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DRAFT Community Energy and Sustainability Master Plan

Prince William County, Office of Sustainability

18 August 2023



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Glossary

Term	Definition
Adaptation	The process of adjustment to actual or expected climate and its effects
Carbon offset	Carbon offsets represent the reduction or removal of GHG emissions that compensates for emissions emitted somewhere else
Climate action	An action that reduces greenhouse gas emissions or climate risk
Climate change	A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer
Climate mitigation	Reducing emissions of and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere
GHG reduction scenario	A GHG reduction scenario represents a group of high-level technological strategies that are needed to reach a GHG reduction goal.
GHG reduction strategy	GHG reduction strategies are high-level technological strategies that help meet a GHG reduction goal. Examples of technological strategies include switching electricity generation sources from fossil fuels to renewables, travel mode shifting from single-occupancy vehicles toward active and public transportation, and electrifying buildings.
Greenhouse gas	Gases in the earth's atmosphere that trap heat
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation
Sequestration	Process of capturing and storing atmospheric carbon dioxide
Vulnerability	The propensity or predisposition to be adversely affected

[NOTE: Please suggest more terms for the list as needed]

Acronyms

Acronym	Definition
ASAP	Action Selection and Prioritization tool
°C	degrees Celsius
CCA	community choice aggregation
CESMP	Community Energy and Sustainability Master Plan
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
EEA	equity emphasis area
EM	Emergency Management department
EV	electric vehicle
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
HVAC	heating, ventilation, air conditioning
IJJA	Infrastructure Investment and Jobs Act
IPCC	Intergovernmental Panel on Climate Change
IRA	Inflation Reduction Act
JET	Joint Environmental Task Force
MTCO ₂ e	metric tons of carbon dioxide equivalent
MWCOG	Metropolitan Washington Council of Governments
NDC	nationally determined contribution
NOS	natural open space
NOVEC	Northern Virginia Electric Cooperative
PPA	power purchase agreement
PWC	Prince William County
PWCS	Prince William County School
PWCSA	Prince William County Service Authority
RECs	renewable energy certificates
RPS	Renewable Portfolio Standard
TOD	transit oriented development
ZEV	zero-emission vehicle
VPPAs	Virtual Power Purchase Agreements

Letter from County Executive

Executive Summary

On November 17, 2020, the Prince William County Government (the County) Board of County Supervisors adopted climate mitigation and resiliency goals. This plan, the Community Energy and Sustainability Master Plan (CESMP), presents recommendations on what we, the County, can do to contribute to the achievement of these goals. We recognize that climate change is not a distant problem, but one that impacts our citizens and resources directly. The increasing effects of our warming climate include, but are not limited to, more severe and persistent heat waves, poor air quality from wildfires, greater risk of power outages, more heat-related illnesses, and storm damages from flooding and high winds. This warming of our climate is caused primarily by the burning of fossil fuels to produce electricity, heat our homes and businesses, and power our vehicles. Our county's climate is changing, and it is directly related to human activities.

According to the Environmental Protection Agency, most of Virginia has warmed by approximately one degree Fahrenheit (F) in the last century and sea levels are expected to rise between one and four feet along the Virginia coast in the next century.¹ Climate change in Virginia manifests as erosion of its beaches and barrier islands, saltwater intrusion, intense tropical storms and hurricanes with more flooding and bigger storm surges throughout the state, increased rainfall with exacerbated coastal and inland flooding, loss of important coastal ecosystems, harmful effects on farming and fishing, and increased dangerously hot days. These effects are already being realized. Compared to 100 years ago, Virginia is experiencing 30 more evenings each year above 68 degrees and Virginia's portion of the Chesapeake Bay has seen approximately 4.5 more inches of rain annually.²

We recognize the time for action is now. The goals that guide the action are as follows:

1. **Cut GHG Emissions County-Wide by 2030:** Reduce GHG emissions county-wide to 50% below 2005 levels by 2030
2. **Use 100% Renewable Electricity County-Wide by 2035:** Source 100% of the county-wide electricity from renewable sources by 2035
3. **Use 100% Renewable Electricity in County Government Operations by 2030:** Achieve 100% renewable electricity in the County government operations by 2030
4. **Become Carbon Neutral for County Government Operations by 2050:** Achieve 100% carbon neutrality in the County government operations by 2050
5. **Prepare for Climate Change:** Become a Climate Ready Region and make significant progress to be a Climate Resilient Region by 2030

Achieving these goals requires unprecedented, aggressive action. This plan presents a list of actions recommended for the County to take, with 25 actions that have been prioritized for immediate execution. In many cases, the actions will be initially driven by the County, but will also require strong participation by residents and businesses. Partnerships and advocacy at the regional, state, and federal levels will become crucial. The 25 High Priority Actions can be grouped into five topic areas in which significant action is needed: electricity, buildings, transportation, natural resources, and adaptation. These high priority actions and the goals they contribute to are listed in [Table 1](#) below. A longer list including medium and low priority actions are provided in [Appendix A. Complete List of CESMP Actions](#). The recommended actions in the CESMP align with and contribute to meeting the goals and action strategies in the County's Comprehensive Plan and 2021-2024 Strategic Plan ([Appendix G. CESMP Actions Mapped to Strategic Plan and Comprehensive Plan Action Strategies](#)).

The intent of the CESMP is to build upon what we already have been doing in energy conservation, decarbonization, and adaptation to climate change. Among many actions, our county landfill currently captures methane for electricity and is building out a new renewable natural gas facility; established a Residential Solar Task Force to streamline the permitting processes; began procuring electric vehicles and building out charging infrastructure; built out an automated flood warning system; and coordinates community outreach and preparedness engagement through the Ready Prince William program. The CESMP will identify how we can take next steps towards the established goals. For a full list of actions the County has been pursuing, see [Appendix C. Existing County Actions](#).

¹ [What Climate Change Means for Virginia \(epa.gov\)](https://www.epa.gov/climate-change/what-climate-change-means-virginia)

² [A new report gives Virginia a realistic view of the future \(chesapeakebay.net\)](https://www.chesapeakebay.net/news-releases/a-new-report-gives-virginia-a-realistic-view-of-the-future)

Table 1. CESMP High Priority Climate and Resiliency Actions

Topic Area	CESMP High Priority Actions	Related Goal #
Electricity	E.1: Acquire Clean Electricity Sources for the County	1, 2, 3, 4
	E.2: Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives	1, 2,
	E.3: Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings	1, 2,
	E.4: Promote Existing Green Power Products	1, 2,
	E.5: Install Solar on County Government Facilities	1, 2, 3, 4
Buildings	B.1: Incentivize Energy Efficiency and Electrification Retrofits	1
	B.2: Propose Green Zoning Regulations	1
	B.3: Incentivize Energy Efficient and Electric New Construction	1
	B.4: Promote Energy Efficiency and Electrification Incentives	1
	B.5: Create Net-Zero Plan for County Government Facilities	1, 2, 4, 5
Transportation	T.1: Improve Pedestrian and Bicycle Infrastructure and Enhance Connectivity	
	T.2: Incentivize Transit-Oriented Development	1
	T.3: Expand Existing Programs that Reduce Single-Occupancy Vehicle Trips	1
	T.4: Upgrade Public Transit Infrastructure	1
	T.5: Incentivize Zero-Emission Vehicles and Charging	1
	T.6: Expand Public EV Charging Network	1
	T.7: Adopt Zero- or Low-Emissions County Fleet	1, 4
Natural Resources	N.1: Adopt Natural Open Space Requirements	1, 5
Adaptation	A.1: Develop Adaptation Plans for Critical Facilities	5
	A.2: Manage Stormwater Flooding in Areas Outside of the Floodplain	5
	A.3: Improve Power Resilience for Critical Infrastructure	5
	A.4: Implement Shoreline Protection and Nature-Based Solutions	5
	A.5: Restore Streams to Reduce Flooding	5
	A.6: Incentivize Technology for Residents to Make Homes Adaptive	1, 5
	A.7: Plan Alternate Evacuation Routes for Flood-prone Areas	5

How were these actions selected and prioritized? And why are these sectors the most significant? The remainder of this plan provides the background analysis and methodology for the answers to these questions. This plan not only presents the actions but provides guidance on what steps we can take first to make progress on achieving our goals.

Plan Structure: The CESMP reviews the county’s GHG emissions and climate vulnerability context, outlines what it will take for us to reach our goals, and establishes what we can do to meet these goals through local climate actions. The CESMP divides our climate actions into climate mitigation actions, which reduce GHG

emissions, and climate adaptation and resiliency actions, which reduce community-wide climate risk. Climate mitigation actions are further divided into community-wide actions that address the broader community's emissions and government actions that address County government emissions.

GHG Emissions: The county's GHG inventories can be used to monitor progress toward the 2030 GHG reduction goal. These inventories are created every two years by Metropolitan Washington Council of Governments (MWCOCG). The 2018 snapshot of the sectors contributing to most of the GHG emissions in the county is shown in **Figure 1** below:

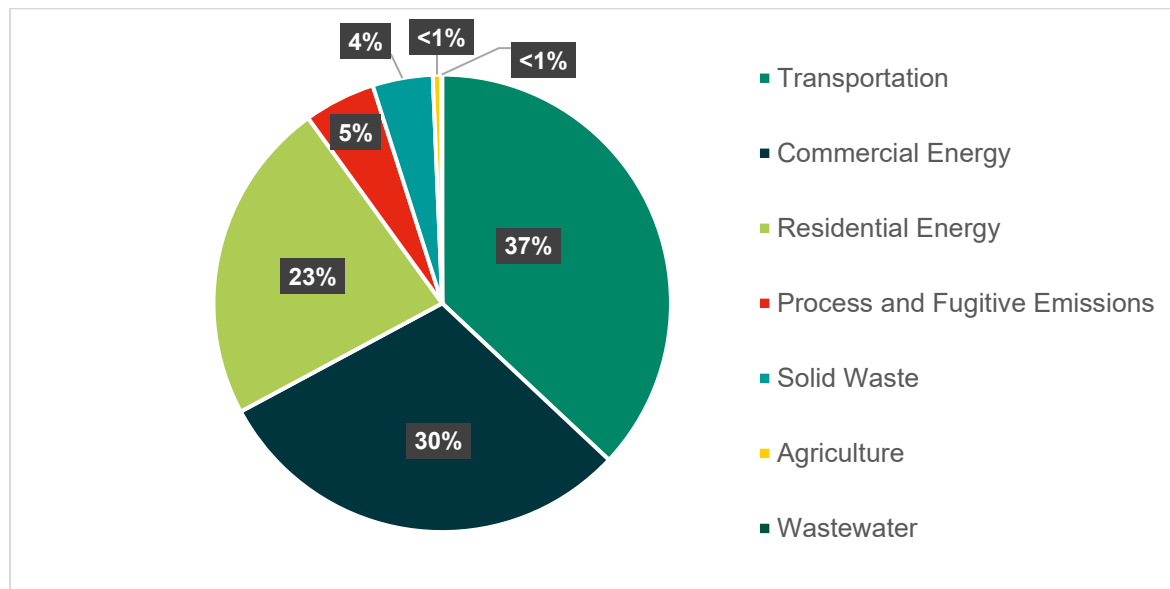


Figure 1. 2018 Community-wide Emissions by Sector

Emissions have increased since 2005— which means emissions are not currently on track to reach the goal of 50% reduction compared to 2005 levels by 2030. GHG emissions were forecast to demonstrate how emissions could change over time if no further climate action is taken to reduce their growth. The forecasts show that emissions are projected to increase by 37% from 2005 to 2030. However, if external regulatory and market forces are taken into account, emissions are projected to be 8% higher in 2030 compared to 2005 levels.

To understand what it will take to achieve the 2030 GHG reduction goal, we developed a preferred GHG reduction scenario comprising a group of high-level technological strategies that are needed to reach the 2030 goal. The first step in developing the GHG reduction scenario was to evaluate how external regulatory or market forces would impact emissions over time. These external factors result in nearly 33% of emissions reductions needed to meet the 2030 target. Building on these external regulatory and market forces, we selected a preferred 2030 reduction scenario strategies to show what it will take to reach the 2030 GHG goal and guide climate action development. Two important reduction scenario strategies include ensuring 92% of the electricity used in the county is from clean energy sources (e.g., solar, wind, hydropower, nuclear, biomass, and geothermal) and 50% of passenger and medium-duty vehicles traveling within the county are electric or zero-emission vehicles. These two strategies are estimated to produce 81% of the total 2030 GHG reductions needed to meet the 2030 goal.

Climate Vulnerability Assessment: We assessed our county's vulnerability to current climate hazards from extreme temperatures, precipitation, coastal flooding and sea level rise, drought, and high winds/tornadoes. The assessment looked at future climate hazards from extreme temperatures, precipitation, and sea level rise. County assets were divided into categories and the vulnerability of each category was rated based on its exposure, sensitivity, and adaptive capacity.

The CESMP Actions: Climate actions demonstrate what we can do to reduce emissions and adapt to climate change. The first step in the action development process was to identify current policies and programs that support the 2030 GHG reduction scenario strategies and address local climate hazards, recognize jurisdictional limitations in our ability to influence these sectors, and determine areas of opportunity for new action development. We then evaluated the new actions for their impact on specific evaluation criteria to provide a more holistic understanding of each action's viability and value to the community. Evaluation criteria included GHG reduction potential; climate risk reduction potential; impact on organizational diversity, equity, and inclusion; resource conservation; cost to residents and businesses; local employment; funding source identification; cost to

the County; and cost savings to the County. After gathering stakeholder feedback, we conducted an action prioritization exercise to organize actions into high, medium, and low priority categories. Detailed action tables and implementation roadmaps were created for the high priority actions while the medium and low priority actions are listed in the CESMP.

Required External Advocacy: The County government cannot directly control or influence many community-wide emissions sources or assets, so our ability to meet the 2030 GHG reduction and 2030 Climate-Ready Region goals relies on significant external support from market factors and state- and national-level regulations. We identified where external assistance is needed to meet the goals and our role in promoting these external forces through advocacy or partnerships.

Meeting the Goals: In our pursuit of the 2030 GHG reduction goal, it is vital to acknowledge that the County government alone cannot exercise direct control over all emission sources in our county. Consequently, the realization of the 2030 GHG target heavily depends on our collective community engagement with the CESMP actions. In fact, depending on the level of community participation, we may witness a deficit of approximately 330,000 to 1,500,000 metric tons of carbon dioxide equivalent (MTCO₂e) between the total reductions necessary to meet our 2030 GHG goal and what the County's actions alone can feasibly achieve (refer to **Figure 2** for clarity). We believe this gap can be bridged with the help of significant external support, such as contributions from market factors, state- and national-level regulation, incorporating forest and tree removals into our GHG inventories, or potentially through the purchase of carbon offsets. However, it is important to emphasize that the acquisition of carbon offsets would be our last resort, reserved for the scenario where we cannot meet our 2030 goal through direct emission reduction initiatives. The first line of action should always be focusing on direct emissions reduction.

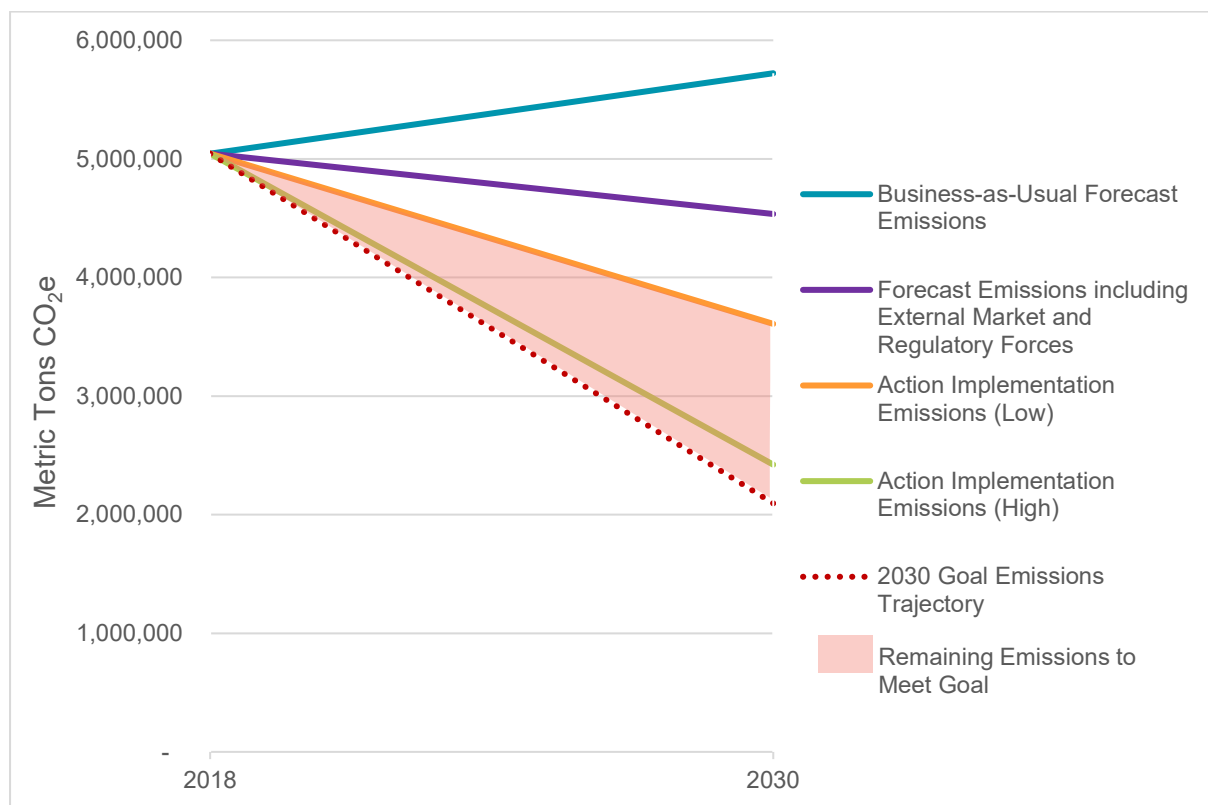


Figure 2. GHG Reduction Potential and Remaining Emissions

Next Steps: [complete after this chapter is completed and reviewed by County]

Chapter 1 Introduction

The Purpose of This Plan

MWCOG set a series of ambitious goals in 2008 to reduce emissions in the region by 2020. In 2020, MWCOG published its 2030 Climate and Energy Action Plan that set new 2030 goals for area governments. Motivated by this plan, Prince William County’s Board of County Supervisors adopted five climate and resiliency goals provided in **Table 2**. These goals demonstrate our continued commitment to protect and prepare our citizens and resources for climate change³. The primary purpose of the CESMP is to develop a pathway towards addressing these goals.

[Note: Graphics to include map of PWC]

Table 2. County Climate Goals

County-wide Goal	Prince William County Government Goal
<ul style="list-style-type: none">• Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	<ul style="list-style-type: none">• Achieve 100% renewable electricity in County Government operations by 2030*
<ul style="list-style-type: none">• Become a Climate Ready Region and making significant progress to be a Climate Resilient Region by 2030	<ul style="list-style-type: none">• Achieve 100% carbon neutrality in County Government operations by 2050
<ul style="list-style-type: none">• Source 100% of county-wide electricity from renewable sources by 2035*	

* The County defines renewable electricity as electricity coming from any non-fossil fuel energy source, including solar, wind, hydro, geothermal, biomass, and nuclear.

How the CESMP Was Developed

Prince William County made it a point to bring everybody to the table - to make sure the action we're taking to address the goals accounts for what matters to our people. Stakeholder engagement was embedded throughout the CESMP process as shown in **Figure 3** below. We took into consideration things like the knowledge of our local experts, the voice of the public, and any unexpected side-effects of our actions. Plus, we had to weigh in our County's jurisdiction and think about how realistically these actions could be implemented, both at the county level and out in the community. A complete list of stakeholders that were engaged during the development of the CESMP are provided in Appendix B. List of Stakeholder Groups Involved in CESMP Development

Table 10 describes the composition and roles of the five primary stakeholder groups engaged throughout the plan development process.

Table 10. Primary Stakeholders

Figure 15 outlines the members of the County Core team that participated in the development of the CESMP.

Figure 15. County Departments Involved in Developing the CESMP

³ <https://www.pwcva.gov/assets/2022-05/13-D.pdf>

The Joint Environmental Task Force

Communication between the Prince William County Government and the Prince William County School (PWCS) system was important throughout the CESMP development process. Because the PWCS system operates separately from our County government operations, PWCS operations are not considered under the County government's direct influence. Therefore, PWCS energy use and emissions are not included under our County government climate goals of 100% renewable energy by 2030 or carbon neutrality by 2050. However, as PWCS emissions are included in the county-wide goals of 50% GHG emissions reduction by 2030 and 100% renewable energy by 2035, they were still a critical partner to engage in CESMP development. PWCS representatives were invited to participate in the CESMP workgroups. Notably, the Joint Environmental Task Force (JET) was developed to foster the relationship and increase communication channels to address climate change and environmental sustainability proactively and equitably. The JET was created on June 22, 2021, by the Board of County Supervisors. The JET's role will be to recommend to the Board of County Supervisors and to the School Board funding priorities that are identified by the CESMP.

Figure 16 outlines the participants of the technical workgroups that helped to prioritize the actions.

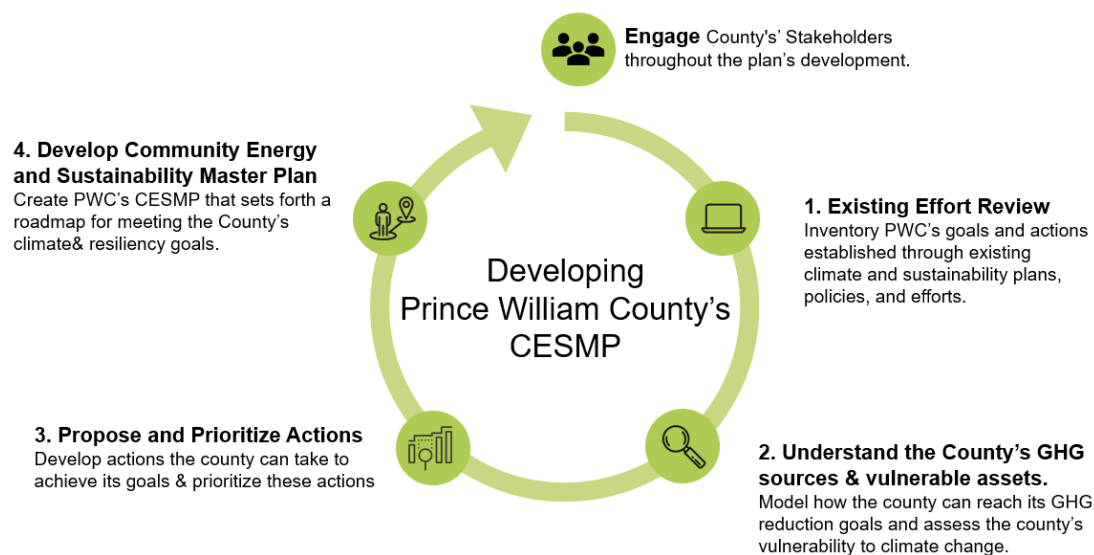
Figure 16. Complete List of Technical Workgroup Participants

Workgroup Participants		
1 Buildings and Decarbonization	2 Transportation and Land Use	3 Climate Adaptation and Resiliency for Vulnerable Population
<ul style="list-style-type: none"> - Building Trades- GPI Consulting Engineering - Virginia Pace Authority - Northern Virginia Electric Cooperative - Prince William Service Authority - Prince William Residential Solar Taskforce - Prince William County Schools - George Mason University VA Climate Center - Northern Virginia Community College - Data Center Coalition - Citizen's Climate Lobby - Prince William Commercial Development Committee - Northern Virginia Building Industry Associations - Developer Rep - Northern Virginia Building Industry Associations- Builder Rep 	<ul style="list-style-type: none"> - Virginia Railway Express - Potomac and Rappahannock Transportation Commission - Lake Ridge Occoquan Coles Civic Association - Woodbridge Potomac Communities Civic Association - Mid County Civic Association of Prince William - HOA Roundtable - Prince William Conservation Alliance - Active Transportation Groups - Biking - Northern Virginia Regional Commission - Trails and Blueways Council - Metropolitan Washington Council of Governments - Prince William County Schools Transportation - Prince William Economic Development - Northern Virginia Building Industry Associations 	<ul style="list-style-type: none"> - Virginians Organized for Interfaith Community Engagement - Student Representative - Community Partners in Equity and Inclusion - Senior Citizen Advocacy - Veteran's Commission - Chesapeake Climate Action Network - Institute for Public Health - Tenants and Workers United - Prince William Department of Social Services Rep for Homeless Populations

Appendix C. Existing County Actions of Stakeholder Groups.

