# 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)

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# CONTENTS

## 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***

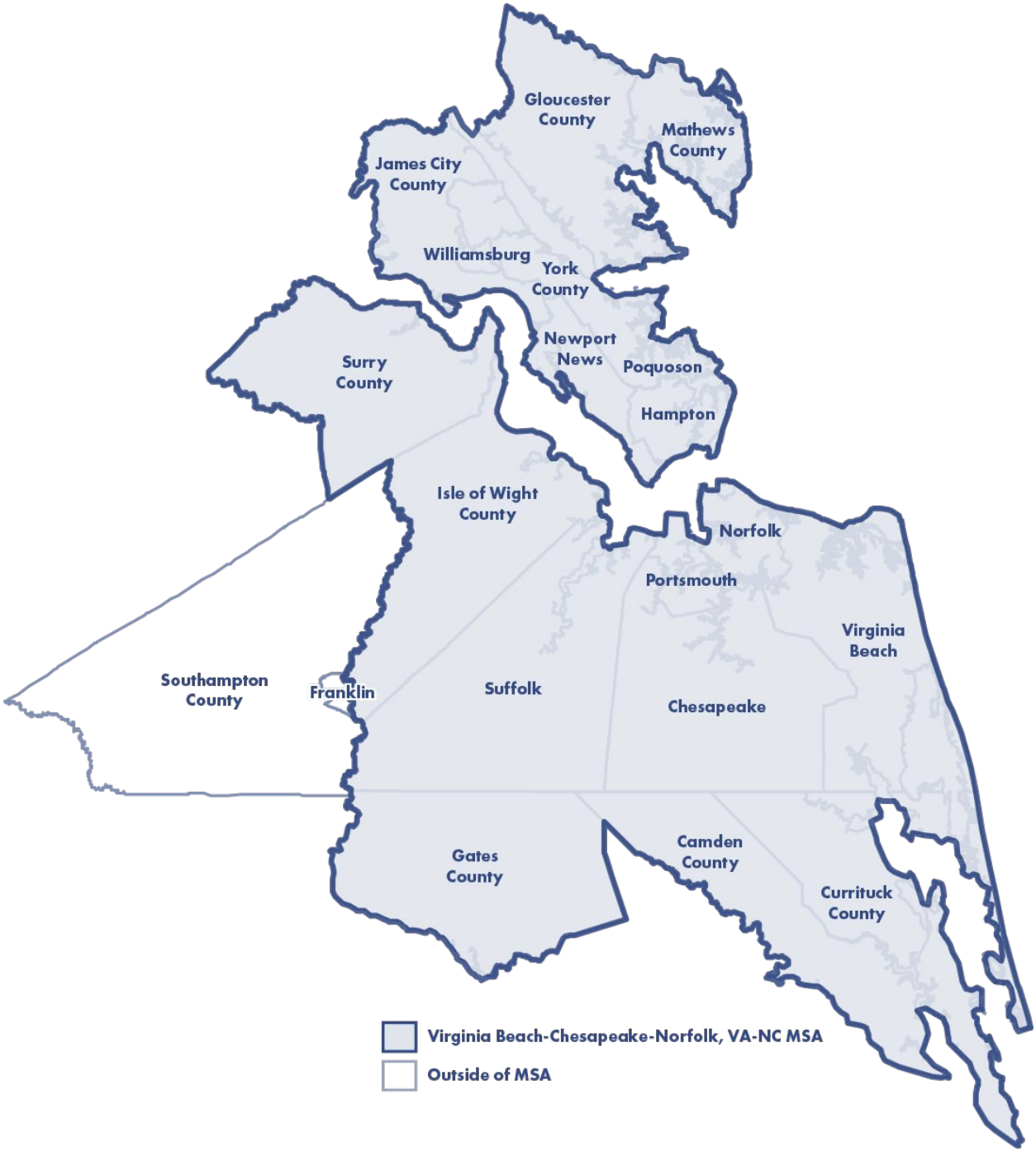



Table 1 summarizes the information included in this PCAP, in line with EPA CPRG planning guidance.

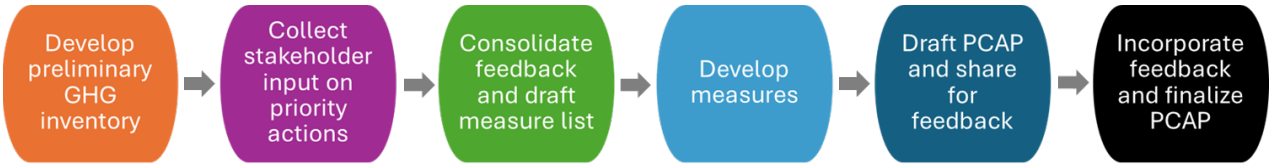
***Table 1: Overview of HRPDC's PCAP***

| 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).

