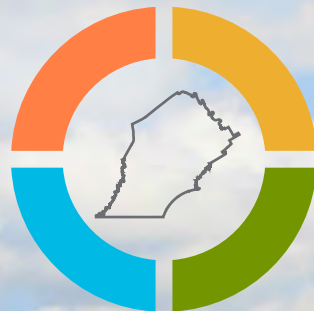


CHESTER COUNTY CLIMATE ACTION PLAN

Objectives and Actions for
County Facilities & Operations
and Community Engagement

2021



**THE COUNTY OF CHESTER
COMMONWEALTH OF PENNSYLVANIA
RESOLUTION No. 38-21**

**RESOLUTION OF THE CHESTER COUNTY COMMISSIONERS AUTHORIZING
THE ADOPTION OF THE CHESTER COUNTY CLIMATE ACTION PLAN**

WHEREAS, the County of Chester, Commonwealth of Pennsylvania, (the "County") is a Third-Class County and a political subdivision organized and existing under the laws of the Commonwealth of Pennsylvania (the "Commonwealth"); and

WHEREAS, the Board of Chester County Commissioners recognize that Climate Change is a significant issue, posing threats to the health and safety of residents, the environment, vital infrastructure, quality of life, and the economy; and

WHEREAS, actions to address climate change and reduce greenhouse gas emissions provide benefits to County residents and businesses by reducing environmental hazards, mitigating extreme weather events, improving air quality, protecting natural resources, enhancing energy security, reducing energy costs, and creating jobs; and

WHEREAS, the County has implemented multiple actions to reduce energy use and greenhouse gas emissions consistent with the Chester County Greenhouse Gas Reduction Report of 2010 and seeks now to take additional action within its own operations and to serve as a community leader on climate change; and

WHEREAS, the Chester County Planning Commission has prepared the Chester County Climate Action Plan in partnership with the County's Environmental and Energy Advisory Board, appointed by the Board of Chester County Commissioners; and

WHEREAS, the Environmental and Energy Advisory Board, after careful review, input, and consideration, recommends the adoption of the Chester County Climate Action Plan; and

WHEREAS, Chester County's Comprehensive Plan of 2018, *Landscapes3*, recommends that the county and its partners support a resilient and clean energy network.

NOW, THEREFORE, be it resolved that on the 7th day of October, 2021, the Board of Chester County Commissioners adopts the Chester County Climate Action Plan.

COMMISSIONERS:


Marian D. Moskowitz, Chair


Josh Maxwell, Commissioner


Michelle Kichline, Commissioner

ATTEST


Robert J. Kagel, Chief Clerk

CHESTER COUNTY CLIMATE ACTION PLAN

Objectives and Actions for
County Facilities & Operations
and Community Engagement
2021



Chester County Commissioners:

Marian Moskowitz
Josh Maxwell
Michelle Kichline

Adopted October 7, 2021



Prepared by the Chester County Planning Commission

Update May 2022

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VISION

Chester County's vision for Climate Action is to reduce the county's contribution to global climate change and equitably improve the health and well-being of the community by: **reducing** greenhouse emissions through government leadership and collaboration, **mitigating** impacts of climate change through resiliency and planning, and **transitioning** to clean and sustainable energy generation.

1 INTRODUCTION

Climate change is one of the most significant environmental challenges of the 21st century. It poses a threat not just to Chester County’s natural resources, but also to the economy and community health. Action to address climate change also presents opportunities for creating a healthier, safer, and more equitable zero-carbon world.

Chester County has an opportunity to make changes in ways that create jobs and benefit all residents. Scientists expect that with the current trends in fossil fuel use, Americans may see more intense heat waves, droughts, rainstorms, floods, wildfires and landslides in the future. (See Figures 1 and 2) These impacts are expected to harm the economy, degrade natural resources and worsen inequities facing many Americans. Action is required at all levels, and local governments have a unique role to play in building low-carbon communities. In Pennsylvania, temperatures have increased by more than 1.8°F since the early 20th century and are expected to increase by an additional 5.9°F by 2050.¹ Similarly, annual precipitation in Pennsylvania has increased by approximately 10% since the early 20th century and is expected to increase by another 8% by 2050, with a 14% increase during the winter season.²