Prince William County staff and residents know which actions will be most effective within our county and the best process to effectively implement them. The stakeholder engagement process was designed to approach stakeholder groups, introduce them to the plan development process, receive their feedback at key milestones, and return feedback to the County Core Team for consideration and incorporation. **Figure 3** demonstrates that stakeholder engagement played a role throughout the action and plan development.

Figure 3. CESMP Development Process



Importance of Climate Action and Resiliency Planning

Recognizing the importance of resilience in a rapidly changing world, the CESMP underscores not only our commitment to mitigating climate impacts, but also our determination to adapt and thrive in the face of adversity. We firmly believe that understanding the dynamics of climate change and fostering resilience are key pillars of sustainability and integral to the ongoing vitality and prosperity of the county.

As it related to climate change, greenhouse gases (GHGs) function like a warm blanket around our Earth, absorbing and re-emitting heat. This natural process, known as the greenhouse effect, is vital for our survival, keeping the planet at a habitable temperature. There are many different GHGs, each with a different ability to trap heat — we call this their "global warming potential." To make sense of all these gases, we convert their quantities into carbon dioxide equivalents (CO₂e) for easier comparison.

There are several major GHGs that result from human activity and are included in U.S. and international estimates of GHG emissions, including:

- Carbon Dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
- Nitrogen Trifluoride (NF₃)
- Sulfur Hexafluoride (SF₆)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)

While GHGs naturally occur at beneficial levels, maintaining the Earth's temperature, our actions have released more GHGs and have tipped the scale since the 1800s. This disruption in balance is "climate change," a long-term shift in average global or regional weather patterns. This imbalance ushers in a host of troubles like extreme droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, devastating storms, and declining biodiversity. Human activities, such as burning fossil fuels to power our buildings or vehicles, have been the main driver of climate change.

The United Nations Intergovernmental Panel on Climate Change (IPCC)—the leading international body for assessing climate science—noted that more severe climate impacts could be avoided if global warming is limited to 1.5 degrees Celsius (°C) (or 2.7 degrees Fahrenheit [°F]) above pre-industrial levels. To do this, global emissions need to fall by at least 45% from 2010 levels by 2030 and reach carbon neutrality by 2050.

"Carbon neutrality" means maxing out GHG reduction efforts through strategies like energy efficiency, clean electricity, and zero-emission technologies. Any remaining emissions are then balanced out by removing them directly from the atmosphere through natural sequestration or direct air capture technologies, among solutions.

To tackle this challenge, world leaders developed the Paris Agreement—a legally binding international treaty with a goal of holding the global average temperature increase to well below 2°C (3.6°F) above pre-industrial levels and pursuing efforts to limit the temperature rise to 1.5°C. The United States re-joined the Paris Agreement in 2021 and developed a nationally determined contribution (NDC) of reducing net GHG emissions by 50-52% below 2005 levels by 2030.

Relevance to Prince William County

In Prince William County, climate change is a pressing reality that is already impacting the community, not a distant issue for future generations to address. This local impact mirrors a global trend where urban areas contribute significantly to the problem by generating much of the world's energy-related greenhouse gas emissions⁴. Daily activities are part of this large puzzle. For instance, whenever we power our vehicles and buildings with fossil fuels, treat and dispose of solid waste and wastewater, leak refrigerants and natural gas, or carry out agricultural practices, we are contributing to the production of these emissions. Each action, seemingly small on its own, adds up to our collective footprint on the climate. These emissions have contributed to the dangerous levels of climate change our county experiences today. Looking back over the 20th century, our county and Virginia have experienced increased average temperatures more than 0.83°C (1.5°F) and a small upward trend in annual total precipitation based on data compiled for the National Climate Assessment.⁵ Analysis developed for the County's Vulnerability Assessment ([Chapter 3 Vulnerability Assessment](#)) confirm these trends and project increased sea level rise throughout the 21st century.

Climate Action the County is Currently Taking

This CESMP is not the first step we are taking to act on this growing concern. The roadmap in [Figure 4](#) lays out our journey, showcasing key milestones we have hit in confronting climate change.

⁴ World Resources Institute, C40 Cities Climate Leadership Group, & ICLEI - Local Governments for Sustainability. (2014). Global protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC).

⁵ [Virginia - State Climate Summaries 2022 \(ncics.org\)](https://ncics.org)

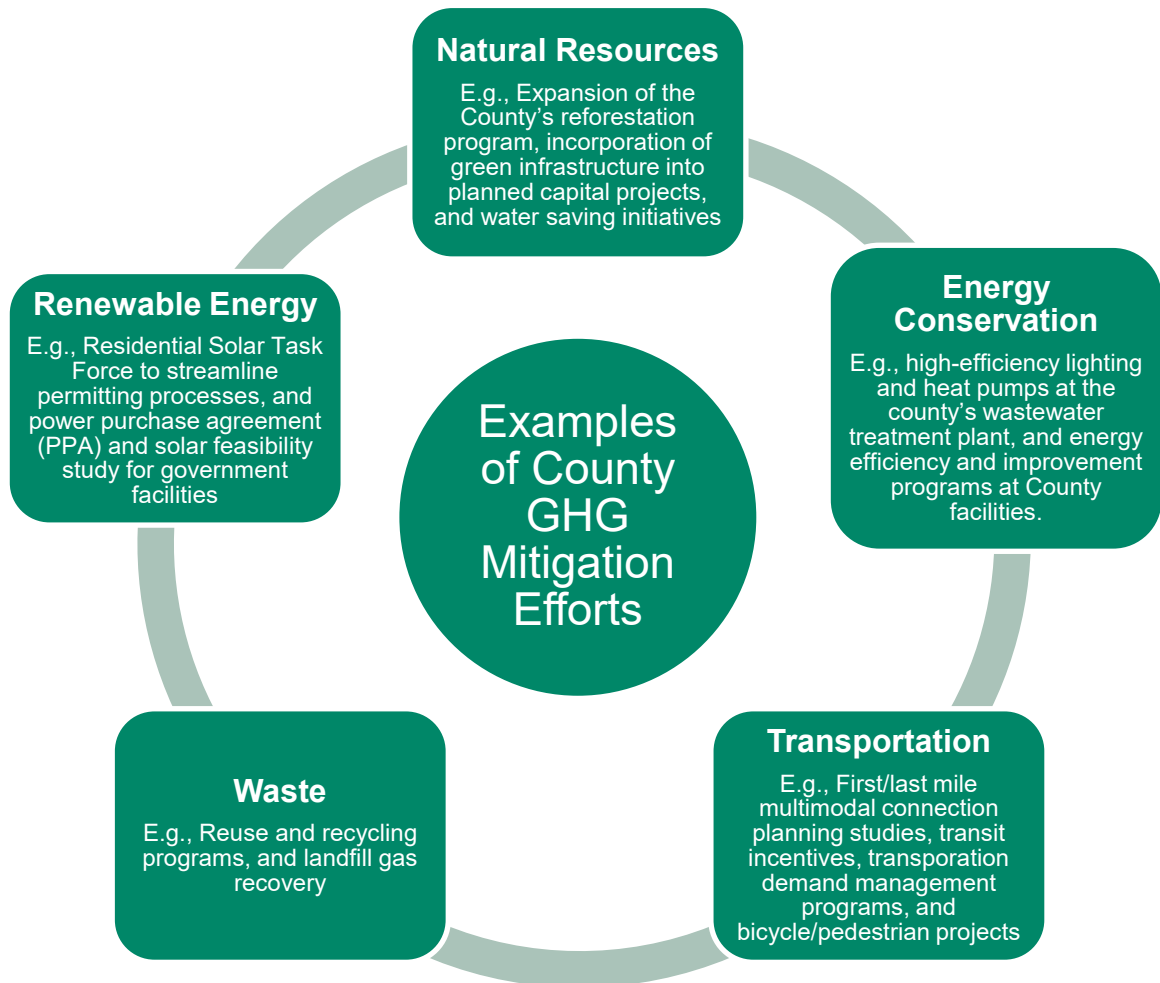


Figure 4. Timeline of CESMP Launch

Ongoing Progress on Climate Action

We are already pursuing many programs, projects, and actions that benefit GHG reduction or climate adaptation. One of the first things we did was comprehensive review of established programs, policies, and action that are already underway. If a project already has a solid foundation and does not need a major overhaul, then it would not be considered as a new action for the CESMP. We will continue to support, staff, advertise, bolster, and fund these programs so they continue to have a positive effect toward the goals and reduction targets. However, the CESMP actions in **Chapter 4 CESMP Actions** will largely focus on implementation and start-up of new efforts.

Examples of our ongoing GHG mitigation efforts targeting a comprehensive set of areas are described in **Figure**



5. For a full list of our current efforts, please refer to **Appendix B. List of Stakeholder Groups Involved in CESMP Development**

Table 10 describes the composition and roles of the five primary stakeholder groups engaged throughout the plan development process.

Table 10. Primary Stakeholders

Figure 15 outlines the members of the County Core team that participated in the development of the CESMP.

Figure 15. County Departments Involved in Developing the CESMP

The Joint Environmental Task Force

Communication between the Prince William County Government and the Prince William County School (PWCS) system was important throughout the CESMP development process. Because the PWCS system operates separately from our County government operations, PWCS operations are not considered under the County government's direct influence. Therefore, PWCS energy use and emissions are not included under our County government climate goals of 100% renewable energy by 2030 or carbon neutrality by 2050. However, as PWCS emissions are included in the county-wide goals of 50% GHG emissions reduction by 2030 and 100% renewable energy by 2035, they were still a critical partner to engage in CESMP development. PWCS representatives were invited to participate in the CESMP workgroups. Notably, the Joint Environmental Task Force (JET) was developed to foster the relationship and increase communication channels to address climate change and environmental sustainability proactively and equitably. The JET was created on June 22, 2021, by the Board of County Supervisors. The JET's role will be to recommend to the Board of County Supervisors and to the School Board funding priorities that are identified by the CESMP.

Figure 16 outlines the participants of the technical workgroups that helped to prioritize the actions.

Figure 16. Complete List of Technical Workgroup Participants

Workgroup Participants		
1 Buildings and Decarbonization	2 Transportation and Land Use	3 Climate Adaptation and Resiliency for Vulnerable Population
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Appendix C. Existing County Actions.

Figure 5. Ongoing GHG Mitigation Efforts

The Sustainability Commission also provided recommendations for “fast-track” climate mitigation and climate resilience measures in September 2022⁶. The intent of the resolution was to get a head start on some actions prior to the delivery of the CESMP.

We participate in the Northern Virginia Hazard Mitigation Plan, as required by 44 CFR 201.6 to maintain eligibility for Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program and other post-disaster federal financial assistance. The PWC Hazard Mitigation Workgroup was established in 2017 to implement the PWC-specific mitigation strategies outlined in the NOVA HMP. The Workgroup is facilitated by PWC’s Office of Emergency Management (EM) and includes representatives from the Departments of Public Works, Development Services, Transportation, Information Technology, Parks, Recreation, and Tourism, Public Safety Communications, Police, the Fire and Rescue System, and the Virginia Department of Transportation. Additional agencies and partners, such as utility or transportation providers, the School Division, town representatives and others are consulted on hazard-specific and project-specific strategies, as they are identified.

To date, the Workgroup has utilized a project management framework to coordinate efforts around specific grant programs and individual mitigation strategies. As flooding is one of the top hazards in PWC, recent efforts have focused on collecting data on flood stage elevations in flood-prone areas, providing enhanced warning about imminent flooding conditions, and increasing participation in the National Flood Insurance Program.

In addition, PWC EM coordinates our all-hazards emergency management program which includes mitigating against, preparing for, responding to, recovering from all natural, technological, and human caused disasters. Key activities include coordination of the County’s Hazard Mitigation Workgroup noted above, the development and maintenance of the County Emergency Operations Plan and supporting operational plans, Continuity of Operations Planning, coordinating relevant training and exercises to ensure agency partner readiness for response and recovery tasks, and coordinates community outreach and preparedness activities through the Ready Prince William program.

⁶ [Res 022-007 Fast Track Sustainability Recommendations.pdf \(pwcva.gov\)](#)

Chapter 2 Prince William County Greenhouse Gas Emissions

Greenhouse Gas Inventory

One of the tools that is used to measure a community's impact on climate change is the GHG inventory. This chapter will talk about the concept of this tool, its relation to our plan, and how it's used to understand what our GHG emissions might look like in the future if we did nothing.

The GHG inventory is a record of the emissions generated by the community. It allows us to measure our progress and identify areas where we can make improvements. Understanding the current emissions is important as we work toward achieving the climate goals.

MWCOG develops a new GHG inventory for our county every two years. The graphic below represents county emissions from 2018, allowing us to identify the largest sources of emissions and areas where we can make improvements.

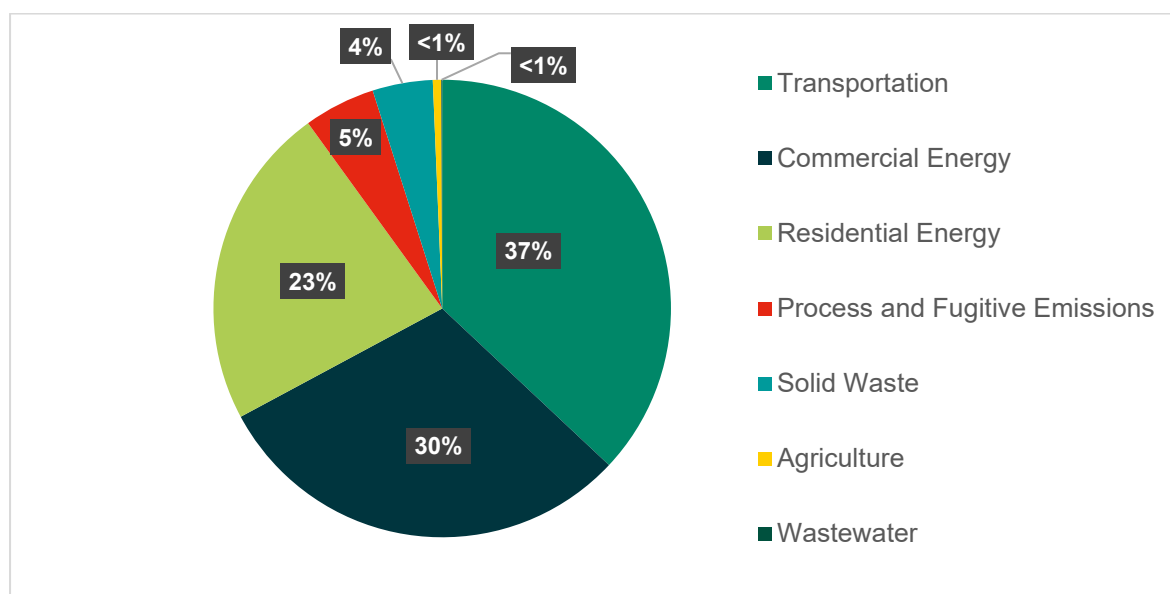


Figure 6. 2018 Community-wide Emissions by Sector

Impact of COVID-19 on GHG Emissions

While county emissions have been steadily increasing annually since 2005, emissions decreased by 9% between 2018 and 2020 (though emissions in 2020 were still 9% higher compared to the baseline year of 2005). The decline in emissions from 2018-2020 is most likely due to the impacts of COVID-19 restrictions, such as reduced on-road travel or non-residential building energy use, though the exact magnitude of emissions impact from these restrictions cannot be precisely measured. Additionally, studies have shown that US-wide GHG emissions are returning to pre-pandemic levels, demonstrating that COVID impacts on emissions are most likely not permanent.⁷

Therefore, while a 2020 County GHG inventory exists, the CESMP references the 2018 inventory year for forecasting and emissions reduction calculations as it represents the most recent pre-pandemic community activity levels and provides a more accurate baseline for local GHG emissions analyses. Future GHG inventories will better reflect any long-term impacts of the pandemic on county-wide emissions.

⁷ <https://rhg.com/research/us-greenhouse-gas-emissions-2022/#:~:text=Based%20on%20preliminary%20economic%20activity,compared%20to%20the%20previous%20year.>

Of our county's 2018 emissions, 37% are from transportation and mobile sources, 30% are from commercial energy, 23% are from residential energy, and the remainder are from fugitive emission sources, solid waste management, agriculture, and wastewater treatment (see [Figure 6](#)). It's important to underscore that more than half of total emissions are generated by electricity used in commercial and residential sectors, largely a consequence of our region's reliance on fossil fuels such as natural gas and coal for electricity generation (see [Appendix D](#). Greenhouse Gas Inventory and Analysis for the regional electric grid resource mix). Additionally, on-road transportation generated about a third of total emissions. **Given that building energy and transportation sectors produce 90% of total emissions, the path to our ambitious 2030 emissions reduction goal necessitates a strategic focus on these sectors.** A more detailed summary of the 2018 GHG inventory is provided in

Appendix D. Greenhouse Gas Inventory and Analysis.

Impact of Forests and Trees on the GHG Inventory

Historically, our county's GHG inventories have included emissions from buildings, transport, waste, and agriculture. These inventories did not consider emissions or removals of CO₂ from other land uses such as forests. Different land use types have different levels of carbon stocks, or stores of carbon in biomass, litter, dead wood, and soils. The net GHG effect of land use is estimated based on the change in these carbon stocks. In the United States, land use is a net sink where removals of CO₂ exceed emissions of CO₂, mostly due to forests and trees outside forests (collectively called forests and trees) that sequester carbon through photosynthesis.

Recent IPCC reports state that all mitigation pathways compatible with limiting global warming to 1.5°C also involve significant CO₂ removal from the atmosphere, highlighting the importance of maintaining and expanding the ability of forests and trees to capture and store carbon. These carbon sinks help to offset other sources of GHG emissions, including those produced by combusting fossil fuels.

To calculate the GHG impact of forests and trees on community GHG inventories, the average annual change (gain and loss) in forest and tree canopy as well as how much forest and tree canopy is unchanged over the GHG inventory cycle must be estimated. To enhance local GHG inventories, MWCOG calculated CO₂ emissions and removals due to forests and trees in our county from 2005 to 2020. The estimated CO₂ emissions are due to forest conversion and loss of trees while the CO₂ removals are due to CO₂ sequestration in existing forests and trees and the addition of new forests. This data showed that including forest and tree emissions and removals in the county's GHG inventories would decrease total annual emissions by approximately 7%, as local forest and tree CO₂ removals exceeded emissions.

However, MWCOG noted that there are significant uncertainties in the estimates. Typical GHG inventories of forests using similar approaches, including the national GHG inventory, report uncertainties in the net GHG balance that can be as high as ±45% (with 95% confidence). While uncertainties can be high, the estimates still provide useful information on the relative magnitude and importance of such GHG fluxes. As the forest and tree emissions data was not available until after the county-wide GHG analysis was complete, and due to the uncertainty of the data, the CESMP has not included forest and tree emissions or removals in the 2018 inventory, emissions forecasting, or primary GHG reduction scenario development. However, the plan does include actions to promote the preservation and expansion of forests and trees (see actions N.1, N.2, and N.3). Additionally, the CESMP discusses the emissions impact of forests and trees on meeting the 2030 GHG reduction goal in **Chapter 5 Meeting the County Goals**.

Greenhouse Gas Forecasts

While the 2018 inventory provides a recent snapshot of our county's GHG emissions, it's important to understand how the GHG emissions may look up to 2030 and 2050.

In an effort to better understand the potential trajectory of county-wide emissions and to assess the magnitude of GHG reductions necessary to reach our 2030 goal, we projected emissions from 2018 through 2050. This forecast paints a picture of a "business-as-usual" emissions scenario, illustrating how emissions could evolve if no additional climate actions are initiated at either local, state, or national levels. The forecast takes into account regional and local growth indicators, such as increases in households, population, building square footage, employees, and vehicle miles traveled. While accurately forecasting GHG emissions is challenging due to the multitude of influencing variables, we are committed to periodically updating these forecasts as more current information becomes available. This approach allows us to continuously reassess our strategies and actions in our mission to reduce emissions.

