 2019 VDOT data for the region to better reflect observed VMT in the MSA.

Off-Road Transportation. PlanRVA developed emissions estimates for ports only for the PCAP. Ports emissions estimates were calculated in alignment with the methodology used in the statewide PCAP for Virginia that was prepared by DEQ. The 2021, U.S. Army Corps of Engineers Entrances and Clearances data was used to develop the number of ship calls in conjunction with Lloyd's Register of Ships produced by IHS Global Limited. For loads and hoteling times, the 2021 Port of Los Angeles was used. Port of Los Angeles is the like port both in ship calls and cargo movements. The 2011 Port of Virginia inventory was used to derive the in bay, RSZ and maneuver times and speeds. For ocean going vessels, the Port of Virginia ratio of calls for the various terminals was used to divide the Port of Virginia calls (and associated emissions) among the appropriate terminals. For all other sectors, the Port of Los Angeles emissions data was used and ratioed using cargo data from the U.S. Army Corps of Engineers Waterborne Cargo data for the various Virgina ports and for the Port of Los Angeles. For harbor craft, only tug movements were used. The 2021 data is used as a proxy for 2019 emissions. For the BAU, ports emissions were held constant over time.

Waste Generation. Based on data from EPA Greenhouse Gas Reduction Program Facility Level Information on Greenhouse gases Tool (FLIGHT), the Richmond MSA does not have any waste combustion facilities within its boundaries. Therefore, no emissions associated with the incineration of MSW were included in this simplified inventory. PlanRVA calculated landfill emissions for 2019 using data from EPA's LMOP. LMOP data presents annual and cumulative MSW tonnage, the total capacity of the landfill, and whether the landfill has a gas capture system. The 2019 LMOP data did not include a value for annual tons of MSW, and therefore 2021 data were used as a proxy for 2019 data. The following equation was used to calculate the emissions from each landfill, based on the EPA Waste Reduction Model (WARM) tool:

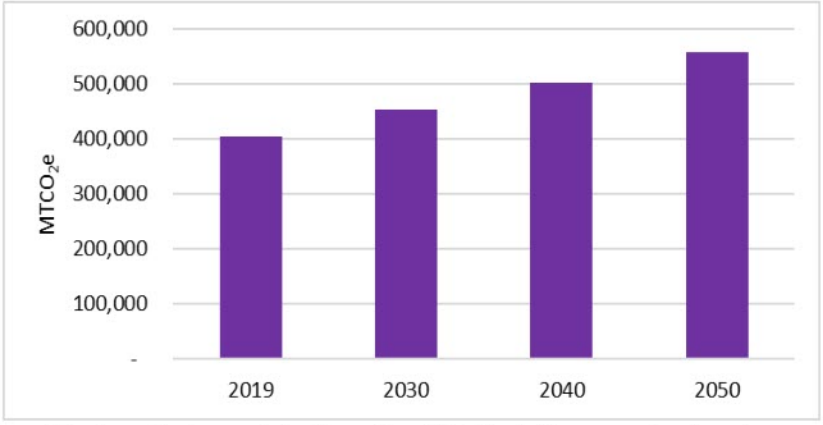
$$Emissions = MSW_{annual} \times (Methane_{EF} \times Methane_{GWP}) \times (1 - O_{rate}) \times (1 - G_{capture})$$

Variable	Value	Description
Emissions	Calculated	Annual emissions for the landfill in $MTCO_2e$.
MSW_{annual}	Retrieved from LMOP data	Annual tons of MSW buried.
$Methane_{EF}$	0.0648	Methane emission factor based on EPA WARM assumptions.
$Methane_{GWP}$	28	The AR5 global warming potential of CH_4.
O_{rate}	0.1 for landfills without gas capture; 0.2 for landfills with gas capture	Oxidation rate based on EPA WARM assumptions.
$G_{capture}$	0 for landfills without gas capture systems; 0.6 for landfills with gas capture systems	Gas capture rate based on EPA WARM assumptions.

The sum of emissions from all landfills within the Richmond MSA in 2019 was used to represent the total emissions from solid waste for 2019 for the MSA. The BAU projections were calculated using an average annual population growth rate using U.S. Census 2020 population data and 2050 population projection data from PlanRVA. The average annual growth rate through 2050 for the MSA is 1.04%.

Municipal Operations. To calculate the municipal inventory for the Richmond MSA, PlanRVA estimated the GHG emissions from municipal buildings (including schools) and from municipal vehicle fleets for the year 2019.

Figure 17. Richmond MSA Municipal Operations GHG Inventory and BAU Projections



Buildings. To estimate municipal building GHG emissions, PlanRVA used data from Henrico County.[34] The county was able to readily provide annual building electricity and fuel emissions data for all public buildings and schools. PlanRVA then extrapolated this data to the rest of the localities in the MSA using a population scaling factor. PlanRVA used the Henrico buildings emissions data as the base for the scaled approach because it was the most comprehensive municipal data inventory readily available. For Richmond City, buildings emissions data available directly from the city for 2018 were used instead of scaling the 2019 Henrico County data.

[34] Henrico Environmental Action Resource Team. "Energy Dashboard - Henrico County, Virginia." Henrico County Virginia. 2024. https://henrico.us/heart/dashboard/.

Vehicle Fleet. Similarly, to estimate municipal vehicle fleet emissions, PlanRVA used municipal vehicle fleet fuel usage information for Henrico County and then extrapolated to the rest of the MSA using a population scaling factor. Henrico County provided data for the number of diesel and gasoline gallons used for their municipal fleet for fiscal year 2023, which was used as a proxy for 2019. PlanRVA then used emissions factors from the EPA MOVES model for diesel and gasoline to estimate the GHG emissions for the municipal fleet. These data were extrapolated to the rest of the localities in the MSA using a population scaling factor. Although the Henrico fuel usage data were not available for the inventory year (2019), PlanRVA used the Henrico fuel usage data as the base for the scaled approach because it was the most comprehensive municipal inventory available throughout the localities in the Richmond MSA. For Hanover County, Chesterfield County, and Richmond City, direct fuel usage data from each municipality were used instead of scaling the Henrico County data.

BAU Projections. The BAU projections were calculated using an average annual population growth rate for each county in the Richmond MSA using U.S. Census 2020 population data and 2050 population projection data from PlanRVA.

Appendix D. Approaches for Quantifying GHG Reductions from PCAP Measures

The following is a summary of methods used for calculating emissions reductions in the Richmond MSA PCAP. In developing these values, modeling assumptions were made to determine reasonable GHG emissions reductions from the deployment of specific measures. In some cases, there may be areas of overlap for emissions reduction values between measures. For example, local government operations are a subset of the total community, and reductions for their fleets (Measure 5) are also modeled in the community-wide ZEV modeling under Measure 1. Similarly, port vehicle electrification (Measure 7) will have some overlap with broader community-wide ZEV modeling under Measure 1. The estimates provided in this PCAP reflect the implementation of each measure with all the identified actions included, to the extent data were available to support the analysis for this PCAP. Since a number of these measures cover the same activity sector, their impacts are not additive as they sometimes overlap with each other. Modeling for these measures is anticipated to be revised as part of the CCAP process.

Measure 1. Incentivize and promote the rapid adoption of electric vehicles through partnerships, technical assistance, financial incentives, and other mechanisms, and support the siting, procurement, installation, and use of charging infrastructure.

This measure models the resulting GHG emissions reduced if the Richmond MSA meets the ZEV sales targets outlined by California's Advanced Clean Cars II (ACCII) rule for light-duty vehicles (LDVs) and the Multi-State Zero Emission Medium- and Heavy-Duty Vehicle (MHDV) Memorandum of Understanding (MOU). Virginia is one of 14 states (including Washington, D.C.) that has adopted California's ACCII rule and is one of 18 states (including Washington, D.C.) that has signed the MOU. Figure 18 below shows the sales targets assumed for LDVs and MHDVs. The model uses outputs from the EPA MOtor Vehicle Emissions Simulator (MOVES4) to project baseline VMT, vehicle population, energy consumption, and Scope 1 emissions for on-road transportation in the MSA by fuel type (gasoline, diesel, ethanol (E-85), compressed natural gas, and electricity), vehicle source type, and model year.[35] Default input values were used.

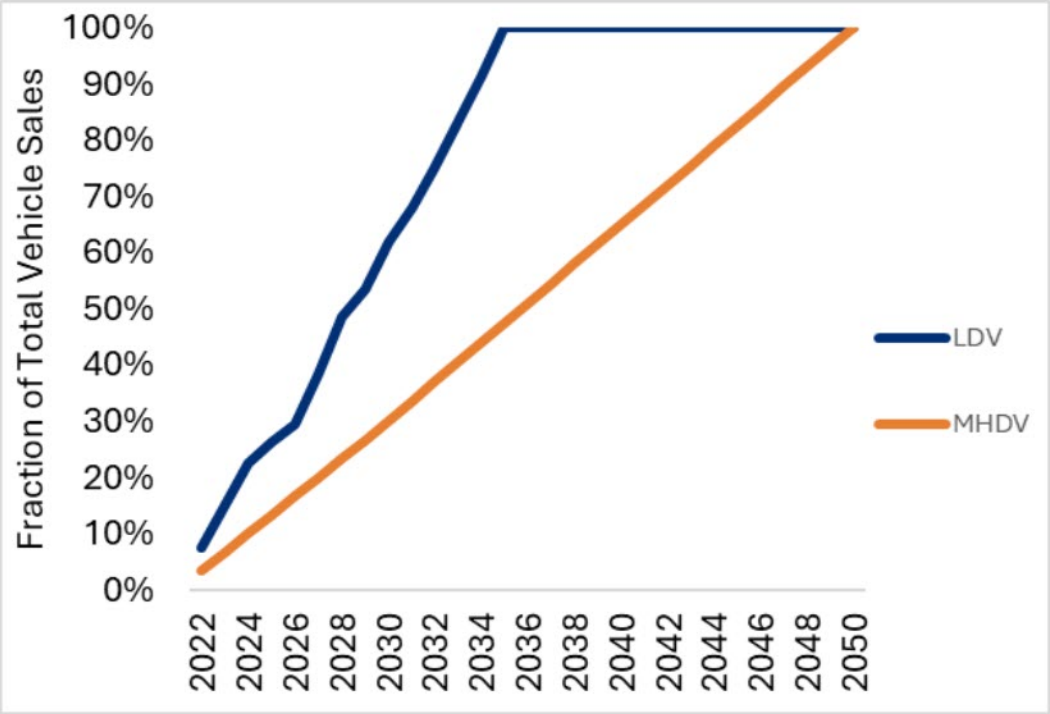
Scope 2 emissions from electricity consumption by EVs were found using the following equation:

$$Scope\ 2\ Emissions = Electricity\ Consumption\ \times\ Electricity\ Emission\ Factor \qquad (1)$$

[35] U.S. Environmental Protection Agency. 2024. Motor Vehicle Emission Simulator: MOVES4 (Version 4.0.1) [Computer software]. https://www.epa.gov/moves.

The electricity emissions factor was held at 2020 EPA's Emissions and Generation Resource Integrated Database (eGRID) reported levels for the Virgina region (SRVC) through 2050 for the baseline.[36]

Figure 18. Percent sales of vehicles that are zero-emission vehicles



To model GHG emissions reductions in the policy scenario, for each model year, a fraction of VMT was designated as fuel type "electricity" or "hydrogen" based on the ZEV sales curve. The resulting energy consumption was found using the following equation:

$$Energy\ Consumption = VMT\ \times Energy\ Efficiency, \quad (2)$$

where energy efficiency was in units of kJ/mi for battery EVs (BEVs) and fuel cell EVs (FCEVs). Implied BEV energy efficiencies from the MOVES4 baseline results were used. FCEV energy efficiencies were sourced from the California Advanced Clean Fleets (ACF) rule making.[37] Scope 1 emissions were found by reducing baseline ICEV emissions by the ZEV sales fraction. Scope 2 emissions were found using Equation (1). The grid emissions factor used for the ZEV measure reflects a cleaner grid overtime in line with state policy. The grid emissions factor

[36] U.S. Environmental Protection Agency. 2022. Emissions & Generation Resource Integrated Database (eGRID), 2020. Washington DC: Office of Atmospheric Protection, Clean Air Markets Division. https://www.epa.gov/system/files/documents/2022-01/egrid2020_summary_tables.pdf.

[37] California Air Resources Board. 2022. Appendix G: Total Cost of Ownership Discussion Document. Advanced Clean Fleets Regulation. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/acf22/appg.pdf.

projection is sourced from EIA's Annual Energy Outlook (AEO) 2023 Reference Case, which includes the impact of state policy and federal tax credits for clean energy.[38] The emissions factor for the PJMD region was used for the CO_2 emission factor projection. The CO_2 emissions factor was combined with the CH_4 and N_2O EPA eGRID emission factor data for the SRVC region to estimate a CO_2e emissions factor representing the MSA.

The following additional key assumptions were made throughout the analysis:

- ZEVs exist in the vehicle fleet for the same length of time as ICEVs.
- ZEV activity/use is identical to an ICEV.
- The annual ZEV sales fraction applies to every fuel type.
  Long-haul medium and heavy-duty vehicles (MHDVs) ZEVs are modeled as FCEV and all other MHDVs ZEVs are modeled as BEV. The hydrogen supply is assumed to be 50% green hydrogen and 50% blue hydrogen.
- All LDVs ZEVs are modeled as BEVs.
- All BEV populations 2021 and earlier are EPA MOVES4 default.
- 2022 LDV ZEV share was sourced from the Alliance for Automotive Innovation.[39]
  The methodology in some cases required re-allocating MOVES4 baseline projected electric vehicle back to ICEVs. Where this was necessary, LDVs were designated as gasoline, and MHDVs were designated as diesel.

Measure 2. Expand equitable transit access.

This measure models resulting VMT and GHG emissions reduced if the Richmond MSA enhances its public transit system by increasing transit service frequency, extending transit network coverage or hours, and implementing transit-supportive roadway treatments throughout the MSA. The measure assumes these strategies only result in light-duty passenger vehicle VMT reduction. The potential VMT reduction due to each of these actions was calculated based on the methodology outlined in the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity,* a document compiled for the California Air Pollution Control Officers Association to provide methods for estimating GHG reductions resulting from various measures.[40]

Passenger vehicle VMT reduction due to transit enhancements was only modeled in counties with existing bus systems for this measure. The resulting passenger VMT reduction in each applicable county is shown in the following table. Larger reductions are possible when this measure is paired with other items such as improved transit-oriented development, congestion and/or VMT pricing, encouragement of teleworking, and other disincentives for driving, which

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[38] United States Energy and Information Administration. 2023. Annual Energy Outlook 2023 Table 54. Electric Power Projections by Electricity Market Module Region: Reference Case | PJM/Dominion. https://www.eia.gov/outlooks/aeo/tables_ref.php.
[39] Alliance for Automotive Innovation. 2024. Economic Insights. https://www.autosinnovate.org/resources/insights/va.
[40] California Air Pollution Control Officers Association. 2021. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. https://www.airquality.org/ClimateChange/Documents/Handbook%20Public%20Draft_2021-Aug.pdf

are not quantified as part of this PCAP measure and will be further reviewed as part of the CCAP process.

Strategy Name	2030 VMT Reduction	2050 VMT Reduction	Applicable Counties
Increase Transit Service Frequency	-0.016%	-0.031%	City of Richmond, Henrico, Petersburg city, Colonial Heights, Hopewell city
	-0.0078%	-0.016%	Chesterfield, Goochland, Hanover
Extend Transit Network Coverage or Hours	-0.042%	-0.084%	City of Richmond, Henrico
Implement Transit-Supportive Roadway Treatments	0.0025%	-0.0050%	City of Richmond, Henrico, Petersburg city, Colonial Heights, Hopewell city
	-0.0012%	-0.0025%	Chesterfield, Goochland, Hanover

Where calculation input data from specific plans were not available, conservative estimates were made for each transit strategy based on the maximum input value listed in the *Handbook.*

The following additional key assumptions were made throughout the analysis:

- VMT reductions apply only to passenger vehicles.
- VMT reductions are taken from the baseline discussed in Measure 1.
- Maximum VMT reductions are achieved by 2050 and half of the maximum reductions are achieved by 2030.
- Results in counties with partial bus service coverage were reduced 50% compared to counties with full coverage.
- Additional transit statistics were sourced from the Federal Highway Administration.[41]

Measure 3. Provide and promote new and expanded opportunities to reduce vehicle miles traveled through micromobility options and connected multimodal infrastructure.

This measure models resulting VMT and GHG emissions reduced if the Richmond MSA enhances its micromobility infrastructure by improving pedestrian networks, expanding bike networks, and implementing an electric bikeshare program throughout the MSA. The measure assumes these strategies only result in light-duty passenger vehicle VMT reduction. The potential VMT reduction due to each of these actions was calculated based on the methodology outlined in the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity,* a document compiled for the

[41] U.S. Department of Transportation. National Household Travel Survey: 2017 Survey. Federal Highway Administration. n.d. https://nhts.ornl.gov/.

California Air Pollution Control Officers Association to provide methods for estimating GHG reductions resulting from various measures.[42]

Passenger vehicle VMT reduction due to micromobility enhancements was modeled for all counties in the MSA. The resulting passenger VMT reduction across the MSA is shown in the following table. Larger reductions are possible when this measure is paired with other items such as improved transit-oriented development, congestion and/or VMT pricing, encouragement of teleworking, and other disincentives for driving, which are not quantified as part of this PCAP measure and will be further reviewed as part of the CCAP process.

Strategy Name	2030 VMT Reduction	2050 VMT Reduction
Provide Pedestrian Network Improvement	-0.25%	-0.50%
Expand Bikeway Network	-0.0097%	-0.019%
Implement Electric Bikeshare Program	N/A	-0.0055%
Parking Pricing	-3.0%	-3.0%

Where calculation input data from specific plans were not available, conservative estimates were made for each micromobility strategy based on the maximum input value listed in the *Handbook*. The following additional key assumptions were made throughout the analysis:

- VMT reduction only applies to passenger vehicles.
- VMT reductions are taken from the baseline discussed in Measure 1.
- Maximum VMT reductions are assumed to be achieved in 2050. Half of maximum reductions are achieved by 2030, except for electric bikeshare which is assumed to be implemented after 2030, and parking pricing which is assumed to be fully implemented by 2030.
- Additional micromobility statistics were sourced from the Federal Highway Administration.[43]

Measure 4. Reduce GHG emissions from solid waste.

To estimate potential GHG reductions from Measure 4, a diversion rate was applied to the BAU projections for MSW tons buried in landfills. Starting from MSA current diversion rates of about 58% in 2019, the diversion rate was grown to 80% by 2050, in line with CVWMA's stated goal. This resulted in cumulative emissions reductions from the BAU of 2.29 $MMTCO_2e$ (million metric tons CO_2e) 2025–2030 and 24.64 $MMTCO_2e$ 2025–2050.

[42] California Air Pollution Control Officers Association. 2021. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. https://www.airquality.org/ClimateChange/Documents/Handbook%20Public%20Draft_2021-Aug.pdf
[43] U.S. Department of Transportation. National Household Travel Survey: 2017 Survey. Federal Highway Administration. n.d. https://nhts.ornl.gov/.

GHG Reduction Quantification Summary	Units	2019	2030	2050
Annual Measure Diversion Rate	%	58.4%	66.0%	80.0%
Total MSW Tons Created Annually	Tons	10,096,050	11,309,826	13,902,739
MSW Tons Buried After Diversion	Tons	4,203,322	3,840,476	2,780,548
Emissions Under Measure Scenario	MTCO2e	2,440,482	2,229,811	1,614,408
BAU Emissions	MTCO2e	2,440,482	2,733,884	3,360,660

Measure 5. Implement decarbonization strategies for municipal operations.

Since most localities in the MSA do not have GHG reduction goals in place for their operations, a target of reaching net zero emissions by 2050 was used to estimate the potential GHG reductions of fully implemented in the actions in Measure 5. This aligns with both the state goal of reaching economy-wide net zero emissions by 2050 (as set forth in the Virginia Clean Economy Act of 2020) and the City of Richmond's community-wide goal to achieve net zero GHG emissions by 2050. This resulted in cumulative emission reductions from the BAU of 0.42 $MMTCO_2e$ 2025–2030 and 7.29 $MMTCO_2e$ 2025–2050.

GHG Reduction Quantification Summary	Units	2019	2030	2050
GHG Reduction Goal Modeled	%	N/A	30%	100%
BAU Municipal Operation GHG Emissions	$MTCO_2e$	404,432	453,054	556,922
Measure Scenario GHG Emissions	$MTCO_2e$	404,432	317,138	0

Measure 6. Accelerate the Deployment of Energy Efficiency Solutions and Decarbonization of Residential and Commercial Buildings

This measure models GHG emission reductions achieved through building energy efficiency upgrades, replacement of fossil fuel-fired heating, hot water, and cooking equipment with heat pump and induction technologies, and reductions from achievement of increased distributed solar adoption.