FIGURE 1
U.S. Annual Temperature Compared to 20th-Century Average, 1901–2020
 30-Year normal compared to 1901–2000

Source: maps by NOAA Climate.gov, based on analysis by Jared Rennie, North Carolina Institute for Climate Studies/NCEI. ▶

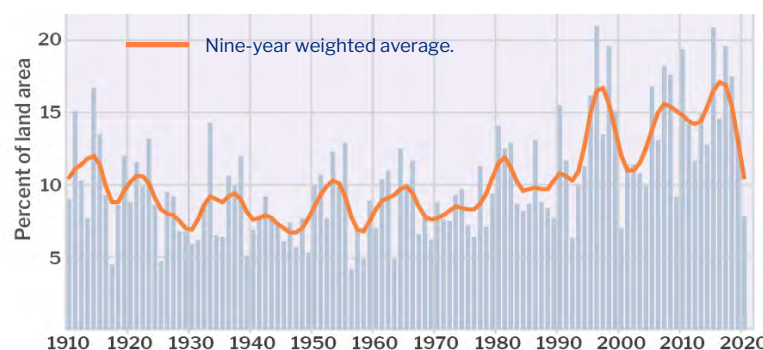
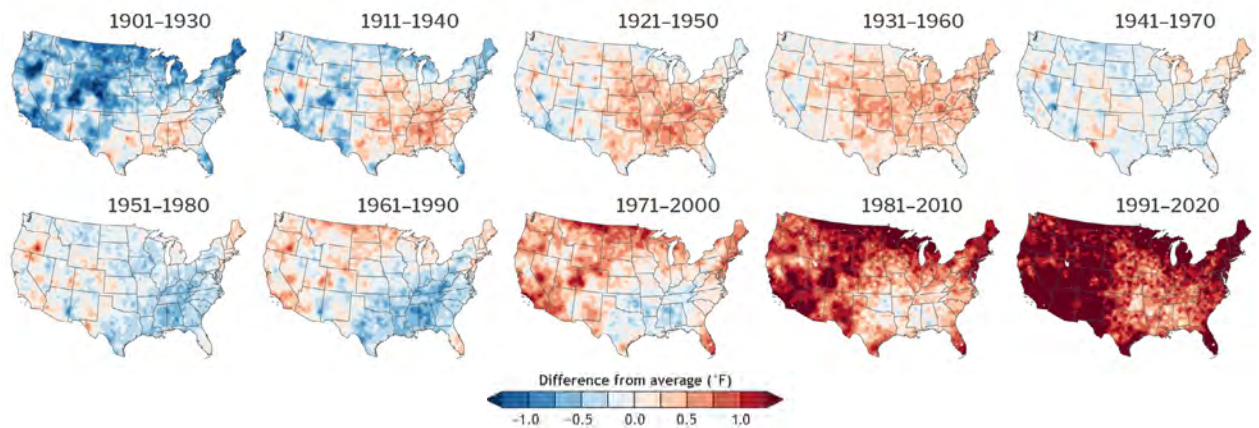


FIGURE 2
Climate Change Indicator:
Heavy Precipitation, 1910–2020
 Extreme One-Day Precipitation Events in the Contiguous 48 States

Source: chart by U.S. EPA; data from NOAA (National Oceanic and Atmospheric Administration), 2021. ▶