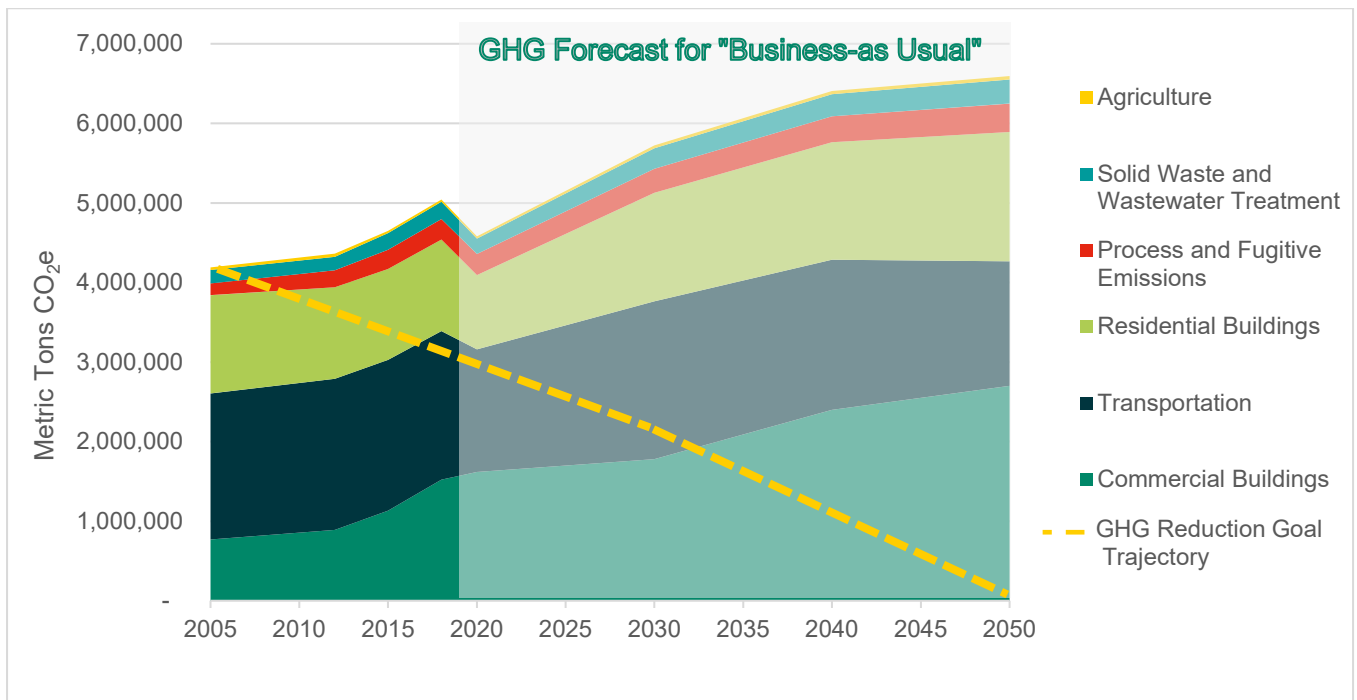


Figure 7. GHG Emissions Business-as-Usual Forecast and Target Trajectory

The forecasts illustrated in **Figure 7. GHG Emissions Business-as-Usual Forecast and Target Trajectory**

show how emissions in each sector are estimated to change over time in a business-as-usual scenario from 2005 to 2050. The dotted line shows approximately where emissions levels should be to maintain a trajectory toward our goal of 50% GHG reductions compared to 2005 levels by 2030. The target trajectory line extends to carbon neutrality by 2050 for illustrative purposes only, as this is the target recommended by the IPCC though such a target has not yet been adopted by the Board of County Supervisors. The forecasts show that emissions are projected to increase by 37% from 2005 to 2030 and 57% from 2005 to 2050. The difference between the top forecast line (i.e., top of the colored chart) and dotted goal line demonstrates that ambitious climate action will be needed to meet our 2030 reduction goal and potential future 2050 reduction goal.

Impact of Data Centers [NOTE: Given the sensitive nature of this topic, the County will need to decide on specific language to include about data centers and the Digital Gateway. Consider this a placeholder.]

The GHG emissions forecast includes projections from our Comprehensive Plan to estimate emissions from new data centers being built in our county through the year 2050. Data centers are typically much more energy intensive than other commercial buildings as they require substantial electricity to maintain and cool their servers. However, many data centers in our county have set corporate energy and emissions reduction goals. For example, some existing data centers in the county are already procuring 100% clean electricity for their operations. Many actions in the CESMP address new data center emissions and will help data centers meet their energy and emissions goals. The actions provided in **Appendix A. Complete List of CESMP Actions**, including action E.1: Acquire Clean Electricity Sources for the County action, action E.2: Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives, action E.3: Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings, action, action E.4: Promote Existing Green Power Products, action B.1: Incentivize Energy Efficiency and Electrification Retrofits, action B.2: Propose Green Zoning Regulations, action B.3: Incentivize Energy Efficient and Electric New Construction, action B.4: Promote Energy Efficiency and Electrification Incentives, and action B.8: Implement Building Energy Benchmarking.

Through a directive by the Board of County Supervisors in January 2023, county staff have established a Data Center Ordinance Advisory Group, comprised of residents, industry representatives and other stakeholders, to advise the County with the development of Regulatory Ordinance changes that will address data center development impacts.

2030 GHG Emissions Reduction Scenario

To understand what it will take to achieve the 2030 GHG reduction goal, we developed a preferred GHG reduction scenario. A GHG reduction scenario represents a group of high-level technological strategies that are needed to reach the 2030 reduction goal. Examples of technological strategies include switching electricity generation sources from fossil fuels to renewables, travel mode shifting from single-occupancy vehicles toward active and public transportation, and electrifying buildings. However, these strategies and their underlying implementation rates might be different than what is politically or financially feasible. The purpose of these scenarios and strategies is to show **what it will take** for us to reach our 2030 reduction goal, demonstrate where climate action is needed, and guide action development. The climate actions then show **what the County can do** to meet the reduction strategies and ultimately the 2030 goal. The relationship between reduction scenario, strategies, and actions is further illustrated in an example in **Figure 8** (this graphic is an example and does not list all County strategies or actions).

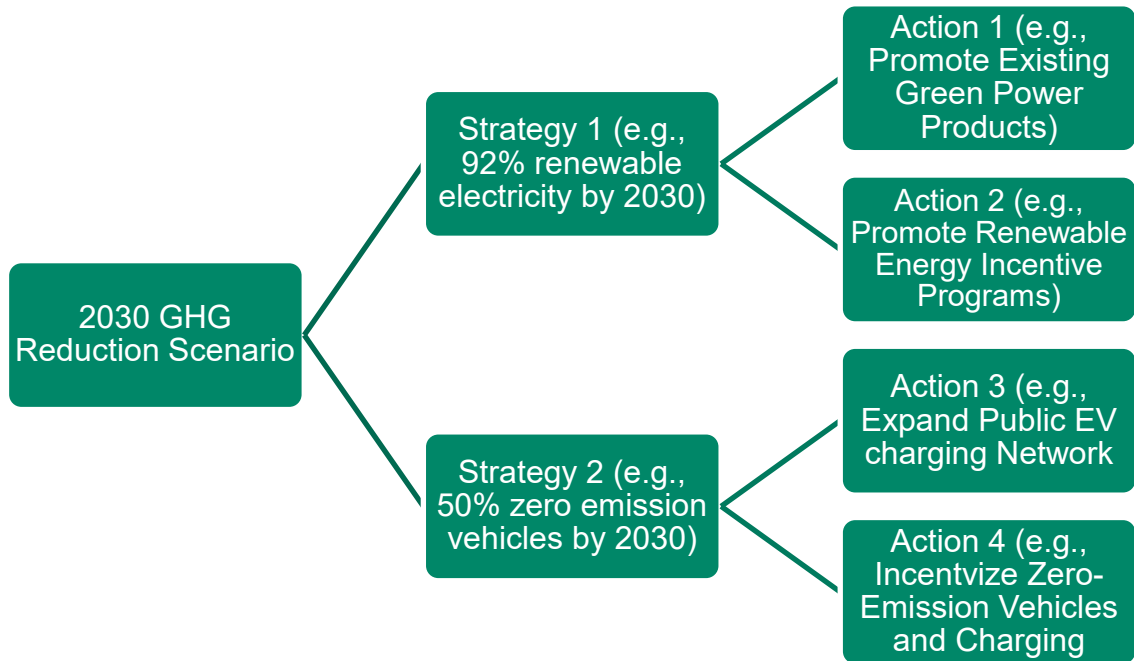


Figure 8. Example County Strategies and Actions to Reach 2030 Goal

GHG reduction scenarios can be represented by “wedge charts” as illustrated in **Figure 9**. The top line represents the emissions forecast and the bottom line shows the GHG goal trajectory. The colored wedges in between those two lines illustrate the magnitude of GHG reductions from each high-level technological strategy shown in the legend. Each wedge represents the emissions reduced through that strategy, with larger wedges representing greater emissions reductions. Any remaining emissions not addressed by GHG reduction strategies are shown in the hatched grey area at the bottom of the chart.

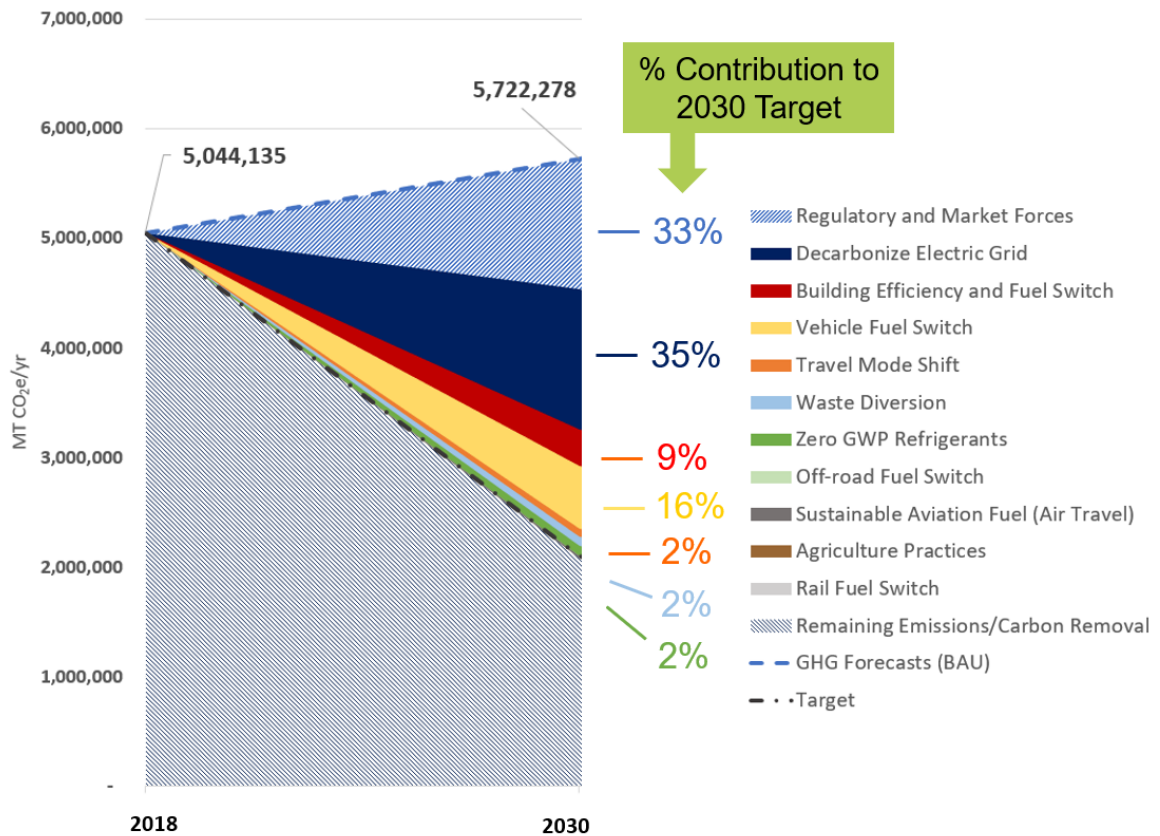


Figure 9. 2030 Greenhouse Gas Reduction Scenario⁸

[Note this figure is under revision to address % and strategies not shown]

The strategies included in our GHG reduction scenario, or **what it will take** to reach the 2030 goal, are as follows (2018 is used as the base year for comparison):

- 92% of the electricity used in the county is from clean energy sources (e.g., solar, wind, hydropower, nuclear, biomass, and geothermal) -- this includes the renewable energy added to the grid through Virginia's Renewable Portfolio Standard
- 50% of passenger and medium-duty vehicles traveling within the county are electric or zero-emission vehicles -- this includes the consideration of current regulations related to electric vehicles
- 40% of fossil fuel building systems (e.g., space or water heaters) are transitioned to highly efficient electric options (e.g., heat pumps)
- 57% of hydrofluorocarbon (HFCs) are replaced with low- or zero-global warming potential alternatives. This includes the reduction in HFC use under the Kigali Amendment
- 5% mode shift from passenger vehicle travel to active or public transport (e.g., biking, walking, or taking the bus)
- 60% of solid waste produced in the county is diverted from landfill (e.g., recycled, composted, reused)
- 100% of lighting and appliances are highly efficient (e.g., LED lights, Energy Star appliances)
- 15% of off-road equipment is electric or produces zero emissions -- this includes market forecasts for electric off-road equipment adoption
- 20% of county-related air travel emissions are reduced
- 10% of agricultural emissions are reduced

⁸ Strategies that produce 1% or less of total reductions do not appear in the wedge chart (e.g., sustainable aviation fuel, agriculture practices, and rail fuel switch)

The top three strategies that provide nearly 90% of the reductions needed to achieve the 2030 goal include:

- 92% of the electricity used in the county is from clean energy sources (e.g., solar, wind, hydro, nuclear)
- 50% of passenger and medium-duty vehicles traveling within the county are electric or zero-emission vehicles
- 40% of fossil fuel building systems (e.g., space or water heaters) are transitioned to highly efficient electric options (e.g., heat pumps)

Because all other sectors and strategies contribute a relatively small amount to total emissions, there is no path to 2030 goal achievement without incredibly aggressive progress in the three areas mentioned above: clean electricity, transportation and vehicle fuels, and building energy. The methodology for developing these strategies and why certain external regulatory or market forces (e.g., the Inflation Reduction Act or the Infrastructure Investment and Jobs Act) were not integrated into the GHG reduction scenario are included in

Appendix D. Greenhouse Gas Inventory and Analysis.

After establishing the preferred 2030 reduction scenario, we developed a list of feasible actions we could pursue to meet these strategies (see [Chapter 4 CESMP Actions](#)). While the GHG reduction scenario and strategies shows **what it will take** to achieve the 2030 goal, the GHG actions shows **what we can do** to achieve the strategies and ultimately the 2030 goal. However, because many of these emissions sources are out of the County government's direct control, County government action alone won't necessarily achieve the GHG strategies or the overall GHG reduction scenario in order to meet the 2030 goal. The ability to achieve these strategies relies on significant external support from market factors and state- and national-level regulation. We have identified where external assistance is needed to meet the GHG reduction strategies and our role in promoting these external forces through advocacy or partnerships in [Chapter 5 Meeting the County Goals](#). Further discussion of how we could consider forest and tree CO₂ removals and carbon offsets to meet the 2030 GHG reduction goal is included in [Chapter 5 Meeting the County Goals](#).

Addressing Goals Related to GHG Emissions

The CESMP is meant to address how we could meet the community-wide goal of 50% emissions reduction from 2005 levels by 2030 through local climate action. We have also established three other emissions-related goals⁹, including:

- Sourcing 100% of county-wide electricity from renewable sources by 2035
- Achieving 100% renewable electricity in County government operations by 2030
- Achieving 100% carbon neutrality in County government operations by 2050

We define renewable electricity as electricity coming from any non-fossil fuel energy source, including solar, wind, hydro, geothermal, biomass, and nuclear. Because the definition of renewable electricity can differ among communities, the CESMP uses the term "clean electricity" instead to mean any non-fossil fuel energy source.

Though achievement of these additional goals was not specifically analyzed in the CESMP, the climate actions developed in the plan can contribute to achievement of these goals. A qualitative discussion of how the plan actions can contribute to these goals is provided in [Chapter 5 Meeting the County Goals](#).

Chapter 3 Vulnerability Assessment

We have made the commitment to ensure we are prepared for the impacts of climate change through a commitment to become a Climate Ready Region by 2030. In line with this commitment, we've concentrated our efforts on understanding the susceptibility of our county's people and infrastructure to local climate hazards, paving the way for resilient action plans that meet the community's most pressing needs. The fruits of this undertaking were realized with the completion of a comprehensive vulnerability assessment in January 2023. This evaluation was designed with an emphasis on anticipating future conditions that could amplify existing vulnerabilities. A detailed report can be found in [Appendix E. Vulnerability Assessment Report](#).

In the context of our conversation, a "vulnerable asset" refers to an essential resource that forms the backbone of our community. These assets encompass a broad range of elements, including our critical infrastructures like transportation systems, public buildings, and utilities; natural resources such as parks, water bodies, and green spaces; as well as economic drivers like businesses, industries, and development projects. Moreover, these assets include the invaluable human capital that is our diverse and dynamic community members, who continually contribute to the growth and resilience of our county.

To be a Climate Ready Region by 2030, local governments are asked to assess current and future climate risks and work to actively integrate climate planning across government plans, operations, and communications. While the goal of Climate Readiness is set to be achieved by 2030, many of the climate hazards that threaten our county will not provide an exaggerated threat until the middle or late part of the twenty-first century. Additionally, infrastructure changes that are planned today will need to have a useful life that extends well beyond 2030. Therefore, the vulnerability assessment evaluated climate threats for the years 2050 and 2075 as planning

⁹ <https://www.pwcva.gov/assets/2022-05/13-D.pdf>

timelines that are more in-line with long-term infrastructure lifetimes. By making changes by 2030 with a focus towards longer-term threats, we will ensure that it is focused on projects that will provide a more resilient future.

Our vulnerability assessment methodically catalogued pertinent assets, gauged their exposure to climate hazards, and assigned ratings for each asset's sensitivity and adaptive capacity. The succeeding chapter provides a comprehensive overview of the climate hazards relevant to our county, which assets are most prone to impacts, and offers a summary of the assessment results.

Under the leadership of our County Officials, Prince William County remains dedicated to these climate resilience efforts. We understand the importance of coordinated actions and continuous adaptations to face the ongoing challenges posed by climate change.

The results of the vulnerability assessment were used to assist in developing climate adaptation actions that consider natural hazards and the most vulnerable asset categories. Further details on action development, evaluation, and prioritization can be found in [Chapter 4 CESMP Actions](#).

Climate Hazards

We reviewed the following climate hazards to assess the vulnerability of our county's assets and vulnerable populations:

- Precipitation
- Temperature
- Drought
- Coastal storms, sea level rise
- High winds/tornadoes.

As part of our dedication to maintaining the well-being of Prince William County, we diligently appraised the present-day risks posed by all climate hazards as well as future conditions for the precipitation, temperature, drought, and sea level rise climate hazards for the years 2050 and 2075. The impacts of the climate hazards can vary depending on the amount of change as well as the scale. For example, a high quantity or high intensity of precipitation will impact both the stormwater systems and overland flooding as well as streams and rivers; however, low amounts will produce similar risks as droughts. For the temperature, both high heat and extreme low temperatures were evaluated for the threat to our county. While coastal storms will produce severe impacts, they occur infrequently whereas sea level rise (which can affect the impact of coastal storms) will produce permanent inundation. The results of the climate hazard analysis were used to evaluate the vulnerability of various groups of County assets.

County Assets

The Vulnerability Assessment groups our county's assets into categories intended to align with FEMA's Community Lifelines. This approach aligns with the guidelines followed by PWC EM.

In this study, we have integrated FEMA's energy and hazardous materials lifeline categories. In addition, we've expanded the scope to include two more essential categories: our natural resources and socially vulnerable populations. These categories recognize the importance of our environment and underscore our commitment to inclusivity, ensuring that every resident's needs are acknowledged and addressed.

Each asset, integral to the fabric of our county, within these categories is meticulously defined and mapped out in [Appendix E. Vulnerability Assessment Report](#). Below, we delve into the types of assets that underwent evaluation in our assessment. These assets are not just mere resources but the pillars of our community, the drivers of our economy, and the protectors of our way of life.

Types of County Assets and Infrastructure Evaluated for Vulnerability



Figure 10 below is an example of graphic showing the location of transportation infrastructure evaluated for vulnerable to climate change. In addition to the airports, rail stations, railroads, bus stops, and major roads shown in the figure, minor roads, commuter parking lots, sidewalks, bridge locations, port facilities, heliport locations, stormwater management facility locations, stormwater management lines, and culvert geospatial layers were included in the analysis.

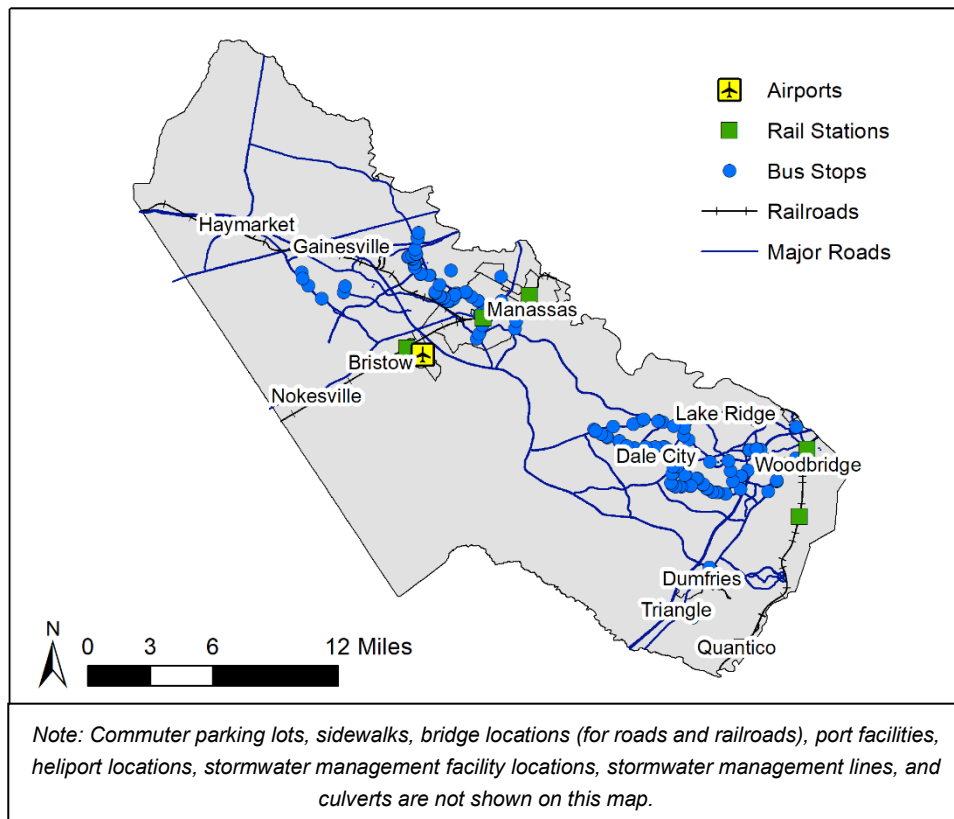


Figure 10. Major Roads, Railroads, Bus Stops, Rail Stations, and Airports included in the Transportation Asset Category

Though not fitting the traditional definition of an "asset" category, our assessment intentionally includes socially vulnerable populations as a crucial group. To demarcate these populations, we have adopted the use of Equity Emphasis Areas (EEAs), as delineated by a methodology developed by The National Capital Region Transportation Planning Board. The EEAs were developed using tract-level Census data to identify areas that have a significant concentration of low-income and/or minority populations. To identify areas of concentration, the tract percent of four parameters (low-income, African American, Asian, and Hispanic or Latino) were divided against its respective regional average, which resulted in a tract-level Ratio of Concentration. High Ratio of Concentration scores were used to designate EEAs¹⁰. In our continuous partnership for the prosperity of the community, both the MWCOG and Prince William County have recognized and utilized EEAs as a valuable planning tool. These tools are instrumental in helping us identify and prioritize areas with socially vulnerable populations. The boundaries of these EEAs are illustrated in **Figure 11**.