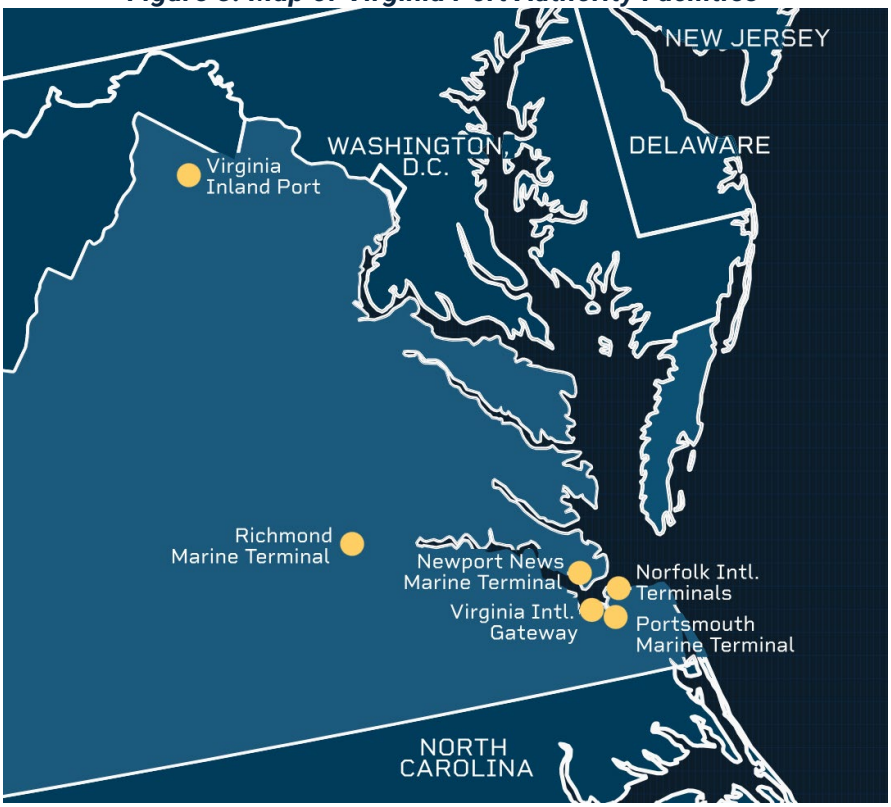
## Energy

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

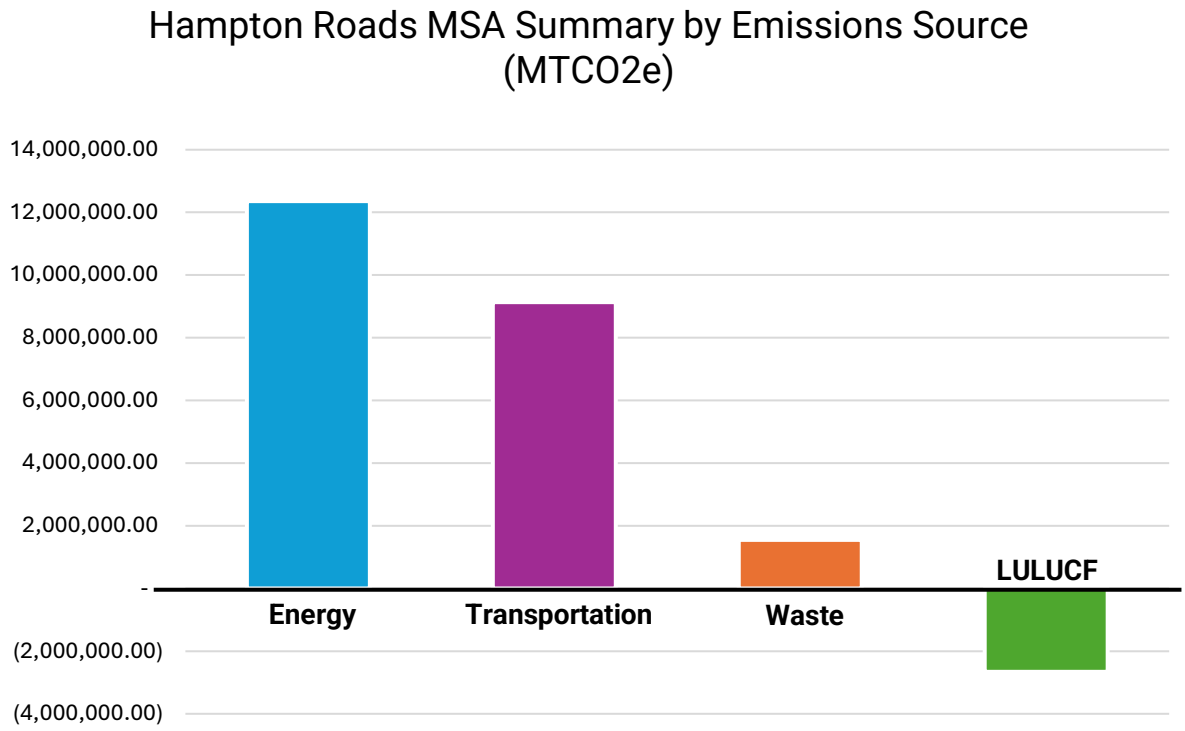
LULUCF represents the net carbon flux from vegetation and other land use. Sequestration of carbon from these sources offset emissions from other sectors, reducing net emissions in the MSA each year.