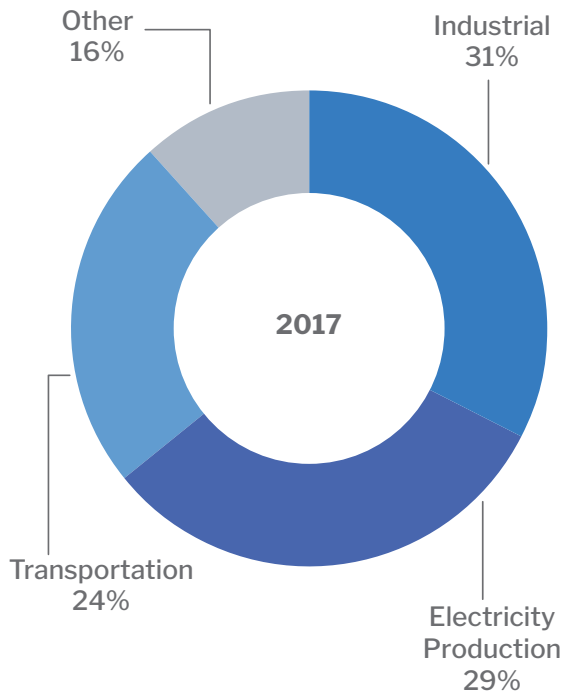
Greenhouse Gases

These impacts are caused by the accumulation of greenhouse gases (GHGs) such as carbon dioxide (CO₂) and methane (CH₄) in the atmosphere, primarily resulting from burning fossil fuels and land use changes. Although the natural greenhouse effect is needed to keep the earth warm, a human enhanced greenhouse effect with the rapid accumulation of GHGs in the atmosphere leads to too much heat and radiation being trapped. Carbon dioxide emissions from human activities have continued to rise in recent decades, reaching the highest rates in human history between 2000 and 2010 (Intergovernmental Panel on Climate Change (IPCC), 2014).

About half of all CO₂ emitted between 1750 and 2010 occurred in the last 40 years. The energy, industry, and transportation sectors have dominated the rise in emissions. In Pennsylvania, the sectors responsible for the most GHG emissions are industrial at 31 percent, electricity production at 29 percent, and transportation at 24 percent (Pennsylvania Department of Environmental Protection (PA DEP), 2020). With the current trajectory of population growth, urbanization, and reliance on personal vehicles, emissions will only continue to rise. Given the critical impacts of climate change on humanity, the time to act to reduce GHG emissions and our carbon footprint is now before we fully transition into a climate crisis.

Greenhouse gas emissions are detailed in Chapter 4.

FIGURE 3
Greenhouse Gas Emissions in Pennsylvania



Source: Pennsylvania Department of Environmental Protection (PA DEP), 2020 ▶

Role of Chester County Communities

In addition to national and state efforts to make systemic changes that will reduce global emissions, local governments can play an important role in addressing climate change. The design of American communities—how we use our land, how we design our buildings, how we get around—greatly affects the amount of energy we use and the volume of GHG emissions we produce. It is critical that Chester County adopts a plan and takes action to reduce GHG emissions while creating more vibrant, sustainable, and prosperous places to live and do business.

A Climate Action Plan led by county government is primarily one of policy, advocacy, support, and coordination. Chester County government does not have direct control over many of the actions that are proposed in this plan, beyond those that relate to county-owned facilities. Therefore, many of the actions included in this plan will require coordination and cooperation with community, municipal government and other stakeholders.

Note: Where the term “County” is capitalized in this report, it generally refers to **Chester County Government**.

Pennsylvania Acts on Climate

In 2008, the Pennsylvania Climate Change Act was passed. It requires the Department of Environmental Protection (PaDEP) to (1) develop an inventory of GHG emissions and update it annually; (2) administer a Climate Change Advisory Committee; (3) set up a voluntary registry of GHG emissions; and (4) prepare a Climate Change Action Plan and Climate Impacts Assessment, both to be updated once every three years. The most recent Climate Impacts Assessment ▶ was updated in 2021, and the most recent PA Climate Action Plan ▶ and GHG inventory, were also released in 2021. These documents offer information and guidance for local climate action planning in the Commonwealth.

The Climate Impacts Assessment provides a scientific basis for potential statewide impacts of global climate change, which can be used alongside available local data to inform community adaptation efforts. The PA Climate Action Plan summarizes statewide GHG emissions, sets an emissions reduction target, and describes potential mitigation and adaptation actions for residents and businesses, as well as local and state government. The reduction targets are 26 percent by 2025 and 80 percent by 2050 from 2005 levels, consistent with an executive order signed by Governor Wolf in 2019 (PA DEP, 2019).