¹⁰ <https://www.mwco.org/assets/1/6/methodology.pdf>

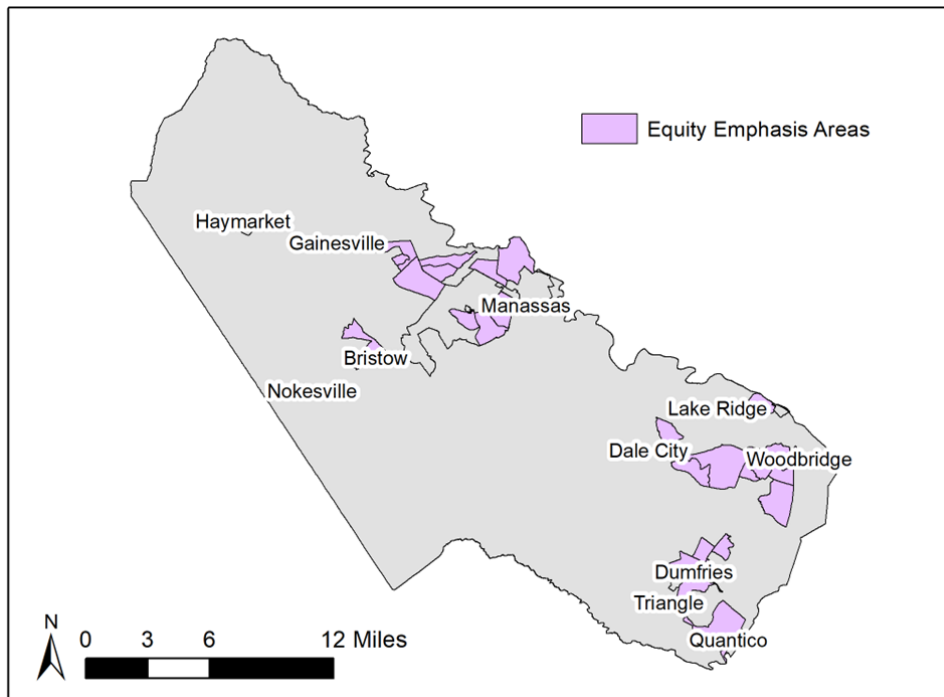


Figure 11. EEAs within Prince William County

Vulnerability Assessment

In our pursuit of safeguarding Prince William County's vital assets, our Vulnerability Assessment employed a thorough process to determine risk. This process encompassed the evaluation of exposure, sensitivity, and adaptive capacity for each asset category and each natural hazard. Here is a brief description of what each of these measures entails:

- **Exposure** quantifies whether an asset is affected by a climate hazard, and if so, the degree of impact.
- **Sensitivity** evaluates the extent to which an asset is impacted when exposed to a climate hazard.
- **Adaptive capacity** gauges the capability of an asset to adjust, recover, or resiliently respond to damage inflicted by climate hazards.

Based on these metrics, our assessment determined that the following climate hazards exert the most substantial impact on our assets:

1. Extreme Temperatures
2. Precipitation
3. Strong Winds/Tornadoes

Although coastal storms and sea level rise will have a significant impact on areas of the county located along the Potomac River, the overall risk to our county was low due to the limited amount of assets in the coastal floodplain. Drought is a potential threat to the county; however, it was rated low due to the moderate drought projections countered by the projected increase in precipitation. Earthquakes were evaluated but determined to be of low risk to our county.

In our endeavor to quantify the vulnerability of Prince William County's crucial assets, we assigned numerical values to each rating. These were then added together to calculate vulnerability scores for each asset category, considering each natural hazard and future time horizon. This gave us an assessment of potential risks and challenges we face.

To further streamline our evaluation, the vulnerability scores within each asset category were amalgamated. This collective data was used to attribute a Low, Medium, or High combined vulnerability rating. These ratings offer a

clear depiction of the potential risks for two future timelines - the years 2050 and 2075. The specifics of these vulnerability ratings are presented in **Table 3**.

Table 3. Summary of combined Vulnerability Ratings (2050 and 2075)

Asset Category	Combined Vulnerability Rating	
	2050	2075
Natural Resources	H	H
Socially Vulnerable Populations	H	H
Transportation	H	H
Energy & Hazardous Materials	M	H
Food, Water, and Shelter	M	M
Health and Medical	M	M
Safety and Security	L	L
Communications	L	L

The ratings detailed in **Table 3** offer us an understanding of how susceptible each asset category might be to specific future climate hazards. As a synopsis, our natural resources, socially vulnerable populations, and transportation systems emerge as the asset categories with the highest combined vulnerability ratings across all hazards. These ratings apply to both the projected scenarios of 2050 and 2075.

These findings guided us in crafting climate adaptation actions and helped assign their respective adaptation scores during the action development and prioritization process.

Chapter 4 CESMP Actions

The CESMP is a guide to action. The actions listed and described in this plan signify a definitive step towards reducing GHG emissions and adapting to climate change. Using the goals as a guide and the analysis completed in Chapters 2 and 3 as a means of understanding our current situation, we now delve into what the actions actually are. Subsequent sections provide some background on how the actions were developed, how the actions can be used to achieve the goals, and more description of the actions themselves.

How the Actions were Developed

The list of CESMP actions demonstrate **what we can do** to reduce emissions and adapt to climate change. The first step in the action development process was to identify current policies and programs that support the 2030 GHG reduction strategies discussed in [Chapter 2 Prince William County Greenhouse Gas Emissions](#) and address local climate hazards. This helped us understand what's already been done or what actions are currently ongoing. We then wanted to understand the limitation on how much control the County has to make changes. Finally, we determined areas of opportunity for new action development.

Simultaneously, we identified our community's GHG emissions sources (Chapter 2) and potential vulnerabilities to future climate hazards (Chapter 3), to lay the groundwork for a detailed list of ways to address the BoCS goals.

The complete list of new actions is provided in [Appendix A. Complete List of CESMP Actions](#). If an action was already underway or in the planning phase and did not need additional support or modification, it was not included in the CESMP list of actions, but rather, considered an existing action and included in [Appendix C. Existing County Actions](#).

Action Evaluation & Prioritization

The initial draft list of actions underwent a rigorous evaluation process. We assessed their benefits to our community, how well the actions reduce GHG emissions, community health benefits, and improvements to quality of life. We also considered the likelihood the action could be completed considering our resources and how much authority the County government has.

The actions were evaluated using the Climate Action Selection and Prioritization (ASAP) tool. ASAP is a decision-making tool that helps users understand the trade-offs between primary benefits, co-benefits, and feasibility across a range of actions. The ASAP Tool is designed to support decision-making, not make decisions itself. By leveraging tools like ASAP, we ensure that every step we take towards a sustainable future is informed, strategic, and advantageous for our community.

During this evaluation process, all actions were evaluated for their impact on specific evaluation criteria. Each evaluation criterion was divided into one of three categories – primary benefits, co-benefits, and feasibility.

- **Primary Benefits:** An estimate of GHG reduction and climate hazard risk reduction resulting from the actions.
- **Co-benefits:** Benefits that actions may have in addition to the primary benefits
- **Feasibility:** How easy or difficult it is to implement the action.

At the heart of our CESMP is a fundamental commitment to curb GHG emissions and mitigate climate risk. These two aspects were the primary benefits considered in our action evaluation. Additionally, the voices of our community are pivotal to our planning process. Hence, we sought extensive input from our stakeholders. Both County staff and community members handpicked a set of co-benefit and feasibility criteria that are integral to our collective values. These key criteria are detailed in [Table 4](#).

Table 4. Action Evaluation Criteria

Criteria Category	Criteria Name	Criteria Definition
Primary Benefits	GHG Reduction Potential	An estimate of GHG reduction potential resulting from the action
	Climate Risk Reduction Potential	An estimate of climate hazard risk reduction resulting from the action
Co-Benefits	Organizational Diversity, Equity, and Inclusion	Impact on social, environmental, or economic disparities such as disproportionate levels of air quality, health impacts, access to transit, flood risk, energy burden etc.
	Resource Conservation	Impact on natural resources, such as air, water, raw materials, and the natural environment.
	Cost to Residents and Businesses	Additional costs or savings to residents and businesses.
	Local Employment	Impact on the employment rate, physical access to jobs, income and social mobility, and/or total number of jobs.
Feasibility	Funding Source Identified or Secured	Has full or partial public funding for this action been secured, or has a potential funding source been identified?
	Cost to the County	What is the magnitude of upfront, operational, and staffing costs to the County from the implementation year to 2030?
	Cost Savings to County	An initial investment that lowers costs paid by the County such that cost savings could be used to fund other climate change/adaptation programs.

Each action was rated and scored in the ASAP tool to be compared relative to the other actions. Once scored, the results were reviewed, modified, and vetted by stakeholder groups to answer the question: what 25 actions should we begin with first?

We extended the conversation to the broader community through a public survey and a Townhall meeting, further enriching our understanding of public priority actions. This process resulted in the identification of high, medium, and low priority actions, as defined in **Table 5**.

Table 5. Priority Level Definitions

Priority Level	Definition
High Priority	<ul style="list-style-type: none"> • Actions we will focus on implementing immediately after CESMP adoption • Actions that are fleshed out with greater detail in this plan, including implementation roadmaps to guide our initial steps on implementation
Medium Priority	<ul style="list-style-type: none"> • Actions that scored highly for primary benefits (GHG reduction and climate risk reduction) but were not included in high priority list • Actions that can serve as a starting point for future ideas after we have meaningful progress on priority actions
Low Priority	<ul style="list-style-type: none"> • Actions that address emissions sources within the county and fill in potential policy/programmatic gaps, but have much lower GHG reduction or climate risk reduction impacts • Actions were not favored (or were disfavored) by stakeholder groups

The following describes our method of action prioritization:

- Prioritize actions that scored highly across all evaluation categories, i.e., actions that produced high GHG or climate risk reduction, co-benefits, and feasibility scores.
- Prioritize actions that the stakeholder groups identified as high priority and integrate their feedback on prioritization considerations and methods.
- Prioritize other actions that produced high GHG reduction or climate risk reduction scores to reach 25 actions as reducing emissions and addressing climate risk are the main goals of the CESMP.

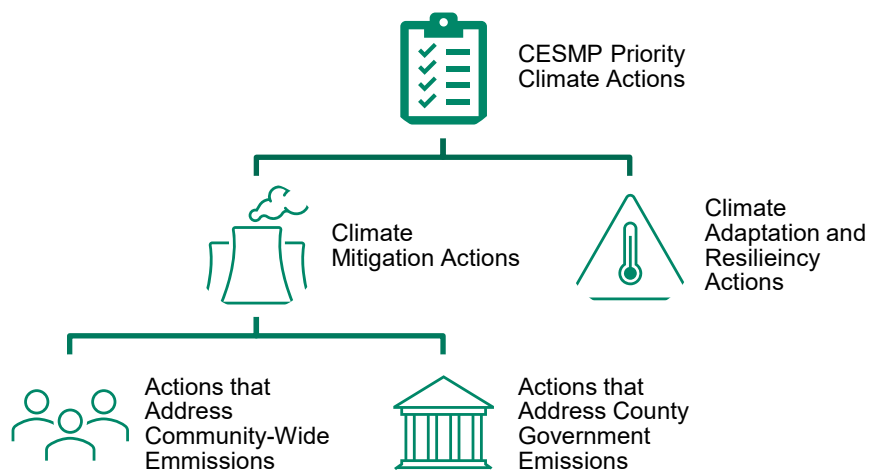
The action development process resulted in 25 high priority actions, 23 medium priority actions, and 11 low priority actions. The sections below describe the 25 high priority actions in more detail. Additionally, implementation roadmaps were developed for each high priority action in [Appendix F. Implementation Plan](#).

How to Read the List of Actions

Each of the following 25 high priority actions are described in more detail using the format below where each of the actions provides a strategy in one of the following: Electricity, Buildings, Transportation, Natural Resources, Waste, and Climate Adaptation.

Electricity – E.1	Acquire Clean Electricity Sources for the County	
<p>Action Description: Form an opt-out municipal aggregation program to acquire 100% clean electricity for Dominion Energy customers in the community. A municipal aggregation program, also known as community choice aggregation (CCA), allows a municipality to negotiate for 100% clean or renewable electricity for all the electricity customers within their jurisdiction. Through a CCA, a municipality can purchase and manage their community’s electric power supply from a preferred mix of energy sources while the utility continues to provide distribution, billing services, and outage management. In PWC, a CCA could be formed in Dominion Energy territory but not in NOVEC territory. If we develop an opt-out program, Dominion Energy customers would automatically be enrolled in 100% clean electricity but can opt-out to revert to their traditional service and electricity energy source mix. This action could substantially reduce county-wide electricity emissions, depending on the offered clean electricity mix and how many customers opt-out of the program.</p>		
<p>County Goals Supported:</p> <ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 • Achieve 100% renewable electricity in County Government operations by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Become a Climate Ready Region and making significant progress to be a Climate Resilient Region by 2030 		
<p>2030 GHG Reduction Strategy:</p> <ul style="list-style-type: none"> • Source 92% clean electricity • Achieve 50% zero-emission private vehicles • Achieve 40% highly efficient and electric HVAC systems and water heaters • Replace 57% HFCs with low- or zero-GWP alternatives • Shift 5% of total trips from private vehicles to active or public transport • Achieve a 60% waste diversion rate • Obtain 100% high-efficiency lighting and appliances • Achieve 15% zero-emission off-road equipment • Reduce aviation emissions by 20% • Reduce agricultural emissions by 10% 	<p>Action GHG Reduction Potential:</p> <ul style="list-style-type: none"> • Very High: greater than 500,000 (MTCO2e) • High: 50,000-500,000 MTCO2e reduced • Medium: 10,000-50,000 MTCO2e reduced • Low: less than 10,000 MTCO2e reduced • Unknown: Not Quantified • *The GHG Reduction potential represent the high/maximum estimate for GHG reductions. 	
<p>Climate Hazard Addressed:</p> <ul style="list-style-type: none"> • All Climate Hazards • Precipitation • High Winds & Tornadoes • Sea Level Rise • Extreme Heat 		
<p>Investment Level:</p> <ul style="list-style-type: none"> • Extremely Large Cost = >\$100M • Very Large Cost = \$10M-100M • Large Cost = \$1M-10M • Some Cost = \$100k-1M • Very Little Cost = \$0-100k • None = No additional costs beyond existing staff time 	<p>Co-Benefits:</p> <ul style="list-style-type: none"> • Organizational Diversity, Equity and Inclusion • Resource Conservation • Cost to Residents and Businesses • Local Employment • Cost Savings to County • None 	
<p>Lead Department(s): Office of Sustainability</p>	<p>Primary Partners:</p> <ul style="list-style-type: none"> • Facilities and Fleet Management • Finance • Management and Budget • Economic Development 	

The sections below break down the actions into several categories: Climate **Mitigation** Actions (that reduce GHG emissions) and Climate **Adaptation and Resiliency** Actions (that protect us from climate hazards) as shown in the graphic below.



The complete list of 60 CESMP actions is provided in **Table 6** below. Description of each action are also provided in **Appendix A. Complete List of CESMP Actions**.

Table 6. Complete List of Climate Actions

Sector	Actions	Level of Priority
Electricity	E.1: Acquire Clean Electricity Sources for the County	High
	E.2: Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives	High
	E.3: Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings	High
	E.4: Promote Existing Green Power Products	High
	E.5: Install Solar on County Government Facilities	High
Buildings	B.1: Incentivize Energy Efficiency and Electrification Retrofits	High
	B.2: Propose Green Zoning Regulations	High
	B.3: Incentivize Energy Efficient and Electric New Construction	High
	B.4: Promote Energy Efficiency and Electrification Incentives	High
	B.5: Create Net-Zero Plan for County Government Facilities	High
	B.6: Create All-electric Guidelines for New Construction of County Government Facilities	Medium
	B.7: Create Policy to Increase Energy Efficiency in County Government Facilities	Medium
	B.8: Implement Building Energy Benchmarking	Low
Transportation	T.1: Improve Pedestrian and Bicycle Infrastructure and Enhance Connectivity	High
	T.2: Incentivize Transit-Oriented Development	High
	T.3: Expand Existing Programs that Reduce Single-Occupancy Vehicle Trips	High
	T.4: Upgrade Public Transit Infrastructure	High
	T.5: Incentivize Zero-Emission Vehicles and Charging	High
	T.6: Expand Public EV Charging Network	High
	T.7: Adopt Zero- or Low-Emissions County Fleet	High
	T.8: Encourage E-Bike and E-Scooter Adoption	Medium
	T.9: Educate on Existing Zero-Emission Vehicle Incentives and Rebates	Medium
	T.10: Promote Zero-Emission Bus and Rail Transition	Medium
	T.11: Support Zero- or Low-Emissions County Government Contracting of Off-Road Equipment	Medium

Sector	Actions	Level of Priority
	T.12: Adopt County Government Zero-Emission Off-Road Policy	Medium
	T.13: Discount Transit Passes for Residents	Low
	T.14: Launch Electric Equipment Lending Program	Low
Natural Resources	N.1: Adopt Natural Open Space Requirements	High
	N.2: Launch Suburban and Rural Tree Planting Initiative	Medium
	N.3: Update Tree Cover Regulations	Medium
	N.4: Support Sustainable Farming Practices	Low
Waste	W.1: Implement County-Wide Composting	Medium
	W.2: Promote Sustainable Purchasing Policy	Medium
	W.3: Mandate Commercial Food Waste Diversion	Low
Adaptation	A.1: Develop Adaptation Plans for Critical Facilities	High
	A.2: Manage Stormwater Flooding in Areas Outside of the Floodplain	High
	A.3: Assess Availability of Backup Power for Critical Infrastructure	High
	A.4: Invest in Backup Power for Critical Infrastructure	High
	A.5: Implement Shoreline Protection and Nature-Based Solutions	High
	A.6: Restore Streams to Reduce Flooding	High
	A.7: Incentivize Technology for Residents to Make Homes Adaptive	High
	A.8: Plan Alternate Evacuation Routes for Flood-prone Areas	High
	A.9: Expand Building Insulation Standards to Protect Against Extreme Heat	Medium
	A.10: Protect Existing Buildings Against High Winds	Medium
	A.11: Protect County Infrastructure from Flooding	Medium
	A.12: Incentivize Nature-based Solutions to Reduce Flooding in Residential Properties	Medium
	A.13: Improve Water Infrastructure for Extreme Precipitation Events	Medium
	A.14: Urban Heat Island Relief Program	Medium
	A.15: Adopt Guidelines to Use Nature-based Solutions on County Government Construction	Medium
	A.16: Improve Grid Resilience During Extreme Weather	Medium
	A.17: Expand Tax Credits for Conservation of Natural Resources	Medium
	A.18: Develop Plan to Preserve Estuaries and Wetlands To Reduce Flooding	Medium
	A.19: Training for Community Members on Climate Change and Mental Health	Medium
	A.20: Increase Protection from the Sun at Childcare Centers	Medium
	A.21: Protect Existing Buildings Against Earthquakes	Low
	A.22: Incentivize Improved Cooling Equipment in Apartments	Low
	A.23: Incentivize Businesses to Reduce Water Usage	Low
	A.24: Protect Electrical Infrastructure from High Winds	Low
	A.25: Expand Community Outreach for Education on Climate Change Adaptation	Low
	A.26: Support Agriculture Resiliency	Low

Climate Mitigation Actions

While our 2030 GHG reduction scenario ([Chapter 2 Prince William County Greenhouse Gas Emissions](#)) shows **what it will take** for us to achieve the 2030 GHG reduction goal, the climate mitigation actions describe **what we can feasibly do** to realize this scenario. Actions that are meant to affect what the PWC community does are described separately from actions that the County government reduce GHG emissions generated by government operations.

Climate Actions for the Community

There are 15 high priority community climate actions that address community-wide emission sources (see [Table 7](#)).