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***

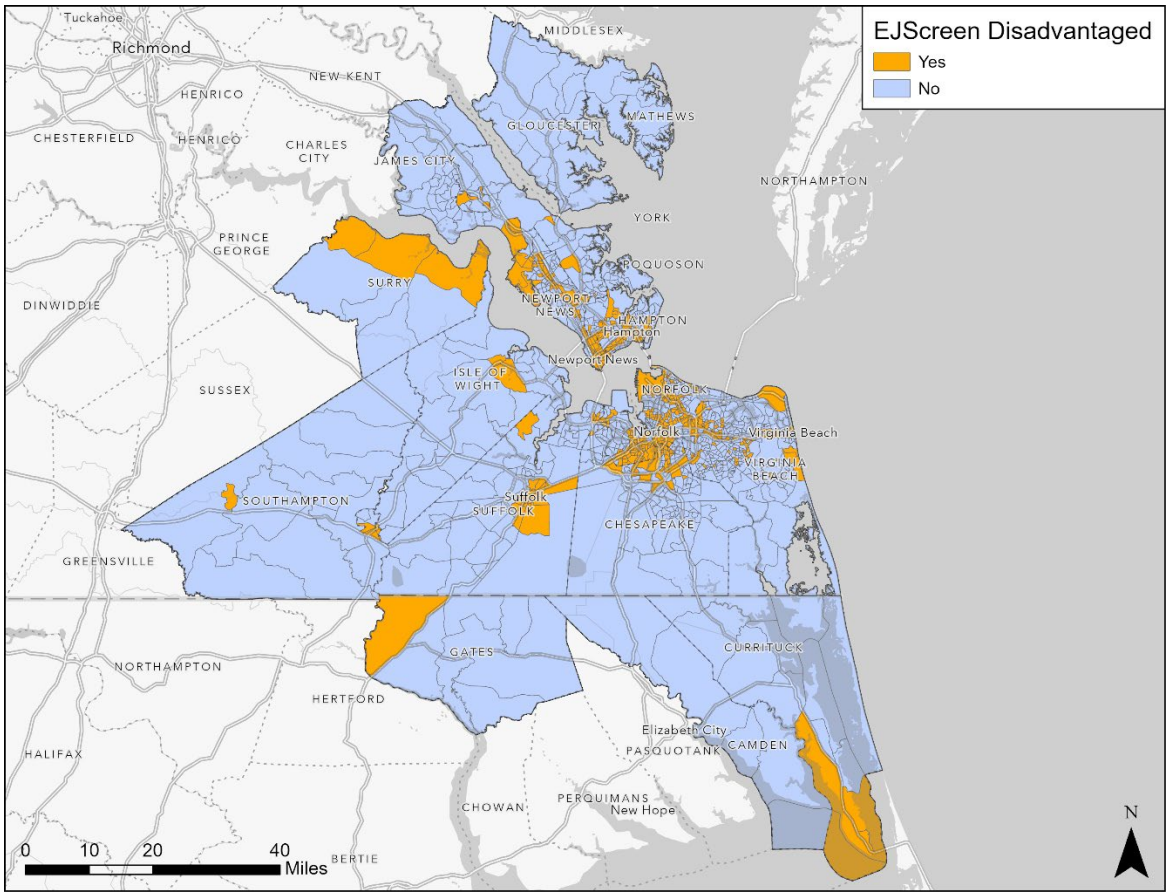
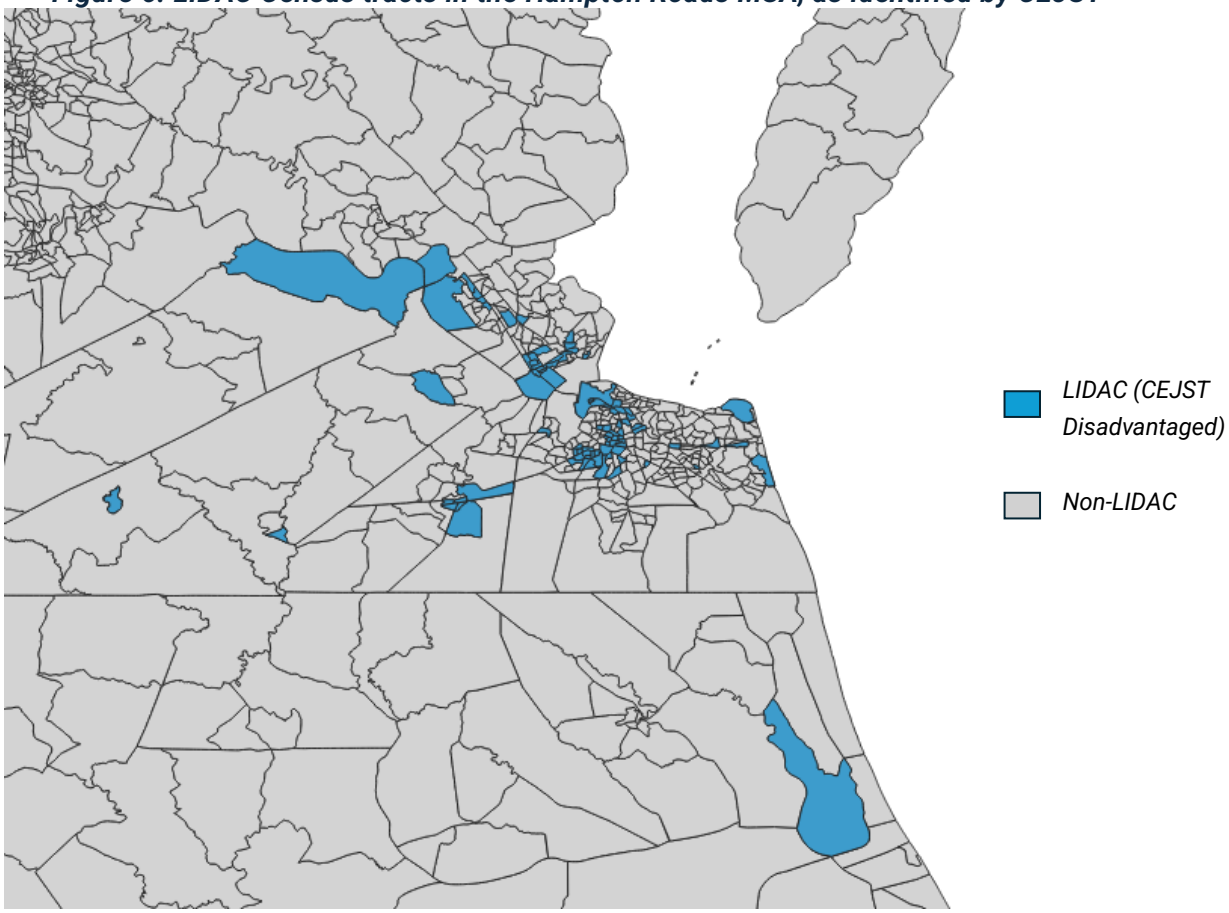