Buildings Approach

Building energy use and building emission projections are based on energy consumption from electricity, natural gas, fuel oil, and propane in existing residential (single-family, multifamily, and mobile homes) and commercial buildings (office, food service, school, hotel, healthcare, retail, and warehouse). The base year and projections for energy consumption in existing buildings are built from the 2022 AEO, which represent projected energy user prior to the passage of the Inflation Reduction Act.[44] AEO data were scaled to the Richmond MSA counties by scaling AEO census level data with the ResStock and ComStock building models of North American building stock with county-level resolution.[45,46]

[44] "Annual Energy Outlook 2023 - U.S. Energy Information Administration (EIA)." March 16, 2023. https://www.eia.gov/outlooks/aeo/index.php.
[45] "ResStock Analysis Tool." n.d. Accessed February 19, 2024. https://www.nrel.gov/buildings/resstock.html.
[46] "ResStock Analysis Tool." n.d. Accessed February 19, 2024. https://www.nrel.gov/buildings/resstock.html.

ICF's CO_2Sight™ platform and Distributed Energy Resources Planner (DER Planner) model were used to quantify the change in energy consumption from existing buildings under an accelerated electrification scenarios for heating, ventilation, and air conditioning (HVAC) as well as Water Heating and Cooking, and a High scenario for building envelope implementation. DER Planner is a bottom-up model that is built upon the best practice principles for potential modeling outlined by the National Action Plan for Energy Efficiency (NAPEE) in their Guide for Conducting Energy Efficiency Potential Studies.[47] DER Planner, informed by stock CO_2Sight measures data, has the capabilities to model various energy efficiency, electrification, and building envelope measures in selected building types. The model uses key inputs such as equipment stock, participation rate curves, and energy change per measure and estimates potential savings from applying efficient measures available for each building type and end-use. Given the efficient technologies available, this quantifies how much energy could be reduced. To compute total savings potential, the model runs all permutations combining savings per measure unit, expected measure penetration, and total number of measure units (or total eligible stock) by all adoption types (replace on burnout (ROB) and retrofit (RET)).[48]

Building characteristics and energy use data for modeling buildings under the selected scenario were derived from ResStock and ComStock datasets provided by the National Renewable Energy Laboratory (NREL). These datasets integrate large public and private data sources statistical sampling, detailed sub-hourly building simulations, and high-performance computing. By synthesizing multiple sources into a single resource, these data allow for a granular understanding of the housing and commercial stock and the impacts of building technologies in different communities and businesses. The ResStock and ComStock energy use data are calibrated to match the AEO dataset.

As an input into DER Planner, each measure has participation (or technology adoption curves) connected to them. A range of factors can impact whether new efficiency technologies are adopted. This approach builds from NREL's Electrification Future Study, from which many of the adoption curves are provided, and through the adoption curves accounts for changes in costs, supporting infrastructure, ownership and availability, health and sustainability (including policies) and other factors that could influence technology adoption.[49] Adoption curves are also provided from the implementation energy efficiency programs and informed by expert judgement. For ease of use, users can select prepopulated groupings of participation curves to match the types of energy change they want to model.

Key Assumptions

- Modeled high scenario for Building Envelope measures meaning high building envelope work and deep energy retrofits
- Modeling accelerated electrification scenarios for HVAC measures and Water Heating and Cooking measures meaning a large amount of electrification will occur

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[47] U.S EPA. "Guide for Conducting Energy Efficiency Potential Studies."2007. https://doi.org/10.2172/1219674.
[48] Measures' adoption type definitions: ROB or "replace on burnout" implies that the technology will be adopted when the previous technology needs to be replaced. RET or "retrofit" implies that the technology is adopted before the previous technology needs to be replaced.
[49] "Electrification Futures Study: A Technical Evaluation of the Impacts of an Electrified U.S. Energy System." n.d. Accessed February 19, 2024. https://www.nrel.gov/analysis/electrification-futures.html.

- BAU emissions factors (2019 eGRID held flat)
- Measure emissions factors (2019 eGRID changed based on 2023 AEO Reference Case)

Data Sources

- ComStock and ResStock data sets
- EPA's ENERGYSTAR Equipment performance thresholds
- Various state's Technical Reference Manual
- NREL's Electrification Future Study
- DOE's equipment purchasing profiles
- PNNL's Building Retuning materials
- EPA's GHG Emission Factors Hub
- Electric Grid Emission Factor Projections, AEO 2023
- EPA eGRID, 2019

Distributed Solar Approach

Emissions reductions from renewable energy were projected through the forecasted adoption of rooftop solar systems in the MSA. The total technical potential for rooftop solar was aggregated from Project Sunroof's estimates of the technical potential in each of the counties and cities in the MSA.[50] To determine an adoption rate, the most aggressive 2050 adoption scenario from NREL's Storage Futures Study (20%) was applied to the total technical potential.[51] For the MSA territory in Virginia, existing rooftop solar capacity assumptions were sourced from PJM's 2023 Load Forecast for the DOM zone and then grown to meet the assumed 2050 level.[52]

To calculate the kWh of solar output, the analysis used the capacity factor for residential solar from NREL's annual technology baseline corresponding to the geography of the MSA. The incremental growth in solar output from current levels, multiplied by grid emissions factors, resulted in the potential avoided emissions from rooftop solar.

Key Assumptions

- Constant technical potential per building over time
- Constant ratio of commercial to residential rooftop solar capacity
- No incremental rooftop PV installation beyond existing in BAU case
- Linear growth of PV installations between 2023 and 2050 in PCAP Policy Case
- BAU emissions factors (2019 eGRID held flat)
- PCAP Policy emission factors (2019 eGRID grown based on 2023 AEO Reference Case)

Data Sources

- Storage Futures Study: Distributed Solar and Storage Outlook: Methodology and Scenarios (2021), NREL
- 2023 Load Forecast, PJM (2023)
- Project Sunroof data explorer, (June 2019), Google

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[50] Google. "Project Sunroof". Accessed Feb 13, 2024. https://sunroof.withgoogle.com/
[51] NREL. "Storage Futures Study." https://www.nrel.gov/analysis/storage-futures.html
[52] https://www.pjm.com/-/media/library/reports-notices/load-forecast/2023-load-report.ashx

- Annual Technology Baseline, Residential PV (2023), NREL
- Electric Grid Emission Factor Projections, AEO 2023 Reference Case
- EPA eGRID, 2019

Measure 7. Reduce emissions from port operations through the adoption of low-carbon fuels, electric equipment, and operational changes.

The GHG reduction calculations represented for ports target specific potential projects at select port facilities and locations. These include a set number of equipment and system upgrades and replacements for forklifts, vans, cruisers, shuttles, pickups, buses, and battery systems. As a state entity, the VPA will be implementing projects for its facilities across the state, not just for its facilities and operations within the boundary of the Richmond MSA. As such, both the Hampton Roads MSA and Virginia State PCAPs measures related to ports are complementary to this measure.

The project list for the Richmond port operations includes electrifying the following vehicles/equipment:

- 10 utility tractor rigs (UTRs)
- 6 top pick container handlers
- 9 pick-up trucks
- 1 specialty vehicle
- 2 mobile harbor cranes
- 5 light-duty, 2 medium-duty, and 1 heavy-duty forklift
- 5 Level 2, 28 Level 3, and 3 Level 4 EV charging stations
- 1 medium-sized battery storage system

To estimate the potential GHG emission reductions from **vehicle electrification**, EPA's GHG equivalency formula was used for passenger vehicles as well as port-wide average fleet fuel consumption to estimate annual CO_2e based on the amount of gasoline consumed. The EPA's GHG equivalency formula for passenger vehicles (using averages for VMT and MPG) based on CO_2e per gallon of gasoline shows:

8.89 × 10-3 metric tons CO_2/gallon gasoline × 10,746 VMT car/truck average × 1/22.9 miles per gallon car/truck average × 1 CO_2, CH_4, and N_2O/0.993 CO_2 = 4.20 metric tons CO_2e/vehicle /year

The Port's calculation utilized their fleet wide per vehicle fuel consumption average in place of the VMT*MPG numbers that the EPA's formula utilizes to generate average fuel consumption nationwide for passenger vehicles.

To estimate the potential GHG emission reductions from the **battery storage** system, the usage of the battery was estimated in terms of annual avoided grid electricity consumption. The emissions from that avoided electricity use were calculated using an emissions factor projection created using eGRID data and information on the local utility, Dominion Energy. The EPA eGRID region SRVC was used for a starting grid emissions factor. Dominion's Integrated Resource Plan and grid decarbonization target from the Virginia Clean Economy Act were then used to create an emissions factor projection for the region.

To estimate the potential GHG emission reductions from the **electrification of port equipment**, EPA's Diesel Emissions Quantifier tool was used to calculate CO_2 and NO_x, which were used to calculate CO_2e.[53] Assumed all equipment would be free of tailpipe emissions in 2040 according to the Port's net-zero goal of 2040. Fuel usage/usage hours as well as engine years and other inputs came from internal fleet data for Richmond and knowledge of normal use.

[53] https://cfpub.epa.gov/quantifier/index.cfm?action=user.account

CPRG IMPLEMENTATION GRANTS COMPETITION
COVER PAGE FOR APPLICATION

APPLICANT INFORMATION

Organization: Metropolitan Washington Council of Governments

Primary Contact: Jeffrey King, Director, Climate, Energy, and Air Programs

Phone Number: (202) 962-3238

Email Address: jking@mwcog.org

TYPE OF APPLICATION ☐ Individual Applicant ☒ Lead Applicant for a Coalition

This coalition is comprised of the U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Grant (CPRG) program planning grant leads for the three metropolitan statistical areas (MSAs) in the Commonwealth of Virginia. The Metropolitan Washington Council of Governments (COG) is serving as the lead applicant for a coalition including:

- Richmond Regional Planning District Commission (PlanRVA)
- Hampton Roads Planning District Commission (HRPDC)

FUNDING REQUESTED: $96,754,605

APPLICATION TITLE: Virginia **I**nitiative for **B**uilding **E**fficiency (VIBE)

BRIEF DESCRIPTION OF GHG MEASURES: This application contains one GHG measure, a new program to accelerate commercial and multifamily building decarbonization, that is a shared priority for the three CPRG planning MSAs in Virginia (*note this application geographically covers areas of these MSA in Virginia; two of the MSAs cross into other states and these areas outside of Virginia are not included*).

This proposed program is the **V**irginia **I**nitiative for **B**uilding **E**fficiency (VIBE) program, which will address key chronic barriers to clean energy investment by integrating financial incentives with comprehensive "concierge" services for commercial multifamily buildings and municipal and institutional buildings in the three MSAs. VIBE will complement and leverage other funding, incentive, and financing sources, including utility program incentives, federal tax incentives, and various types of financing available.

Focusing on high-performance, cost-effective measures and technologies in energy efficiency, electrification, and distributed energy resources, VIBE will drive marked growth in Virginia's clean energy economy, while also producing co-benefits such as improved indoor air quality and health benefits, and improved energy equity and reduced energy burden. VIBE will work in tandem with Virginia's participation in the multistate coalition entitled: "States Supporting Resilient Local Energy Systems," focused renewable and resilient energy systems for public buildings.

SECTORS:

☐ Industry
☒ Electricity Generation
☐ Transportation
☐ Other (please describe)
☒ Commercial and Residential Buildings
☐ Agriculture/Natural and Working Lands
☐ Waste and Materials Management

EXPECTED TOTAL CUMULATIVE GHG EMISSION REDUCTIONS

Estimated cumulative GHG reductions for 2025-2030 (in metric tons): 101,133 metric tons CO_2e

Estimated cumulative GHG reductions from 2025-2050 (in metric tons): 501,851 metric tons CO_2e

LOCATIONS: The application covers the geographies of the three MSAs in Virigina, including the following cities, counties, and Tribes in Virginia: Arlington County, Clarke County, Culpeper County, Fairfax County, Fauquier County, Loudoun County, Prince William County, Rappahannock County, Spotsylvania County, Stafford County, Warren County, City of Alexandria, City of Falls Church, City of Fairfax, City of Fredericksburg, City of Manassas, City of Manassas Park, Town of Ashland, Amelia County, Charles City County, Chesterfield County, City of Colonial Heights, Dinwiddie County, Prince George County, Sussex County, City of Hopewell, City of Petersburg, Goochland County, Hanover County, Henrico County, King & Queen County, King William County, New Kent County, Powhatan County, City of Richmond, Upper Mattaponi Tribe, Rappahannock Tribe, Pamunkey Tribe, Chickahominy Tribe, Chickahominy Tribe Eastern Division, Gloucester County, Matthews County, James County/City, Williamsburg, York County, Newport News, Poquoson, Hampton, Surry County, Southampton County, Franklin, Isle of Wight County, Suffolk, Portsmouth, Chesapeake, Norfolk, Virginia Beach.

APPLICABLE PRIORITY CLIMATE ACTION PLAN(S) (PCAP) REFERENCES
PCAP Lead Organization(s):

- Metropolitan Washington Council of Governments (COG) (sub granted CPRG planning funds from the Washington DC Department of Energy and Environment to develop a PCAP for the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA)
- Richmond Regional Planning District Commission (PlanRVA)
- Hampton Roads Planning District Commission (HRPDC)

PCAP Title(s):

- COG: Priority Climate Action Plan: Washington-Arlington-Alexandria-DC-VA-MD-WV Metropolitan Statistical Area
- PlanRVA: Richmond, VA Metro Area Metropolitan Statistical Area Priority Climate Action Plan
- HRPDC: Priority Climate Action Plan for the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area

PCAP Website link(s):

- COG: https://www.mwcog.org/documents/2024/03/01/priority-climate-action-plan/
- PlanRVA: https://www.climateresilientrva.org/about-1
- HRPDC: https://www.hrpdcva.gov/1135/EPA-Climate-Pollution-Reduction-Grant-CP

List of GHG reduction measures and PCAP page reference for each measure: The VIBE program integrates priorities within the following GHG reduction measures from each MSA's PCAP.

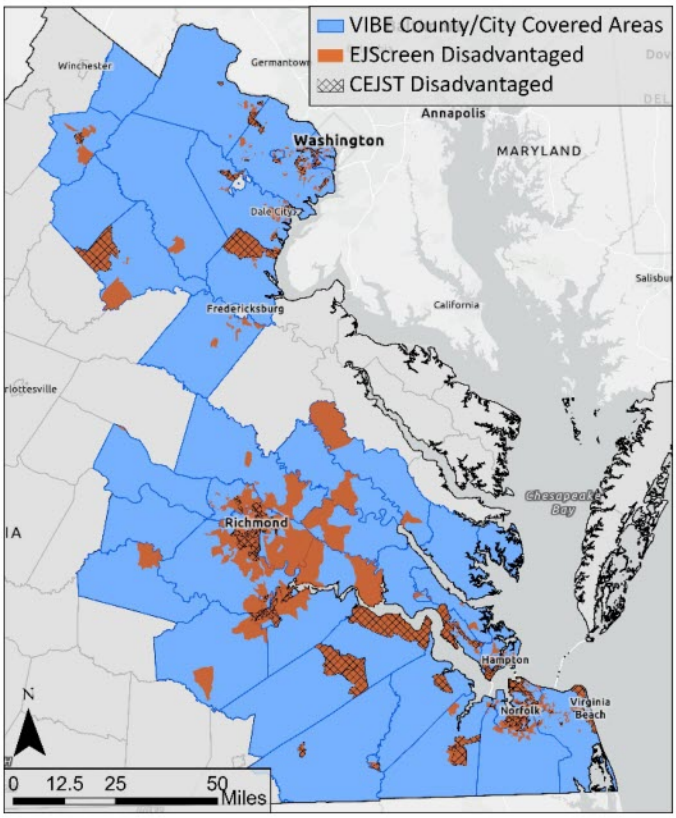
Measure	PCAP Title(s) and Page Numbers
Accelerate the deployment of energy efficiency solutions and decarbonization of residential, institutional, municipal, and commercial buildings	Priority Climate Action Plan: Washington-Arlington-Alexandria-DC-VA-MD-WV Metropolitan Statistical Area, pages 23-26
Accelerate the deployment of clean and renewable energy	Priority Climate Action Plan: Washington-Arlington-Alexandria-DC-VA-MD-WV Metropolitan Statistical Area, pages 27-30

Measure 5: Implement decarbonization strategies for municipal operations	Richmond, VA Metro Area Metropolitan Statistical Area Priority Climate Action Plan, pages 34-36
Measure 6: Accelerate and support the deployment of energy efficient and low-carbon solutions and incentivize the transition to clean energy for residential and commercial buildings	Richmond, VA Metro Area Metropolitan Statistical Area Priority Climate Action Plan, pages 36-38
Measure 1: Create programs to support and incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching	Priority Climate Action Plan for the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area, pages 25 to 28
Measure 2: Reduce energy consumption and increase building & facility decarbonization through programs to support and incentivize energy efficiency and electrification measures	Priority Climate Action Plan for the Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area, pages 29 to 33

CPRG IMPLEMENTATION GRANTS COMPETITION WORKPLAN

1. Overall Project Summary and Approach

Figure 1. Geographic coverage of the VIBE program



Residential and commercial buildings energy are the second highest source of greenhouse gas (GHG) emissions in the Commonwealth of Virginia (35% in 2020),[1] and the highest sources of emissions in its core urban regions around Northern Virginia, Richmond, and Hampton Roads. However, relatively little has been done to address this persistent and challenging source of emissions. Virginia building stock's energy performance has long been inhibited by weaker policies and programs than those in its surrounding states. Virginia's energy codes are lagging, and local governments are prevented by the state's Dillon Rule legal structure from adopting more stringent standards. Utility incentives are relatively less generous in Virginia, and have been in place for only a few years, as compared to many neighboring states who have had these incentives available for more a decade.

To address these major sources of GHG emissions and fill a critical gap in financial and technical assistance need in Virginia, the **V**IBE program, a new program to be established with U.S. EPA Climate Pollution Reduction Grant (CPRG) funds, will provide marketing, engagement and outreach (ME&O), technical assistance, and financial incentives for existing commercial, multifamily and public buildings in the three defined CPRG MSAs in the Commonwealth of Virginia (see Figure 1). The three MSAs have a combined population of nearly 6 million, well over half of Virginia's total population, and 31% of the MSAs' populations live in low-income, disadvantaged communities (LIDACs) identified using EPA's EJScreen (14% are LIDACs identified using the Climate & Economic Justice Screening Tool (CEJST)). Accordingly, the VIBE program will be designed and implemented by a coalition led by the Metropolitan Washington Council of Governments (COG) along with the Richmond Regional Planning District Commission (PlanRVA) and the HRPDC – the three CPRG MSA planning grantees in Virginia.

VIBE is designed to complement and leverage other funding, incentive, and financing sources, including utility program incentives, federal tax incentives, and f various types of financing available (e.g., Virginia's C-PACE programs, affordable housing investment funds, and municipal capital improvement budgets). The VIBE program will have three primary markets of focus, including:

1. **Low-income, disadvantaged community commercial and multifamily buildings:** Focusing on high-performance, cost-effective measures in energy efficiency, electrification, and clean distributed energy resource technologies to move the buildings sector toward net-zero emission futures, VIBE

[1] Virginia Department of Environmental Quality. Commonwealth of Virigina Priority Climate Action Plan. 2024. https://www.deq.virginia.gov/home/showpublisheddocument/22732/638451476222270000

will serve privately-owned buildings in LIDACs, such as multifamily buildings, places of worship, non-profit organizations, and small businesses.

2. **Market-rate commercial and multifamily buildings:** VIBE will also support efficiency, electrification, and clean distributed energy resource technologies at non-LIDAC buildings. This program subsector will also define and include 'distressed assets' (commercial or multifamily buildings at risk of foreclosure).
3. **Municipal and institutional buildings:** Lastly, the VIBE program will target energy efficiency and electrification for municipal and institutional buildings, including schools. The VIBE program will work in tandem with Virginia's participation in the multistate coalition entitled: "States Supporting Resilient Local Energy Systems" by feeding retrofitted/efficient buildings with VIBE support to the multistate coalition program so renewable energy systems can be right sized to building energy needs, should both CPRG applications be funded.