Table 7. High Priority Community Climate Actions

Sector	High Priority Community Climate Mitigation Actions
Electricity	E.1: Acquire Clean Electricity Sources for the County
	E.2: Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives
	E.3: Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings
	E.4: Promote Existing Green Power Products
Buildings	B.1: Incentivize Energy Efficiency and Electrification Retrofits
	B.2: Propose Green Zoning Regulations
	B.3: Incentivize Energy Efficient and Electric New Construction
	B.4: Promote Energy Efficiency and Electrification Incentives
Transportation	T.1: Improve Pedestrian and Bicycle Infrastructure and Enhance Connectivity
	T.2: Incentivize Transit-Oriented Development
	T.3: Expand Existing Programs that Reduce Single-Occupancy Vehicle Trips
	T.4 Upgrade Public Transit Infrastructure
	T.5: Incentivize Zero-Emission Vehicles and Charging
	T.6: Expand Public EV Charging Network
Natural Resources	N.1: Adopt Natural Open Space Requirements

Electricity – E.1	Acquire Clean Electricity Sources for the County
<p>Action Description: Form an opt-out municipal aggregation program to acquire 100% clean electricity for Dominion Energy customers in the community. A municipal aggregation program, also known as community choice aggregation (CCA), allows a municipality to negotiate for 100% clean or renewable electricity for all the electricity customers within their jurisdiction. Through a CCA, a municipality can purchase and manage their community's electric power supply from a preferred mix of energy sources while the utility continues to provide distribution, billing services, and outage management. In PWC, a CCA could be formed in Dominion Energy territory but further legal review is needed to determine if one could be formed in NOVEC territory. If we develop an opt-out program, Dominion Energy customers would automatically be enrolled in 100% clean electricity but can opt-out to revert to their traditional service and electricity energy source mix. This action could substantially reduce county-wide electricity emissions, depending on the offered clean electricity mix and how many customers opt-out of the program.</p>	
<p>County Goals Supported:</p> <ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 • Achieve 100% renewable electricity in County Government operations by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 	
<p>2030 GHG Reduction Strategy: Source 92% clean electricity</p>	<p>Action GHG Reduction Potential: Very High</p>
<p>Investment Level: Some Cost</p>	<p>Co-Benefits: None</p>
<p>Lead Department: Office of Sustainability</p>	<p>Primary Partners:</p> <ul style="list-style-type: none"> • Facilities and Fleet Management • Finance • Management and Budget • Economic Development

Electricity – E.2	Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives
Action Description: Provide outreach and education on programs and incentives for residents and businesses to install renewable energy systems, such as solar tax credits, community solar programs, net metering, the multifamily shared solar program, solar renewable energy certificates and Solarize NOVA. Develop additional local renewable energy incentives, such as streamlined solar permitting, in partnership with stakeholders such as the Residential Solar Task Force and local utilities. This would include providing a centralized tool for residents and businesses to reference relevant federal, state, county, and utility incentives and programs.	
County Goals Supported:	
<ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 	
2030 GHG Reduction Strategy: Source 92% clean electricity	Action GHG Reduction Potential: Medium
Investment Level: Very Large Cost	Co-Benefits:
	<ul style="list-style-type: none"> • Local Employment: + • Cost to Residents and Business: +
Lead Department(s):	Primary Partners:
<ul style="list-style-type: none"> • Development Services • Real Estate Assessments • Office of Sustainability 	<ul style="list-style-type: none"> • Economic Development • Residential Solar Task Force • Dominion • NOVEC

Electricity – E.3	Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings
Action Description: Incentivize the use of renewable energy in energy-intensive commercial buildings through a voluntary reporting program, real estate tax reductions, expedited permitting, height bonuses, or a reduction in proffers. As commercial building electricity use is forecast to generate roughly 28% of county-wide emissions by 2030, incentivizing emissions reductions in this sector is crucial toward meeting the 2030 GHG reduction target.	
County Goals Supported:	
<ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 	
2030 GHG Reduction Strategy: Source 92% clean electricity	Action GHG Reduction Potential: High
Investment Level: Large Cost	Co-Benefits: None
Lead Department(s):	Primary Partners: Businesses and Data Centers
<ul style="list-style-type: none"> • Development Services • Planning Office • Economic Development 	

Electricity – E.4	Promote Existing Green Power Products
Action Description: Promote purchasing utility green power options within the community. Green power products allow customers to purchase renewable or clean electricity on a month-to-month basis through an added fee on their utility bill. Both Dominion and NOVEC offer 100% renewable electricity options.	
County Goals Supported:	
<ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 • Achieve 100% renewable electricity in County Government operations by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 	
2030 GHG Reduction Strategy:	Action GHG Reduction Potential: High
<ul style="list-style-type: none"> • Source 92% clean electricity 	
Investment Level: Large Cost	Co-Benefits: Organizational Diversity, Equity, and Inclusion: +
Lead Department(s):	Primary Partners:
Office of Sustainability	<ul style="list-style-type: none"> • Communications • Public Works • Dominion and NOVEC

Buildings – B.1	Incentivize Energy Efficiency and Electrification Retrofits
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	
Action Description: Incentivize existing building energy efficiency and electrification retrofits through actions such as streamlined permitting or reducing real estate taxes.	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> • Achieve 40% highly efficient and electric HVAC systems and water heaters • Obtain 100% high-efficiency lighting and appliances 	Action GHG Reduction Potential: Medium
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Resource Conservation: + • Local Employment: + • Cost to Residents and Business: +
Lead Department(s): <ul style="list-style-type: none"> • Real Estate Assessments • Development Services – Building Department 	Primary Partners: None identified

Buildings – B.2	Propose Green Zoning Regulations
Action Description: Propose green zoning regulations to incentivize energy- and water-efficient buildings, multifamily and mixed-use areas, and transit-oriented developments. Green zoning involves revising zoning policies to require or incentivize developers to abide by certain sustainable development practices. This could include density bonuses, by-right zoning, or zoning overlays. Denser developments and multifamily housing units typically use less energy than other, more dispersed building types. Additionally, mixed-used and transit-oriented areas significantly reduce the need for vehicle travel, which would also reduce transportation emissions. *This action reduces emissions in both the buildings and transportation sectors	
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> • Achieve 40% highly efficient and electric HVAC systems and water heaters • Obtain 100% high-efficiency lighting and appliances • Shift 5% of total trips from private vehicles to active or public transport 	Action GHG Reduction Potential: Medium*
Investment Level: Some Cost	Co-Benefits: <ul style="list-style-type: none"> • Local Employment: + • Organizational Diversity, Equity, and Inclusion: +
Lead Department(s): Planning Office	Primary Partners: <ul style="list-style-type: none"> • Transportation • Housing • Watershed • Parks and Recreation • Economic Development/Community Development

Buildings – B.3	Incentivize Energy Efficient and Electric New Construction
Action Description: Provide incentives for developers to build to energy-efficient or all-electric new developments, such as streamlined permitting, a reduction in real estate taxes, or a reduction in proffers.	
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> • Achieve 40% highly efficient and electric HVAC systems and water heaters • Obtain 100% high-efficiency lighting and appliances 	Action GHG Reduction Potential: Medium
Investment Level: Large Cost	Co-Benefits: None
Lead Department(s): <ul style="list-style-type: none"> • Planning Office • Development Services 	Primary Partners: None identified

Buildings – B.4	Promote Energy Efficiency and Electrification Incentives
Action Description: Provide outreach and education to residents and businesses about tools, technology, and incentives for building energy efficiency and electrification. This would include providing a centralized webpage or tool for residents and businesses to reference relevant federal, state, and utility incentives, Commercial Property Assessed Clean Energy (C-PACE) information, and County programs, among other resources.	
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> Achieve 40% highly efficient and electric HVAC systems and water heaters Obtain 100% high-efficiency lighting and appliances 	Action GHG Reduction Potential: Medium
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> Resource Conservation: + Cost to Residents and Businesses: +
Lead Department(s): Office of Sustainability	Primary Partners: <ul style="list-style-type: none"> Development Services Communications Office Economic Development Green Business Council

Transportation – T.1	Improve Pedestrian and Bicycle Infrastructure and Enhance Connectivity
Action Description: Improve active transportation infrastructure and improve sidewalk and trail connectivity to support walking, biking, and rolling, with improvements such as providing bike lockers, installing curb ramps, or installing traffic-calming designs like crosswalk islands or speed humps. This action would involve developing a strategic Active Transportation Plan that includes recommendations for prioritizing infrastructure improvements and outlines new active transportation policies, processes, and infrastructure.	
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> Shift 5% of total trips from private vehicles to active or public transport 	Action GHG Reduction Potential: High
Investment Level: Very Large Cost	Co-Benefits: <ul style="list-style-type: none"> Resource Conservation: + Local Employment: + Cost to Residents and Business: + Organizational Diversity, Equity, and Inclusion: +
Lead Department(s): <ul style="list-style-type: none"> Transportation Parks, Recreation and Tourism 	Primary Partners: <ul style="list-style-type: none"> Planning Office Watershed Service Authority Virginia Department of Transportation (VDOT) Schools

Transportation – T.2	Incentivize Transit-Oriented Development
Action Description: Incentivize transit-oriented development (TOD) within 1/2-mile of transit stations. This could be done through developer incentives, such as streamlined permitting, a reduction in real estate taxes, or a reduction in proffers, or zoning amendments, such as density bonuses, by-right zoning, or zoning overlays. We could establish parking maximums, remove parking minimums, and require bicycle parking minimums in TOD areas.	
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> Shift 5% of total trips from private vehicles to active or public transport 	Action GHG Reduction Potential: High
Investment Level: Some Cost	Co-Benefits: <ul style="list-style-type: none"> Resource Conservation: + Local Employment: + Organizational Diversity, Equity, and Inclusion: +
Lead Department(s): <ul style="list-style-type: none"> Planning Office Transportation 	Primary Partners: <ul style="list-style-type: none"> Potomac and Rappahannock Transportation Commission (PRTC) VRE Development Services

Transportation – T.3		Expand Existing Programs that Reduce Single-Occupancy Vehicle Trips	
Action Description: Expand and promote programs that offer transportation demand management services, reduce transit fares, and support teleworking.			
County Goals Supported:			
<ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 			
2030 GHG Reduction Strategy:		Action GHG Reduction Potential: Medium	
<ul style="list-style-type: none"> • Shift 5% of total trips from private vehicles to active or public transport 			
Investment Level: None		Co-Benefits:	
		<ul style="list-style-type: none"> • Resource Conservation: + • Local Employment: + • Cost to Residents and Business: + • Organizational Diversity, Equity, and Inclusion: + 	
Lead Department(s): Transportation		Primary Partners:	
		<ul style="list-style-type: none"> • Planning Office • Potomac and Rappahannock Transportation Commission (PRTC) 	

Transportation – T.4		Upgrade Public Transit Infrastructure	
Action Description: Partner with County transit operators and VDOT to improve and provide new public transit infrastructure and build out transit nodes. Though PWC does not operate the public buses that service the County, PWC can help provide supportive infrastructure to help increase the efficiency and frequency of bus travel. However, as most public roads and bus infrastructure are maintained by VDOT, PWC will partner with VDOT to identify and develop transit priority treatments			
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030			
2030 GHG Reduction Strategy:		Action GHG Reduction Potential: Medium	
<ul style="list-style-type: none"> • Shift 5% of total trips from private vehicles to active or public transport 			
Investment Level: Extremely Large Cost		Co-Benefits:	
		<ul style="list-style-type: none"> • Resource Conservation: + • Local Employment: + • Cost to Residents and Business: + • Organizational Diversity, Equity, and Inclusion: + 	
Lead Department(s): Transportation		Primary Partners:	
		<ul style="list-style-type: none"> • Planning Office • Potomac and Rappahannock Transportation Commission (PRTC) • Virginia Department of Rail and Public Transportation (DRPT) • Virginia Railway Express (VRE) • Virginia Department of Transportation (VDOT) 	

Transportation – T.5		Incentivize Zero-Emission Vehicles and Charging	
Action Description: Develop incentives for residents and businesses to purchase ZEVs or install charging equipment, such as through streamlined permitting for EV chargers, "group-buy" programs for EV chargers, or EV purchasing co-ops.			
County Goals Supported:			
<ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 			
2030 GHG Reduction Strategy:		Action GHG Reduction Potential: High	
<ul style="list-style-type: none"> • Achieve 50% zero-emission private vehicles 			
Investment Level: Large Cost		Co-Benefits:	
		<ul style="list-style-type: none"> • Resource Conservation: + • Local Employment: + • Cost to Residents and Business: + 	
Lead Department(s): Transportation		Primary Partners: Facilities and Fleet Management	

Transportation – T.6		Expand Public EV Charging Network	
Action Description: Expand public EV charging infrastructure, especially along main routes and in popular destinations. This would include developing an EV Infrastructure Plan to guide community deployment and considerations for electric bike charging.			
County Goals Supported: Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030			
2030 GHG Reduction Strategy:		Action GHG Reduction Potential: High	
<ul style="list-style-type: none"> Achieve 50% zero-emission private vehicles 			
Investment Level: Very Large Cost		Co-Benefits:	
		<ul style="list-style-type: none"> Resource Conservation: + Local Employment: ++ Cost to Residents and Business: + Organizational Diversity, Equity, and Inclusion: + 	
Lead Department(s):		Primary Partners:	
<ul style="list-style-type: none"> Transportation Facilities and Fleet Management 		<ul style="list-style-type: none"> Virginia Department of Transportation (VDOT) Virginia Railway Express (VRE) Potomac and Rappahannock Transportation Commission (PRTC) 	

Natural Resources – N.1		Adopt Natural Open Space Requirements	
Action Description: Establish minimum Natural Open Space (NOS) guidelines to encourage preservation of NOS, if appropriate, in new development. NOS is “open space with natural resource benefits within the boundaries of a development such as native forests; topographic features; critical habitats for threatened and endangered species and species of special concern; natural creeks, streams and lakes; and natural wetlands that are set aside as an area to remain undisturbed during development and in perpetuity for the preservation of the natural resources contained therein and for the passive use and enjoyment of the residents of the development and/or the public at large.”			
County Goals Supported:			
<ul style="list-style-type: none"> Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 			
2030 GHG Reduction Strategy: NA		Action GHG Reduction Potential: Unknown	
		Climate Hazard: Extreme Heat	
Investment Level: Some Cost		Co-Benefits: Resource Conservation: ++	
Lead Department(s):		Primary Partners:	
<ul style="list-style-type: none"> Public Works - Watershed County Arborist 		<ul style="list-style-type: none"> Planning Office County Attorney's office Owners of open space areas (HOA's, commercial owners, environmental trusts, etc.) 	

Climate Actions for County Government

There are three high priority County government climate actions that address County government operations emission sources (see [Table 8](#)). Though not explicitly listed as an action in the CESMP, one of our initial steps will be to create a County government operations GHG inventory in order to better measure and track progress toward achieving carbon neutrality in County government operations by 2050. Further discussion of how actions can help meet other government GHG and renewable energy goals are described in the [Chapter 5 Meeting the County Goals](#)[Error! Reference source not found.](#).

Table 8. High Priority County Government Climate Actions

High Priority County Government Climate Mitigation Actions	Sector
E.5: Install Solar on County Government Facilities	Electricity
B.5: Create Net-Zero Plan for County Government Facilities	Buildings
T.7: Adopt Zero- or Low-Emissions County Fleet	Transportation

Electricity – E.5	Install Solar on County Government Facilities
Action Description: Develop solar projects on our County government facilities through direct ownership or third-party ownership models such as PPAs.	
County Goals Supported: <ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 • Achieve 100% renewable electricity in County Government operations by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 	
2030 GHG Reduction Strategy: Source 92% clean electricity	Action GHG Reduction Potential: Low
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Local Employment: + • Cost Savings to County: +
Lead Department(s): Facilities and Fleet Management	Primary Partners: Departments with facilities not managed by Facilities and Fleet: <ul style="list-style-type: none"> • Community Services • Housing and Community Development • Fire & Rescue • Parks, Recreation & Tourism • Public Works • Adult Detention Center

Buildings – B.5	Create Net-Zero Plan for County Government Facilities
Action Description: Develop a net-zero emissions building plan for County government facilities, which will include implementing an energy benchmarking program and procuring 100% clean electricity for all County government operations.	
County Goals Supported: <ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Source 100% of county-wide electricity from renewable sources by 2035 • Achieve 100% renewable electricity in County Government operations by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> • Source 92% clean electricity • Achieve 40% highly efficient and electric HVAC systems and water heaters • Replace 57% HFCs with low- or zero- GWP alternatives • Obtain 100% high-efficiency lighting and appliances 	Action GHG Reduction Potential: Medium
Investment Level: Very Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Resource Conservation: + • Cost Savings to County: +
Lead Department(s): <ul style="list-style-type: none"> • Facilities and Fleet Management • Finance – Risk and Wellness Services 	Primary Partners: Departments with facilities not managed by Facilities and Fleet: <ul style="list-style-type: none"> • Community Services • Housing and Community Development • Fire & Rescue • Parks, Recreation & Tourism • Public Works • Adult Detention Center

Transportation – T.7	Adopt Zero- or Low-Emissions County Fleet
Action Description: Transition our County fleet to zero- or low-emissions vehicles and ensure supporting infrastructure is open to other fleets.	
County Goals Supported: <ul style="list-style-type: none"> • Reduce GHG emissions county-wide to 50% below baseline 2005 levels by 2030 • Achieve 100% carbon neutrality in County Government operations by 2050 	
2030 GHG Reduction Strategy: <ul style="list-style-type: none"> • Achieve 50% zero-emission private vehicles 	Action GHG Reduction Potential: Low
Investment Level: Extremely Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Resource Conservation: + • Cost Savings to City: ++
Lead Department(s): Fleets and Facilities Management	Primary Partners: None identified

Climate Adaptation and Resiliency Actions

The climate adaptation and resiliency actions provide opportunities for us to address existing and future climate hazards that impact our County.

High Priority Climate Adaptation and Resiliency Actions	Climate Hazard Addressed
A.1: Develop Adaptation Plans for Critical Facilities	All Climate Hazards
A.2: Manage Stormwater Flooding in Areas Outside of the Floodplain	Precipitation
A.3: Improve Power Resilience for Critical Infrastructure	High Winds & Tornadoes
A.4: Implement Shoreline Protection and Nature-Based Solutions	Precipitation & Sea Level Rise
A.5: Restore Streams to Reduce Flooding	Precipitation
A.6: Incentivize Technology for Residents to Make Homes Adaptive	Extreme Heat
A.7: Plan Alternative Evacuation Routes for Flood-prone Areas	Precipitation

Climate Adaptation – A.1	Develop Adaptation Plans for Critical Facilities
Action Description: Develop site-level adaptation plans for critical facilities and service areas considering current and future climate change hazards.	
Climate Hazard: All Climate Hazards	
Investment Level: Some Cost	Co-Benefits: <ul style="list-style-type: none"> • Cost to Residents and Businesses • Organization Diversity, Equity and Inclusion • Cost Savings to County
Lead Department(s): Emergency Management	Primary Partners: <ul style="list-style-type: none"> • Facilities and Fleet Management (for County facilities) • Risk and Wellness (for some County facilities) • External critical facility owners

Climate Adaptation – A.2	Manage Stormwater Flooding in Areas Outside of the Floodplain
Action Description: Increase understanding of flooding in areas outside of the delineated FEMA floodplain through modeling and/or historic flood records. Develop and implement mitigation actions to reduce stormwater flooding.	
Climate Hazard: Precipitation	
Investment Level: Large Cost	Co-Benefits: Cost Savings to the County
Lead Department(s): Emergency Management	Primary Partners: <ul style="list-style-type: none"> • Public Works – Watershed • VDOT

Climate Adaptation – A.3	Improve Power Resilience for Critical Infrastructure
Action Description: Improve the resilience of electrical infrastructure for publicly owned essential services and infrastructure.	
Climate Hazard: Extreme Temperature, High Winds & Tornadoes	
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Local Employment • Cost to Residents and Businesses • Organization Diversity Equity and Inclusion
Lead Department(s): <ul style="list-style-type: none"> • Emergency Management • Critical Infrastructure Owners • County Energy Providers 	Primary Partners: <ul style="list-style-type: none"> • Facilities and Fleet Management • Parks & Rec • Fire

Climate Adaptation – A.4	Implement Shoreline Protection and Nature-Based Solutions
Action Description: Develop guidance to prioritize nature-based solutions for shoreline protection for coastal areas.	
Climate Hazard: Erosion from sea level rise and storm surge	
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Resource Conservation • Cost to Residents and Businesses • Organization Diversity, Equity and Inclusion • Cost Savings to County
Lead Department(s): Public Works – Watershed	Primary Partners: <ul style="list-style-type: none"> • Development Services - Land Development Division • Emergency Management • Parks, Recreation and Tourism

Climate Adaptation – A.5	Restore Streams to Reduce Flooding
Action Description: Develop and implement stream restoration projects in support of reduced flooding outcomes.	
Climate Hazard: Precipitation	
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Resource Conservation • Cost to Residents and Businesses • Organizational Diversity, Equity and Inclusion
Lead Department(s): <ul style="list-style-type: none"> • Public Works, Watershed Team 	Primary Partners: <ul style="list-style-type: none"> • Planning Office • Emergency Management

Climate Adaptation – A.6	Incentivize Technology for Residents to Make Homes Adaptive
Action Description: Provide additional incentives or subsidies for residents of low-income housing and rental properties to install or retrofit buildings with climate adaptive technologies to reduce energy, reduce water use, reduce waste heat, and minimize urban heat gain.	
Climate Hazard: Extreme Heat	
Action GHG Reduction Potential: Low	
Investment Level: Large Cost	Co-Benefits: <ul style="list-style-type: none"> • Resource Conservation • Cost to Residents and Businesses • Organizational Diversity, Equity and Inclusion
Lead Department(s): Office of Sustainability	Primary Partners: <ul style="list-style-type: none"> • Development Services • Dominion Energy

Climate Adaptation – A.7	Plan Alternate Evacuation Routes for Flood-prone Areas
Action Description: Develop localized evaluation routes throughout PWC and socialize with the public.	
Climate Hazard: All Hazards	
Investment Level: Large Cost	Co-Benefits: No co-benefits
Lead Department(s): Emergency Management	Primary Partners: None Identified

Chapter 5 Meeting the County Goals

The CESMP provides a list of actions to address the following goals:

1. **Cut GHG Emissions County-Wide by 2030:** Reduce GHG emissions county-wide to 50% below 2005 levels by 2030
2. **Use 100% Renewable Electricity County-Wide by 2035:** Source 100% of the county-wide electricity from renewable sources by 2035
3. **Use 100% Renewable Electricity in County Government Operations by 2030:** Achieve 100% renewable electricity in the County government operations by 2030
4. **Become Carbon Neutral for County Government Operations by 2050:** Achieve 100% carbon neutrality in the County government operations by 2050
5. **Prepare for Climate Change:** Become a Climate Ready Region and make significant progress to be a Climate Resilient Region by 2030

The complete list of actions provided in [Appendix A. Complete List of CESMP Actions](#) indicates the goals each action supports. Our County's goals are aggressive. However, they are not significantly different from the broader region in Virginia and the rest of the country. We recognize that although meeting these goals will be challenging, we are committed to immediate action. The sections below provide more information about how the county may meet each of these five goals, and strategies that could be used to increase our likelihood of success.

Goal 1: Greenhouse Gas Reduction

Our **2030 GHG Emissions Reduction Scenario** shows **what it will take** to achieve the 2030 goal while the **Climate Mitigation Actions** show **what we can do** to achieve the reduction scenario strategies and ultimately the 2030 goal. In Virginia, counties cannot force businesses and residents (by means of law) to purchase only electric vehicles. Similarly, the county cannot force all business and residents to use only carbon free electricity. There will always be a portion of our County's GHG emissions that we can neither control nor eliminate completely without external support. What we *can* do is incentivize this type of behavior and make reasonable estimates (low and high) that a portion of the population will work with us on achieving these goals. So how close do we get to meeting our GHG reduction goals?

Error! Reference source not found. shows what our 2030 county-wide emissions levels might be under different scenarios. The bottom line shows the goal, and the top line shows the effect of doing nothing. The middle lines show the effects of varying degree of actions in and outside of our control. If we were to implement all actions listed in the CESMP, there is a gap of about 330,000-1,500,000 MTCO₂e shown as the shaded pink area. This includes the current and future effects of existing regulations and the impact of the market.