***Figure 6: LIDAC Census tracts in the Hampton Roads MSA, as identified by CEJST***




### *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*

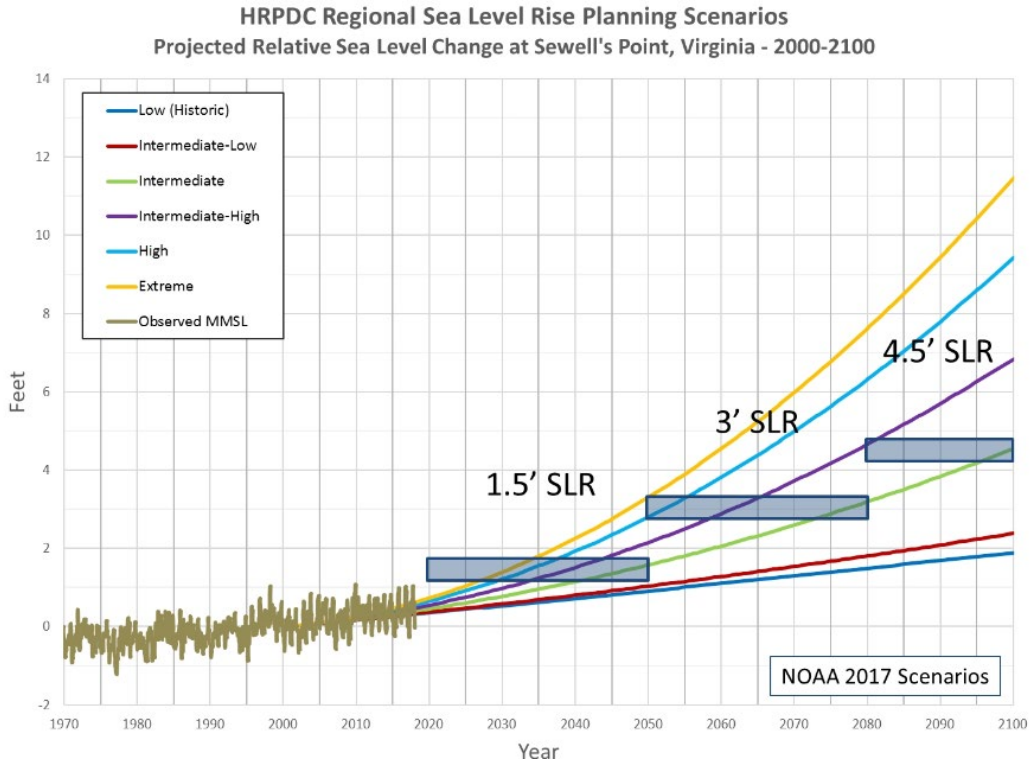
Within the Hampton Roads MSA, the most prevalent climate risks are extreme heat, extreme precipitation, storms, and sea level rise. Average temperatures in Virginia have already risen over 1.5° F since the beginning of the 20th century. The number of days over 95°F is projected to drastically increase.

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.

[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

[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.

[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

[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.

[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

[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**.

[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)<br>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<br>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)<br>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]

[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

[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.

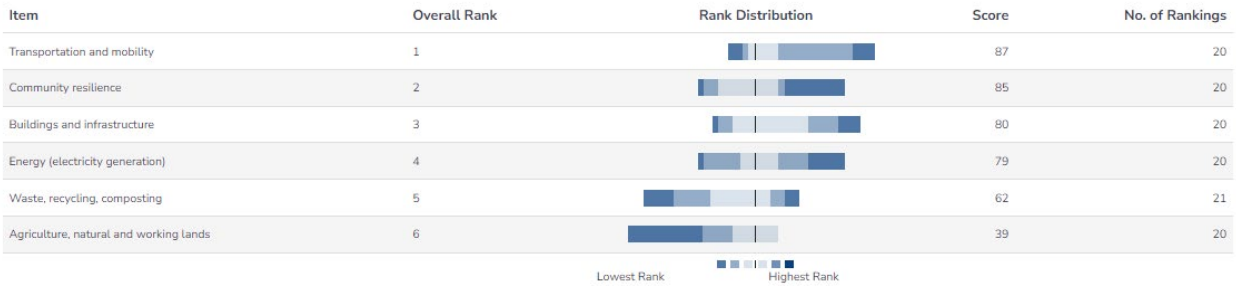
| Name | Organization | Region | Committee | Email | Date |
|---|---|---|---|---|---|
| **Beth Mertz-Guinn (#6, #31)** | York County | Virginia | CPRG | elizabeth.mertz-guinn@yorkcounty.gov | 01.30<br>02.06 |
| **Gabe Diaz** | Diversity, Equity and Inclusion- City of Hampton | Hampton, VA | | Gabe.diaz@hampton.gov | 01.30 |
| **Lamont Curtis** | City of Newport News | Virginia | Director of Utilities, Cit. Adv. | curtislw@nnva.gov | 01.30 |
| **Darryll D Lewis** | City of Suffolk | Virginia | | dlewis@suffolkva.us | 01.30 |
| **Mark Podolinsky** | City of Virginia Beach | Virginia | | mpodolin@vbgov.com | 02.01 |
| **Vivian Oden** | Hampton Roads Community Foundation (1) | Southside | | voden@hamptonroadscf.org | 02.02 |
| **Linda Rice** | Hampton Roads Community Foundation (2) | Virginia | | lrice@hamptonroadscf.org | 02.02 |
| **Ruth McElroy Amundsen** | Norfolk Solar | Norfolk | | rma@cox.net | 02.04 |
| **25** | | Virginia Beach | CAC | | 02.04 |
| **Garry Harris** | Sustainability Solutions Group and Institute/<br><br>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.