VIBE focuses on existing commercial, multifamily, and municipal buildings as single-family residential buildings are targeted for ample technical assistance and eligible for multiple federal incentives, including upcoming opportunities through the U.S. Department of Energy Home Energy Rebates for energy efficiency and electrification, plus federal tax credits and utility program incentives. Moreover, Virginia's commercial buildings and multifamily buildings markets face greater market barriers including:

- **The largest and most persistent market barrier is the split incentive barrier between owners and occupants.** A recent report from the American Council for an Energy Efficiency Economy (ACEEE) identified this as the greatest risk for retrofits for commercial buildings.[2] Most of the occupied space in the commercial and multifamily markets is tenant-occupied; the tenants typically pay their own energy bills but cannot invest in building energy upgrades. Owners have little incentive to pay for upgrades that reduce tenant energy bills, and they often view these upgrades or major renovations as significant financial risks. The result has been chronic under-engagement of these building owners and under-investment in clean energy and other upgrades.
- **The fragmentation of commercial and multifamily buildings sector end-use energy markets limits awareness, understanding, and the ability to implement upgrades.** With nearly 100,000 buildings in the three MSA regions, owned by thousands of organizations and individuals, and served by thousands of energy service contractors, it is hard to build awareness, technical knowledge, and the implementation capacity needed to execute energy upgrades at scale and build on success from others. As stated in Dominion Energy's most recent long-term plan, "*Customer research revealed that both residential and business customers have low awareness of the Company's distribution management system (DSM) programs compared to awareness among customers of utilities in other jurisdictions. This low awareness, coupled with high levels of interest for participating in energy efficiency, indicates an opportunity to increase program participation and boost energy savings.*"[3]
- **Energy equipment markets are typically driven by equipment failure.** Energy service contractors are typically only called on to replace or repair energy equipment in emergencies and are not trained or incentivized to assess or implement comprehensive upgrades. Equipment dealers are similarly motivated to stock only the basic models needed for emergency replacement, rather than higher-performance equipment, let alone equipment that uses a different fuel and/or requires more extensive installation knowledge.

[2] ACEEE. Financial and Systemic Barriers and Solutions to Scaling Energy Retrofits in Commercial Buildings. December 2023. https://www.aceee.org/research-report/b2305

[3] Dominion Energy and Cadmus. Demand-Side Management Long-Term Plan. Demand-Side Management Long-Term Plan (dominionenergy.com)

- **Lack of awareness and technical expertise to understand and implement energy upgrade projects is pervasive, especially in smaller commercial and multifamily buildings.** This leaves the majority of clean energy investment potential unseen and untapped. In addition, Virginia's energy codes for new construction are weaker than many states across the country, which has produced a less-efficient building stock.
- **Limited investment from and uptake of existing programs is a persistent challenge:**
  - The Virginia Energy Savings Performance Contracting (ESPC) averages less than $40 million annually in local government building investment.[4] Annual savings are estimated at less than a tenth of one percent of Virginia local governments' multibillion dollar energy costs.
  - Virginia's Commercial Property Assessed Clean Energy (C-PACE) financing, while it has state-enabled legal authority and has implemented several projects, only has local government buying in 11 of 95 counties.[5]
  - Virginia's utility energy efficiency programs have reached only 3-4% of the state's commercial buildings, and in 2021 reported savings of only 0.15% of total commercial customer energy consumption.[6] Even though program spending is increasing in this area, eligible technologies and incentive levels are limited by the utility regulators' strict cost effectiveness criteria.[7]

Stakeholders Engaged in 2022 by Fairfax County

- **State and Local Agencies:** Virginia Energy, Fairfax County Department of Economic Initiatives, Fairfax County Redevelopment and Housing Authority, Fairfax County Economic Development Authority:
- **Lenders:** Arlington Community Federal Credit Union, Clean Energy Credit Union
- **Green Banks:** Montgomery County Greenbank, Energize Delaware, Philadelphia Green Capital Corp, Philadelphia Energy Authority
- **Service Providers:** Dominion Energy, PEG, Home Energy Medics, Ipsun Solar, The Fifth Fuel
- **Other stakeholders:** Inclusive Prosperity Capital, America's Small Business Development Centers Virginia, Pearl Certification, Moseley Architects

The VIBE program is designed to complement and leverage these existing programs, overcome their administrative and operational limits, and produce greatly increased combined impact. It will also develop a long-term succession plan that will maximize the potential for continued provision of services, incentives and financing to these markets.

These barriers have a greater impact in LIDAC areas, where property values, older and less-efficient construction, and other market dynamics further limit investment in improving the building stock.

As further evidence of the need for the VIBE program, in 2022, Fairfax County, Virginia undertook a study to assess the needs and opportunities for a program with features such as what VIBE will offer.[8] The study, based on a wide range of stakeholder input and feedback (see text box), found that in the Northern Virginia market, substantial needs and opportunities exist as outlined in Table 1 below.

[4] Virginia Energy. Energy Savings Performance Contracting. https://energy.virginia.gov/energy-efficiency/performancecontracting.shtml
[5] https://virginiapace.com/local-programs/
[6] Evaluation, Measurement, and Verification Report for Virginia Electric and Power Company (Dominion Energy), CASE NO. PUR-2021-00247 (VIRGINIA), June 15, 2023
[7] https://www.scc.virginia.gov/docketsearch/DOCS/7r7p01!.PDF, pp. 19 et seq
[8] ICF and Fairfax County. Fairfax County Green Bank Gap and Feasibility Analysis. November 2022. https://www.fairfaxcounty.gov/environment-energy-coordination/green-bank

Table 1. Gaps, Barriers, and Opportunities for Clean Energy Markets in Virginia

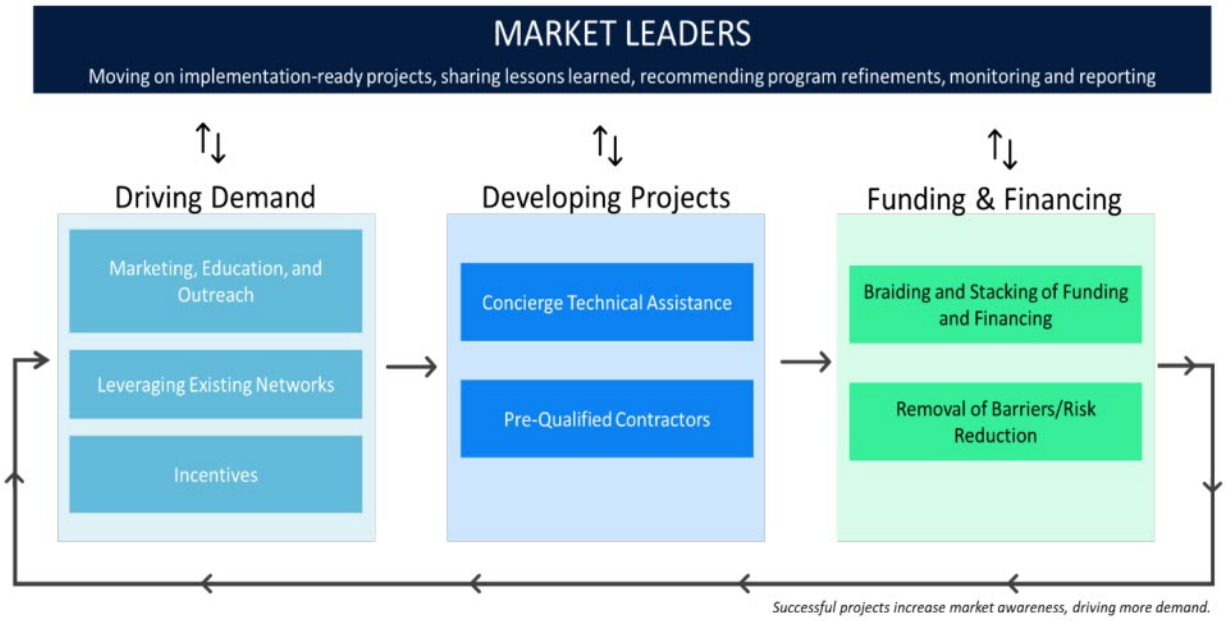
Gaps and Barriers	Opportunities
• Large upfront costs and project prioritization • Technical and financial uncertainty • Misaligned financial incentives • Contractor constraints • Creditworthiness	• Contractor Pre-qualification • Marketing and Promotion Assistance • Focus on Low- and Moderate-Income Marketplace • Focus on Multifamily Residential and Retail Commercial Marketplace

According to this same report, these results extend across the Commonwealth of Virginia. A concerted program effort that addresses these gaps, barriers and opportunities in Virginia and is flexible enough to address the unique needs of each region participating in the program could thus realize upscaled GHG emission reductions, improve indoor environments and air quality, democratize building decarbonization, overcome seminal barriers to achievement, and improve energy use and cost reductions and additional co-benefits across the three regional geographies, especially in LIDACs.

a. Description of GHG Reduction Measure

Features: The VIBE program will provide ME&O, technical assistance, and financial incentives for existing commercial and multifamily residential buildings and municipal and institutional buildings in the three defined CPRG MSAs in Virginia (see program concept in Figure 2).

Figure 2. VIBE Program Concept and Services



VIBE is designed to complement and leverage other funding, incentive, and financing opportunities, including utility program incentives, federal tax incentives, and financing available from various sources (e.g., Virginia's C-PACE program, affordable housing investment funds, municipal capital funds, Virginia's ESPC program, and emerging state and local green banks). VIBE's design is based on identifying and working with market leaders to drive demand, develop projects, and provide financing in an integrated effort to increase the level of functionality in Virginia's clean energy economy.

Building off known successful models, such as the New York City Accelerator program, the VIBE program will be an 'accelerator' for clean energy investment, by engaging networks and partners and offering incentives to drive demand, and providing a range of technical, administrative and financing and funding services in 'concierge' fashion to take participants from initial interest to completed

projects. A critical element of driving demand will be working with state representatives (from Virginia Energy and Virginia Department of Environmental Quality), regional representatives in each MSA, existing organizations with deep networks (e.g., the Virginia Energy Efficiency Council), and with local governments across the MSAs to build on existing LIDAC relationships and community development initiatives and their knowledge of Virginia and local leaders and market conditions.

The program will focus on three primary market segments and provide a range of offerings:

Market Focus 1. Efficiency, Electrification, and Solar for LIDAC Multifamily & Commercial Buildings. VIBE will provide ME&O, technical assistance and incentives for energy efficiency, electrification, and clean distributed energy resource technologies. VIBE will serve privately-owned buildings in LIDACs, such as multifamily buildings, houses of worship, non-profit organizations, and small businesses, working with groups such as Viridiant, the Faith Alliance for Climate Solutions, the Inter-Faith Power & Light, federal weatherization providers such as Community Housing Partners and project: Homes, and other local community-based organizations to serve as aggregators and outreach channels. Specific services will include:

- **ME&O:** Engaging with service providers/contractors who can drive participation, as well as local organizations such as chambers of commerce, economic development agencies, and LIDAC community based organization (CBOs).
- **Technical assistance**: Providing comprehensive "concierge" service to accelerate participation rates and project installation rates, such as site visits, data collection, energy audits and related analysis, decision-support tools, measure recommendations, and technical support for project development, completion, and financing. A limited number of 'full-service' treatments will be budgeted each year, targeted for less-well-resourced buildings, to facilitate participation and project completion.
- **Incentives**: Complementing others, including utility program incentives, affordable housing investment funds, and federal tax incentives and credits. They will include both prescriptive incentives (e.g. providing a fixed dollar amount for defined lighting, HVAC, hot water, or electrification measure) for simpler projects involving one or more measures, and custom incentives (e.g. calculated payments based on dollars per ton of CO_2e avoided).
- **Measures:** Including those eligible for federal tax incentives, which include lighting, HVAC, hot water, and building envelope measures.
- **Financing options:** Including connections with and considerations of Commercial PACE as currently authorized in Virginia, green bank financing products, and other financing options flowing from the Greenhouse Gas Reduction Fund (GGRF). The program will enhance financing through interest rate buydowns and technical assistance in applying for available options.

Market Focus 2. Efficiency, Electrification, and Solar for Non-LIDAC Multifamily & Commercial Buildings. VIBE will provide ME&O, technical assistance and incentives for energy efficiency, electrification, and clean distributed energy resource technologies. Incentives, levels of service, and other features will generally be lower for this program than for the LIDAC-focused portion of the program, but it will include a special focus area for distressed assets (properties facing default or foreclosure) as a part of targeting overall community benefits. Specific services will include:

- **ME&O:** Engaging with service providers/contractors who can drive participation, as well as local organizations such as chambers of commerce, economic development agencies, developer and trade organizations and agencies, and CBOs.
- **Technical assistance**: Providing site visits, data collection, energy analysis, measure recommendations, and technical support for project development, completion, and financing, along the lines of the accelerator approach described above in Figure 2.

- **Incentives**: Complementing others, including utility program incentives, local initiatives (such as the Arlington County Commercial Market Resiliency Initiative, or CMRI 2.0), and federal tax incentives. They will include both prescriptive incentives (e.g. providing a fixed dollar amount for defined lighting, HVAC, hot water, or electrification measure) for simpler projects involving one or more measures, and custom incentives (e.g. calculated payments based on dollars per ton of CO_2e avoided).
- **Measures**: Including those eligible for federal tax incentives, which include lighting, HVAC, hot water, and building envelope measures.
- **Financing options**: Including connections with the Commercial PACE Programs as currently authorized in Virginia, green bank financing products, and other financing options flowing from the GGRF. The program will enhance financing through interest rate buydowns and technical assistance in applying for available options.

Market Focus 3. Efficiency and Electrification for Municipal and Institutional Facilities. As a third focus market the VIBE program will provide ME&O, technical assistance and incentives for energy efficiency and electrification for municipal and institutional facilities (e.g., public schools), with a priority focus on those in LIDAC communities. The VIBE program will work in tandem with Virginia's participation in the multistate coalition entitled: "States Supporting Resilient Local Energy Systems" by feeding retrofitted/efficient buildings with VIBE support to the multistate coalition program so renewable energy systems can be right sized to building energy needs, should both CPRG applications be funded.

This effort will leverage Virginia's ESPC program as a lead financing model, in which energy service companies (ESCOs) provide the bulk of technical services and the upfront capital investment. VIBE will make the ESPC program more valuable to local governments, by contributing funds to these transactions while also providing expert services to help the localities gain maximum benefits from the program. The program will do this by providing technical assistance to help facility owners understand the program, engage with ESCOs, and work with ESCOs to define optimal measure mixes and contract terms. It will also provide additional incentive funds, which will enable greater total investment, greater energy savings and emission reductions, and better financial returns to local governments. For facilities that do not meet the requirements for participation in the performance contracting program, the program will provide services and incentives similar to those described above, including.

Already Identified Needs for Municipal Buildings Support

Multiple local governments have already identified and gathered needs for their buildings to target for efficiency and electrification upgrades through the CPRG planning and implementation grant development process. Examples of these include:

- 4 libraires in the City of Alexandria that serve as community resilience hubs, 2 of which are in the LIDACs and 5 fire stations in the City serving LIDACs.
- Over $4.6 million for municipal facility upgrades in Newport News, including police headquarters, recreation and cultural centers, and public works and safety facilities, serving and located in LIDACs.

- **ME&O:** Engaging jurisdictions and institutions, focusing on those with already known pipelines of projects to get immediate reductions, as well as ESCOs.
- **Technical assistance**: Including working with facility owners and ESCOs to scope projects, and providing other support as needed for project development, completion, and financing.
- **Incentives**: Complementing the ESCO business model, and leveraging other incentives including utility program incentives, and federal tax incentives, including the Direct Pay tax rebates available to local governments and other non-taxpaying entities.

- **Measures**: Starting with those recommended by ESCOs and expanding the scope to deepen savings and move facilities closer to net-zero energy and emissions performance. For facilities not able to participate in the ESCO program, the focus will be on measures eligible for federal tax incentives, which include lighting, HVAC, hot water, and building envelope measures.
- **Financing options**: Focusing primarily on the state's ESPC program. For facilities unable to use that program, financing options will include Commercial PACE as currently authorized in Virginia, green bank financing products, and other financing options flowing from the GGRF. The program will enhance financing through interest rate buydowns and technical assistance in applying for available options.

In addition to the direct services and functions for market areas described above, the VIBE program will focus on sharing lessons that can scale results across Virginia and lead to long-term market transformation ensuring priorities across the MSAs are captured in the program. Activities will include:

- Establishment of the VIBE Advisory Board – comprised of coalition members, local government and CBO representatives, state agency representatives, non-profit organizations, and utilities – to inform program design, oversee progress, and support program transition/close out.
- Annual meeting/session to discuss program progress, success, challenges, and barriers (e.g., as a part of the annual Virginia Clean Energy Summit which is open to all of the Commonwealth).
- Development and publication of 2-4 case studies per year.
- Publication of an annual report, highlight program progress, success, and metrics in line with the outcomes and outputs described in this application.
- A planning effort in VIBE's final year to enable transitions to long-term sustainability of VIBE's services and incentives. This will include consideration of such options as transitioning VIBE's services to financing organizations using the GGRF to provide financing, such as green banks or Community Development Financial Institutions (CDFIs), transitioning some or all of VIBE's program administration role to utility program administrators, and enabling VIBE participants to act collectively through virtual power plant (VPP) and other distributed energy resource entities (such as microgrids) that can obtain value from Virginia utilities or the regional PJM grid operator.

Tasks and Milestones: The phases, tasks and milestones for the VIBE Program are outlined in Table 2. These are placed in a timeline in Section 3c, Authorities, Implementation Timeline, and Milestones.

Table 2. VIBE Program Phases, Tasks and Milestones

Tasks	Milestone(s)
Pre-Award and Award Set Up	
Finalize coalition	• Signed memorandum of agreement (MOAs) with PlanRVA and HRPDC
Finalize award paperwork	• Completed award paperwork
Program Start Up	
Develop grant performance plans	• EPA approved Quality Assurance Performance Plan and Quality Management Plan
Establish subgrants	• Established subgrants with PlanRVA and HRPDC
Develop work plan	• EPA accepted work plan • Active work plan management system
Develop reporting templates and performance management systems	• Reporting templates in line EPA grant reporting requirements and to communicate results and progress publicly • Subgrantee and program participating reporting templates and procedures • List of performance metrics and supporting data collection approaches and agreements • Performance management dashboard
Hire for program in COG, PlanRVA, and HRPDC	• Job postings • New hires onboarding

Tasks	Milestone(s)
Procure contractors for program design, administration, implementation, and evaluation	• Request for proposals (RFPs) posted for competitive procurement in line with 2 CFR Part 200 and 2 CFR Part 1500 • Selected contractor(s)
Establish advisory board	• Call for members • Board selection • Established governance
Program Design and Launch	
Engage test cases for targeted buildings to inform program design for each market	• Selected test case for each market (varied regionally) to help inform program design and seek immediate reductions
Set incentive levels and design	• Program potential/incentive level study • Final incentive design
IT and Tracking Infrastructure	• Project-level data collection requirements • Application intake processes • Project workflow tracking • Customer relationship management system
Establish network of partners	• Stakeholder map
Pre-qualify service providers	• Service provider qualifications specifications • Pre-qualified service provider list • Participating service provider agreements (terms & conditions)
Develop ME&O plans and supporting materials	• ME&O plan • Initial set of ME&O material, including draft website • Coordinated outreach collateral with utility programs • Participant terms & conditions
Launch program	• Launched website • Launch events and engagement (to be defined in the ME&O plans and amplified by state, regional and local partners)
Program Management and Administration, and Implementation	
Outreach, marketing, intake	• Pipeline of projects and candidates • Identified priority projects for assistance (based on need, interest, energy/carbon reduction potential, and feasibility for implementation)
Technical assistance	• Assigned one-on-one case managers for each project • Completed building assessment and identified measures
Project development	• Secured contractors, financing and other funding with signed contracts and project timelines
Project installation	• Installed and commissioned equipment and systems
Evaluation	• Evaluation report(s)
Program Reporting	
EPA reporting	• Semi-annual and final reports to EPA
Program reporting	• Annual meeting/session to discuss program progress, success, challenges, and barriers • Quarterly Advisory Board meetings • Annual case studies • Annual reports
Program Close Out and Transition	
Determine feasibility of transition for program long-term	• Transition feasibility report and decision about program future
Develop transition and close out plan	• Transitions or close out plan
Transition or close out	• Full transitioned program from COG to new entity or close out and • Complete grant close out activities

Of note in the table above are a few features to help ensure the success and long-term durability of the VIBE program, including:

- **Test cases to inform program design.** While the program design study is being completed and the program is being established, the VIBE program will take volunteers with projects in a state of sufficient readiness to engage as a part of program design. These test cases, one for each region and varied by market focus areas, will be eligible for VIBE services and incentives in exchange for providing information and feedback to inform service offerings, incentive levels, and key details of braiding funding and financing sources. By engaging these participants early, the program will be designed to be more effective and efficient.
- **Transition study.** Toward the end of the CPRG grant period the VIBE program Advisory Board will develop a transition plan and decide on a path forward beyond 2030. The study will be focused on identifying viable paths forward for the program to deliver benefits in Virginia, and maybe even expanded beyond the MSA regions, after the CPRG funding period. The study will consider long-term funding options (e.g., sets of VIBE participants serving as a VPPs for Virginia utilities and the PJM regional grid operator; and GGRF financing mechanisms providing ongoing financing with concierge service support). A transition of the program administrator may also be considered, e.g. integration with utility program administration. Regardless, in the middle of the fifth year of the CPRG grant a decision about the transition of the program or required close out will be made by the Coalition members with support from the Advisory Board.