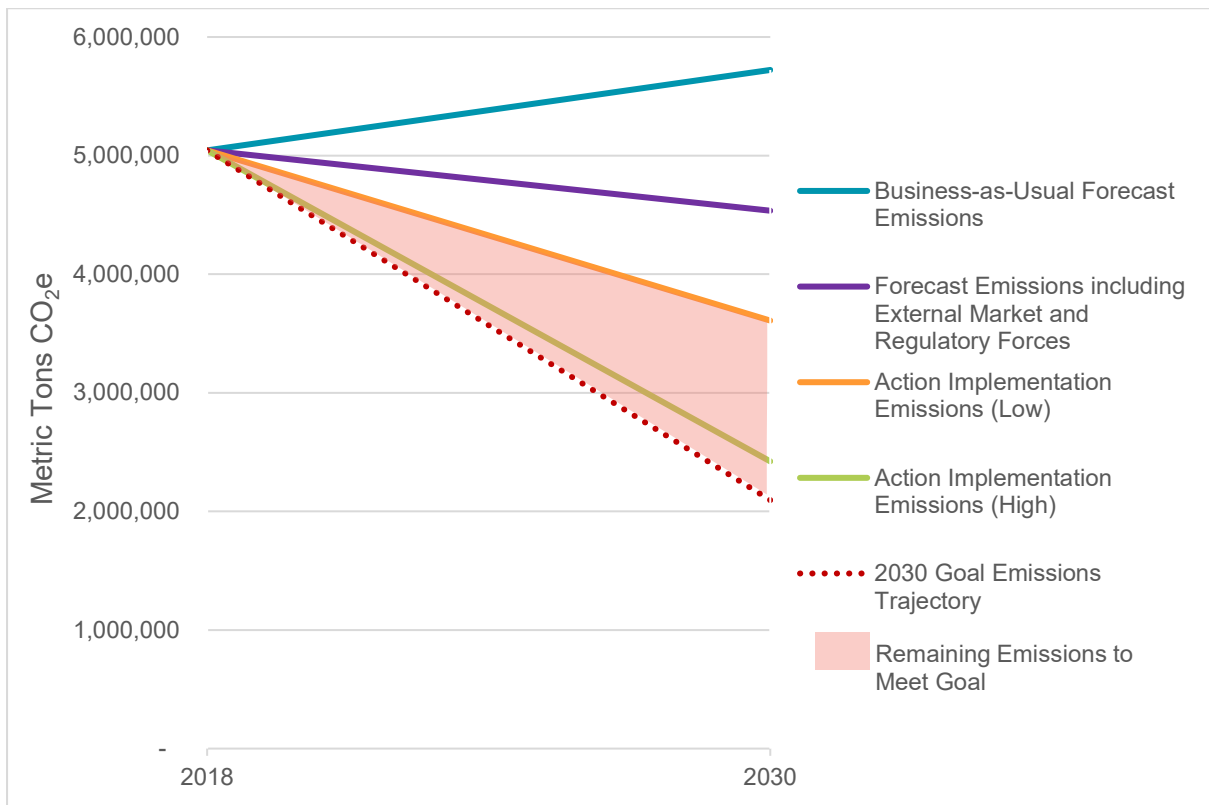


Figure 12. GHG Reduction Potential and Remaining Emissions

The GHG emission gap highlights the importance of implementing a municipal aggregation program (also known as community choice aggregation or CCA) through action E.1: Acquire Clean Electricity Sources for the County. This action alone could generate 2,000,000-2,400,000 MTCO_{2e} in emissions reductions for the county by 2030, which represents 58-68% of the reductions needed to meet the 2030 goal, without a CCA, the other renewable energy actions and Virginia’s Renewable Portfolio Standard (RPS) may only generate 21-39% of the reductions needed to meet the 2030 target, which means the emissions gap to meet the 2030 goal would be widened from 330,000-1,500,000 MTCO_{2e} to 1,400,000-2,400,000 MTCO_{2e}. [Error! Reference source not found.](#) illustrates potential action implementation emissions levels if a CCA program is not implemented. **[NOTE: This section will be revised with the new understanding of potential exclusion of NOVEC from the CCA]**

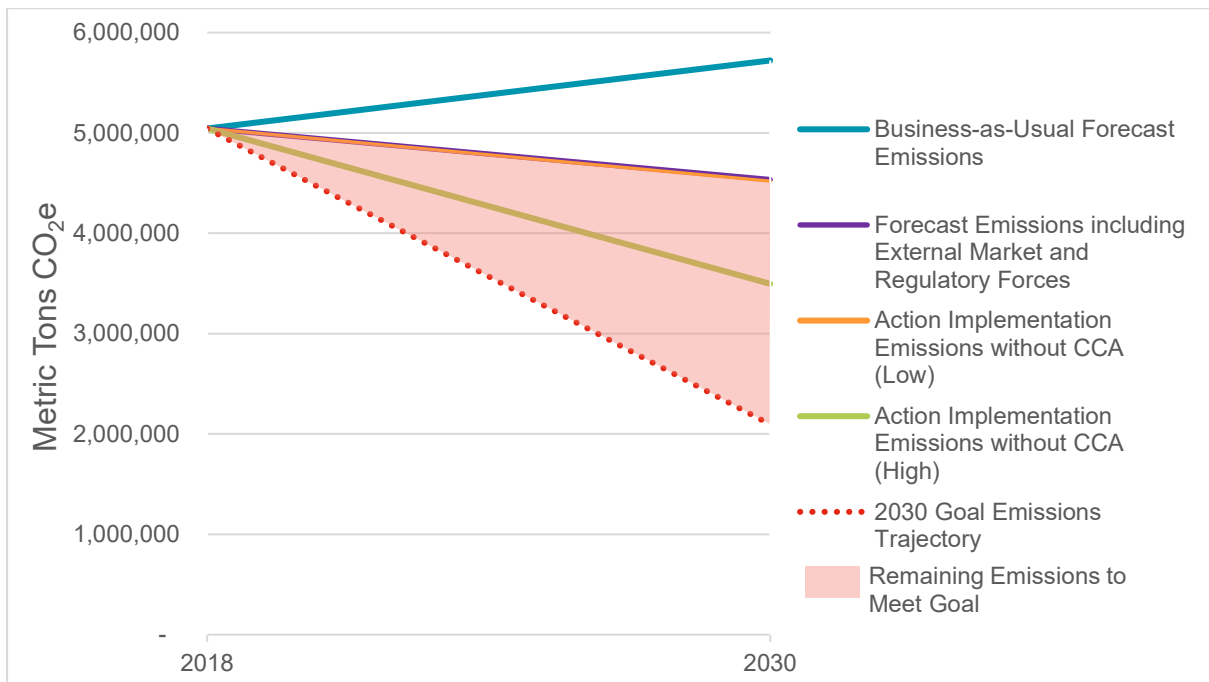


Figure 13. GHG Reduction Potential and Remaining Emissions with Government Aggregation Program

With the successful implementation of a CCA program, there will still most likely be additional measures needed to meet the GHG reduction goal. This gap could be met through three different but complementary strategies:

1. Gaining more County control over actions that impact our GHG emissions through advocating for ourselves at the state and national level (see discussion in **Error! Reference source not found.**)
2. Considering the positive effects that forests and trees have on reducing GHG emissions, and/or
3. Purchasing qualified carbon offsets

A discussion on how to integrate forests and trees into our GHG inventory and how we might consider carbon offsets are provided in the sections below.

Integrating Forests and Trees

Forests and trees naturally play a positive role in reducing the effects of climate change and GHG emissions by capturing CO₂. MWCOCG calculated the reduction of CO₂ emissions due to forest and trees in the county from 2005 to 2020. This data showed that including the effects of forests and trees in our GHG inventories would decrease total annual emissions by roughly 7%. This ultimately makes it easier for us to meet our GHG reduction goals by shrinking the gap between what we need to do and what we can do.

As MWCOCG noted that there are significant uncertainties in these estimates, the effects of forests and trees were not included in our inventory analysis or emissions forecasting. Though these estimates are highly uncertain, these measurements will most likely improve in accuracy overtime and can be vetted by County staff, leading to their potential inclusion toward meeting the 2030 GHG reduction goal.

As a brief comparison, our county's 2020 forest and trees annual GHG flux (including emissions and removals) totaled about 350,000 MT CO₂e per year in total removals, which is roughly equivalent to the gap between the 2030 high action implementation emissions levels and the 2030 GHG reduction goal emissions levels (see **Error! Reference source not found.** – this assumes 2020 levels of forest and tree GHG flux apply to 2030). Though it is not certain that these land use trends will be sustained by 2030, these emissions estimates could be incorporated into our GHG inventories in the future to help close the emissions reduction gap.

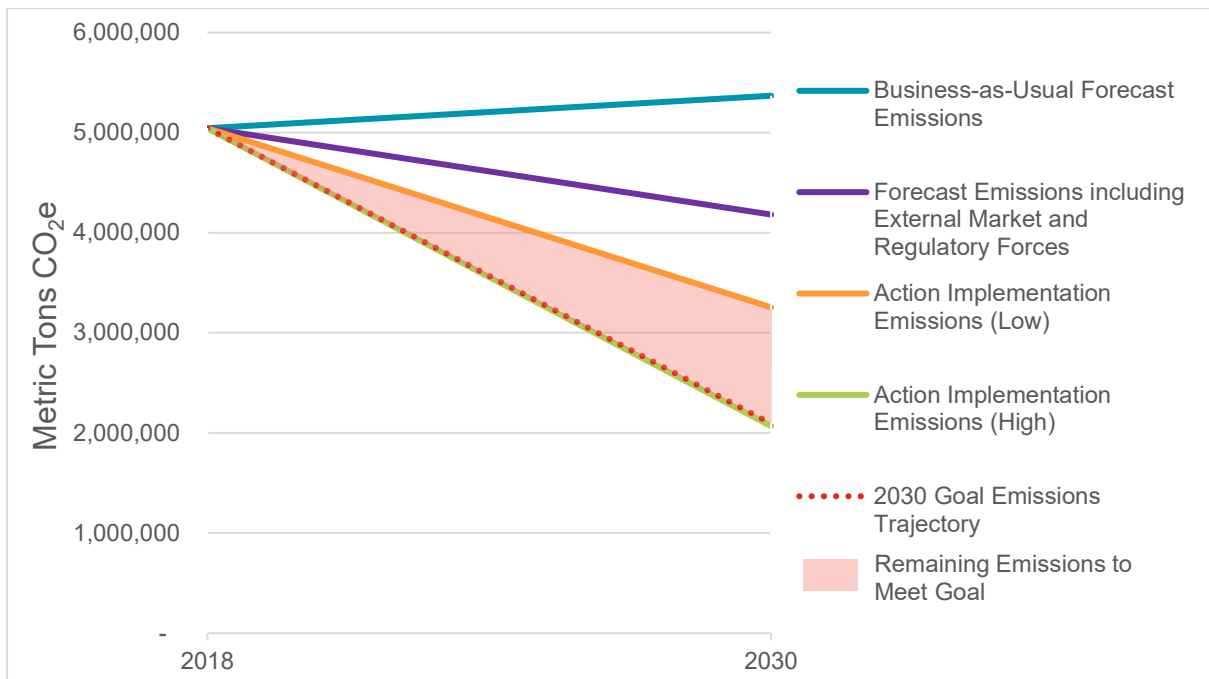


Figure 14. GHG Reduction Potential and Remaining Emissions with Forest and Tree Emissions/Removals

Carbon Offsets

Another way of closing the gap between what we need to do and what we can do is by purchasing quality carbon offsets. Carbon offsets represent the reduction or removal of GHG emissions that compensates for emissions emitted somewhere else. The purchase of a carbon offset represents a one-time GHG reduction acquisition from another party creating the reductions. This purchase must be repeated on an annual basis to maintain goal achievement.

Carbon offsets can be generated by a variety of activities, including those that reduce emissions and those that remove carbon from the atmosphere. Offset projects that **reduce** emissions represent projects that would avoid potential future emissions, such as using renewable energy or cleaner cookstoves, or physically store the carbon that would have been released, such as through carbon capture and storage systems on a fossil fuel power plant. Offset projects that **remove** emissions represent projects that remove carbon dioxide directly from the atmosphere, such as reforestation projects, soil carbon enhancement, or direct air capture with carbon capture and storage. Most offsets available today represent emission reductions, which are necessary but not sufficient to achieve net zero in the long run. As carbon removals scrub carbon directly from the atmosphere, they play a hugely important role in stabilizing GHG emissions in the atmosphere. Therefore, entities should prioritize carbon removal projects over emission reduction projects when purchasing carbon offsets.

Though carbon offsets are typically used to meet a net zero goal, we are exploring using them to meet the interim 2030 GHG reduction goal. Carbon offsets are a potential “last resort” option if we cannot meet their 2030 goal through our own direct actions. Alternatively, money spent on offsets could instead be spent on local GHG reduction programs. However, we could risk not meeting the 2030 GHG reduction goal if we do not purchase offsets. If necessary, we will purchase verified carbon offsets from carbon removal projects annually to meet their 2030 reduction goal. Because there is no single governing body that certifies carbon offsets, there are a variety of non-profit third-party companies that check carbon offset claims, ensure they are valid, and certify the offsets. We will review available verified offsets, determine which ones are “high quality” (e.g., which are focused on long-term removals), and complete a cost analysis of the offset choices before purchasing.

Goal 2 and 3: Renewable Electricity Goals

By 2030 and 2035 our goal is to have the county and its government operations on 100% clean electricity. One action in the CESMP would substantially contribute toward meeting both the government and county-wide goals: a municipal aggregation program (see action E.1). To obtain the maximum effect of completing the other actions in the electricity sector, Action E.1 (Developing a CCA) would be the very first action we would want to implement before the others. If we enact a municipal aggregation program, we would be able to aggregate the electric load of all Dominion electricity customers within our jurisdiction and negotiate for 100% clean or renewable electricity

for those customers. If enacted by 2030, this would represent a substantial step to meeting the government and county-wide renewable goals.

However, further legal review will need to be conducted to determine if a municipal aggregation program could be formed in NOVEC territory. If a municipal aggregation program cannot be formed, we will have to rely on other local actions to address emissions from NOVEC customers or any Dominion customers that opt-out of the program. These other actions include: [This content may be further revised]

- Utility green power purchasing (action E.4), [County to confirm if these are bundled or unbundled]
- Local renewable installations (actions E.2 and E.5), and
- Virtual Power Purchase Agreements (VPPAs), with a last resort option of purchasing Green-e Energy certified unbundled renewable energy certificates (RECs) on the open market.
- [Analyzing which actions under the transportation sector would be most impactful to place higher focus on]

VPPAs are where a third-party developer installs, owns, and operates the energy system while the customer purchases the system's electric output for a predetermined period. In a VPPA, the energy system is developed off-site, and the electricity is sold into the wholesale market instead of directly consumed by the customer. RECs are a market-based instruments that certify the bearer owns one megawatt-hour of electricity generated from a renewable energy resource. Unbundled RECs are sold separately from the electricity that was generated, while bundled RECs are sold with the electricity. Green-e Energy certification ensures that the RECs are high-quality and not double-counted. To meet the community-wide renewable electricity goal, we could the purchase and retire unbundled RECs on behalf of residents and businesses to cover any remaining electricity consumption that is not generated by renewable energy sources. We could follow a similar tactic of REC purchasing to meet our government operations renewable electricity goal.¹¹

Onsite Government Solar Feasibility

Even though government electricity use is a small portion of total county-wide electricity use, the amount of space and funds needed to produce all government electricity from onsite solar is currently infeasible. We estimated that County government operations used 64-80 gigawatt-hours of electricity in 2018 (roughly 1% of total county-wide electricity). To fully meet this electricity demand with onsite solar, we would need to install 275 acres of solar panels, or over roughly 200 football fields. If we were to directly purchase these panels, it could cost roughly \$130 Million. However, the costs of renewable energy could be significantly cheaper through a PPA where a third-party developer installs, owns, and operates the energy system while the customer purchases the system's electric output for a predetermined period. Because it is unlikely that we could install enough onsite solar to meet their 100% renewable electricity goal for County operations by 2030, we will most likely need to pursue a combination of local renewables (action E.5), utility green energy purchasing (action E.4), VPPAs, and purchasing RECs to meet this goal.

Goal 4: Government Carbon Neutrality

We have set an ambitious goal of achieving carbon neutrality for government operations by 2050. Carbon neutrality is achieved when our county government emits just as much GHG emissions as it removes/offsets. Government emissions typically include government building and facility energy use, government fleet and equipment fuel use, and solid waste and wastewater treatment emissions. Though we have not yet developed a government operations GHG inventory, government emissions are typically a small portion of overall community emissions (likely <5%). Achieving government carbon neutrality will depend on the emissions sources we include in our government GHG inventory. Therefore, the first step to develop a carbon neutrality pathway will be to create a baseline government operations GHG emissions inventory. Though government carbon neutrality achievement was not specifically analyzed in the CESMP, actions have been developed to reduce government emissions by 2030, as listed in **Climate Actions for County Government**. Additionally, achieving our goal of 100% renewable electricity for County government operations by 2030 will also greatly help in achieving the government carbon neutrality goal.

¹¹ Currently, MWCOG uses a location-based method to calculate electricity emissions, which uses an average electricity emissions factor that reflects energy sources used throughout the regional grid. Alternatively, the market-based method allocates electricity emissions from energy generators to consumers based on "contractual instruments". The emissions reduction impact of any clean electricity purchasing actions in the CESMP, such as municipal aggregation or purchasing RECs, would not be reflected through the location-based accounting method, but would be reflected through the market-based method. PWC will work with MWCOG to determine if the market-based electricity emissions can be calculated along with location-based emissions in the future.

Alignment with Strategic and Comprehensive Plan Goals

The County's 2021-2024 Strategic Plan¹² and 2040 Comprehensive Plan¹³ outline goals and action strategies to guide the growth and development of the community. The Strategic Plan provides key policy guidance for service delivery and resource allocation decisions while the Comprehensive Plan articulates the goals and policies that the Board of County Supervisors relies on to make informed land use development decisions and investments in public infrastructure. Both Plans support climate-related actions that reduce GHG emissions and increase local climate resiliency. The CESMP actions have been mapped to related Strategic Plan and Comprehensive Plan action strategies in **Appendix G. CESMP Actions Mapped to Strategic Plan and Comprehensive Plan Action Strategies**.

Opportunities for External Advocacy and Action

Although our County government cannot directly control or influence many community-wide emissions sources or assets, the ability to meet the 2030 emissions reduction goal and 2030 Climate-Ready Region goal may rely on significant external support from market forces and state- and national-level regulation.

Table 9 Table 9 below provides a list of opportunities we have to advocate for ourselves at the state and federal levels. In addition to advocacy, we strive to build and maintain strong partnerships with entities that impact our community and influence our ability to reduce GHG emissions and procure clean energy.

Table 9. Opportunities for External Advocacy and Action

[County can recommend advocacy in any other sectors including agriculture, refrigerants, etc.]

Sector	Opportunities for External Advocacy and Action
Buildings	<ul style="list-style-type: none"> Advocate for Virginia to become a Home Rule state. Advocate for a low-carbon building code/more aspirational codes and vote on energy code updates. Advocate for quicker adoption of the International Energy Conservation Code in Virginia. Encourage adaptation planning for private businesses by providing examples of adaptation plans for our county's critical facilities
Electricity	<ul style="list-style-type: none"> Advocate for a more aggressive state-wide Renewable Portfolio Standard. Advocate for policies to help overcome barriers to municipal aggregation adoption in Virginia. Work with Dominion and NOVEC to develop electrification incentives and promote expansion of electrical infrastructure to accommodate growing building and vehicle electrification. Work with Dominion and NOVEC to promote grid resiliency through actions such as micro-grid development or undergrounding of power wires.
Transportation and Off-road equipment	<ul style="list-style-type: none"> Work with Potomac and Rappahannock Transportation Commission to advocate for transit service expansion and fleet electrification. [County to confirm if this is the correct transit agency] Advocate for more state and national incentives and mandates for purchasing EVs.
Waste	<ul style="list-style-type: none"> Advocate for the expansion of Balls Ford Road Compost Facility to accept more food waste.
Wastewater	<ul style="list-style-type: none"> Advocate for high-efficiency wastewater treatment processes and state-wide programs aimed at helping local wastewater treatment facilities in their decarbonization efforts.
Land Use	<ul style="list-style-type: none"> Advocate for a stronger state tree preservation requirement program through State Code.

¹² https://www.pwcva.gov/assets/2021-09/2021-2024_Strategic_Plan-FINAL.pdf

¹³ <https://www.pwcva.gov/department/planning-office/prince-william-County-comprehensive-plan>

Chapter 6 Action Implementation and Monitoring

Climate action is dynamic work that requires regular analysis and reassessment. Evolving technology, policies, strategies, and funding opportunities calls for taking on an adaptive management approach as the county strives to meet our Climate Mitigation and Resiliency goals. This is an intentional approach towards making decisions and adjustments in response to new information or opportunities.

As a next step, the county will need to develop a system for annually assessing the impact of the actions towards meeting the goals. This work has already begun through the development of Implementation Roadmaps for the 25 high priority actions ([Appendix F. Implementation Plan](#)). The roadmaps identify the County departments that will lead implementation, supporting partners, implementation steps, action cost range, and high-level performance indicators. The implementation roadmap actions are fluid and may change as the county's emission sources, funding sources, and department roles change. They are not a requirement for lead departments to complete each implementation step or a guarantee that all actions will be implemented. They are simply a recommended starting point to begin action. The Office of Sustainability will have an oversight role in guiding and tracking action implementation, but actual action implementation will be led by the respective departments.

We will need continuous engagement with our stakeholders during the implementation of the CESMP. Many of the actions proposed in this CESMP would impact everyone if implemented. Additionally, many of the actions will be led by key County agencies and support of the County Core Team. It is our intention to stand up a review committee with representation from relevant industries, technical experts, and the community that would meet regularly to assess progress towards the goals.

To begin implementation, we recommended starting with the \$1.04M in Capital Improvement Project funding that has been allocated by the Board of County Supervisors for the CESMP to kick-start actions that will not require extensive feasibility analysis. It is also recommended that actions identified by the Office of Sustainability as time sensitive and high impact be considered in the FY25 budget.