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| 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.<br>Educate more people on how to use investor dollars to install solar at no cost to sites.<br>Implement solar consumer protections such as other states have.<br>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.<br>Encourage all cities go to the SolarAPP+ for solar permitting – eliminate permitting barriers.<br>Eliminate the requirement that Dominion has instituted to submit the insurance declarations page for any solar install before the NMIN is submitted.<br>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.<br>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. |

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| | Go to Performance Based Contracting so that utilities have an incentive to use less electricity.<br>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.<br>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).<br>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).<br>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).<br>Require that state pension plans divest from fossil fuels<br>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.<br>Find funding for roof repair for roofs that need renovation before solar install<br>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<br>-Advance Community Scale Solar and Expanded Roof Top Options<br>-Bolster Utility Scale Energy Efficiency Program<br>-Advance Long Term Duration Energy Storage<br>-Clean Transportation Deployment including EVs, Clean Transit<br>-Reforestation and Tree Planting and Natural Forest Maintenance<br>-Advance Waste to Energy Concepts including Landfills<br>-Advance Carbon Capture and Industrial Emissions Abatement<br>-Standup an Education and Behavioral Energy Use Program |

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| | -Look Beyond Carbon Reductions; Review Health Inequities, Access, Equity Among Carbon Reduction Formulation<br>-Conduct a Comprehensive Carbon Drawdown Approach and Analysis, Solution Building<br>-Develop a Business Compact That Advances Energy Efficiency Solutions<br>Advance Community Resilience Hub Concepts and Deployment<br>-Measure Air Pollution Hot Spots and Pollution Sources<br>-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.<br>- Establish a Community Solar Program that benefits low-income renters<br>- 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<br>- 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<br>- 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.<br>- 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.<br>- 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.<br>- 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.<br>- 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 |

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| | improvements and energy efficiency, with a focus on low-income households and environmental justice communities.<br>- 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.<br>- 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).<br>- 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.<br>- 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<br>Clean transportation modes and infrastructure<br>Clean power generation<br>Natural lands carbon capture strategies |
| Hampton | Reduce GHG emissions from vehicles<br>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. |

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| | Improving government building energy efficiencies by upgrading HVAC, lighting, building green certified - focusing in LIDAC areas.<br>Responding the EV infrastructure study by installing chargers for public/fleet use.<br>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.<br><br>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.<br><br>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.<br><br>Incentive programs for implementation of end-use energy efficiency measures in existing government-owned, commercial, and residential buildings<br><br>Incentive programs for the purchase of certified energy-efficient appliances, heating and cooling equipment, lighting, and building products to replace inefficient products |

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| | 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<br><br>Implementation of a building energy performance management program for government-owned buildings<br><br>Implementation of a new benchmarking and building performance standards<br><br>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

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| York County | No |
| Diversity, Equity and Inclusion- | Limited community feedback |

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| 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<br>Beyond Carbon Benefits Leading with Equity and Justice<br>Measure Effectiveness; Per Ton of CO2 removal capability<br>Technical Achievability<br>Potential Achievability<br>Health Benefits<br>Reductions in Energy Burden<br>Advancement in Energy Democracy<br>Preservation of our Natural Resources<br>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.<br><br>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<br>2. Little agriculture in our City |
| City of Newport News | Projects are both local and regional in needs |

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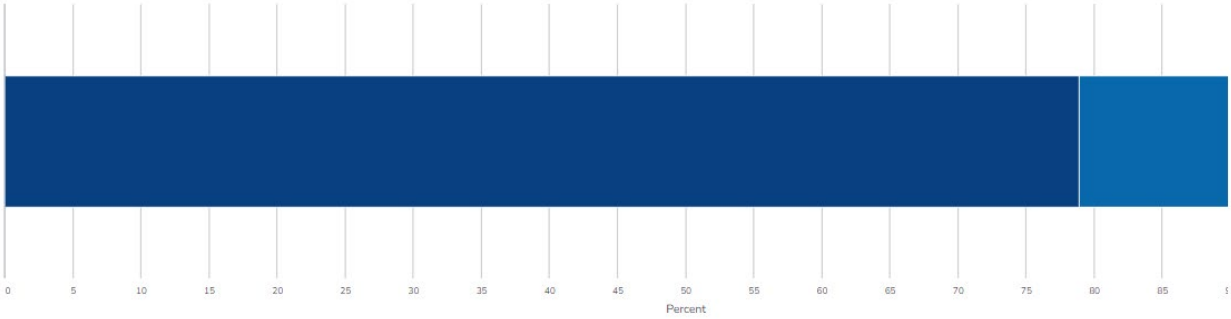
| City of Norfolk | Ranked agriculture, natural and working lands last due to lack of areas in Norfolk. Waste, recycling and composting are extremely important, but less so than the other four categories. Transportation/mobility and Buildings/Infrastructure could be equally ranked. There's a big focus 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:

| | |
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| #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