Potential Risks: Like any program that seeks to transform markets by reducing market barriers, VIBE faces risks, including the depth and persistence of some barriers. By way of example and especially in LIDACs, clean energy under-investment may persist even with enhanced incentives and support services. Coordination challenges - such as the need to engage a wide range of audiences and braid multiple incentives and service offerings in complex transactions - could limit the number and/or size of projects completed. Supply chain limitations (such as qualified contractor availability or equipment availability) also may present risks. Recognizing these risks, the VIBE program will apply proven best practices in other parts of the country to significantly move the needle on market barriers and minimize such risks.

COG also acknowledges that there is a timing risk in terms of hiring and procurement which may lead to potential delays in program launch and successes. To mitigate this, prior to grant award, COG, along with its coalition partners, plans to post jobs early to build a pipeline of candidates in anticipation of grant award, assess the viability of using existing multi-award and ridable contracts that meet the requirements of 2 CFR Part 200 and 2 CFR Part 1500 as applicable to try to streamline the procurement process, and prepare and post RFP(s) in an expedited fashion.

Coalition Participation: The three CPRG MSA planning grantees with coverage in Virginia are the three members of this coalition application. COG as the lead applicant, with PlanRVA and HRPDC coalition members have been working closely together to develop this application and are fully committed to establishing and signing memoranda of agreement by July 1, 2024, following the requirements of Appendix E of the Notice of Funding Opportunity, Guidelines for a Memorandum of Agreement for a Coalition. This commitment is codified in the letters of intent attached to this application. The roles and responsibilities of each coalition member are outlined below.

- **Lead application - COG:** Receive funds from EPA and manage and administer grant overall, including EPA reporting; ensure compliance with quality and performance plans; subgrant funds and manage subgrants; release RFP and contract with third party(ies) for program administration and implementation; staff program for program design, startup, management, and reporting; identify and work with market leaders in Northern Virginia; and establish and serve on Advisory Board.
- **Coalition members - PlanRVA, HRPDC:** Receive subgrantee funds and manage subgrants according to MOAs and grant paperwork; hire support staff for program duration; serve as leading members on the VIBE Advisory Board; identify and work with market leaders in respective regions; support building a pipeline of projects; engage in networks of local partners; communicate support needs

and market barriers and opportunities to the COG and the VIBE program administrators and implementers; and support grant reporting.

PCAP Priority Reduction Measure: The VIBE program aligns with aspects of the following measures from each of the MSA's respective Priority Climate Action Plans (PCAPs).

- **Priority Climate Action Plan: Washington-Arlington-Alexandria-DC-VA-MD-WV MSA**: Pages 23-26 (Measure: Accelerate the deployment of energy efficiency solutions and decarbonization of residential, institutional, municipal, and commercial buildings) and pages 27 to 30 (Measure: Accelerate the deployment of clean and renewable energy).
- **Richmond, VA Metro Area MSA Priority Climate Action Plan:** Pages 34-36 (Measure 5: Implement decarbonization strategies for municipal operations) and pages 36-38 (Measure 6: Accelerate and support the deployment of energy efficient and low-carbon solutions and incentivize the transition to clean energy for residential and commercial buildings).
- **Priority Climate Action Plan for the Virginia Beach-Norfolk-Newport News, VA-NC MSA:** Pages 25 to 28 (Measure 1: Create programs to support and incentivize a transition to clean energy, including onsite renewable energy, energy storage system deployment, and fuel switching) and pages 29 to 33 (Measure 2: Reduce energy consumption and increase building & facility decarbonization through programs to support and incentivize energy efficiency and electrification measures).

b. Demonstration of Funding Need

Flexible federal funding is needed to reach commercial and multifamily energy end-use markets in Virginia. There are currently no current or planned programs like VIBE to accelerate uptake of building retrofits in Viriginia. As discussed on page 3 (under the bullet "Limited investment from and uptake of existing programs is a persistent challenge") existing programs like Virginia's ESPC, C-PACE and utility programs have had very limited impacts, have limited financial incentive capacity, and are subject to restrictive cost effectiveness, legal, and financial requirements that limit their applicability and effectiveness. While selected larger jurisdictions in the three MSA region are eligible for Energy Efficient and Conservation Block Grant (EECBG) funds, the total funding is less than 1/6th of the EECBG allocations in the American Recovery and Reinvestment Act of 2009 and represents a small fraction of localities identified funding needs. For example, Newport News' EECBG allocation is about 5% of its identified need in the municipal projects it has identified (see text box on page 6). The bottom line is that previous and current funding have supported only a small fraction of the three MSAs' commercial, multifamily, and municipal funding needs. A 2022 analysis estimated the commercial building market investment potential for energy efficiency was estimated at $83M, just for Fairfax County, Virginia.[9] Fairfax County accounts for about one-fifth of the three MSA region VIBE would serve, so regional efficiency potential could be in the $400 million range, plus additional potential for electrification and solar PV.

Federal tax deductions[10] and direct pay[11] options are available for commercial energy upgrades, but require calculations and other technical elements that many building owners cannot easily interpret or follow. Anecdotally, building owners, municipal facilities managers, and portfolio managers in the MSAs have expressed confusion, limited awareness, of and general skepticism in the applicability of these options to fund retrofits for their buildings. Those that are able to take advantage of the 179D tax credit for commercial buildings then face long payback times and split incentives with the contractor that performed the work.

[9] ICF and Fairfax County. Fairfax County Green Bank Gap and Feasibility Analysis. November 2022. https://www.fairfaxcounty.gov/environment-energy-coordination/green-bank

[10] https://www.irs.gov/credits-deductions/energy-efficient-commercial-buildings-deduction

[11] https://public-inspection.federalregister.gov/2024-04604.pdf

The VIBE program will coordinate with and seek to leverage other programs and incentives, making the combined effect greater than would occur from each program acting alone. For example, the combined VIBE and utility incentives could be braided with tax incentives to make the economics of a given project much more attractive, and the Virginia C-PACE, Virginia ESPC, and future GGRF financing options could be used to minimize the capital outlay for a given project. By paying for the additional incentive amounts and concierge services needed to make investments happen at higher rates that would otherwise occur, CPRG funds will fill a critical need to accelerate clean energy investment.

c. Transformative Impact

The VIBE program will transform commercial, multifamily, and municipal and institutional building end-use energy markets in the three MSA regions in Virginia, especially in LIDAC communities, by combining attractive incentives with concierge services and innovative financing that reduce the barriers listed above and can thus realize building energy upgrades at a scale never before attained. VIBE will provide incentives at levels to "move the needle" enough to make projects more financially attractive and less risky such that they can move forward. For some LIDAC buildings, owners could be offered zero-investment, positive-cash flow projects. For non-LIDAC buildings, owners would be offered very attractive returns on investment. Local governments would see ESPC projects that achieve greater energy savings and GHG reductions, and that provide greater financial benefits to local communities, than the current ESPC is able to offer.

Proven Impact of New York City's Accelerator program:

- Engaged more than 17,000 buildings totaling over 1 billion square feet
- Energy savings are projected to exceed $30 million
- GHG emission reductions are projected to exceed 100,000 tons
- About half of projects implemented to date are in affordable housing

VIBE will provide key 'missing links' in its concierge service model, which provides the staffing capacity and the technical, cost, financing, and operational expertise needed to convert initial interest into completed projects. There is proven success in applying this concierge service (e.g., see textbox on the NYC Accelerator) and VIBE will seek to emulate this model. Field experience has shown that simply offering incentives and financing does not change buildings end-use markets like those targeted by the VIBE program; the concierge service model is designed to address the barriers that have constricted these markets. VIBE's transformative impacts include:

- Engaging services providers such as HVAC contractors, solar installers, building owners and tenant associations, CBOs, and local governments to build awareness of the program and its upgrade opportunities.
- Increasing awareness, availability, and market acceptance of high-efficiency and low-emission technologies, including solar PV, electric heating and hot water systems.
- Bundling incentives, services and financing into a one-stop 'accelerator' model that helps building owners and other stakeholders move from initial awareness to project completion.
- Complementing and leveraging other incentives, including federal and state funds, tax incentives, and utility program incentives, to create very attractive investments that would not exist without this program's bundled approach.
- Driving longer-term market transformation impacts, such as substantially increasing the market shares of high-efficiency/low-emission technologies, including heat pumps, conditioning energy service providers and supply chains to better understand, value, and promote clean energy technologies, and achieving long-term improvements in building thermal envelopes, so that the regions' building sector continues to realize substantial improvements in energy performance and GHG emission reductions.

- A planning effort in its final year to identify and pursue transition strategies that will sustain some or all of VIBE's services and incentives. For example, GGRF recipients are expected to establish new financing mechanisms, offered through such entities as green banks or CDFIs; VIBE's concierge service model could be merged with such mechanisms to ensure that building owners get the services and financing they need. Virginia utilities are undergoing a new round of program planning that is expected to expand utility offerings; VIBE's service offerings could be integrated into future program administration models. And VIBE participants could potential act collectively to participate in future distributed energy resource entities such as virtual power plants (VPPs) or microgrids.

The VIBE program will fill a critical gap in Virginia for the commercial and multifamily and municipal and institutional buildings sector. A program such as this can be a model used or can be transitioned to a future state-wide program and will demonstrate how to successfully accelerate GHG reductions in hard-to-reach sectors, particularly in states where the regulatory environment may not be favorable.

2. Impact of GHG Reduction Measures

a. Magnitude of GHG Reductions from 2025 through 2030

The total GHG emission reductions quantified for VIBE between 2025 and 2030 include reductions in emissions across all market focus areas is outlined in Table 3 below. While other project incentives and financing options exist, there are no other services like the VIBE program, and it is assumed that without VIBE the targeted projects would not occur (see page 3 under the bullet "Limited investment from and uptake of existing programs is a persistent challenge"). Therefore, the GHG reductions presented in Table 3 are fully associated with the requested CPRG funding for the VIBE program. The GHG emission reduction estimates are calculated using the global warming potentials in the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment report and include emissions from the following GHGs: carbon dioxide, methane, and nitrous oxide.

Table 3. Cumulative GHG Reductions from 2025 to 2030 for the VIBE Program by Market Focus Area

Focus Area	Cumulative GHG reductions (metric tons CO_2e), 2025-2030
Focus Area 1- LIDAC commercial and multifamily buildings	**76,931**
Focus Area 2- Non-LIDAC commercial and multifamily buildings	**3,426**
Focus Area 3- Municipal and institutional buildings	**20,776**
Total	**101,133**

To ensure the durability of the GHG emission reductions resulting from VIBE, one of the elements of the program is to perform monitoring and evaluation. Through these activities, which include work such as ensuring proper installation and maintenance and operations of equipment through model contract terms & conditions and data collection directly from projects (e.g., through utility bill), the durability and certainty in short-term emissions reductions (through 2030) can be assured. This assurance is further backed by any monitoring and evaluation required for projects that use utility incentives (to ensure proper use of rate payer funds) or that participate in ESCOs (to ensure contractual agreements are met). VIBE GHG reductions will be realized by technologies that have typical service lives (15 years was assumed for energy efficiency and electrification and 20 years was assumed for distributed energy resources (DER), such as solar and batteries. Backed by supplier warranties and service networks, these installations can be expected to perform reliability through their service lifetimes. Moreover, it is highly likely that they will be replaced by comparable equipment of equal or better performance, which means that impacts are likely to be sustained for the longer term.

b. Magnitude of GHG Reductions from 2025 through 2050

The total GHG emission reductions quantified for VIBE between 2025 and 2050 include reductions in emissions across all market focus areas is outlined in Table 4 below. While other project incentives and

financing options exist, there are no other services like the VIBE program, and it is assumed that without VIBE the targeted projects would not occur (see page 3 under the bullet "Limited investment from and uptake of existing programs is a persistent challenge"). Therefore, the GHG reductions presented in Table 4 are fully associated with the requested CPRG funding for the VIBE program. The GHG emission reduction estimates are calculated using the global warming potentials in the IPCC's Fifth Assessment report and include emissions from the following GHGs: carbon dioxide, methane, and nitrous oxide.

Table 4. Cumulative GHG Reductions from 2025 to 2050 for the VIBE Program by Market Focus Area

Focus Area	Cumulative GHG reductions (metric tons CO_2e), 2025-2050
Focus Area 1- LIDAC commercial and multifamily buildings	**388,238**
Focus Area 2- Non-LIDAC commercial and multifamily buildings	**23,905**
Focus Area 3- Municipal and institutional buildings	**89,709**
Total	**501,851**

The discussion above on the durability of GHG emission reductions in the short term also applies to the long-term GHG emission reductions. In addition, in considering the GHG reductions for the VIBE program, it is important to consider the slow turnover time of building stock and equipment over decades long buildings lifetime. Therefore, getting into buildings in an expedited timeframe through the VIBE program will have both short-term and lasting benefits by cutting through longer turnover cycles and accelerating GHG reductions. Transitioning to newer and more efficient equipment and clean energy resources will also shift the paradigm for "like for like" replacement and help transform the market, consumer and vendor standards, which will ensure the durability and permanence of GHG reductions from the VIBE program.

c. Cost Effectiveness of GHG Reductions

The cost effectiveness (calculated as requested CPRG implementation grant dollars divided by the quantified GHG emission reductions for the period 2025-2030 calculated the CPRG funding request) for the VIBE program are presented in Table 5.

Table 5. CPRG Cost Effectiveness for the VIBE Program ($/mt$CO_2e$) 2025-2030

Total Funding ($)	**$96,754,605**
Total Reductions (metric tons CO_2e)	**101,133**
Cost Effectiveness of Emissions Reductions ($/MT$CO_2e$)	**$956.70**

There are several factors that will affect the cost effectiveness of the VIBE program over time, and the estimates above in Table 5 only represent raw program and incentive cost which misses many benefits. For example, this calculation misses two critical elements – the lasting benefits of more efficient and low-carbon long-lifetime equipment and the financial benefits that will be realized by program participants.

Simply considering a longer-term framing of the cost effectiveness of the VIBE program would result in a $/metric CO_2e of $193 (assuming CPRG funding and the resulting GHG reductions from 2025-2050). As supply chains continue to expand for equipment because of nationally transforming markets, it is expected that equipment costs will decline over time. Further, starting within and well beyond the five-year CPRG timeframe projects, particularly owners of buildings and renters or leases, will see increased financial benefits through reduced energy bills that help offset up upfront capital costs and reduce payback periods. The VIBE program would also likely result in substantial leverage for additional private investment over the CPRG program period and beyond: for example, by leveraging the Virginia ESPC program, VIBE can add modest fractions of total project costs to leverage substantial ESCO investment and increase total energy savings and GHG reductions. Similarly, if VIBE's concierge services plus limited financial incentives provide the expertise and support needed to help commercial buildings qualify for

Internal Revenue Service (IRS) 179D tax deductions, it can generate 50% reductions in energy use with the building owner providing most of the investment capital. While each transaction will vary, a conservative estimate is that VIBE will generate more than a dollar of private investment for each federal dollar spent.

Looking beyond just the project and program financials in the short and long-term, many other societal economic benefits will be realized through VIBE that are not captured in the CPRG cost effectiveness calculations. For example, reduced health care costs due to improved indoor and outdoor air quality (see Section 3a, Expected Outputs and Outcomes) and reduced business disturbances due to reduced impacts from outages for buildings on distributed energy systems.

d. Documentation of GHG Reduction Assumptions

VIBE program costs and resulting GHG emissions reductions were developed using a simplistic approach that includes: assuming a set level and quantity of incentives and a proportional percentage for program administration and ME&O, and a set number of new staff hires (see Section 7, Budget and the Budget Narrative); scaling project case studies for commercial and multifamily buildings and leveraging the EPA AVoided Emissions and geneRation Tool (AVERT) tool and EPA fossil fuel emissions factors; and combining project case study and other costs to estimate total investment, then combining this with equipment useful lives to determine carbon reductions through 2030 and 2050.

The GHG emission reduction quantification for VIBE presented in Tables 3 and 4 account for the necessary time to design and launch the VIBE program and for implementation of projects. It is assumed that in year 1 of the CPRG grant the VIBE program will be designed and launched and the incentive budget allocated for year 1 will be provided first to the test case projects and then other allocations of the year 1 incentive budget would occur at the end of the year. For this reason, as presented in Section 7, Budget and the Budget Narrative, it is assumed that the total incentive budget in year 1 is lower than in future years except for Focus Area 3 as COG, PlanRVA, and HRPDC have already identified a robust list of municipal projects with local government partners. A full background on emissions reductions can be found in the Technical Appendix and file *GHGcalcs_MWCOG Coalition*.

3. Environmental Results – Outputs, Outcomes, and Performance Measures

a. Expected Outputs and Outcomes

The VIBE program aligns explicitly with the EPA's Fiscal Year (FY) 2022-2026 Strategic Plan Goal 1, "Tackle the Climate Crisis"; Objective 1.1, "Reduce Emissions that Cause Climate Change." Under this objective, EPA will "aggressively reduce the emissions of greenhouse gases from all sectors while increasing energy and resource efficiency and the use of renewable energy." VIBE will directly increase energy and resource efficiency and the use of renewable energy in commercial, multifamily, municipal and institutional buildings in the three MSA regions in Virginia. VIBE program outputs and outcomes are:

Outputs: Outputs are categorized into types and presented below.

- ME&O (marketing, outreach, and engagement):
  - Number and diversity of organizations engaged, to be determined in program planning
  - 10 case studies completed and published (assumed 2 per year)
  - 212 – 1,385 projects initiated, and services provided to those projects (services to qualified leads including energy assessments, site visits, measure recommendations, project development, and transaction support to maximize conversion of qualified leads to project installation commitments)
- Completed projects:
  - 212 – 1,385 projects completed and/or square footage of retrofitted space (depending on the buildings engaged)
- Program staffing and resourcing

  - Number of pre-qualified contractors, and percent of staff/hires that live in LIDACs (depending on program needs as identified during program design)
  - 6 staff hired by COG, PlanRVA, and HRPDC
- Program reporting:
  - Annual program reports
  - CPRG bi-annual progress reports and final report to EPA

Outcomes:

- Modeled 101,133 $mtCO_2e$ cumulative GHG reductions from VIBE supported projects from 2025 to 2030 and 501,851 $mtCO_2e$ resulting from reduced energy use and clean energy.
- Mmbtu energy saved from the VIBE program (in mmbtu across all fuel types).
- MW of new installed clean distributed energy resources.
- Reduced NOx emissions and other co-pollutants from fuel combustion at building sites, with associate ambient air quality improvements.
- Improved indoor air quality from reducing fuel combustion in buildings, such as reduced NOx and benzene levels from fuel cooking appliances.
- Reduced energy bills for building owners and tenant, in LIDACs and through the VIBE program coverage area.
- Increased property values and real estate taxes.
- Increased economic activity and job creation, including an expanded cadre of trained and certified energy service professionals, and for residents in LIDACS.
- Demonstration opportunity for energy- and climate-related job sectors that will stimulate timely interest and build confidence and engagement in long-term potential.
- Ongoing financing options that will support increased levels of investment for the longer term.
- Improved business vitality and housing affordability in LIDACs.

Improved resilience for multifamily and commercial properties in LIDACs and through the VIBE program coverage area through distributed and clean energy resources, resulting in reduced disruptions to businesses, more consistent availability for heating and cooling (reducing health risk exposures during extreme heat events. Building decarbonization efforts from VIBE also have the potential to provide a broad range of reductions in criteria (CAP) and hazardous air pollutants (HAP). Due to the nature of the program, at this stage there is significant uncertainty on the amount, location, and pollutants that will be reduced, however, it's expected that pollutant reductions will align with the building air pollutant profile of the commonwealth's existing operations. A list of Criteria and Hazardous Air Pollutants whose emissions could reasonably be expected to be reduced by VIBE includes:

- **Criteria Pollutants:** Particulate Matter, both PM2.5 and PM10, Carbon Monoxide (CO), Sulfur dioxide (SO_2), Ozone (O_3), Nitrogen dioxide (NO_2).
- **Hazardous Air Pollutants:** Formaldehyde, Propane.

b. Performance Measures and Plan

VIBE has been designed for flexibility and continuous improvement to its service offerings and program operations, including the full range of concierge/accelerator technical and financial services, project development, project execution, and data collection and reporting to support performance measurement. In this regard, performance measures are not only best assessed but also enhanced and improved through analyses that support course correction and opportunistic improvements. COG and its coalition partners will use the following performance measures and approaches to track, measure, and report progress toward achieving VIBE outputs and outcomes:

- **ME&O (marketing, outreach, and engagement)**

- ***Performance measures will include***: Number of website and media impressions, number of website and media impressions compared to paid marketing budgets by platform, number of individuals and organizations contacted, number of meeting attendees and number of different types of stakeholders represented (with a separate tracking of those representing LIDACs), number of organizations or agencies who request and/or are shared program information (with a separate tracking of those representing LIDACs), and organizations or agencies who are helped through the program (with a separate tracking of those representing LIDACs). Will also include measures of overall experience satisfaction.
- ***Approaches to tracking will include:*** Google, web, and social media analytics, meeting registration platforms, and data from an established customer relationship management software (CRM; e.g., Salesforce). Experience satisfaction would be based on data such as customer satisfaction scores (CSAT), Net Promoter Score, and other customer experience metrics gathered through a post-participation survey.