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Appendix A. Complete List of CESMP Actions

Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County-Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
Energy	E.1: Acquire Clean Electricity Sources for the County <i>Form an opt-out municipal aggregation program to acquire 100% clean electricity for the community.</i>	High	O		O	O	O
	E.2: Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives <i>Provide outreach and education on programs and incentives for residents and businesses to install renewable energy systems. Develop additional renewable energy incentives, such as streamlined solar permitting, in partnership with stakeholders such as the Residential Solar Task Force.</i>	High	O		O		
	E.3: Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings <i>Incentivize the use of renewable energy in energy-intensive commercial buildings (e.g., through tax credits/reductions, expedited permitting, density or height bonuses, or a reduction in proffers).</i>	High	O		O		
	E.4: Promote Existing Green Power Products <i>Promote purchasing utility green power options within the community.</i>	High	O		O		
	E.5: Install Solar on County Government Facilities <i>Develop solar projects on County government facilities.</i>	High	O		O	O	O
Buildings	B.1: Incentivize Energy Efficiency and Electrification Retrofits <i>Incentivize existing building energy efficiency retrofits (e.g., streamlined permitting or reduction in real estate taxes).</i>	High	O				
	B.2: Propose Green Zoning Regulations <i>Propose green zoning regulations to incentivize water- and energy-efficient buildings, multifamily and mixed-use areas, and transit-oriented developments.</i>	High	O				

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County-Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030	
Buildings (cont.)	B.3: Incentivize Energy Efficient and Electric New Construction <i>Provide incentives or streamlining for developers who build to a more energy-efficient standard set by the County or use all-electric systems and equipment.</i>	High	○					
	B.4: Promote Energy Efficiency and Electrification Incentives <i>Provide outreach and education to residents and businesses about the tools, technology, and incentives for building energy efficiency and electrification.</i>	High	○					
	B.5: Create Net-Zero Plan for County Government Facilities <i>Develop a net-zero building plan for County government facilities, which will include implementing an energy benchmarking program and procuring 100% clean electricity for all County government operations.</i>	High	○			○		
	B.6: Create All-electric Guidelines for New Construction of County Government Facilities <i>Develop an all-electric new construction requirement for all new County government facilities.</i>	Medium	○			○		
	B.7: Create Policy to Increase Energy Efficiency in County Government Facilities <i>Adopt a County government energy policy that outlines operational and purchasing requirements that increase energy efficiency.</i>	Medium	○			○		
	B.8: Implement Building Energy Benchmarking <i>Implement a voluntary commercial building energy benchmarking and reporting program with the intent to transition to a building energy performance standard.</i>	Low	○					
	Transportation	T.1: Improve Pedestrian and Bicycle Infrastructure and Enhance Connectivity <i>Improve active transportation infrastructure and improve sidewalk and trail connectivity to support walking, biking, and rolling, with improvements such as providing bike lockers, installing curb ramps, or installing traffic-calming designs like crosswalk islands or speed humps.</i>	High	○				
			High	○				

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County- Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
Transportation (cont.)	T.2: Incentivize Transit-Oriented Development <i>Support transit-oriented development within 1/2-mile of transit stations.</i>						
	T.3: Expand Existing Programs that Reduce Single-Occupancy Vehicle Trips <i>Work with major employers to expand the Transportation Demand Management and Transit Fare Buy Down Program (expanding Strategic Plan program) and promote teleworking.</i>	High	O				
	T.4: Upgrade Public Transit Infrastructure <i>Partner with County transit operators to improve and provide new public transit infrastructure and build out transit nodes (e.g., priority bus lanes, bus stops, priority signaling).</i>	High	O				
	T.5: Incentivize Zero-Emission Vehicles and Charging <i>Develop incentives for residents and businesses to purchase ZEVs or install charging equipment (e.g., through streamlined permitting or "group-buy" programs).</i>	High	O				
	T.6: Expand Public EV Charging Network <i>Expand public EV charging infrastructure, especially along main routes and in popular destinations.</i>	High	O				
	T.7: Adopt Zero- or Low-Emissions County Fleet <i>Transition County fleet to zero-/low-emissions vehicles and ensure supporting infrastructure is open to other fleets.</i>	High	O			O	
	T.8: Encourage E-Bike and E-Scooter Adoption <i>Promote the use of e-bikes and e-scooters through enhanced infrastructure and incentives.</i>	Medium	O				
	T.9: Educate on Existing Zero-Emission Vehicle Incentives and Rebates <i>Provide outreach and education on existing ZEV incentives or rebates.</i>	Medium	O				

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County- Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
Transportation (cont.)	T.10: Promote Zero-Emission Bus and Rail Transition <i>Partner with public transit operators to promote the transition to zero-emission buses, including school buses, and rail systems (e.g., providing charging station infrastructure).</i>	Medium	○				
	T.11: Support Zero- or Low-Emissions County Government Contracting of Off-Road Equipment <i>Adopt a policy that encourages the County to contract with businesses operating low- or zero-emission off-road equipment.</i>	Medium	○			○	
	T.12: Adopt County Government Zero-Emission Off-Road Policy <i>Adopt a municipal zero-emissions off-road vehicles and equipment policy that requires low- or zero-emissions replacements.</i>	Medium	○			○	
	T.13: Discount Transit Passes for Residents <i>Continue free local OmniRide service and offer discounts for other services such as rail.</i>	Low	○				
	T.14: Launch Electric Equipment Lending Program <i>Start a lending library where residents can check out electric landscaping equipment and expand to other low-emissions tools and equipment.</i>	Low	○				
Natural Resources	N.1: Adopt Natural Open Space Requirements <i>Establish minimum Natural Open Space (NOS) guidelines to encourage preservation of NOS, if appropriate in new development.</i>	High	○	○			
	N.2: Launch Suburban and Rural Tree Planting Initiative <i>Implement a tree planting and maintenance program to expand suburban and rural tree cover.</i>	Medium	○	○			
	N.3: Update Tree Cover Regulations <i>Update tree cover regulations utilizing 2008 enabling legislation to increase the percent of required tree cover for new development projects.</i>	Medium	○	○			
	N.4: Support Sustainable Farming Practices	Low	○				

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County-Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
	<i>Provide outreach and education to the agricultural community on sustainable farming practices that reduce fertilizer use and increase soil carbon sequestration.</i>						
Waste	W.1: Implement County-Wide Composting <i>Implement a county-wide composting program to provide free food waste composting services to residents, businesses, and the agricultural sector.</i>	Medium	O				
	W.2: Promote Sustainable Purchasing Policy <i>Develop a municipal sustainable purchasing policy for County purchasing decisions to promote use of sustainable products, such as those made from recycled materials, and prohibit the use of single use plastics and Styrofoam to-go containers.</i>	Medium	O			O	
	W.3: Mandate Commercial Food Waste Diversion <i>Require commercial businesses to divert food scraps either through food recovery or composting programs.</i>	Low	O				
Adaptation	A.1: Develop Adaptation Plans for Critical Facilities <i>Develop site-level adaptation plans for critical facilities and service areas considering future climate change hazards.</i>	High			O		
	A.2: Understand Stormwater Flooding in Areas Outside of the Floodplain <i>Develop plans for stormwater system upgrades based on future conditions stormwater modeling data and historic flooding information.</i>	High			O		
	A.3: Improve Power Resilience for Critical Infrastructure <i>Improve the resilience of electrical infrastructure for publicly owned essential services and infrastructure</i>	High			O		
	A.4: Assess Shoreline Protection and Nature-Based Solutions <i>Conduct feasibility studies to evaluate shoreline protection measures against erosion and flood, incentivizing nature-based solutions. Develop long-term plans to address sea level rise for at-risk public and private property.</i>	High			O		
	A.5: Restore Streams to Reduce Flooding	High			O		

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County- Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
	<i>Develop stream corridor restoration projects to improve conveyance and mitigate flooding.</i>						
Adaptation (cont.)	A.6: Incentivize Technology for Residents to Make Homes Adaptive <i>Provide incentives or subsidies for residents of low-income housing and rental properties to install or retrofit buildings with climate adaptive technologies to reduce energy, reduce water use, reduce waste heat, and minimize urban heat gain.</i>		High		O	O	
	A.7: Plan Alternate Evacuation Routes for Flood-prone Areas <i>Identify alternate evacuation routes for roads and bridges identified as vulnerable to flooding and/or sea level rise.</i>	High		O			
	A.8: Expand Building Insulation Standards to Protect Against Extreme Heat <i>Increase standards for insulation in new construction buildings and homes for resiliency against extreme heat events.</i>	High	O	O			
	A.9: Protect Existing Buildings Against High Winds <i>Identify structures for high wind retrofits and implement retrofits on existing structures.</i>	Medium		O			
	A.10: Protect County Infrastructure from Flooding <i>Identify residential and commercial infrastructure vulnerable to future flooding and evaluate if infrastructure should be elevated, relocated, or floodproofed.</i>	Medium		O			
	A.11: Incentivize Nature-based Solutions to Reduce Flooding in Residential Properties <i>Develop program to provide incentives and promote rain gardens, conservation landscapes, green roofs, water harvesting, and permeable pavement for residential properties.</i>	Medium		O			
	A.12: Improve Water Infrastructure for Extreme Precipitation Events <i>Update water and drainage infrastructure design standards to address the projected increase in intensity of precipitation,</i>	Medium		O			

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County- Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
	<i>including the use of retrofits and/or green infrastructure in new construction.</i>						
Adaptation (cont.)	A.13: Urban Heat Island Relief Program <i>Incentivize urban designs that facilitate air movement to alleviate heat islands (e.g., increasing urban tree cover).</i>	Medium	○	○			
	A.14: Adopt Guidelines to Use Nature-based Solutions on County Government Construction <i>Develop guidelines on how to incorporate nature-based solutions into county projects.</i>	Medium		○			
	A.15: Improve Grid Resilience During Extreme Weather <i>Evaluate resilient energy systems such as microgrids or other distributed energy resources within the County to provide stable energy supply during times of extreme weather.</i>	Medium		○			
	A.16: Expand Tax Credits for Conservation of Natural Resources <i>Expand tax credits for conservation of floodplains and natural buffers, such as wetlands and riverbank tree planting, in vulnerable areas.</i>	Medium		○			
	A.17: Develop Plan to Preserve Estuaries and Wetlands To Reduce Flooding <i>Map projected future sea levels and identify existing wetlands that may be impacted. Develop a plan to preserve these spaces and use them to mitigate runoff and flood impacts where possible.</i>	Medium		○			
	A.18: Training for Community Members on Climate Change and Mental Health <i>Provide professional development training for teachers, support staff and other community members to support child and youth mental health related to climate change.</i>	Medium		○			
	A.19: Increase Protection from the Sun at Childcare Centers <i>Develop guidelines for shade for schools and childcare centers' grounds.</i>	Medium	○	○			
	A.20: Incentivize Improved Cooling Equipment in Apartments <i>Incentivize expanded access to reliable, efficient cooling for apartments.</i>	Low	○	○			

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Sector	Actions	Action Priority	Cut GHG Emissions	Prepare for Climate Change	Use 100% Renewable Electricity County- Wide by 2035	Become Carbon Neutral for County Government	Use 100% Renewable Electricity in County Government by 2030
Adaptation (cont.)	A.21: Incentivize Businesses to Reduce Water Usage <i>Develop incentives, training and technical assistance programs for significant water use reductions including rainwater and greywater harvesting and onsite blackwater treatment with a focus on industrial and commercial properties.</i>	Low	0	0			
	A.22: Protect Electrical Infrastructure from High Winds <i>Partner with energy providers to increase resilience of the electrical grid including hardening infrastructure and/or burying power lines where appropriate.</i>	Low		0			
	A.23: Expand Community Outreach for Education on Climate Change Adaptation <i>Expand existing "Ready Prince William" Community Outreach and Preparedness Campaign to support the development of accessible technology to provide climate information to individuals and industries to enhance collective understanding.</i>	Low		0			
	A.24: Support Agriculture Resiliency <i>Identify support for farmers to prepare for and recover from extreme weather, such as access to more accurate weather data, harvest support, drought resistant crops, backup generation, and livestock evacuation.</i>	Low		0			

Appendix B. List of Stakeholder Groups Involved in CESMP Development

Table 10 describes the composition and roles of the five primary stakeholder groups engaged throughout the plan development process.

Table 10. Primary Stakeholders

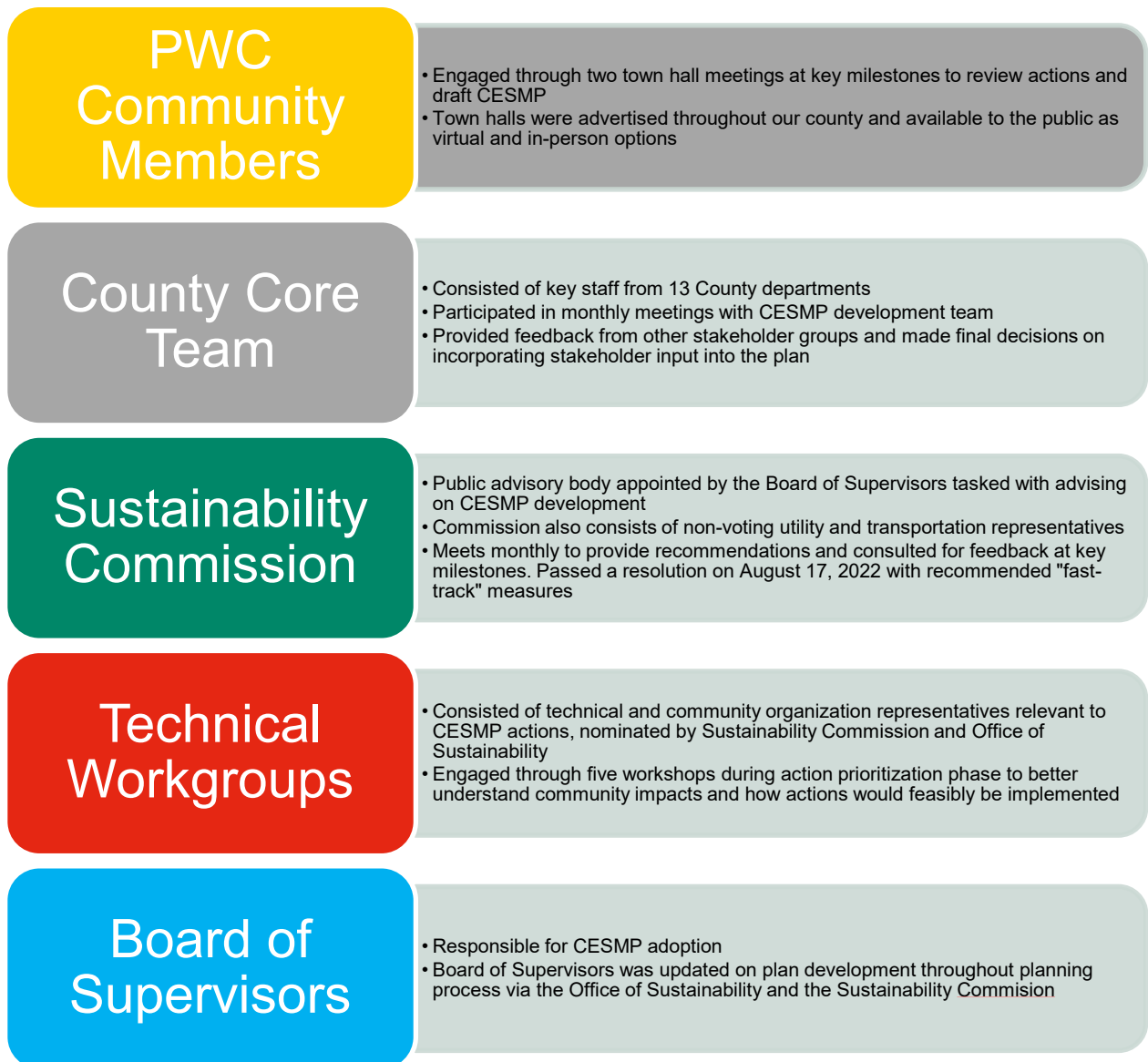


Figure 15 outlines the members of the County Core team that participated in the development of the CESMP.

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Figure 15. County Departments Involved in Developing the CESMP



The Joint Environmental Task Force

Communication between the Prince William County Government and the Prince William County School (PWCS) system was important throughout the CESMP development process. Because the PWCS system operates separately from our County government operations, PWCS operations are not considered under the County government's direct influence. Therefore, PWCS energy use and emissions are not included under our County government climate goals of 100% renewable energy by 2030 or carbon neutrality by 2050. However, as PWCS emissions are included in the county-wide goals of 50% GHG emissions reduction by 2030 and 100% renewable energy by 2035, they were still a critical partner to engage in CESMP development. PWCS representatives were invited to participate in the CESMP workgroups. Notably, the Joint Environmental Task Force (JET) was developed to foster the relationship and increase communication channels to address climate change and environmental sustainability proactively and equitably. The JET was created on June 22, 2021, by the Board of County Supervisors. The JET's role will be to recommend to the Board of County Supervisors and to the School Board funding priorities that are identified by the CESMP.

Figure 16 outlines the participants of the technical workgroups that helped to prioritize the actions.

Figure 16. Complete List of Technical Workgroup Participants

Workgroup Participants		
1 Buildings and Decarbonization	2 Transportation and Land Use	3 Climate Adaptation and Resiliency for Vulnerable Population
<ul style="list-style-type: none"> - Building Trades- GPI Consulting Engineering - Virginia Pace Authority - Northern Virginia Electric Cooperative - Prince William Service Authority - Prince William Residential Solar Taskforce - Prince William County Schools - George Mason University VA Climate Center - Northern Virginia Community College - Data Center Coalition - Citizen's Climate Lobby - Prince William Commercial Development Committee - Northern Virginia Building Industry Associations - Developer Rep - Northern Virginia Building Industry Associations- Builder Rep 	<ul style="list-style-type: none"> - Virginia Railway Express - Potomac and Rappahannock Transportation Commission - Lake Ridge Occoquan Coles Civic Association - Woodbridge Potomac Communities Civic Association - Mid County Civic Association of Prince William - HOA Roundtable - Prince William Conservation Alliance - Active Transportation Groups - Biking - Northern Virginia Regional Commission - Trails and Blueways Council - Metropolitan Washington Council of Governments - Prince William County Schools Transportation - Prince William Economic Development - Northern Virginia Building Industry Associations 	<ul style="list-style-type: none"> - Virginians Organized for Interfaith Community Engagement - Student Representative - Community Partners in Equity and Inclusion - Senior Citizen Advocacy - Veteran's Commission - Chesapeake Climate Action Network - Institute for Public Health - Tenants and Workers United - Prince William Department of Social Services Rep for Homeless Populations

Appendix C. Existing County Actions

The following is a list of actions, programs, and projects that we already have underway. These actions either make an effort to mitigate GHG emissions or improve climate resiliency and hazard mitigation in the county.

Existing GHG Mitigation Actions

Natural Resources

1. We recently secured annual funding and a full-time employee to expand upon an existing reforestation program. The program is now expanded to allow 10-acre non-agricultural lots to apply which is expected to substantially increase participation in the county.
2. In response to recent regulations, we are currently working with the State on tree preservation requirements for new development.
3. Plant effluent water reuse within the water treatment plant which helps to reduce potable water usage by 1.5 million gallons per day.
4. On-going customer water savings initiatives are in place such as public education and flyers inserts in bills. An on-going recommended watering program is in place which directs even and odd address for homes to water on different days.

Energy Conservation

5. In 2022, our wastewater treatment plant's inefficient electric-resistance heating and conventional lighting was converted to high-efficiency lighting and high-efficiency heat pumps.
6. We received grant funding to implement major energy efficiency and improvement programs at their facilities.

Transportation

7. There is a Commuter Choice funded Transportation Demand Management marketing campaign for the I-66 corridor and Transit Fare Buy Down Program for 5 OmniRide Bus Routes.
8. There are sidewalk and trail improvement efforts covered in the Capital Improvement Program. The current program includes three standalone bike/pedestrian projects and thirteen transportation projects that include bike/pedestrian facilities.
9. A First/Last Mile Study is being conducted at Neabsco Commuter Garage via MWCOG. A consultant did an analysis of a 1-mile walkshed of the garage and provided recommendations to provide pedestrian improvements and cost estimates. Various recommendations included exploring micro-mobility: e-bikes/e-scooters, sidewalk connectivity, sidewalk improvements to include safety features, and desired paths (putting in trails where people are naturally walking).
10. Yorkshire Corridor Improvements Study grant received via MWCOG tasks the consultant to provide actionable recommendations to build off existing planned improvements to make Route 28 a more walkable, transit-oriented corridor. This will include a gap analysis of first/last mile connections, review of planned project scopes and existing and future land use and recommendations for prioritized pedestrian, bicycle and/or micro-mobility connections and transit supportive infrastructure. This project will include coordination with the City of Manassas, the City of Manassas Park and OmniRide, which operates bus services on the corridor.
11. The Board recently approved providing a local match to the Woodbridge Pedestrian Bridge that will connect the Woodbridge VRE to a new development on the other side of Route 1. Transportation is beginning the design process of a pedestrian bridge over Route 15 in Gainesville. Staff is looking to find other sources of funding to allow the project to proceed beyond the design stage.
12. We are adopting a new Mobility Chapter of the Comprehensive Plan which aims to reduce lane miles and focus on transit and non-motorized transportation.
13. We are updating the Transportation chapter of the Design and Construction Standards which will be informed by a Green Infrastructure planning study.
14. We have purchased five electric vehicles for our fleet and have been installing charging stations to support them. There are plans to continue to purchase more EVs.
15. A Green Infrastructure Study grant received via MWCOG tasks a consultant to provide a clear roadmap to implementing green infrastructure into planned capital projects in the county, many of which already have dedicated funding. The project will also inform long term policy decisions through the review and recommendation of applicable policies, specifically into the Prince William Design and Construction Standards Manual. This will allow us to include green infrastructure recommendations in future projects and help secure funding for the enhanced project scopes.

Waste

16. There are reuse and clothing and shoe collection programs at the Prince William County Landfill and the Balls Ford Road Compost facilities. The reuse program was recently reinstated in July 2022. The clothing program has collected 4,500 pounds through Calendar Year 2022.
17. There is a public outreach program promoting source reduction and reuse as part of on-going outreach and education programs. We partner with Keep Prince William Beautiful on Fix-It Fairs.
18. We promote "grasscycling" (leaving grass clippings on the lawn) and backyard composting.
19. We promote backyard composting including the sale of low-cost compost bins, with a total of 31 bins sold in Fiscal Year 2022.

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20. We have plans to promote a food scraps recovery program with the commercial sector, expand residential organics collection to include food scraps, and expand their glass recycling drop-off collection program. A draft plan for this work was presented to the Board in Fall 2022.
21. Starting in October 2021, we began implementing a year-round residential yard waste collection program. As of Calendar Year 2022, the yard waste program has diverted more than 2,000 tons from our county landfill to the Balls Ford Road Compost facility.
22. The implementation of five glass recycling drop-off centers has increased glass recycling from 17 to 575 tons from Calendar Year 2018 to 2021.

Existing Renewable Electricity Actions

1. Building Development has recently established a Residential Solar Task Force with industry members to provide education, receive feedback on permitting processes, and define opportunities to improve the processes. Recommendations from the task force will directly inform our streamlining actions.
2. A consultant is analyzing the feasibility of PPAs and solar installations for government facilities.
3. A small solar system was installed on the McCoart Administrative Building as pilot project.
4. Our county landfill currently captures methane and uses it to produce approximately 6.7 MW of electricity to NOVEC annually. We plan to retire the generators and work with a private company to build a new facility to use captured methane more efficiently by converting it into renewable natural gas.

Existing Adaptation/Resilience Actions

All Hazards

1. The County Emergency Operations Plan outlines all aspects of response and recovery for the community to include all aspects of mass care, survivor support, public information, damage assessment, public reporting, etc. All aspects of the Emergency Operations Plan should continue to be supported and enhanced, where necessary to continue to support the community's needs.
2. The Ready Prince William community outreach and engagement program seeks to integrate existing community partners and volunteering efforts in preparedness, response, and recovery. EM is actively working to enhance this program.
3. PWC EM coordinates with other County, Regional, and State agencies to provide technical assistance resources for specific facilities, including universities, schools, day care centers, assisted living facilities, healthcare facilities, etc. This can include information on hazard risk, information for facility emergency action plans, and routinely participates in plan reviews, stakeholder meetings, trainings, and exercises, as requested by facilities.

Flooding

4. FEMA manages floodplain mapping for the county. EM and Public Works are conducting a Flood Resilience Plan and supporting "small area plans" that develop mitigation actions for flooded areas and communities. This will also address, where able, future flooding risk and assessing community vulnerability to flooding risk.
5. Storm surge zones have already been mapped by FEMA and existing data shows critical infrastructure within this zone and the rest of the special flood hazard area.
6. The backbone of a County Automated Flood Warning System is now operational with four water depth gauges at key areas of riverine flooding. The system will gauge adjusted rainfall rates to identify flooding trends for each basin. There are future plans to add rain gauges, weather stations, and additional water level sensors to expand county-wide coverage. The system will support early warning capabilities and data collection to determine county-wide flooding trends. We are using several grant funding sources to continue the build out of the rest of the system. Improvements to the program could include expansion of staff needed to coordinate and validate data, and the addition of a hydrologist to expand predictive modeling capabilities.
7. We actively participate in FEMA's Community Rating System. Prince William County recently advanced from CRS Class 7 rating to Class 6, meaning that the county residents and businesses will see a 20 percent discount on their flood insurance premiums issued or renewed from Oct. 1, 2023, an increase from 15 percent last year. We plan to continue to participate in the Community Rating System program and actively find ways to maintain and enhance all eligible program areas to increase resilience and provide flood insurance discounts for residents who live in a special flood hazard area.
8. PWC EM coordinates community outreach and engagement through the Ready Prince William program. Flood preparedness and flood insurance outreach efforts routinely occur through this program, including providing a detailed flood preparedness brochure in the annual real estate tax mailing, a targeted campaign for Dam Safety Day to ensure all homeowners who live downstream from a dam understand the flood risk associated with the Dam, and proclamation of Flood Awareness Week in the Spring each year.
9. Many hazard risk assessment programs already exist in the county in regard to technical assistance for specific facilities, including universities, schools, day care centers, assisted living facilities, healthcare facilities, etc.