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| 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<br>Healthy Portsmouth<br>Bon Secours<br>Old Dominion |

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| | ICAR<br>EVMS<br>Virginia Wesleyan<br>NAACP<br>Sierra Club of Virginia<br>Virginia Organizing<br>United Civic League of Cavalier Manor<br>ECO District Hampton Roads<br>National Environmental Justice Institute<br>Georgia Institute of Technology.<br>Portsmouth Office of Social Services<br>Portsmouth Health Department<br>Virginia Environmental Justice Collaborative<br>Southern Alliance for Clean Energy<br>Interfaith Power and Light<br>People's Solar Power Initiative<br>ACEEE<br>Justice40 Accelerator<br>Justice40 Network Hub<br>University of Maryland Climate and Environmental Justice Initiative<br>NASA<br>Emory University Hercules Research Project<br>US Department of Energy National Renewable Energy Laboratory<br>University of Michigan Energy Equity Project<br>Southern Environmental Law Center<br>Environmental Defense Fund<br>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 |

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| 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 |

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| | 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.).

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| 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. |

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| 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.

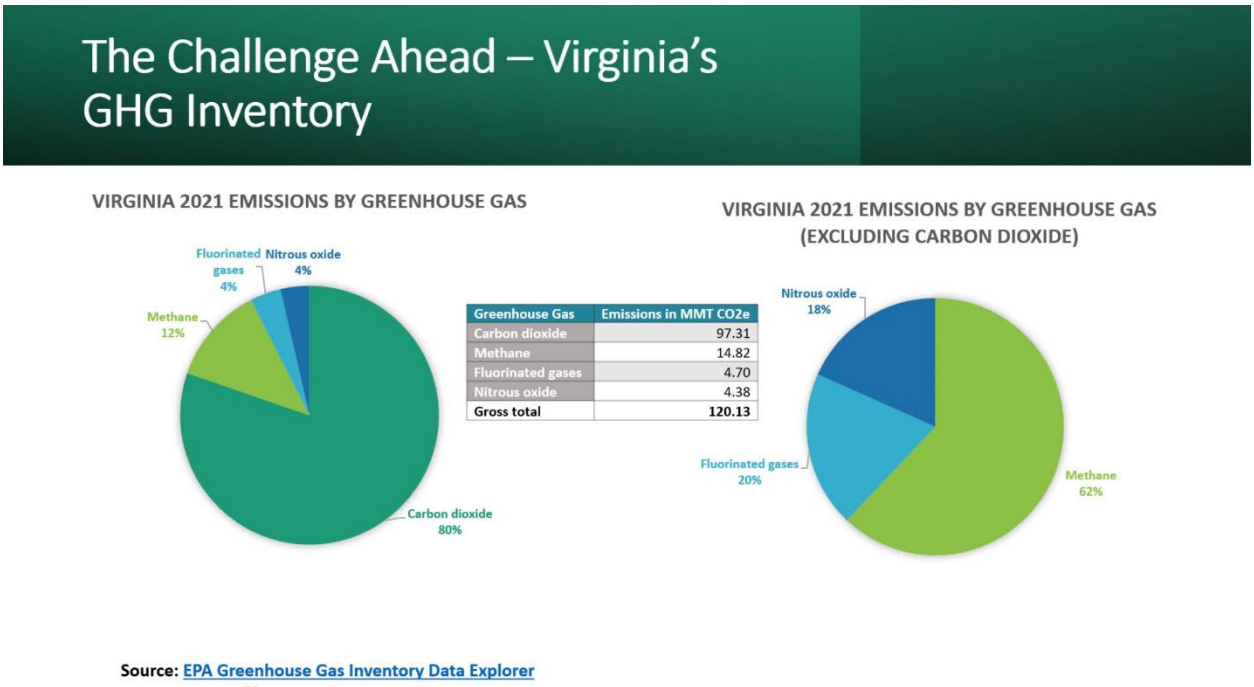


*Image via Virginia DEQ*

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*

$CO_2$Sight 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 $CO_2$Sight 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 $CO_2$Sight 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, $CO_2$Sight 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 $CO_2$e/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

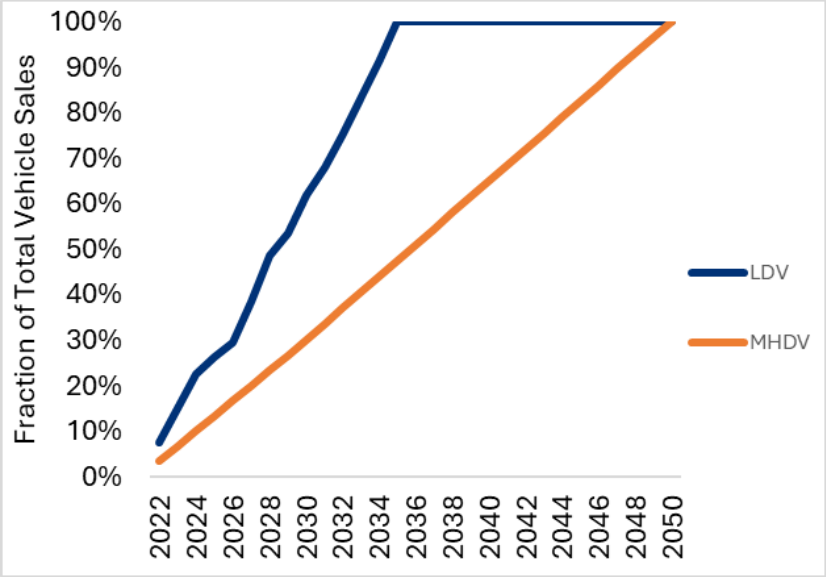
[77] NREL. Nd. *Electrification Futures Study*. Electrification Futures Study Technology Data | NREL Data Catalog