- **Services delivered**
  - ***Performance measures will include:*** Number of energy assessments, site visits, measure recommendations (building decarbonization roadmaps), projects that initiate development (including status), number of transactions receiving technical support, number of financing applications, deployment of financing mechanisms, and vendor contracts executed. All tracked for the program and for projects in LIDACs.
  - ***Approaches to tracking will include:*** Data from an established CRM that can also be utilized to track various projects or actions related to specific buildings, and qualified vendor/contractor reporting.
- **Completed projects**
  - ***Performance measures will include:*** Number, location (including Census Block or Tract), technical characteristics, projected energy and emissions impacts, total dollar investment, total incentive payments, and amount financed, for each installed measure as applicable, and for each completed project as a whole. All tracked for the program and for projects in LIDACs.
  - ***Approaches to tracking will include:*** Data from an established CRM that can also be utilized to track projects or actions related to specific buildings, and qualified vendor/contractor reporting.
- **Program staffing and resourcing**
  - ***Performance measures will include:*** Number of pre-qualified contractors and number of staff hired by COG, PlanRVA, and HRPDC. Tracked for the program and for a proportion of staff that live in LIDACs.
  - ***Approaches to tracking will include:*** Data from an established CRM and self-reporting from COG, PlanRVA, and HRPDC.
- **GHG and air quality emissions**
  - ***Performance measures will include:*** Energy savings by energy type (mmbtu) and KW of installed solar (as applicable) translated to GHG emission reductions and co-pollutant reductions (criteria air pollutants: CAPs and hazardous air pollutants: HAPs) by project, aggregate for projects in LIDACs, and aggregate for the whole VIBE program.
  - ***Approaches to tracking will include:*** Working with building owners and contracted vendors and accessing public records (e.g., tax records) to collect information on buildings (e.g., purpose or type, number of floors, square footage) and logging in the CRM, which will be used as a traditional CRM and a warehouse for all background data and all future project tracking activity. VIBE one-on-one technical assistance managers will also work with building owners to capture and log information in the CRM through project progression (e.g., types of projects, status, contact/account relationships and all interactions). Project utility bill data will also be requested and required as a part of participant terms and conditions to help inform the program

performance. Data may also be or gathered from utility program monitoring and evaluation reports and as a part of the desktop review/evaluation of VIBE and logged in the CRM. Tools and data such as EPA's eGRID and AVERT along with project location data will be used along with energy savings or onsite energy generation to quantify benefits by project, aggregate for projects in LIDACs, and aggregate for the whole VIBE program.

These measures will be tracked in raw form quarterly and will be visible through a CRM system such as Salesforce. Tracking results will be visible on a dedicated VIBE program online dashboards on quarterly, year to date, and program cumulative bases. These data and dashboards will be used for reporting at quarterly Annual Board meetings and to complete the required CPRG bi-annual progress reports and final report to EPA. At the end of each program year, a self-evaluation process will be conducted and presented to the VIBE Advisory Board and presented in a programmatic annual report, which will also be integrated into CPRG bi-annual reports as appropriate and the final CPRG report. The annual report will include a separate section to report and track the benefits and disbenefits to LIDACs. The annual process will focus on summarizing measured outputs and outcomes for the metrics shown above and verifying that the raw data has been corrected for errors. It will also include a process evaluation, based on interviews with program staff and participants to learn what worked well, what needs improvement, and how program processes and design features can be improved to achieve such improvements. This annual evaluation process will work in parallel with a continuous improvement process, designed into the program management culture, that each month and quarter will look for incremental operational changes to improve efficiency and outcomes. The annual evaluation will be used to make more significant program improvements to processes and design features; these could include simplification of intake procedures, increased outreach to underserved geographies and market segments, adjustments to incentive format and level, and modification of eligible measures, among others.

c. Authorities, Implementation Timeline, and Milestones

The roles and responsibilities for the parties that will deliver, support, and otherwise engage in the VIBE program are summarized below.

- **Coalition Lead - COG:** Receive funds from EPA and manage grant overall, including EPA reporting; subgrant funds and manage subgrants; release RFP(s) and contract with third party(ies) for program administration and implementation; oversee contractor performance; staff program for program design, startup, management, and reporting; establish Advisory Board.
- **Coalition members - PlanRVA and HRPDC:** Receive and manage subgranted funds; hire program managers for program duration; new hires would serve on the Advisory Board, coordinate the program and support ME&O in their region; and support grant reporting.
- **Local county/city agency partners:** Appoint a member to the VIBE Advisory Board (voluntary); conduct localized ME&O in concert with program implementers and administrators and serve as conduits for public reporting of program status and results; identify and facilitate coordination with key sector-specific CBOs, community advocates and representatives and leverage other government programs such as Human Services, Economic Development, Affordable Housing, and Commercial Markets programs; and, play a lead role in program implementation for municipal buildings, including identifying owned facilities and potential projects, and overseeing projects that go to development and installation phases.
- **Virginia Department of Environmental Quality (DEQ) and Virginia Energy:** Serve on Advisory Board; ensure coordination with state programs for municipal battery storage and solar if awarded through CPRG ("States Supporting Resilient Local Energy Systems"); and support coordination with state networks. Virginia Chamber of Commerce may also be engaged to help promote high-quality job practices.

- **Community organizations, non-profits, and other stakeholders.** Serve on the Advisory Board; support local marketing, education and awareness and building pipeline of candidates (importantly serving as a major conduit to LIDACs); support leads recruitment and development; stimulate program support and involvement of relevant CBOs; serve as conduits of community information on VIBE products, benefits, and co-benefits; co-host public or sector events that may serve as Program platforms; facilitate collection of customer satisfaction data.
- **Local utilities.** Serve on Advisory Board; as appropriate enter data sharing agreements; provide information on available incentives; and inform VIBE program marketing.
- **Contractors.** One or more contractors will be selected by COG for program administration, implementation, ME&O and evaluation in line with competitive procurement procedures from 2 CFR Part 200 and 2 CFR Part 1500 and under COG's established procurement processes.
- **Building owners.** Engaged and participating building owners will oversee the development and installations of projects supported by VIBE on their premises, under their existing authorities to maintain and improve their facilities.
- **Pre-qualified project installation contractors and service providers.** These will be pre-selected under COG's existing procurement processes and will be subject to COG's rules. For a given project, one or more of these firms will be selected competitively, and will then be bound by installation contract terms and conditions.

The VIBE Advisory Board will advise on program governance, advise on program and contractor oversight, inform program design, regularly review program performance and provide feedback for improvement and adjustments, and make decisions on program transition/close out.

Given the non-regulatory nature of the VIBE program, COG, PlanRVA, and HRPDC all have the authority to implement the program and subgrants within its current authorities. All entities are current recipients of and manage federal grants. Notwithstanding the lack of home rule in Virginia to adopt local building codes, cities and counties in the Commonwealth of Virginia have—for as long as 22 years—fashioned and implemented green building incentive programs. Municipal and institutional entities have the authority to design and implement projects in their owned facilities. Private building owners have the authority to approve and pay for improvements to the buildings they own. The other entities listed above will participate in the VIBE program within their existing missions and authorities.

The VIBE program timeline (in calendar years and assuming summer 2024 announcements and fall 2024 award), tasks and milestones are presented in Table 6 below. Due to the nature of the VIBE program and the potential to extend it beyond the CPRG grant lifetime, the timeline below reflects continued program operations and participation even during a potential transition and close out period. This may be adjusted based on the outcomes of the transition study.

Table 6. VIBE Program Timeline, Tasks, and Milestone ("Q" is quarter year and "H" is half year)

Tasks	Milestone(s)	2024			2025				2026	2027	2028	2029	
		7/1	Q3	Q4	Q1	Q2	Q3	Q4				H1	H2
Pre-Award and Award Set Up													
Finalize coalition	Signed MOAs with PlanRVA and HRPDC												
Finalize award paperwork	Completed award paperwork												
Program Start Up													
Develop grant performance plans	EPA approved Plans												
Establish subgrants	Established subgrants												
Develop work plan	EPA accepted work plan												
	Active work plan management system												
	Reporting templates												

Develop reporting templates and performance management systems	Subgrantee and program participating reporting templates and procedures												
	Performance metrics and supporting data collection approaches and agreements												
	Performance management dashboard												
Hire for program in COG, PlanRVA, and HRPDC	Job postings												
	New hires onboarding												
Procure contractors	RFPs posted												
	Selected contractor(s)												
Establish advisory board	Call for members												
	Board selection												
	Established governance												
Program Design and Launch													
Engage test cases	Selected test case for each market												
Set incentive levels and design	Program potential/incentive level study												
	Incentive design												
IT and Tracking Infrastructure	Project-level data collection requirements												
	Application intake processes												
	Project workflow tracking												
	CRM system												
Establish partner network	Stakeholder map												
Pre-qualify service providers	Service provider qualifications specifications												
	Pre-qualified service provider list												
	Participating service provider agreements												
Develop ME&O plans and supporting materials	ME&O plan												
	Initial set of ME&O material, including draft website												
	Coordinated outreach collateral with utilities												
	Participant terms & conditions												
Launch program	Launched website												
	Launch events and engagement												
Program Management and Administration, and Implementation													
Outreach, marketing, intake	Pipeline of projects and candidates												
	Identified priority projects for assistance												
Technical assistance	Assigned one-on-one case managers												
	Completed building assessment and identified measures												
Project development	Secured service providers, financing and other funding with signed contracts and project timelines												
Project installation	Installed and commissioned equipment and systems												
Evaluation	Evaluation report(s)												
Program Reporting													
EPA reporting	Semi-annual and final reports to EPA												
Program reporting	Annual meeting/session												
	Quarterly Advisory Board meetings												
	Annual case studies												
	Annual reports												
Program Close Out and Transition													
Determine feasibility of transition for program	Transition feasibility report and decision about program future												

Develop transition and close out plan	Transitions\ or close out plan												
Transition or close out	Full transitioned program from COG to new entity or close out and completed grant close out activities												

4. Low-Income and Disadvantaged Communities

The three MSA regions covered by the VIBE program have a combined population of nearly 6 million, and 31% of the MSAs' populations live in LIDACs identified using EPA's EJScreen (14% are LIDACs as identified using (CEJST)). Figure 1 on page 1 identifies LIDACs that could benefit from VIBE and these are further detailed in the attachment Areas_COG.xlsx.

a. Community Benefits

The VIBE program and resulting projects will provide multiple benefits to LIDACs across the three MSA regions in Virigina. By design VIBE prioritizes benefits for LIDACs, with the most well-funded incentive budgets (see Section 7, Budget and Budget Narrative; the LIDAC-focused portion is well over 40% of the total) and the highest-touch services aimed at LIDAC-located and LIDAC resident-serving buildings. Benefits and potential risks or disbenefits to LIDACs are discussed below.

Improved local air quality, and related reduced health impacts and reduced public health costs and other economic and cascading benefits. VIBE will result in more localized air quality improvements from the reduction of the combustion of onsite fossil fuels in buildings in LIDACs, and in reduced generation from power plants in LIDACs, both within the three MSA region and outside of it. Indoor air quality will also improve with VIBE, as levels of pollutants may be two to five times higher than outdoor levels from fuel combustion for heating, cooking, and other activities.[12] The affected air pollutants include particulate matter, ozone, nitrogen oxides, carbon monoxide and air toxics, which can lead to premature mortality, increased risk of heart disease and stroke, asthma, lung cancer, type 2 diabetes, premature birth and respiratory infection in vulnerable populations. Reducing and eliminating the use of fossil fuels in homes and buildings will thus improve ambient and indoor air quality and reduce public health costs, which can strain families and businesses that are already struggling financially.

In considering reductions in grid electricity use resulting from VIBE efficiency and distributed energy resources (see Technical Appendix) and applying those changes in EPA's AVERT, air quality benefits and public health outcomes can be realized. While not all these benefits will be realized in LIDACs, a number of fossil-based power plants that serve the three MSA region are in LIDACs. Further, as demonstrated in the Harvard University's Healthy Buildings Program study - Impacts of Indoor Air Quality on Cognitive Function - increased air and human health quality create cascading benefits to schools, workplaces, stability of economic activity in LIDAC census tracts, stability of families, and arresting building decline (e.g., mold stimulation).[13]

One potential disbenefit when considering air quality as a result of the VIBE program is that potential increased electricity demand as a result of electrified end uses may result in increased fossil fuel generation while the grid continues to use fossil generation fuels. This may result in increased CAPs and HAPs emissions for some LIDAC communities. This impact may be carefully offset with the use of distributed energy resources like rooftop solar, battery storage, demand response, and efficient electric equipment.

The creation and expansion of green energy jobs and training for auditors, construction workers, contractors, and other building trades such as HVAC suppliers and carpenters. By focusing on engaging

[12] American Lung Association. The Health Impact of Combustion in Homes. January 2023. https://www.lung.org/getmedia/da394c1a-200e-4c89-9947-7ecb1a26571a/The-Health-Impact-of-Combustion-in-Homes.pdf

[13] Harvard University. Impacts of Indoor Air Quality on Cognitive Function. September 2021. Impacts of Indoor Air Quality on Cognitive Function – Healthy Buildings (harvard.edu)

organizations on the VIBE Advisory Board (e.g., Virginia Energy Efficiency Council: VAEEC) that already support training programs that benefit LIDACs, the VIBE program will spur high-quality job opportunities for those that need it most. As one example, this has been a large focus for the VAEEC, who is currently ramping up its Energy Efficiency Workforce Initiative (EEWI) in partnership with the Tidewater Community College in downtown Norfolk (in the VIBE region and immediately adjacent to and serving LIDACs). Participants in EEWI who receive industry credentials through the program can be directly connected to VIBE program pre-qualified service providers to ensure immediate high-quality jobs.

Reduced energy costs and burden. The VIBE program will result in reduced energy costs from the implementation of energy efficiency, electrification and renewable energy measures, which will reduce energy bills. This is especially relevant for low-income families in multifamily buildings, where high energy burdens and the split incentives barrier present large and persistent challenges. According to the Affordable Energy Coalition,[14] 3 of 4 homes in Virginia face unaffordable electric bills, and many of these homes are centralized in the Commonwealth's urban areas. And a recent ACEEE study found that 17% of Richmond households (85,086) have a high energy burden (above 6%), 9% of Richmond households (46,342) have a severe energy burden (above 10%), 28% of Black households (42,980) and 24% of Hispanic households (6,024) experience high energy burdens (above 6%).[15] Similar benefits may also be present for small business or non-profits that rent in commercial spaces. However, following retrofits, increased rents may make some housing units unaffordable to low-income households as landlords seek to recover value from improved buildings. Revitalization projects in LIDACs have often resulted in this kind of gentrification as minority populations are priced out of their traditional neighborhoods. Countereffortsfforts will be taken with VIBE program project agreements to ensure benefits primarily flow to the original occupants and that improved multifamily properties remain affordable. Other potential temporary disbenefits for business and residential lease holders during construction include construction noise, fugitive dust, utility interruptions, and in some cases early lease termination or tenant relocation to complete construction activities.

Plan and process for continuing to assess, quantify, and report benefits and avoided disbenefits to these communities, including co-pollutant impacts (e.g., CAP and HAP emission reductions), throughout the grant period. As discussed in Section 3b, Performance Measures and Plan, the VIBE program will collect information on and track energy savings by energy type (kWh and mmbtu) and KW of installed solar (as applicable) translated to GHG emission reductions and co-pollutant reductions (CAPs and HAPs) by project, aggregated for projects in LIDACs, and aggregated for the whole VIBE program. This information will be captured in the VIBE CRM and will be visible in program dashboards. Approaches to collecting and tracking these data are discussed in Section 3b along with the various formats in which they will be reported (through annual program reports and through EPA CPRG bi-annual and final reports).

b. Community Engagement

Input from LIDACs, and CBOs and non-profit organizations has been integrated into the VIBE application based on information and input collected during the development of each MSA's PCAP, and based on continued discussions with stakeholders about LIDAC needs during the development of this application. CBOs and other LIDAC representative organizations are detailed within each PCAP. These organizations and the local governments from the three MSAs that participated in PCAP development expressed a strong need for support for multifamily and commercial LIDAC buildings, buildings in distress, and municipal and institutional buildings. This is evidenced in the documentation of engagement and input on project ideas in each of the three MSA PCAPs (*note due to space limitations PCAP information is not*

[14] https://www.aecva.org/
[15] ACEEE. Energy Burdens in Richmond. 2020. aceee-01_energy_burden_-_richmond.pdf

reiterated here, but each PCAP contains detailed information and appendixes on engagement). Further, organizations such as Viridiant (who serves LIDAC communities in the Richmond area) and VAEEC (who works with job training programs and is familiar with building stock in LIDAC communities) reviewed and provided thoughtful feedback in the design of the VIBE program.

Through a stakeholder mapping exercise at the start of the program LIDAC community representatives will be identified; this map will directly feed the ME&O plan. The VIBE program ME&O plan will detail explicit strategies to engage LIDACs through the use of multiple channels, leveraging the networks of existing CBOs and other LIDAC organizations, and providing materials in multiple languages, and conducting in person events. Through such events and the program website community members will have the opportunity to submit question and provide feedback; in addition, participant customer surveys will allow the VIBE program to better respond to LIDAC and other participant needs over time through enhanced engagement materials and tactics.

The VIBE Advisory Board will include a diverse set of players that represent different stakeholder perspectives and needs. In setting up the Board, COG, HRPDC, and PlanRVA will pay particular attention to reaching out to community organizations that represent LIDACs to ensure they have substantial representation (e.g., community colleges like Tidewater, Faith Alliance for Climate Solutions). Public or student members may also be considered for the Board. As discussed above in Section 3c, Authorities, Implementation Timeline, and Milestones, the Board will play a critical role in establishing program governance, providing program and contractor oversight, informing and providing approvals for program design (including the ME&O plan and incentive level designations), regularly reviewing program performance, providing feedback for improvement and adjustments, and making decisions on ultimate program transition/close out. This engagement effort will ensure that the VIBE program will prioritize and continually engage with LIDACs.

5. JOB QUALITY

The VIBE program will generate high-quality jobs and help develop a diverse, highly skilled workforce in multiple ways. **COG and coalition members labor and diversity, equity, and inclusion (DEI) policies and practices**. COG will apply rigorous labor standards, including wages at or above the prevailing rate and local hire provisions, and demonstration of proactive DEI practices. COG frequently undertakes projects using state and federal grants with standards that meet requirements of Davis Bacon, Minority Business Enterprise (MBE)/ Disadvantaged Business Enterprise (DBE), and other strong labor standards, and will apply such practices under this grant as well. COG will apply DEI criteria to its procurement process for the third party contractor that is retained to implement the program. Specific scoring criteria will also be added, such as a MBE spending plan, a LIDAC hiring plan, and demonstration that the bidder meets or exceeds the federal Good Jobs Principles. COG will prioritize contractors and subcontractors that demonstrate their workforce meets high safety and training standards (e.g., 206 professional certification and licensure). In addition to the criteria applied in (1) above, COG will work proactively to retain installation contractors located in LIDAC areas. Consistent with the requirements in 2 CFR 200, Appendix II, all contracts made in excess of $100,000 with respect to a capital expenditure that involve employment of mechanics or laborers must include a provision for compliance with certain provisions of the Contract Work Hours and Safety Standards Act, 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). COG will work with contractors who implement the VIBE program and install projects under the program to ensure that new hires that occur during the program period are proactive in seeking diversity in their workforces, including in the higher-skilled job categories. DEI employment will be tracking and reported as part of the grant management and dashboard reporting system.

Jobs will be generated primarily in the building energy services sector, which includes HVAC installers, plumbers, electricians, insulation installers, energy auditors, and consulting engineers. Additional jobs

will be generated in the supply chains for products and materials installed in projects, such as HVAC, water heating, and cooking equipment, insulation materials, and windows. Further, the VIBE program has the potential to generate supplemental job positions in outreach and engagement, administration, and tracking of program outcomes. By their nature, these are active local positions with positive equity, workforce, and economic impacts. COG will work with existing workforce and training partners in the design and execution of a successful workforce development program, including the Virginia Energy Efficiency Council's Energy Efficiency Workforce Initiative (EEWI) pilot program for HVAC and weatherization training. COG will also leverage ongoing its collaborations with colleges and universities to provide training, internship and job placement opportunities for students. hire local workers and/or workers from historically-underserved communities.