Extreme Heat

10. EM has established warming and cool centers coupled with triggers and escalation levels. These locations are primarily the libraries throughout the community, but EM has also established additional locations identified if libraries are not suitable to the needs of the incident, including the use recreation centers and other facilities. Extreme Heat procedure are currently in place. A comfort center plan for extreme heat/cold mass care support is in development by EM. If a resident signs up for PWC Alerts, and opts into weather watches and warnings, they will receive notifications for heat advisories. This is supported by our Emergency Operations Plan.

Tornadoes

11. Community tornado safe rooms are targeted by FEMA for states and communities in tornado alley and other areas that have significant early warning of a tornado coming to allow individuals time to go to a community

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safe room. This is not feasible in our county, as tornadoes are relatively rare in this area and there is a very short working time as they can occur very quickly from a severe thunderstorm cell. The preparedness messaging used instead is focused on teaching individuals how to identify a safe room in their house, place of work, etc. that they can quickly and safely get to should a tornado pop up quickly. This is a room on the lowest level of a building and the most interior room without windows.

Infrastructure Resiliency

12. The PWC Service Authority and Virginia American Water is in coordination with Fairfax Water to secure supply, leading to better regional resiliency of water supply.
13. Action Strategy G3.5 in the Comprehensive Plan aims to prioritize improvements to vulnerable infrastructure as identified by Vtrans Vulnerability Assessment. This consideration is currently included as prioritization factor for transportation projects submitted for state funding. DOT has an active project, the Route 28 Bypass, in an area with existing flooding and is pursuing enhanced stormwater management measures to better prepare the area for future floods. Impact projects are funded by SMART SCALE (beginning Round 5 which funds projects in Fiscal Years 2026-2027) through the Virginia Office of Intermodal Planning and Investment.
14. We implement watershed studies, stormwater retrofits, and small drainage improvement projects as needed. We have undertaken a number of stream restoration projects to improve the quality of our local streams and waterways. Our stream restoration program identifies projects through field inspections and watershed studies.
15. Public Works' is seeking funding to conduct detailed watershed studies for flood control to implement climate adaptation strategies, assess the adequacy and capacity of existing stormwater infrastructure, and propose DCMS changes for changes in precipitation patterns over the years.
16. PWCSA has an established pipe cured in-place pipe lining and Infiltration and Inflow reduction program to keep 1,150 miles of sanitary sewers operating at capacity.
17. PWCSA works with county businesses to prevent Fats, Oil and Grease from entering the sewer where FOG can cause blockage. The program conducts periodic inspections of business to maintain compliance and ensure routine maintenance of grease traps and interceptors.
18. PWCSA includes nutrient management plans in landscape contracts to reduce nutrient runoff.
19. PWCSA is in the design phase of a large design-build project for facility-wide improvements at the H.L. Mooney Advanced Water Reclamation Facility to replace/renew/refurbish assets. The project includes a new headworks to increase peak flow capacity at the plant.
20. We maintain a Mutual Aid Debris Removal Operations Plan and Prince William County Debris Management Plan. We maintain a contractor for debris management emergency response services. We also maintain primary and secondary Monitoring Debris Management Contractors.

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Appendix D. Greenhouse Gas Inventory and Analysis

Appendix D.1 Greenhouse Gas Inventory

Appendix D.2 Electric Grid Resource Mix

Appendix D.3 Greenhouse Gas Reduction Strategies

Appendix D.4 Method for Developing GHG Emission Reduction Strategies

Appendix D.1 2018 Greenhouse Gas Inventory

MWCOG develops our GHG inventories every two to three years following guidance from the U.S. Community Protocol (USCP) – an inventory reporting protocol to guide U.S. local governments in calculating and reporting their community’s GHG emissions.¹⁴ MWCOG previously developed the inventories for 2005, 2012, 2015, 2018, and 2020. As our goal is to reduce county-wide GHG emissions by 50% from a 2005 baseline by 2030, the 2005 inventory represents the GHG emissions baseline against which we measure our emissions reduction progress. Total emissions in 2005 were 4,190,056 MTCO_{2e}. In 2018, we generated approximately 5,044,135 MTCO_{2e} – a **20% increase** from 2005 levels (see **Figure 17**). To progress toward the 50% reduction goal by 2030, 2018 county-wide emissions needed to show a 26% **decrease** below 2005 levels – which means emissions are not currently on track for goal achievement.

Impact of COVID-19 on GHG Emissions

While emissions have been steadily increasing annually since 2005, emissions decreased by 9% between 2018 and 2020 (though emissions in 2020 were still 9% higher compared to the baseline year of 2005). This is most likely due to the impacts of COVID-19 restrictions, such as reduced on-road travel or non-residential building energy use, though the exact magnitude of emissions impact from COVID restrictions cannot be precisely measured. Additionally, studies have shown that US-wide GHG emissions are returning to pre-pandemic levels, demonstrating that COVID impacts on emissions are most likely not permanent.¹⁵

Therefore, while a 2020 County GHG inventory exists, the CESMP references the 2018 inventory year for forecasting and emissions reduction calculations as it represents the most recent pre-pandemic community activity levels and provides a more accurate baseline for local GHG emissions analysis. Future GHG inventories will better reflect any long-term impacts of the pandemic on county-wide emissions.

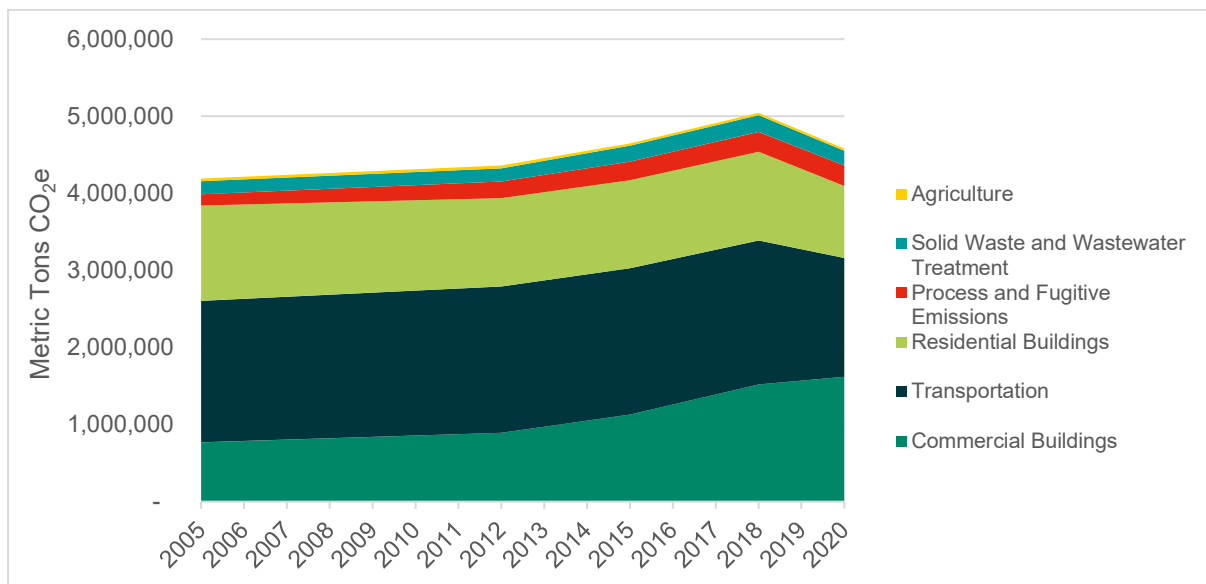


Figure 17. Prince William County GHG Emissions 2005 – 2020

¹⁴ <https://www.mwco.org/documents/2022/12/09/greenhouse-gas-emissions-inventories-methodology-guide-climate--energy-greenhouse-gas/>

¹⁵ <https://rhg.com/research/us-greenhouse-gas-emissions-2022/#:~:text=Based%20on%20preliminary%20economic%20activity,compared%20to%20the%20previous%20year.>

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Table 11. 2018 PWC GHG Emissions Inventory

Emissions Type	Emissions Activity or Source	2018 Emissions (MTCO ₂ e)	% of Total Emissions
Residential Energy	Electricity	724,067	14%
	Natural Gas	412,703	8%
	Fuel Oil	9,889	<1%
	Liquefied Petroleum Gas	7,150	<1%
Commercial Energy	Electricity	1,359,354	27%
	Natural Gas	157,959	3%
	Fuel Oil	2,621	<1%
	Liquefied Petroleum Gas	1,246	<1%
Transportation and Mobile Emissions	On Road Transportation	1,636,658	32%
	Passenger Air Travel	62,539	1%
	Rail Transportation	2,598	<1%
	Off Road Mobile Sources	164,404	3%
Process and Fugitive Emissions	Hydrofluorocarbon & Refrigerant Emissions	238,364	5%
	Natural Gas Fugitive Emissions	16,625	<1%
Solid Waste Treatment	Landfill Waste	214,717	4.3%
Agriculture	Enteric Fermentation	13,397	<1%
	Manure Management	1,461	<1%
	Agricultural Soils	15,051	<1%
Wastewater Treatment	Septic System Emissions	1,502	<1%
	Sewer System Treatment Emissions	1,160	<1%
	Sewer System Effluent Discharge Emissions	668	<1%
TOTAL		5,044,135	

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Appendix D.2 Electric Grid Resource Mix

The information below is from the EPA eGRID data for the SERC Virginia/Carolina subregion.¹⁶

Generation Resource Mix (%)											
	Coal	Oil	Gas	Other Fossil	Nuclear	Hydro	Biomass	Wind	Solar	Geothermal	Other unknown/ purchased fuel
2018	19.1%	0.6%	34.6%	0.1%	37.8%	2.3%	2.8%	0.4%	2.2%	0.0%	0.1%
2021	13.4%	0.2%	38.1%	0.2%	38.8%	1.9%	2.3%	0.4%	4.7%	0.0%	0.1%

¹⁶ <https://www.epa.gov/egrid/historical-egrid-data>

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Appendix D.3 Greenhouse Gas Reduction Strategies

2030 Greenhouse Gas Reduction Strategy	Percent of 2030 GHG Reductions Needed to Meet Goal
92% clean electricity	57%
50% of passenger and medium-duty vehicles are ZEV	24%
40% of HVAC systems and water heaters are highly efficient and electric	8%
57% HFCs replaced with low- or zero-GWP alternatives	4%
5% mode shift from passenger vehicles to active/public transport	2%
60% waste diversion rate	2%
100% high-efficiency lighting and appliances	1%
15% zero emissions off-road equipment	1%
20% reduction in aviation emissions	<1%
10% reduction in agriculture emissions	<1%

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Appendix D.4 Method for Developing GHG Emission Reduction Strategies

The first step in developing the GHG reduction scenarios was to evaluate how external regulatory or market forces would impact emissions over time. Reductions from these forces are reflected in the blue hatched wedge at the top of the chart in Figure 9. These external forces include:

- Virginia’s Renewable Portfolio Standard (RPS), which requires electricity generation from 30% renewables by 2030 for Phase I utilities and 41% for Phase II utilities.
- Market forecasts for electric vehicle (EV) adoption, where approximately 17% of passenger vehicles are assumed to be EVs 2030.
- Reductions in hydrofluorocarbons use under the Kigali Amendment, where industrialized nations like the United States must reduce production and consumption of HFCs to about 15% of 2012 levels by 2036.
- Market forecasts for electric off-road construction equipment, which are assumed to be 10% electric by 2030.

These external factors result in roughly 33% of the emissions reductions needed to meet the 2030 goal. The impact of these external forces may be large, but local action is still necessary to meet the 2030 goal.

Emissions Impact of Other External Regulatory and Market Forces

The emission impact of certain external regulatory or market forces, such as impacts from the Inflation Reduction Act (IRA) or the Infrastructure Investment and Jobs Act (IIJA), were not integrated into our GHG reduction scenario but could help to further reduce local emissions, especially in the electricity, buildings, and transportation sectors.

Enacted in 2022, the IRA is a federal law which aims to curb inflation by investing into domestic energy production while promoting clean energy, among other actions. The IIJA is a federal law enacted in 2021 that directs spending toward transportation, electric, and other infrastructure improvements. Because the IRA and IIJA provide US-wide funding and financing opportunities and do not require a discrete amount of emissions reductions or clean energy use, the emissions impact of these laws was not quantified in the emissions forecasts or included in the 2030 GHG reduction scenario. However, both the IRA and IIJA will likely help to reduce emissions in the county due to their promotion of clean energy, electric vehicles, and public transit. Studies have estimated the IRA will have minimal impact on transportation emissions by 2030 but could decrease emissions in the US power sector by roughly 50-60% by 2030 as compared to business-as-usual emissions.^{17,18} However, these studies do not specifically analyze how these reductions will interact with any state’s RPS, which requires a certain percentage of renewable energy and will therefore also decrease power sector emissions. Another study found that the IIJA could increase or decrease transportation emissions +/- 1% in 2030 compared to a base case scenario depending on the direction of investment.¹⁹ At the time of our 2030 GHG reduction scenario development, IRA and IIJA impacts were not integrated into the EV market forecast study that was used to forecast external impacts on our transportation emissions. In the future, IRA and IIJA impacts may be integrated into both EV forecasts and Virginia renewable energy forecasts and could be used in county emissions forecasting updates. This could help us better understand the overall impact of these laws on their future emissions and GHG reduction scenario.

Though the IRA and IIJA will most likely help spur clean energy integration into the regional electrical grid and improve transportation infrastructure, they will not be enough to guarantee that we achieve our 2030 GHG reduction goal or 2035 renewable energy goal. Therefore, including potential emissions reductions from the IRA, IIJA or other forces in the 2030 reduction scenario would not change the focus of actions presented in the CESMP. Because

¹⁷ Ramseur, J. L. (2023). U.S. Greenhouse Gas Emissions Trends and Projections from the Inflation Reduction Act. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/IN/IN12082>

¹⁸ Sherlock, M. F. (2023). Tax Credits for “Clean Electricity”—Projected Effects on CO2 Emissions and the Generation Mix. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/IN/IN12082>

¹⁹ Georgetown Climate Center. (2021, 12 16). Georgetown Law. Retrieved from <https://www.georgetownclimate.org/articles/federal-infrastructure-investment-analysis.html>

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the CESMP is a living document, the emission impacts of new measures and regulations can be monitored and incorporated in future GHG forecasting updates.

Building upon these external regulatory and market forces, multiple 2030 GHG reduction scenarios were developed to demonstrate what it will take to achieve our 2030 GHG reduction goal. After reviewing these scenarios, we selected the preferred 2030 reduction scenario in order to show what it will take to reach the 2030 goal and guide climate action development.

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Appendix E. Vulnerability Assessment Report

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Appendix F. Implementation Plan

How to Read an Implementation Roadmap

Action Title	The action number and title	
Action Description	Description of action as reflect in the CESMP text	
Related County Goal(s)	County goals that the action contributes towards meeting	
Climate Action Topic	Climate action topic the action addresses: Electricity, Buildings, Transportation, Waste, Natural Resources, Climate Adaptation	
GHG Reduction Potential/Climate Hazard	<p>Action's GHG reduction potential range and/or climate hazard addressed</p> <p>GHG Reduction Potential (represents the high/maximum estimate for GHG reductions):</p> <ul style="list-style-type: none"> • Very High: greater than 500,000 (MTCO_{2e}) • High: 50,000-500,000 MTCO_{2e} reduced • Medium: 10,000-50,000 MTCO_{2e} reduced • Low: less than 10,000 MTCO_{2e} reduced • Unknown: Not Quantified <p>Climate Hazard:</p> <ul style="list-style-type: none"> • All Climate Hazards • Precipitation • High Winds & Tornadoes • Sea Level Rise • Extreme Heat 	
Lead Department(s)	Department(s) that will be leading action implementation	
Supporting Departments/Partners	Departments or other entities that can support action implementation	
Implementation Steps	High-level steps to implement action	
Potential County Action Cost Range (2025-2030)	Includes first year budget requests and ongoing cost considerations from 2025-2030. Does not include existing staff time.	
Performance Indicators	Output Indicators: Measurable result of action (i.e., miles of bike lanes built, kW of renewable energy installed)	Outcome Indicators: Outcomes needed to achieve the goal (i.e., increase in bicycle mode share, electricity emissions reduced)

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Appendix G. CESMP Actions Mapped to Strategic Plan and Comprehensive Plan Action Strategies

Actions	Comprehensive Plan Action Strategies	Strategic Plan Action Strategies
E.1: Acquire Clean Electricity Sources for the County	H5.9	SG2: C., SG2: E
E.2: Promote Renewable Energy Incentive Programs and Develop Additional Solar Incentives	H5.4, H5.6, H5.7, H5.9	SG2: C., SG2: E, SG2: F
E.3: Incentivize Renewable Energy Use in Energy-Intensive Commercial Buildings	H5.9	SG2: C., SG2: E
E.4: Promote Existing Green Power Products	H5.9	SG2: C., SG2: E
E.5: Install Solar on County Government Facilities	H5.9	SG2: C., SG2: E
B.1: Incentivize Energy Efficiency and Electrification Retrofits	H5.4	SG2: E
B.2: Propose Green Zoning Regulations	LU8.1, LU8.3, H5.2, H5.3, H5.4, H5.4, H5.10	SG2: B., SG2: E
B.3: Incentivize Energy Efficient and Electric New Construction	H5.3, H5.4, H5.4	SG2: B., SG2: E
B.4: Promote Energy Efficiency and Electrification Incentives	H5.4, H5.7	SG2: E
B.5: Create Net-Zero Plan for County Government Facilities		SG2: A., SG2: B., SG2: E
B.6: Create All-electric Guidelines for New Construction of County Government Facilities		SG2: A., SG2: B., SG2: E
B.7: Create Policy to Increase Energy Efficiency in County Government Facilities		SG2: A., SG2: B., SG2: E

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Actions	Comprehensive Plan Action Strategies	Strategic Plan Action Strategies
B.8: Implement Building Energy Benchmarking		SG2: E
T.1: Improve Pedestrian and Bicycle Infrastructure and Enhance Connectivity	G3.9, G3.10, LU8.2, LU8.4	SG2: E, TM2: A
T.2: Incentivize Transit-Oriented Development	G3.9, G3.10, LU8.1, LU8.2, LU8.4, LU8.5, H5.2, H5.10	SG2: E
T.3: Expand Existing Programs that Reduce Single-Occupancy Vehicle Trips	G3.9, G3.10, LU8.2	SG2: E, TM4: A
T.4: Upgrade Public Transit Infrastructure	G3.9, G3.10, G3.11, LU8.2	SG2: E
T.5: Incentivize Zero-Emission Vehicles and Charging	G3.9, G3.10, RP3.1	SG2: E
T.6: Expand Public EV Charging Network	G3.9, G3.10, RP3.1	SG2: D., SG2: E
T.7: Adopt Zero- or Low-Emissions County Fleet	G3.9, G3.10, RP3.1	SG2: D., SG2: E
T.8: Encourage E-Bike and E-Scooter Adoption	G3.9, G3.10, LU8.2	SG2: E
T.9: Educate on Existing Zero-Emission Vehicle Incentives and Rebates	G3.9, G3.10, RP3.1	SG2: E
T.10: Promote Zero-Emission Bus and Rail Transition	G3.9, G3.10, G3.11, RP3.1, LU8.2	SG2: E
T.11: Support Zero- or Low-Emissions County Government Contracting of Off-Road Equipment	G3.9, G3.10, RP3.1	SG2: E
T.12: Adopt County Government Zero-Emission Off-Road Policy	G3.9, G3.10, RP3.1	SG2: D., SG2: E
T.13: Discount Transit Passes for Residents	G3.9, G3.10, LU8.2	SG2: E
T.14: Launch Electric Equipment Lending Program		SG2: E
N.1: Adopt Natural Open Space Requirements		SG2: E, EC1: A., EC1: B., EC1: C., H5.2, H5.4
N.2: Launch Suburban and Rural Tree Planting Initiative		SG2: E
N.3: Update Tree Cover Regulations		SG2: E, EC1: A., EC1: B

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Actions	Comprehensive Plan Action Strategies	Strategic Plan Action Strategies
N.4: Support Sustainable Farming Practices		SG2: E
W.1: Implement County-Wide Composting		SG2: E
W.2: Promote Sustainable Purchasing Policy		SG2: E
W.3: Mandate Commercial Food Waste Diversion		SG2: E
A.1: Develop Adaptation Plans for Critical Facilities	H5.2	
A.2: Manage Stormwater Flooding in Areas Outside of the Floodplain		EC5: B, EC5: C
A.3: Improve Power Resilience for Critical Infrastructure	H5.7	
A.4: Assess Shoreline Protection and Nature-Based Solutions		EC5: B
A.5: Restore Streams to Reduce Flooding		EC5: B
A.6: Incentivize Technology for Residents to Make Homes Adaptive		SG2: B, SG2: E
A.7: Plan Alternate Evacuation Routes for Flood-prone Areas		EC5: B
A.8: Expand Building Insulation Standards to Protect Against Extreme Heat		SG2: E
A.9: Protect Existing Buildings Against High Winds	H5.12	
A.10: Protect County Infrastructure from Flooding		EC5: B, EC5: C
A.11: Incentivize Nature-based Solutions to Reduce Flooding in Residential Properties	H5.2	
A.12: Improve Water Infrastructure for Extreme Precipitation Events	H5.2	
A.13: Urban Heat Island Relief Program	H5.2	SG2: E
A.14: Adopt Guidelines to Use Nature-based Solutions on County Government Construction	H5.2	

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Actions	Comprehensive Plan Action Strategies	Strategic Plan Action Strategies
A.15: Improve Grid Resilience During Extreme Weather	H5.7	
A.16: Expand Tax Credits for Conservation of Natural Resources		EC1: A
A.17: Develop Plan to Preserve Estuaries and Wetlands To Reduce Flooding		EC1: A
A.18: Training for Community Members on Climate Change and Mental Health		EC5: D
A.19: Increase Protection from the Sun at Childcare Centers		SG2: E
A.20: Incentivize Improved Cooling Equipment in Apartments	H5.4	SG2: B, SG2: E
A.21: Incentivize Businesses to Reduce Water Usage	H5.4	SG2: B, SG2: E
A.22: Protect Electrical Infrastructure from High Winds	H5.7	
A.23: Expand Community Outreach for Education on Climate Change Adaptation		EC5:D
A.24: Support Agriculture Resiliency		

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