- 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 |
| Chesapeake City | 515500202003 |
| Chesapeake City | 515500202004 |
| Chesapeake City | 515500203001 |
| Chesapeake City | 515500203002 |
| Chesapeake City | 515500204001 |
| Chesapeake City | 515500204002 |
| Chesapeake City | 515500204003 |
| Chesapeake City | 515500205001 |
| Chesapeake City | 515500207001 |
| Chesapeake City | 515500207002 |
| Chesapeake City | 515500207003 |
| Chesapeake City | 515500207004 |
| Chesapeake City | 515500208053 |
| Chesapeake City | 515500208091 |
| Chesapeake City | 515500208111 |
| Chesapeake City | 515500209031 |
| Chesapeake City | 515500209052 |
| Chesapeake City | 515500209101 |
| Chesapeake City | 515500209112 |
| Chesapeake City | 515500214021 |
| Chesapeake City | 515500214024 |
| Chesapeake City | 515500214031 |
| Chesapeake City | 515500214033 |
| Chesapeake City | 515500214051 |

| County | Block Group ID |
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| Chesapeake City | 515500214072 |
| Chesapeake City | 515500215071 |
| Chesapeake City | 515500216021 |
| Chesapeake City | 515500216024 |
| Currituck County | 370531104031 |
| Currituck County | 370531104032 |
| Currituck County | 370531104040 |
| Currituck County | 370531104041 |
| Franklin City | 516200901001 |
| Franklin City | 516200902001 |
| Franklin City | 516200902002 |
| Franklin City | 516200902003 |
| Gates County | 370739703001 |
| Greensville County | 510818801012 |
| Greensville County | 510818802002 |
| Hampton City | 516500101042 |
| Hampton City | 516500101044 |
| Hampton City | 516500101045 |
| Hampton City | 516500103062 |
| Hampton City | 516500103063 |
| Hampton City | 516500103091 |
| Hampton City | 516500103111 |
| Hampton City | 516500103121 |
| Hampton City | 516500103141 |
| Hampton City | 516500103152 |
| Hampton City | 516500103162 |
| Hampton City | 516500104001 |
| Hampton City | 516500104002 |
| Hampton City | 516500104003 |
| Hampton City | 516500104004 |
| Hampton City | 516500104005 |

| County | Block Group ID |
|---|---|
| Hampton City | 516500105021 |
| Hampton City | 516500105032 |
| Hampton City | 516500105042 |
| Hampton City | 516500106011 |
| Hampton City | 516500106012 |
| Hampton City | 516500106021 |
| Hampton City | 516500106022 |
| Hampton City | 516500107011 |
| Hampton City | 516500107012 |
| Hampton City | 516500107021 |
| Hampton City | 516500108001 |
| Hampton City | 516500109001 |
| Hampton City | 516500109002 |
| Hampton City | 516500110022 |
| Hampton City | 516500112001 |
| Hampton City | 516500112002 |
| Hampton City | 516500113001 |
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| Hampton City | 516500114001 |
| Hampton City | 516500116003 |
| Hampton City | 516500118001 |
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| Hampton City | 516500118003 |
| Hampton City | 516500118004 |
| Hampton City | 516500118005 |
| Hampton City | 516500118006 |
| Hampton City | 516500119001 |
| Hampton City | 516500119002 |
| Hampton City | 516500119003 |
| Hampton City | 516500120001 |
| Hampton City | 516500120002 |
| Hertford County | 370919501021 |
| Hertford County | 370919502011 |
| Hertford County | 370919502012 |
| Hertford County | 370919502021 |
| Isle of Wight County | 510932801051 |
| Isle of Wight County | 510932801052 |
| Isle of Wight County | 510932801053 |
| James City County | 510950801021 |
| James City County | 510950801022 |

| County | Block Group ID |
|---|---|
| James City County | 510950801023 |
| James City County | 510950801032 |
| Newport News City | 517000301001 |
| Newport News City | 517000301002 |
| Newport News City | 517000301003 |
| Newport News City | 517000301004 |
| Newport News City | 517000303001 |
| Newport News City | 517000303002 |
| Newport News City | 517000303003 |
| Newport News City | 517000303004 |
| Newport News City | 517000303005 |
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| Newport News City | 517000313002 |
| Newport News City | 517000313003 |
| Newport News City | 517000314003 |
| Newport News City | 517000314004 |
| Newport News City | 517000316022 |
| Newport News City | 517000316023 |
| Newport News City | 517000316041 |
| Newport News City | 517000316042 |
| Newport News City | 517000319021 |
| Newport News City | 517000320021 |
| Newport News City | 517000320061 |
| Newport News City | 517000320062 |
| Newport News City | 517000320063 |
| Newport News City | 517000321132 |
| Newport News City | 517000321171 |