These practices will promote effective and efficient delivery of high-quality projects that support economic resilience with significant employment opportunities with high labor standards and DEI outcomes. Such practices will reduce the likelihood of potential challenges such as work stoppages or accidents, while ensuring a reliable supply of skilled labor while minimizing disruptions. The overall impact will support on-time and on-budget delivery.

6. Programmatic Capability and Past Performance

a. Past Performance

COG has vast organizational experience with grant and contract management. Between FY20-23, COG managed between 40-60 contracts and grants annually. Total contract revenue associated with federal, state, and local contracts and grants managed by COG is more than $40+ million. COG's Contracting, Finance, and Accounting Departments have decades of experience managing all aspects of grants and contracts, including handling competitive procurements, contract awards, financial accounting and reporting, invoicing and payments, and auditing. Contracts and grants managed by COG related to climate action implementation include cooperative procurement for local and regional climate plan development and implementation, EV procurement and planning, climate resilience and energy vulnerability studies for critical infrastructure, and feasibility assessments for combined heat and power, solar, microgrids.

Project 1: Enhanced Mobility of Seniors and Individuals with Disabilities			
Assistance Agreement #, Listing # and Funding Agency	DC-2022-002-00 (FY21) 1473-2024-1 (FY23)	49 U.S.C. 5310	Department of Transportation, Federal Transit Administration (FTA)
Description:	COG serves as direct recipient of more than $34 million in federal funds for more than 100 projects improving transportation access through suballocations to nonprofits, local governments, and private companies since 2013. Handle contracts with subrecipients. Determine project eligibility, procure vehicles/monitor use.		
Funder Contact:	Kelly Tyler, Transportation Program Specialist, kelly.tyler@dot.gov		
Project 2: Military Installation Resilience Review (MIRR) Naval Support Activity Washington Joint base Anacostia-Bolling/Fort McNair			
Assistance Agreement #, Listing # and Funding Agency	MIR1230-21-01	12.003	Department of Defense, Office of Local Defense Community Cooperation (DOD OLDCC)
Description:	COG was the lead contractor managing a MIRR project in the District of Columbia, supporting Joint Base Anacostia-Bolling, Naval Research Laboratory, Washington Navy Yard, and Ft. McNair. The planning project focused on identifying risks or vulnerabilities on the installations that could be mitigated through directed investments in the community and was outlined in the final report, Building Resilience Together: Community-Military Collaboration in Washington, DC Value: $756,059		

Funder Contact:	Jennifer Hirsch, DoD OLDCC, Hirsch, jennifer.l.hirsch3.civ@mail.mil		
Project 3: Diesel Emission Reduction Act Locomotive Engine Repower Project			
Assistance Agreement #, Listing # and Funding Agency	2019-1914-AQD-G001	66.039	District DOEE, U.S. EPA
Description:	COG is the lead implementer managing all aspects of partnership with Amtrak to replace legacy high-polluting diesel engines with new clean Tier 4 engines for two locomotives operating at the Union Station Terminal/Ivy City Maintenance Facility in Washington, DC. Value: $3,470,800		
Funder Contact:	Joseph Jakuta, District DOEE, Joseph.Jakuta@dc.gov		
Project 4: Regional Blue-Green Infrastructure Community Engagement and Planning Project			
Assistance Agreement #, Listing # and Funding Agency	22RCPG117-01	97.111	Washington DC, Homeland Security and Emergency Management Agency (DCHSEMA), Federal Emergency Management Agency (FEMA)
Description:	COG is the Lead Contractor managing all aspects of the project to develop and deploy a model community engagement and blue-green infrastructure planning framework that can be replicated and scaled across metropolitan Washington. The project will develop feasibility studies for the implementation of blue-green infrastructure projects in the sub watersheds of the Anacostia River including Arundel Canal, Oxon Run, and Watts Branch and develop a community engagement plan. Value: $1,430,113		
Funder Contact:	Kenya Troutman, DCHSEMA, kenya.troutman@dc.gov		
Project 5: Urban Area Security Initiative (UASI Program)			
Assistance Agreement #, Listing # and Funding Agency	UASI117	97.067	DCHSEMA, U.S. Department of Homeland Security (DHS)
Description:	COG is the lead contractor for numerous UASI Program projects, including topics such as bomb squad robotics equipment and training, situational awareness software and management, Metro rail response kits, NCR radio equipment and interoperability and more. Value: $8,449,377		
Funder Contact:	Charles Madden, DCHSEMA, charles.madden@dc.gov		

b. Reporting Requirements

Reporting history for each project includes: **Project 1:** Thus far, COG has submitted acceptable and timely quarterly reports and handled all deliverables as required. **Project 2:** The project kicked off January 2021 and the final report was published April 2023. COG submitted acceptable and timely interim and final reports. **Project 3:** COG has submitted the requisite periodic reports for the project. The project kicked off in August 2019 and anticipate project completion is December 2024. **Project 4:** COG submitted acceptable and timely interim and final reports. The project kicked off May 1, 2023, and the anticipated project completion is June 2025. **Project 5:** These UASI projects cover FY2020-2023. COG submitted acceptable and timely interim and final reports.

c. Staff Expertise

COG is experienced in managing climate planning projects to ensure effective expenditure of project funds. The COG Climate, Energy, and Air Programs Director has more than 30 years of experience working with contracting and accounting department staff and management to ensure effective and timely tracking of all project budgets and transactions. COG's Executive, Contracts, Purchasing, Accounting, Legal, and Finance departments also have dedicated staff to support all contract projects managed by COG. COG staff have the experience and expertise to successfully achieve the proposed project's goals and GHG reduction measures. As leaders of a well-established organization serving the region for 67 years, Clark Mercer, COG's Executive Director, and Kanti Srikanth, COG's Deputy Director for Metropolitan Planning, will ensure the team has the resources needed to manage the project and

hire the staff needed. COG's existing team focused on buildings, climate and energy will support this program at no cost to EPA, particularly while new hires are ramping up.

Existing staff qualifications include: **Jeffrey King** is the Director of COG's Department of Environmental Program's Climate, Energy, and Air Programs. He has more than 34 years of experience as an environmental program manager with a proven track record managing programs and projects to reduce emissions of air pollutants and greenhouse gases. He has managed more than $50 million in environmental projects, including solar energy projects for the U.S. Department of Energy and emission reduction programs for the U.S. Environmental Protection Agency. He works with COG's contracting, legal, and accounting staff on all aspects of project procurement, contracting, and progress and financial tracking and reporting. **Maia Davis**, Senior Environmental Planner, serves as COG's lead climate planning staff, and provides technical services to COG members. She supported development of a net-zero high school in Northern Virginia through technical assistance from Oak Ridge National Laboratories for a geothermal feasibility study to inform school designs. **Leah Boggs,** Senior Environmental Planner, leads COG's Built Environment and Energy Advisory Committee, working closely with area sustainability, energy, buildings, and fleet managers on efforts to adopt low and no-emission solutions for government operations and the community. **Alissa Boggs**, Environmental Planner, serves as a lead technical staff and grant/plan coordinator for local and regional climate planning and implementation projects.

COG staff resumes may be found in the resume/bio attachments to this application (entitled *MWCOG_bio_MWCOG Coalition*). Along with COG staff's credentials, COG is also providing credentials and experience for staff representing each of its coalition members from PlanRVA and HRPDC and supporting partnering organizations (local governments, non-profits, etc.) who will be engaged in VIBE and the Advisory Board. These personnel bring extensive understanding of Virginia's programs and policy landscape, contractor networks, supply chains, local communities, workforce development, and holistic and inclusive climate action. They understand their local context and stakeholders and will be essential partners with COG.

7. BUDGET

The total proposed budget for the VIBE program is $96,754,605. The breakdown of this budget is summarized in Table 7 below. Budget details are provided in the attachment *Budgetcalcs_MWCOG Coalition* and additional information about the budget assumptions and supporting information (NOFO requirement Sections 7a [Budget Detail], 7b [Expenditure of Awarded Funds], and 7c [Reasonableness of Costs])is provided below in the CPRG IMPLEMENTATION GRANTS COMPETITION BUDGET NARRATIVE.

Table 7. Budget Summary for the VIBE Program

COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	PERSONNEL	$498,540	$513,496	$528,901	$544,768	$561,111	$2,646,817
	FRINGE	$111,623	$114,972	$118,421	$121,974	$125,633	$592,622
	TRAVEL	$8,300	$8,527	$8,760	$9,001	$9,249	$43,836
	EQUIPMENT	$0	$0	$0	$0	$0	$0
	SUPPLIES	$0	$0	$0	$0	$0	$0
	CONTRACTUAL	$1,757,500	$2,049,350	$2,158,331	$1,967,580	$1,877,014	$9,809,775
	OTHER	$13,675,974	$17,689,030	$18,461,701	$16,475,552	$15,489,818	$81,792,075
	TOTAL DIRECT	$16,051,937	$20,375,375	$21,276,114	$19,118,875	$18,062,825	$94,885,125
Indirect Costs	TOTAL INDIRECT	$352,125	$362,689	$373,570	$384,777	$396,320	$1,869,480
Total Funding		$16,404,062	$20,738,063	$21,649,683	$19,503,652	$18,459,145	**$96,754,605**

CPRG IMPLEMENTATION GRANTS COMPETITION BUDGET NARRATIVE

NOFO SECTION 7A. BUDGET DETAIL

The total proposed budget for the **V**IBE program is $96,754,605. The breakdown of this budget is summarized in Table Budget-1 below. Detailed information about how each budget category cost was developed is provided below the table. The Metropolitan Washington Council of Governments (COG) understands that any funds disbursed under the CPRG are subject to Davis Bacon Prevailing Wage requirements and to Build America, Buy America. COG is committed to complying with these requirements as they are applicable to awarded funds.

Table Budget-1. Budget Summary for the VIBE Program

COST-TYPE	CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Direct Costs	PERSONNEL	$498,540	$513,496	$528,901	$544,768	$561,111	$2,646,817
	FRINGE	$111,623	$114,972	$118,421	$121,974	$125,633	$592,622
	TRAVEL	$8,300	$8,527	$8,760	$9,001	$9,249	$43,836
	EQUIPMENT	$0	$0	$0	$0	$0	$0
	SUPPLIES	$0	$0	$0	$0	$0	$0
	CONTRACTUAL	$1,757,500	$2,049,350	$2,158,331	$1,967,580	$1,877,014	$9,809,775
	OTHER	$13,675,974	$17,689,030	$18,461,701	$16,475,552	$15,489,818	$81,792,075
	TOTAL DIRECT	$16,051,937	$20,375,375	$21,276,114	$19,118,875	$18,062,825	$94,885,125
Indirect Costs	TOTAL INDIRECT	$352,125	$362,689	$373,570	$384,777	$396,320	$1,869,480
Total Funding		$16,404,062	$20,738,063	$21,649,683	$19,503,652	$18,459,145	**$96,754,605**

Personnel. COG has budgeted for the positions included below included in Table Budget-2, for a total cost of $2,646,817. This table also includes all required information, including the annual salary, leave costs, percentage of time assigned to the VIBE program, and total costs for the budget period.

Table Budget-2. COG Personnel and Supporting Budget Information for the VIBE Program

Title	# of Staff	Annual Salary					% of Time Assigned to VIBE	Leave Costs (18.7%)	Total Cost
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5			
Program Director	*1*	$150,000	$154,500	$159,135	$163,909	$168,826	*100%*	$148,921	$945,292
Program Manager	*1*	$120,000	$123,600	$127,308	$131,127	$135,061	*100%*	$119,137	$756,233
Engagement Specialist	*1*	$80,000	$82,400	$84,872	$87,418	$90,041	*100%*	$79,425	$504,156
Program Analyst	*1*	$70,000	$72,100	$74,263	$76,491	$78,786	*100%*	$69,497	$441,136

Annual salaries by position are based on 2,000 hours worked per year at set unloaded hourly rates. In year 1 this is $75/hour for the Program Director (annual salary of $150,000), $60/hour for the Program Manager (annual salary of $120,000), $40/hour for the Engagement Specialist (annual salary of $80,000), and $35/hour for the Program Analyst (annual salary of $70,000). An assumed 3% annual increase in salary is applied. COG also applies a rate of 18.7% of salary to cover leave (sick and vacation) for employees.

Fringe Benefits. COG applies a rate of 22.39% for fringe benefits to salary and leave, resulting in a cost of $592,622.

Travel. COG has included the following travel costs totaling $43,836:

- $35,824 for travel stipends for annual VIBE program Advisory Board meetings. Based on the assumptions that:
  - The Advisory Board meeting is in alignment with annual Virginia Energy Efficiency Council (VAEEC) meeting in Octobers as most participants will already likely be traveling to Richmond for that meeting.
  - There are 30 Board members who receive a stipend average cost of $225 per person in Year 1, in line with the General Services Administration (GSA) 2024 lodging and per diem rates for Richmond, Virginia. These are $149/night for lodging with an 8% lodging tax and $64/day per diem.[16] The budget assumes a 3% annual increase in lodging and per diem per year based on past increases.
- $6,012 for four day trips per year for two people to Richmond for HRPDC from Hampton Roads area to meet as a coalition as a part of program ramp up and regular coordination meetings. Based on the assumptions that:
  - It is 100 miles driving each way from the Hampton Roads area to Richmond.
  - Costs are 67 cents per mile in Year 1 (2024 IRS rates) and increase 2.3% per year for milage costs (based on 2023 to 2024 IRS milage increase).[17]
  - Parking of $10 per day.
- $2,000 for four day trips per year for two people to Richmond for COG from Washington DC to meet as a coalition as a part of program ramp up and regular coordination meetings. Based on the assumptions that:
  - Roundtrip Amtrak travel is $20.
  - It is $30 to travel to or from the train station in Washington DC or Richmond (assuming some mix of Metrorail and taxi or rideshare and parking).

Equipment. Equipment costs are not included.

Supplies. Supply costs are not included.

Contractual. Contractor costs of $9,809,775 include:

- $262,500 for a program design study and support in Year 1 (1,750 hours at an average rate of $150/hour).
- $7,900,000, or 10% of the incentive budget, for program administration and implementation.
- $1,019,731 for program ME&O for:
  - 0.5 FTE (assumed 1000 hours per year) at an average of $145/hour and with an annual rate increase of 3%.
  - Annual budget of $50,000 for printing, supplies, and advertisement.
- $627,544 for annual desktop program evaluations for Years 2 through 5 (1000 hours per year at an average rate of $150/hour and with an annual rate increase of 3%).

Other. Other costs total $81,792,075 and include subawards to coalition partners, HRPDC and PlanRVA for program staff and incentive budgets by market focus area.

- $1,616,155 for a subaward to HRPDC for one full time program manager starting at $100,000 per year with a leave rate of 20.72%, fringe rate of 32.75%, and indirect rate of 33.354%, assuming a 3% annual increase in salary and for 20% of time in Years 1 and 2 for 2 senior sponsors (proportional

[16] GSA. FY 2024 Per Diem Rates for Virginia. https://www.gsa.gov/travel/plan-book/per-diem-rates/per-diem-rates-results?action=perdiems_report&city=&fiscal_year=2024&state=VA&zip=&gad_source=1&gclid=Cj0KCQjwwYSwBhDcARIsAOyL0finaU25Utd-X1gsfQmXrFpVNs_9_8LeM9yT4ggqeDraKMqNQ4H0WecaAjPFEALw_wcB

[17] https://www.irs.gov/newsroom/irs-issues-standard-mileage-rates-for-2024-mileage-rate-increases-to-67-cents-a-mile-up-1-point-5-cents-from-2023#:~:text=IRS%20issues%20standard%20mileage%20rates,Internal%20Revenue%20Service

salary of $109,710 per year) with 26.82% leave rate, 29.77% fringe and 33.354% indirect, to be a part of program start up and the Advisory Board.

- $1,175,919 for a subaward to PlanRVA for one full time program manager starting at $100,000 per year with a fringe benefit rate of 50.93%, and indirect rate of 46.75%, assuming a 3% annual increase in salary.
- A total five-year program incentive budget of $77,500,000 initially allocated as follows:
  - $36,500,000 (over 45% of the total incentive budget) for VIBE program participant incentives (efficiency, electrification and DER measures) and other financial support (e.g., interest rate buy downs) for LIDAC commercial and multifamily buildings. Assumes average awards of $50,000 to $500,000 for 73 to 730 projects, and available budget peaks in middle program years to account for program ramp up and ramp down.
  - $15,000,000 for VIBE program participant incentives (efficiency, electrification and DER measures) and other financial support (e.g., interest rate buy downs) for Non-LIDAC rate commercial and multifamily buildings. Assumes average awards of $25,000 to $250,000 for 60 to 600 projects, and available budget peaks in middle program years to account for program ramp up and ramp down.
  - $27,500,000 or VIBE program participant incentives (efficiency, electrification) for municipal and institutional building. Assumes average awards of $50,000 to $350,000 for 79 to 550 projects, and available budget peaks in early years to account for funding already identified projects and then ramps down with program ramp down.
  - As the program progresses efficiencies may be seen in program administration and implementation, or annual travel funds may not be expended, etc. In the instance that annual budgets for non-incentive costs are not spent, they will be rolled over into the next year's annual incentive budget. Further, during annual evaluations incentive funding may be reallocated between market focus areas depending on uptake and interest, based on Advisory Board input. The incentive budgets and levels used for budgeting purpose are indicative and actual VIBE program incentive levels will be determined through the program design. Incentive budgets and levels will be optimized to ensure that throughout the program lifetime at least 40% of the financial benefits, but ideally more, go to low-income disadvantaged communities.

Indirect Charges. COG applies an indirect rate of 57.71% to salary and wages. This equates to $1,869,480 for the five-year CPRG grant period.

NOFO Section 7b. Expenditure of Awarded Funds

COG complies with the Office of Management and Budget's (OMB) Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards regulations, located at 2 Code of Federal Regulations (CFR) Part 200 and the EPA adopted the regulations at 2 CFR 200 and promulgated additional regulations specific to EPA (together the Uniform Grants Guidance). COG's approach, procedures and controls for ensuring that awarded grant funds will be expended in a timely and efficient manner within the five-year grant period include:

- **Deltek Time & Expense and Costpoint**—Time & Expense is COG's electronic timesheet system, and Costpoint is COG's integrated project and financial management system. Each of our contracts or grants has a unique charge code, as well as subsets for tasks/subtasks; all labor (COG, contractor, and subgrantee) and other direct costs are tracked by their unique code. Using these numbers, staff record hours worked on a daily basis and sign, certify, and submit timesheets to supervisors for approval on a weekly basis. Costpoint incorporates this information, along with direct costs and other relevant costs for each project, and provides access to customized reports that will be used to track and control labor hours, labor costs, travel, and other direct costs. Management staff will use

these data to analyze financial performance by comparing actual project costs to the proposed budget.

- **Financial Forecasting**—Our Program Director will conduct financial forecasting with COG's financial group, which reviews all grant expenditures on a quarterly basis for accuracy and completeness. This forecasting includes an assessment of the need for financial adjustments owing to anticipated or unexpected factors, allowing for budget reallocations as needed.
- **Contracts Support**—COG's contracts team and legal counsel will assist our Project Director in establishing budgets and billing and payment schedules, terms and conditions, and insurance requirements including those for subawards and contractors. As sub grantees and contractors submit invoices, the Program Director will review and approve them, focusing on each invoice's consistency with the work conducted and its reasonableness in light of the assigned responsibilities and timeframe of work. Our Contracts group also will work with the Program Director to ensure that EPA receives regular financial progress updates in a timely manner.

NOFO Section 7c. Reasonableness of Costs

COG's costs for the VIBE program are based on federally accepted or established costs, COG fair and reasonable salaries and benefits, and benchmarking to existing similar programs. The reasonableness of costs presented for each cost category are described below.

Personnel. The salaries included for program staff for the VIBE program are commensurate with salaries for existing staff of equal position and seniority. COG's Office of Human Resources is responsible for administering COG's overall compensation system as prescribed by the Board of Directors of COG. The Executive Director through its designee, the Director of Human Resources, is authorized to determine the appropriate grade in which each position or category of positions shall be classified. COG's pay structure is reviewed each year through a market-based salary survey. Any changes to the pay structure on a given year is subject to budgetary and COG Board of Director's approval.

Employee's pay is also affected by the following: 1) Introductory increase may be granted following successful completion of introductory period; 2) Annual merit increases may be awarded within each grade ranging from zero (0%) to four (4.0%) percent based on the employee's performance evaluation score; 3) An employee may also be considered for other incentives such as bonus and outstanding performance awards. Further information on COG's pay structure may be found here: https://www.mwcog.org/about-us/human-resources/pay-and-benefits/.