| County | Block Group ID |
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| Newport News City | 517000321172 |
| Newport News City | 517000321173 |
| Newport News City | 517000321231 |
| Newport News City | 517000321261 |
| Newport News City | 517000321262 |
| Newport News City | 517000321281 |
| Newport News City | 517000321282 |
| Newport News City | 517000321283 |
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| Newport News City | 517000321332 |
| Newport News City | 517000322114 |
| Newport News City | 517000322121 |
| Newport News City | 517000322122 |
| Newport News City | 517000322123 |
| Newport News City | 517000322232 |
| Newport News City | 517000322251 |
| Newport News City | 517000322252 |
| Newport News City | 517000322253 |
| Newport News City | 517000322261 |
| Newport News City | 517000322262 |
| Newport News City | 517000322263 |
| Newport News City | 517000322271 |
| Newport News City | 517000322282 |
| Newport News City | 517000323001 |
| Newport News City | 517000323002 |
| Newport News City | 517000323003 |
| Newport News City | 517000323004 |
| Newport News City | 517000323005 |
| Norfolk City | 517100002012 |
| Norfolk City | 517100002022 |
| Norfolk City | 517100003002 |
| Norfolk City | 517100004002 |
| Norfolk City | 517100004003 |
| Norfolk City | 517100005001 |
| Norfolk City | 517100005003 |
| Norfolk City | 517100005004 |
| Norfolk City | 517100006001 |
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| County | Block Group ID |
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| Norfolk City | 517100008002 |
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| Norfolk City | 517100009012 |
| Norfolk City | 517100009013 |
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| Norfolk City | 517100009015 |
| Norfolk City | 517100009021 |
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| Norfolk City | 517100012002 |
| Norfolk City | 517100013001 |
| Norfolk City | 517100013002 |
| Norfolk City | 517100014001 |
| Norfolk City | 517100014002 |
| Norfolk City | 517100014003 |
| Norfolk City | 517100016001 |
| Norfolk City | 517100016002 |
| Norfolk City | 517100025001 |
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| Norfolk City | 517100031001 |
| Norfolk City | 517100031002 |
| Norfolk City | 517100031003 |
| Norfolk City | 517100032003 |
| Norfolk City | 517100033001 |
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| Norfolk City | 517100034002 |

| County | Block Group ID |
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| Norfolk City | 517100035014 |
| Norfolk City | 517100041001 |
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| Norfolk City | 517100042002 |
| Norfolk City | 517100043001 |
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| Norfolk City | 517100046001 |
| Norfolk City | 517100046002 |
| Norfolk City | 517100047001 |
| Norfolk City | 517100047002 |
| Norfolk City | 517100048001 |
| Norfolk City | 517100048002 |
| Norfolk City | 517100050001 |
| Norfolk City | 517100050002 |
| Norfolk City | 517100050003 |
| Norfolk City | 517100051001 |
| Norfolk City | 517100051002 |
| Norfolk City | 517100051003 |
| Norfolk City | 517100051004 |
| Norfolk City | 517100055001 |
| Norfolk City | 517100055002 |
| Norfolk City | 517100055003 |
| Norfolk City | 517100056022 |
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| Norfolk City | 517100057013 |
| Norfolk City | 517100057014 |
| Norfolk City | 517100057022 |
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| Norfolk City | 517100058003 |

| County | Block Group ID |
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| Norfolk City | 517100068001 |
| Norfolk City | 517100069012 |
| Norfolk City | 517100069013 |
| Norfolk City | 517100069021 |
| Norfolk City | 517100070011 |
| Northampton County | 371319201012 |
| Northampton County | 371319201031 |
| Pasquotank County | 371399605031 |
| Pasquotank County | 371399607013 |
| Pasquotank County | 371399607014 |
| Portsmouth City | 517402102001 |
| Portsmouth City | 517402103001 |
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| County | Block Group ID |
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| Portsmouth City | 517402119002 |
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| Portsmouth City | 517402127011 |
| Portsmouth City | 517402127012 |
| Portsmouth City | 517402127013 |
| Portsmouth City | 517402127021 |
| Portsmouth City | 517402127022 |
| Portsmouth City | 517402128012 |
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| County | Block Group ID |
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| Portsmouth City | 517402132001 |
| Portsmouth City | 517402132002 |
| Portsmouth City | 517409801001 |
| Southampton County | 511752003001 |
| Suffolk City | 518000651001 |
| Suffolk City | 518000651002 |
| Suffolk City | 518000652001 |
| Suffolk City | 518000653011 |
| Suffolk City | 518000653012 |
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| Suffolk City | 518000653022 |
| Suffolk City | 518000654011 |
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| Suffolk City | 518000755043 |
| Suffolk City | 518000756011 |
| Suffolk City | 518000756012 |
| Suffolk City | 518000757012 |
| Surry County | 511818601001 |
| Surry County | 511818601002 |
| Surry County | 511818601003 |
| Sussex County | 511838704002 |
| Tyrrell County | 371779601000 |
| Virginia Beach City | 518100402001 |

| County | Block Group ID |
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| Virginia Beach City | 518100402002 |
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| Virginia Beach City | 518100410021 |
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| County | Block Group ID |
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| Virginia Beach City | 518100462232 |
| Williamsburg City | 518303701001 |
| Williamsburg City | 518303702003 |
| Williamsburg City | 518303703002 |
| York County | 511990502071 |
| York County | 511990503061 |
| York County | 511990505001 |