Fringe Benefits. COG applies a rate of 22.39% for fringe benefits to salary and leave. This covers the costs of benefits for COG employees (not including leave). More information about COG's benefits may be found at: https://www.mwcog.org/about-us/human-resources/pay-and-benefits/.

Travel. Travel costs are based on the federal government (IRS and GSA) provided rates for lodging, per diem, and milage. Other costs are based on researched rates (e.g., the cost of a roundtrip Metrorail trip is $2 to $6 one way and the cost Amtrak quotes for flexible fares for roundtrip DC to Richmond is $17, not inclusive of tax). Travel costs are included for an annual meeting of the Advisory Board and planned for when many Board members may also be traveling to the location due to the VAEEC annual meeting in order to reduce travel costs. To be most productive, coalition members will meet in person once a quarter, as is reflected in the travel budget. This will help continue to foster and strengthen regional relationships and lead to productive sessions, which are particularly important as the VIBE program launches and evolves over time.

Equipment. Equipment costs are not included.

Supplies. Supply costs are not included.

Contractual. Contractor costs for program design, evaluation, and marketing are based on a review of similar program RFPs and awards, as well as consideration of different program costs.

For program administration, implementation, marketing, outreach, and engagement costs COG reviewed data on program budgets and associated administration and implementation from ESource, which compiles budget percentages as reported by utility programs, and other state and local program budgets (e.g., NYC Accelerator, MassSAVES, NYSERDA programs). In general program administration and implementation budgets were seen to be 10% to 25% of total program budgets, with a higher percent of administrative, implementation, and marketing budget associated with targeting LIDACs and more targeted concierge services. Further Department of Energy (DOE) IRA rebate programs allow up to 20% of program budgets to go to program planning, administration and technical assistance. This percentage generally includes program staff from the administering agency, marketing funds, and contractor costs. Staff (including fringe and indirect costs) for all VIBE program coalition members totals to a little over $7.9 million (or 8% of the total program budget) - assuming a higher end of the range for administration and implementation and marketing and mainly commensurate with the DOE allowable administrative rates, this leaves around 10% of the program budget for the contractor support needed to administer and implement the program. The higher end was assumed given the larger LIDAC focus and the more concierge style one-on-one technical services offered through VIBE.

Other.

- **Subaward Costs** – HRPDC and PlanRVA apply set rates for fringe and federally approved indirects. Generally cost of living in Richmond and Hampton Roads is lower than the Northern Virginia area, and therefore the assumed salary for a program manager in these areas is lower than for the COG program manager. HRPDC senior staff involved in years 1 and 2,are existing staff and therefore their associated costs are known.
- **Incentive Budgets:** Incentive budgets were designed to maximize available funds for projects and stay within a CPRG Tier of funding COG is confident it can manage with its coalition partners and at a level which will have substantial and lasting impact for the three MSAs in Virginia. See also discussion on contractual costs and proportion of administration/implementation budgets to total program budgets.

Indirect Charges. COG applies an indirect rate of 57.71 percent to salary and wages. This indirect rate was established between COG and the U.S. Department of Transportation Federal Transit Administration on February 15, 2024 for the period July 1, 2024 through June 30, 2025. COG shall furnish supporting paperwork for this indirect rate upon request from EPA and prior to grant award.

TECHNICAL APPENDIX

VIBE program and resulting GHG reductions were developed using a straightforward, top-down approach leveraging project case studies and EPA's AVERT tool and EPA emissions factors to determine the cost per metric tons of CO_2e reduced for energy efficiency, solar, and electrification projects in multifamily and commercial building projects. Distilling recent project case studies resulted in the costs outlined in Table A. These costs were combined with estimated investments, and equipment useful life to determine carbon reductions through 2050.

EPA's AVERT Tool[18] was used to develop electricity emissions factors from energy efficiency, and renewable energy for this project. Inputs of 1 MWh reduction in electricity use from energy efficiency in Virginia was provided as an input to derive electricity factors. Gas, fuel oil and propane emissions factors were taken from the EPA's GHG Emissions Hub[19].

Table A. Cost Per MT CO2e reduced over the life of equipment

	LIDAC Multifamily and Commercial	Non-LIDAC Multifamily and Commercial	Municipal and Institutional
Technology Type - Energy Efficiency	$129.35	$129.35	$147.31
Technology Type- Renewable Energy	$251.00	$251.00	$204.38
Technology Type- Electrification	$166.54	$166.54	$166.54

Modeling is built on case studies of recent projects, from which total project costs, energy, and/or emissions reductions were used to determine costs per metric ton of carbon for certain building and project types. Case study information from different building types (multifamily residential, commercial and institutional buildings) were used to derive cost per MT CO_2e reduced. LIDAC and Non-LIDAC Multifamily and Commercial Costs were calculated using an average of costs from multifamily and commercial costs per metric ton reduced, while only commercial and institutional case studies were used for Municipal and Institutional costs per metric ton reduced. Three different technology types were also reviewed: Energy Efficiency, Renewable Energy and Electrification/Electrification. Wherever possible, regional examples were used (Virginia, DC Metro Area and the broader mid-Atlantic), however electrification case studies for commercial and multifamily buildings were not readily available and information was gathered as available. Within all data, there is considerable uncertainty since exact program design has not been completed, however costs should be indicative to carbon reduction potential from investments.

Case studies (sourced below) for energy efficiency and electrification included a range of different projects to display the diversity of solutions in the building and technology types including lighting retrofits, HVAC systems replacements, building controls, HVAC electrification, and other solutions. Renewable energy costs were limited to onsite solar and values exclude cost strategies such as power purchase agreements and lease structures which are not representative of the total cost. Additionally, prices exclude utility rebates and tax incentives, for alignment with CPRG funding to align with guidance on EPA's cost effectiveness. A full list of project names, and their data sources is outlined below in Table B, and more details on the energy and emissions reductions can be found in the *GHGcalcs_MWCOG Coalition* attachment.

[18] https://www.epa.gov/avert/avert-overview-0

[19] ghg-emission-factors-hub-2024.pdf (epa.gov)

Table B. Projects Cases Studies used to develop cost per MTCO2e

Building Type	Technology Type	Project Description	Source
Multifamily Housing	Energy Efficiency	Stockbridge Condo LED Upgrades	Montgomery County Green Bank[20]
Multifamily Housing	Energy Efficiency and Electrification/Crosscutting	Glen Manor Condo Energy Efficiency	Montgomery County Green Bank
Multifamily Housing	Energy Efficiency and Electrification/Crosscutting	Takoma Park Condo Energy Efficiency	Montgomery County Green Bank
Multifamily Housing	DER/ Solar	Silverton Condominiums PV	Montgomery County Green Bank
Multifamily Housing	DER/ Solar	Seneca Village Apt PV	Montgomery County Green Bank
Multifamily Housing	DER/ Solar	Case 5 Older Affordable Housing	Montgomery County BEPS Case Studies[21]
Multifamily Housing	DER/ Solar	Case 6 Garden Style Multifamily	Montgomery County BEPS Case Studies
Commercial	Energy Efficiency and Electrification/Crosscutting	Glascock Office Building EE upgrades	Montgomery County Green Bank
Commercial	Energy Efficiency and Electrification/Crosscutting	Shenandoah School District	Virginia Energy Case Studies[22]
Commercial	Energy Efficiency	Philadelphia 123 S Broad St	Philadelphia CPACE Case Studies[23]
Commercial	DER/ Solar	Sandy Spring Meeting House	Montgomery County Green Bank
Commercial	DER/ Solar	Case 1- Office Class A	Montgomery County BEPS Case Studies
Commercial	DER/ Solar	Case 2- Office (Mixed-fuel HVAC)	Montgomery County BEPS Case Studies
Commercial	DER/ Solar	Case 3- Office (Older All Electric)	Montgomery County BEPS Case Studies
Commercial	DER/ Solar	Case 7- Mid Sized Hotel	Montgomery County BEPS Case Studies
Commercial	DER/ Solar	Case 8- Standard Hotel	Montgomery County BEPS Case Studies
Commercial	DER/ Solar	Case 9- Worship/Education	Montgomery County BEPS Case Studies
Commercial	Electrification/Crosscutting	St. Paul's Lutheran Church	DC Green Bank Case Studies[24]
Multifamily Housing	Electrification/Crosscutting	Zoe Bayliss House (Multifamily)	Elevate NP Case Study[25]

[20] https://mcgreenbank.org/case-studies/

[21] https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case-studies-building-energy-performance-standards-report.pdf

[22] Microsoft Word - Shenandoah Schools Case Study Final Report 8-24-15.docx (virginia.gov)

[23] 123 S. Broad St_Deal Fact Sheet and Notice (philadelphiacpace.org)

[24] St.Paul's Lutheran Church – DC Green Bank

[25] Case Study: Building Electrification at Madison's Zoe Bayliss House - Elevate (elevatenp.org)

Modeling added all costs and carbon savings and assumed average $/MTCO$_2$e from each building and technology type combination. To determine total emissions savings, investment values from each building and technology type were used in alignment with the program priorities outlined in Table C.

Table C. Investment Amounts and Funding Values

	Funding Split		
	LIDAC Multifamily and Commercial	**Non-LIDAC Multifamily and Commercial**	**Municipal and Institutional**
Technology Type - Energy Efficiency	60%	60%	80%
Technology Type- Renewable Energy	20%	20%	0%
Technology Type- Electrification	20%	20%	20%
Total Investment	$36,500,000	$15,000,000	$27,500,000

A useful life was applied for each technology type (15 years for energy efficiency and electrification measures and 20 years for renewable energy). GHG emissions reductions were allocated for the useful life for each year from 2025-2050, accounting for when the technology was installed and with savings starting in the first full year after the installation was completed. The following installation schedule was assumed for each building type (Table D).

Table D. Modeled project implementation schedule

	2025	**2026**	**2027**	**2028**	**2029**
LIDAC Multifamily and Commercial	$5,000,000	$8,000,000	$8,000,000	$8,000,000	$7,500,000
Non-LIDAC Multifamily and Commercial	$2,000,000	$3,000,000	$4,000,000	$3,000,000	$3,000,000
Municipal and Institutional	$6,000,000	$6,000,000	$6,000,000	$5,000,000	$4,500,000

Using the full set of assumptions outlined above, resulted in the following GHG reductions (Table E and Table F).

Table E Planned GHG Emissions reductions by Building Type

Building Type	**2025-2030**	**2025-2050**
LIDAC Multifamily and Commercial	76,931	388,238
Non-LIDAC Multifamily and Commercial	3,426	23,905
Municipal and Institutional	20,776	89,709
Sum of Emission Reductions	**101,133**	**501,851**

Table F Planned GHG Emission Reductions by Technology Type

Technology Type	**2025-2030**	**2025-2050**
Energy Efficiency	41,755	216,131

Renewable Energy	21,536	108,953
Electrification	37,843	176,767
Sum of Emission Reductions	**101,133**	**501,851**

Finally, applying the total investment of $96,754,605 by the total reduction from 2025-2030 resulted in the Table G with should the cost effectiveness of emissions reductions.

Table G Cost Effectiveness of GHG Reductions 2025-2030

Funding Amount	$96,754,605
Total Reductions	101,133
Cost Effectiveness of Emissions Reductions ($/MTCO2e)	$956.70

Additional details and precise calculations can be found in the *GHGcalcs_MWCOG Coalition* attachment.

Consolidated Budget Table: Virginia Initiative for Building Efficiency (VIBE)

This table will update automatically based on the budget detail entered in the tabs for measures 1-5. If your application includes more than 5 individual measures, you will need to add additional tabs, update the formulas below, and add additional lines to the "Budget by Project" table to include the additional measures.

BUDGET BY YEAR							
COST-TYPE	**CATEGORY**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**TOTAL**
Direct Costs	TOTAL PERSONNEL	*$498,540*	*$513,496*	*$528,901*	*$544,768*	*$561,111*	*$2,646,817*
	TOTAL FRINGE BENEFITS	*$111,623*	*$114,972*	*$118,421*	*$121,974*	*$125,633*	*$592,622*
	TOTAL TRAVEL	*$8,300*	*$8,527*	*$8,760*	*$9,001*	*$9,249*	*$43,836*
	TOTAL EQUIPMENT	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
	TOTAL SUPPLIES	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
	TOTAL CONTRACTUAL	*$1,757,500*	*$2,049,350*	*$2,158,331*	*$1,967,580*	*$1,877,014*	*$9,809,775*
	TOTAL OTHER	*$13,675,974*	*$17,689,030*	*$18,461,701*	*$16,475,552*	*$15,489,818*	*$81,792,075*
	TOTAL DIRECT	*$16,051,937*	*$20,375,375*	*$21,276,114*	*$19,118,875*	*$18,062,825*	*$94,885,125*
	TOTAL INDIRECT	$352,125	$362,689	$373,570	$384,777	$396,320	$1,869,480
TOTAL FUNDING		**$16,404,062**	**$20,738,063**	**$21,649,683**	**$19,503,652**	**$18,459,145**	**$96,754,605**

BUDGET BY PROJECT			
Project Number	**Project Name**	**Total Cost**	**% of Total**
1	*VIBE Program*	*$96,754,605*	*100%*
Total		*$96,754,605*	*100%*

Detailed Budget Table

This Excel Workbook is provided to aid applicants in developing the required budget table(s) within the budget narrative.

BUDGET BY YEAR							
COST-TYPE	**CATEGORY**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**TOTAL**
Direct	**Personnel**						
	One program director @$75/hour unloaded and 1 FTE (2,000 work hours per year). Assumes 3% annual increase and leave costs of 18.7% of salary.	*$178,050*	*$183,392*	*$188,893*	*$194,560*	*$200,397*	*$945,292*
	One program manager @$60/hour unloaded and 1 FTE (2,000 work hours per year). Assumes 3% annual increase and leave costs of 18.7% of salary.	*$142,440*	*$146,713*	*$151,115*	*$155,648*	*$160,317*	*$756,233*
	One engagement specialist @$40/hour unloaded and 1 FTE (2,000 work hours per year). Assumes 3% annual increase and leave costs of 18.7% of salary.	*$94,960*	*$97,809*	*$100,743*	*$103,765*	*$106,878*	*$504,156*
	One program analyst @$35/hour unloaded and 1 FTE (2,000 work hours per year). Assumes 3% annual increase and leave costs of 18.7% of salary.	*$83,090*	*$85,583*	*$88,150*	*$90,795*	*$93,519*	*$441,136*
	TOTAL PERSONNEL	*$498,540*	*$513,496*	*$528,901*	*$544,768*	*$561,111*	*$2,646,817*
	Fringe Benefits						
	Full-time employees @22.39% of salary and leave	*$111,623*	*$114,972*	*$118,421*	*$121,974*	*$125,633*	*$592,622*
	TOTAL FRINGE BENEFITS	*$111,623*	*$114,972*	*$118,421*	*$121,974*	*$125,633*	*$592,622*
	Travel						
	Stipend for travel for annual VIBE program Advisory Board meetings. Assumes alignment with annual VAEEC meeting in Octobers as most participants will already be traveling. Assumes 30 Board members and stipend average cost of $225 per person in Year 1 (2024 GSA rates) to cover one hotel night and one day per diem @GSA 2024 rates of $149/night with an 8% lodging tax and $64/day per diem. Assumes 3% increase in lodging and per diem per year.	*$6,748*	*$6,950*	*$7,159*	*$7,373*	*$7,594*	*$35,824*
	Four day trips per year for two people to Richmond for HRPDC (100 miles each way) to meet as a coalition as a part of program ramp up and regular coordination meetings. Assumes 67 cents per mile in Year 1 (2024 rates) and an increase of 2.3% per year for milage costs (based on 2023 to 2024 IRS mileage increase) and parking of $10 per day.	*$1,152*	*$1,177*	*$1,202*	*$1,228*	*$1,254*	*$6,012*
	Four day trips per year for two people to Richmond for COG to meet as a coalition as a part of program ramp up and regular coordination meetings. Assumes Amtrak travel at $20 round trip and $30 for travel to and from train stations (Metrorail or taxis).	*$400*	*$400*	*$400*	*$400*	*$400*	*$2,000*
	TOTAL TRAVEL	*$8,300*	*$8,527*	*$8,760*	*$9,001*	*$9,249*	*$43,836*
	Equipment						
		$0	*$0*	*$0*	*$0*	*$0*	*$0*
	TOTAL EQUIPMENT	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
	Supplies						
							$0
	TOTAL SUPPLIES	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
	Contractual						
	Program design study and support for 1750 @ an average rate of 150/hr.	*$262,500*					*$262,500*
	Program administration and implementation @assumed 10% of incentive budget	*$1,300,000*	*$1,700,000*	*$1,800,000*	*$1,600,000*	*$1,500,000*	*$7,900,000*
	Program marketing, outreach and engagement for 0.5 FTE (1000 hours per year) @ an average of 145/hour (with an annual increase of 3%) and printing, supplies, and advertisement budget of $50,000 per year.	*$195,000*	*$199,350*	*$203,831*	*$208,445*	*$213,105*	*$1,019,731*
	Annual program evaluation for 1000 hours @ an average rate of 150/hr (with an annual increase of 3%).		*$150,000*	*$154,500*	*$159,135*	*$163,909*	*$627,544*
	TOTAL CONTRACTUAL	*$1,757,500*	*$2,049,350*	*$2,158,331*	*$1,967,580*	*$1,877,014*	*$9,809,775*
	OTHER						

	Subaward to HRPDC for one full time program manager @$100,000 per year, with a leave rate of 20.72%, fringe rate of 32.75%, and indirect rate of 33.354%, assuming a 3% annual increase in salary. Subaward also includes 20% of time in Years 1 and 2 for 2 senior sponsors (proportional salary of $109,710 per year, with 26.82% leave rate, 29.77% fringe and 33.354% indirect) to be a part of program start up and the Advisory Board.	*$454,484*	*$460,895*	*$226,722*	*$233,524*	*$240,530*		*$1,616,155*
	Subaward to PlanRVA for one full time program manager @$100,000 per year, with a fringe benefits rate of 50.93%, and indirect rate of 46.75%, assuming a 3% annual increase in salary.	*$221,490*	*$228,134*	*$234,979*	*$242,028*	*$249,289*		*$1,175,919*
	VIBE program participant incentives (efficiency, electrification and DER measures) and other financial support (e.g., interest rate buy downs) for LIDAC commercial and multifamily buildings. Assumes average awards of $50,000 to $500,000 for 73 to 730 projects, and available budget peaks in middle program years to account for program ramp up and ramp down.	*$5,000,000*	*$8,000,000*	*$8,000,000*	*$8,000,000*	*$7,500,000*		*$36,500,000*
	VIBE program participant incentives (efficiency, electrification and DER measures) and other financial support (e.g., interest rate buy downs) for Non-LIDAC commercial and multifamily buildings. Assumes average awards of $25,000 to $250,000 for 60 to 600 projects, and available budget peaks in middle program years to account for program ramp up and ramp down.	*$2,000,000*	*$3,000,000*	*$4,000,000*	*$3,000,000*	*$3,000,000*		*$15,000,000*
	VIBE program participant incentives (efficiency, electrification) for municipal and institutional building. Assumes average awards of $50,000 to $350,000 for 79 to 550 projects, and available budget peaks in early years to account for funding already identified projects and then ramps down with program ramp down.	*$6,000,000*	*$6,000,000*	*$6,000,000*	*$5,000,000*	*$4,500,000*		*$27,500,000*
	TOTAL OTHER	*$13,675,974*	*$17,689,030*	*$18,461,701*	*$16,475,552*	*$15,489,818*		*$81,792,075*
	TOTAL DIRECT	*$16,051,937*	*$20,375,375*	*$21,276,114*	*$19,118,875*	*$18,062,825*		*$94,885,125*
Indirect Costs	**Indirect Costs**							
	Indirect charges for COG (57.71% of COG Personnel & Fringe Benefits)	*$352,125*	*$362,689*	*$373,570*	*$384,777*	*$396,320*	#	*$1,869,480*
								$0
	TOTAL INDIRECT	*$352,125*	*$362,689*	*$373,570*	*$384,777*	*$396,320*		*$1,869,480*
TOTAL FUNDING		***$16,404,062***	***$20,738,063***	***$21,649,683***	***$19,503,652***	***$18,459,145***		***$96,754,605***

Overview

Purpose:	Provides GHG reduction modeling for the Climate Pollution Reduction Grant (CPRG) Implementation Grant application.
Last Updated:	3/29/2024

Metropolitan Washington Council of Governments

Table Of Contents

Worksheet Name	Contents
Summary Results	Summary Results
GHG Reduction Calcs	Modeled GHG reductions and key assumptions.
Cost per Metric Ton Calcs	Cost per Metric Ton Calculations- Built from Available Case Studies
Emission Factors & Conversions	Sourcing for Emissions and Other Conversion Factors

Summary Results

Cumulative Emission Reductions (Million Metric Tonnes CO2e)

Building Type	2025-2030	2025-2050
LIDAC Multifamily and Commercial	76,931	388,238
Non-LIDAC Multifamily and Commercial	3,426	23,905
Municipal and Institutional	20,776	89,709
Sum of Emission Reductions	**101,133**	**501,851**

Cumulative Emission Reductions (Million Metric Tonnes CO2e)

Technology Type	2025-2030	2025-2050
Energy Efficiency	41,755	216,131
Renewable Energy (DER and Solar)	21,536	108,953
Other	37,843	176,767
Sum of Emission Reductions	**101,133**	**501,851**

Cost Effectiveness of Emission Reductions (2025-2030)

Funding Amount	$	96,754,605
Total Reductions		101,133
Cost Effectiveness of Emissions Reductions ($/MTCO2e)	**$**	**956.70**

Cost Effectiveness of Emission Reductions (2025-2050)

Funding Amount	$	96,754,605
Total Reductions		501,851
Cost Effectiveness of Emissions Reductions ($/MTCO2e)	**$**	**192.80**

Greenhouse Gas Reduction Calculations

HOME program participant incentives amounts	Total Available Funding for Direct Subsidies	Anticipated Minimum Number of Projects	Anticipated Subsidy Sizes	
			Minimum	Maximum
LIDAC Multifamily and Commercial	$ 36,500,000	73 - 730	$ 50,000	$ 500,000
Non-LIDAC Multifamily and Commercial	$ 15,000,000	60 - 600	$ 25,000	$ 250,000
Municipal and Institutional	$ 27,500,000	79 - 550	$ 50,000	$ 350,000
Other Direct Costs	$ 10,866,135			
Indirect Costs	$ 1,869,490			
Total	$ 90,734,625			

Pacing of Funding (Year Funding Spent)

	2024	2025	2026	2027	2028	2029
LIDAC- MF and Comm	0%	14%	22%	22%	22%	21%
Non LIDAC- MF and Comm	0%	11%	30%	27%	30%	30%
Muni and Inst	0%	22%	22%	22%	18%	16%
	2024	2025	2026	2027	2028	2029
LIDAC- MF and Comm	$0.00	$5,900,000	$8,669,000	$8,000,000	$8,000,000	$7,500,000
Non LIDAC- MF and Comm	$0.00	$2,900,000	$3,669,000	$3,000,000	$3,000,000	$3,000,000
Muni and Inst	$0.00	$4,900,000	$6,669,000	$6,000,000	$5,000,000	$4,500,000

Award Track	Cost Per Metric Ton			Useful Life	Capital Cost for 1st year Metric Ton			Funding Split		
	LIDAC- MF and Comm	Non LIDAC- MF and Comm	Muni and Inst		LIDAC- MF and Comm	Non LIDAC- MF and Comm	Muni and Inst	LIDAC- MF and Comm	Non LIDAC- MF and Comm	Muni and Inst
Energy Efficiency	$129.33	$129.35	$147.31	13	$ 1,940	$ 1,940	$ 2,210	60%	60%	80%
HER	$251.68	$251.68	$284.38	20	$ 3,020	$ 3,020	$ 4,888	20%	20%	0%
Electrification	$166.54	$166.54	$188.54	15	$ 2,498	$ 2,498	$ 2,498	20%	20%	20%

1st year of Full Savings (phased a year after funding deployed)

	2025	2026	2027	2028	2029	2030
LIDAC- MF and Comm		$ 5,000,000	$ 8,000,000	$ 8,000,000	$ 8,000,000	$ 7,500,000
Non LIDAC- MF and Comm		$ 2,900,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000
Muni and Inst		$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 5,000,000	$ 4,500,000

Carbon Savings (1st Year)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Energy Efficiency																										
LIDAC- MF and Comm	0	1546	2474	2474	2474	2319																				
Non LIDAC- MF and Comm	0	618	928	1237	928	928																				
Muni and Inst	0		2172	2172	2172	1810																				
HER																										
LIDAC- MF and Comm	0	80	120	159	120	120																				
Non LIDAC- MF and Comm	0	80	120	159	120	120																				
Muni and Inst	0		0	0	0	0																				
Other																										
LIDAC- MF and Comm	0	480	640	640	640	800																				
Non LIDAC- MF and Comm	0	480	480	480	480	360																				
Muni and Inst	0		480	480	480	360																				
	1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Carbon Savings (Cumulative)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Energy Efficiency	0	4137	9911	15794	21006	25883	25883	25883	25883	25883	25883	25883	25883	25883	25883	25883	21546	19472	10088	6876	0	0	0	0	0	0
Renewable Energy	0	159	398	717	956	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1195	1034	797	478	239	0
Other	0	1361	2962	4963	6964	8885	8885	8885	8885	8885	8885	8885	8885	8885	8885	8885	8885	8523	2922	1321	1321	0	0	0	0	0
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
LIDAC- MF and Comm	0	2626	6260	8333	11098	14167	14167	14167	14167	14167	14167	14167	14167	14167	14167	14167	14167	12226	9106	6891	3417	998	518	398	239	120	0
Non LIDAC- MF and Comm	0	1179	2706	4063	6038	7038	7038	7038	7038	7038	7038	7038	7038	7038	7038	7038	7038	6839	4521	2813	1896	998	518	398	239	120	0
Muni and Inst	0	2652	5305	7958	10469	11758	11758	11758	11758	11758	11758	11758	11758	11758	11758	11758	9103	6452	3898	1990	0	0	0	0	0	0
Energy Efficiency	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
LIDAC- MF and Comm	0	1546	4020	6494	8968	11287	11287	11287	11287	11287	11287	11287	11287	11287	11287	11287	9741	7267	4793	2319	0	0	0	0	0	0
Non LIDAC- MF and Comm	0	618	1546	2783	3711	4639	4639	4639	4639	4639	4639	4639	4639	4639	4639	4639	4020	3092	1855	928	0	0	0	0	0	0
Muni and Inst	0	2172	4345	6517	8327	9956	9956	9956	9956	9956	9956	9956	9956	9956	9956	9956	7784	5612	3439	1629	0	0	0	0	0	0
Renewable Energy																										
LIDAC- MF and Comm	0	80	199	359	478	598	598	598	598	598	598	598	598	598	598	598	598	598	598	598	598	518	398	239	120	0
Non LIDAC- MF and Comm	0	80	199	359	478	598	598	598	598	598	598	598	598	598	598	598	598	598	598	598	598	518	398	239	120	0
Muni and Inst	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other																										
LIDAC- MF and Comm	0	480	1041	1681	2322	2282	2282	2282	2282	2282	2282	2282	2282	2282	2282	2282	1881	1241	600	600	0	0	0	0	0	0
Non LIDAC- MF and Comm	0	480	961	1441	1841	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1321	841	360	360	0	0	0	0	0	0
Muni and Inst	0	480	961	1441	1841	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1321	841	360	360	0	0	0	0	0	0

Cost Per Metric Ton Calculations

LIHAC and Non-LIHAC Multifamily

Energy Efficiency

Measure Description	Energy Unit	Cost	Energy reduced Annually	Useful life	Energy Reduced (MWh or MMBTU)	Annual GHG Reduced	Lifetime CO2e reduced	Sources	Cost/ Metric Ton CO2 (over)	Include
Weatherize Condo LED Upgrades	kWh	$ 44,600	103,088.80	12	1,236.98		806.04	https://marylandcb.org/cb-day-condo-upgrades/	$ 24.23	Y
Glen Manor Condo Energy Efficiency		$ 832,838		15		208.08	3,306.08	https://marylandcb.org/glen-manor-condominium/	$ 121.80	Y
Takoma Park Condo Energy Efficiency		$ 617,838		15		208	3,306.08	https://marylandcb.org/takoma-overlook-condominium/	$ 111.69	Y
		$ 1,381,838					10,406.04		$ 111.29	

SMD/ Solar

Measure Description	Energy Unit	Cost	Energy reduced Annually	Useful life	Lifetime Energy Reduced (MWh or MMBTU)	Annual GHG Reduced	Lifetime CO2e reduced	Sources	Cost/ Metric Ton CO2 (over)	Include
Silverton Condominium PV	kWh	$ 381,149	195,638.80	20	2,932.72		1,701.22	https://marylandcb.org/silver-st-condominium-pv-installation/	$ 170.29	Y
Seneca Village Apt PV		$ 11,880,000	2,565,595.80	20	51,478.78		29,907.08	https://marylandcb.org/seneca-village-apartments-pv-system-with-energy-efficiency-improvements/	$ 220.86	Y
Case 5: Other Affordable Housing		$ 264,838	550,592.33	20	6,258.05		1,404.58	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 193.11	Y
Case 6: Garden Style Multifamily		$ 215,838	366,928.74	20	4,258.53		1,171.95	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 184.80	Y
		$ 12,580,139					42,808.58		$ 297.42	

LIHAC and Non-LIHAC Commercial

Energy Efficiency

Measure Description	Energy Unit	Cost	Energy reduced Annually	Useful life	Energy Reduced (MWh or MMBTU)	Annual GHG Reduced	Lifetime CO2e reduced	Sources	Cost/ Metric Ton CO2 (over)	Include
Glenmark Office Building HE upgrades	kWh	$ 286,938	93,088.80	15	708.08		903.77	https://marylandcb.org/glenmark-office-buildings/	$ 180.84	Y
Shenandoah School District	kWh	$ 7,030,838	3,415,088.80	15	51,215.08		34,414.78	https://www.energy.virginia.gov/energy-efficiency/documents/DOE%20Annual%20Report%20to%20Congress%20Fiscal%20Year%202016.pdf	$ 165.86	Y
Shenandoah School District	therms		24,108.80	15	24,108.80		1,604.75			Y
Shenandoah School District	gallons FOC		32,540.80	15	44,929.50		3,053.50			Y
Philadelphia 121 S Broad St		$ 4,189,825		40			35,415.08	https://climatebluepaper.org/wp-content/uploads/2021/12/121-S-Broad-St-Real-Face-Sheet-and-Narrative.pdf	$ 122.82	Y
		$ 11,506,326					77,206.79		$ 147.31	

SMD

Measure Description	Energy Unit	Cost	Energy reduced Annually	Useful life	Lifetime Energy Reduced (MWh or MMBTU)	Annual GHG Reduced	Lifetime CO2e reduced	Sources	Cost/ Metric Ton CO2 (over)	Include
Sandy Spring Meeting House	kWh	$ 72,140		15	708.08		403.78	https://marylandcb.org/sandy-spring-meeting-house-installs-31-kw-rooftop-solar-pv-system/	$ 190.50	Y
Case 1: Office Class A		$ 562,838	306,693.59	20	6,889.92		1,805.97	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 132.88	Y
Case 2: Office HE and Fuel HVAC		$ 414,838	334,693.72	20	6,857.62		1,856.95	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 130.65	Y
Case 3: Office Older All Electric		$ 243,838	141,081.27	20	2,815.75		1,805.39	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 190.97	Y
Case 7: Mid Sized Hotel		$ 226,838	132,181.10	20	2,214.08		1,118.92	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 180.89	Y
Case 8: Standard Hotel		$ 226,838	141,088.47	20	2,837.25		1,805.73	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 171.60	Y
Case 9: Worship/Education		$ 1,016,838	373,643.41	20	7,472.87		5,618.51	https://www.montgomerycountymd.gov/DEP/Resources/Files/energy/commercial/case_studies/building_energy_performance_standards_report.pdf	$ 362.11	Y
		$ 3,965,163					19,415.79		$ 204.25	

LIHAC and Non- LIHAC Multifamily and Commercial Electrification/Crosscutting Projects

Measure Description	Energy Unit	Cost	Energy reduced Annually	Useful life	Lifetime Energy Reduced (MWh or MMBTU)	Annual GHG Reduced	Lifetime CO2e reduced	Sources	Cost/ Metric Ton CO2 (over)	Include
Unitarian Universalist Church	kWh	$ 1,680,838		20		314.08	6,808.08	https://marylandcb.org/unitarian-universalist-church-of-silver-spring-installs-82-kw-solar-array/	$ 265.49	Y
Glen Manor Condo		$ 832,838		15		208.08	3,306.08	https://marylandcb.org/glen-manor-condominium/	$ 121.80	Y
Takoma Park Condo		$ 617,838		15		208	3,306.08	https://marylandcb.org/takoma-overlook-condominium/	$ 111.69	Y
Glenmark Office Building HE upgrades	kWh	$ 286,938	93,088.80	15	708.08		903.77	https://marylandcb.org/glenmark-office-buildings/	$ 180.84	Y
Philadelphia 121 S Broad St		$ 4,189,825		40			35,415.08	https://climatebluepaper.org/wp-content/uploads/2021/12/121-S-Broad-St-Real-Face-Sheet-and-Narrative.pdf	$ 122.82	Y
St. Paul's Lutheran Church	kWh	$ 980,838	1,236.80	15	18.58		14.58	https://marylandcb.org/st-pauls-lutheran-church-solar-array/	$ 1,546.17	Y
St. Paul's Lutheran Church	therms		7,138.80	15	10,706.58		968.78			Y
Jay Building Homes (Multifam)	kWh	$ 696,838	227,414.80	20	41,148.30		1721.28	https://www.electronicdevelopment.com/real-estate/building-electrification-multifamily-and-multiple-tenant-buildings/	$ 0.585.83	Y
	therms		6,022.80	20	12,044.98		618.15			Y
		$ 8,821,339					82,908.53		$ 106.44	

	Price Per Metric Ton CO2e					
	LIHAC- MF and Comm		Non LIHAC- MF and Comm		Muni and Instr	
Energy Efficiency	$	219	$	129	$	147
SMD	$	352	$	270	$	264
Electrification /Electrification	$	352	$	352	$	161

Montgomery County Case Study Approach

Used Capital Cost for Solar projects and derived energy savings (kWh) by dividing energy savings by ~12¢ kWh

Building Type	Technology Types	Project Description	Source
Multifamily Housing	Energy Efficiency	Strathbridge Condo LED Upgrades	Montgomery County Green Bank
Multifamily Housing	Energy Efficiency and Electrification/Crosscutting	Glen Manor Condo Energy Efficiency	Montgomery County Green Bank
Multifamily Housing	Energy Efficiency and Electrification/Crosscutting	Takoma Park Condo Energy Efficiency	Montgomery County Green Bank
Multifamily Housing	SMD/ Solar	Silverton Condominium PV	Montgomery County Green Bank
Multifamily Housing	SMD/ Solar	Seneca Village Apt PV	Montgomery County Green Bank
Multifamily Housing	SMD/ Solar	Case 5: Other Affordable Housing	Montgomery County MCPS Case Studies
Multifamily Housing	SMD/ Solar	Case 6: Garden Style Multifamily	Montgomery County MCPS Case Studies
Commercial	Energy Efficiency and Electrification/Crosscutting	Glenmark Office Building HE upgrades	Montgomery County Green Bank
Commercial	Energy Efficiency and Electrification/Crosscutting	Shenandoah School District	Virginia Energy Case Studies
Commercial	Energy Efficiency	Philadelphia 121 S Broad St	Philadelphia ESHCB Case Studies
Commercial	SMD/ Solar	Sandy Spring Meeting House	Montgomery County Green Bank
Commercial	SMD/ Solar	Case 1: Office Class A	Montgomery County MCPS Case Studies
Commercial	SMD/ Solar	Case 2: Office (Mixed-Fuel HVAC)	Montgomery County MCPS Case Studies
Commercial	SMD/ Solar	Case 3: Office (Older All Electric)	Montgomery County MCPS Case Studies
Commercial	SMD/ Solar	Case 7: Mid Sized Hotel	Montgomery County MCPS Case Studies
Commercial	SMD/ Solar	Case 8: Standard Hotel	Montgomery County MCPS Case Studies
Commercial	SMD/ Solar	Case 9: Worship/Education	Montgomery County MCPS Case Studies
Commercial	Electrification/Crosscutting	St. Paul's Lutheran Church	DC Green Bank Case Studies
Multifamily Housing	Electrification/Crosscutting	Jay Building Homes (Multifamily)	Elevate MF Case Study

Emission and Conversion Factors

Outputs from AVERT Web edition- 3.18.2023

https://www.epa.gov/avert/avert-web-edition

Virginia Changes- Energy Efficiency

	Raw Outputs		Converted	
	Value	Unit	Value	Unit
Total Energy Efficiency Reduction (input)	1000	MWh		
Generation Changes	1080	MWh		
SO2	-780	lbs	-0.3538	MT
NOx	-630	lbs	-0.28576	MT
Ozone season Nox	-230	lbs	-0.10433	MT
CO2	-740	tons	-671.317	MT
PM2.5	-90	lbs	-0.04082	MT
VOCs	-20	lbs	-0.00907	MT
NH3	-30	lbs	-0.01361	MT
CO2e			-671.698	MT
Avert CO2e emissions factor			-0.6717	MT/MWh
CO2e emissions factor			(0.67)	MT/MWh

Gas Emissions Factor	CO2 emission factor (kg /MMBtu)	NH4 emission factor (g /MMBtu)	N2O emission factor (g /MMBtu)	CO2e emission factor (MTCO2e/ MMBtu)	Source
Natural Gas	53.06	1	0.1	0.0531145	https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf
Fuel Oil #2	73.96	3	0.6	0.074755	https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf

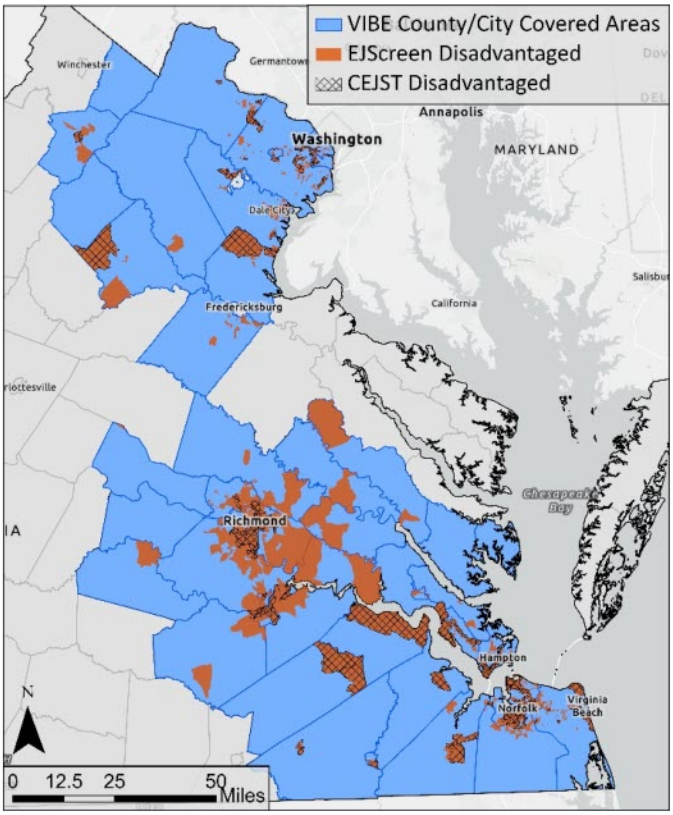
Conversion Factors	Value	Source
lbs to tons	0.0005	
tons to MT	0.907185	https://www.eia.gov/tools/faqs/faq.php?id=7&t=11
lbs to MT	0.000454	Calculated
therms to MMBTU	0.1	
MMBTU to gallons Fuel Oil #2	0.138	https://portfoliomanager.energystar.gov/pdf/reference/Thermal%20Conversions.pdf

Global Warming Potentials (AR5)	
CO2	1
CH4	28
N2O	265

Areas Affected_MWCOG Coalition

Areas Affected: The application covers the geographies of the three MSAs in Virigina, including the following cities, counties, and Tribes in Virginia: Arlington County, Clarke County, Culpeper County, Fairfax County, Fauquier County, Loudoun County, Prince William County, Rappahannock County, Spotsylvania County, Stafford County, Warren County, City of Alexandria, City of Falls Church, City of Fairfax, City of Fredericksburg, City of Manassas, City of Manassas Park, Town of Ashland, Amelia County, Charles City County, Chesterfield County, City of Colonial Heights, Dinwiddie County, Prince George County, Sussex County, City of Hopewell, City of Petersburg, Goochland County, Hanover County, Henrico County, King & Queen County, King William County, New Kent County, Powhatan County, City of Richmond, Upper Mattaponi Tribe, Rappahannock Tribe, Pamunkey Tribe, Chickahominy Tribe, Chickahominy Tribe Eastern Division, Gloucester County, Matthews County, James County/City, Williamsburg, York County, Newport News, Poquoson, Hampton, Surry County, Southampton County, Franklin, Isle of Wight County, Suffolk, Portsmouth, Chesapeake, Norfolk, Virginia Beach.

Figure.7¡.Geographic.coverage.of.the.VIBE.



List of Congressional Districts_ MWCOG Coalition

Virginia – 1, 2, 3, 4, 5, 6, 7, 8, 10, 11