The Delaware Valley Regional Planning Commission’s (DVRPC) Long Range Plan, Connections 2045, also sets a target of 80 percent reduction by 2050 as well as interim targets of achieving a 50 percent reduction in GHG emissions by 2035 and 60 percent by 2040.³ The Chester County Climate Action Plan focuses on reducing GHG emissions at the County government level and combined municipal level (i.e., for the county as a whole) to support the state and regional GHG reduction targets. **(Chester County’s goals are discussed on page 32 of the plan.)**

Plan Need

Chester County recognizes the risk that climate change poses to its residents and businesses, and is acting now to reduce the GHG emissions of both its government operations and the community at-large through the innovative programs laid out in this Climate Action Plan. Furthermore, Chester County recognizes the need to address existing climate risks such as flooding and heat waves brought on by extreme weather events and adapt its systems and infrastructure to new conditions. The plan will do our part to address environmental justice for those people vulnerable to the impacts of climate change.

This Climate Action Plan takes advantage of common sense approaches and cutting-edge policies that Chester County can implement—actions that can reduce energy use and waste, create local jobs, improve air quality, preserve our local landscape and history, reduce risk to people and property, and in many other ways benefit our citizens for years to come.

Along with a cohort of 19 other jurisdictions in the Commonwealth of Pennsylvania, Chester County began this climate action planning process in 2019. Chester County collaborated with faculty, staff, and students from Millersville University to participate in a DEP program designed to assist PA localities in preparing climate action plans.

Purpose

By creating a feasible and clear course of action so that everyone has a role in creating and achieving climate and sustainability goals, this Climate Action Plan drives and coordinates County, local, and community partner efforts toward significant reductions in GHG emissions to the greatest degree possible over the next three decades. The Climate Action Plan provides a 10-year framework for the development and implementation of actions that reduce Chester County’s GHG emissions at the County government level and county-wide. The plan provides guiding objectives and actions to realize Chester County’s GHG reduction goal.

Scope

This plan covers objectives and actions for reducing GHG emissions resulting from Chester County’s facilities and operations as well as opportunities to engage the Chester County community, including residents, business leaders, and municipal governments, among others. The plan focuses on the following sectors:



Emissions from industrial processes and fugitive emissions from natural gas systems and petroleum refining are included, but mitigation activities are outside the scope of this plan.

Audience

The plan audience consists of three primary groups: County Government (Facilities and other County Departments); Local Municipal Government (as they have direct influence over local regulatory actions); and other stakeholders including residents, businesses, and community and advocacy groups as outlined on page 39 of the plan.

Planning Process

In 2010, Chester County conducted their first assessment of emissions in a Greenhouse Gas Reduction Report.⁴ The report provided an overview of Chester County's GHG emissions as well as opportunities to reduce emissions through Chester County's operations and through the work of Chester County's municipalities. Following the Greenhouse Gas Reduction Report, the Delaware Valley Regional Planning Commission (DVRPC), the federally designated Metropolitan Planning Organization for nine regional counties, updated a GHG inventory for Chester County and neighboring counties that provides additional detail on Chester County's GHG emission profile. The 2015 DVRPC inventory provided the most current GHG emission results for this Climate Action Plan, and the mitigation activities identified in the 2010

Greenhouse Gas Reduction Report were reviewed, updated, reorganized, and included where appropriate.

The current planning process was organized by the Pennsylvania Department of Environmental Protection and is based on the overarching framework, developed by ICLEI – Local Governments for Sustainability, USA (ICLEI), known as the Five Milestones for Climate Mitigation.

Future Updates

The status of implementation actions in the Climate Action Plan should be reviewed and assessed on an annual basis. A full plan review should be undertaken at five year intervals and the emissions data should also be updated at five year intervals or as it becomes available.



FIGURE 4
**Five Milestones for Climate
Change Mitigation**

Climate action planning is a continuing cycle and does not stop with the development of this document. For Chester County, this plan represents a significant step forward in the County's climate change response.

Plan Objectives

This Climate Action Plan provides a suite of objectives, organized by the primary source of emissions, and actions to reduce GHG emissions from the County’s operations and through community-wide engagement. Actions to implement these objectives are outlined in Chapter 5 – Taking Action.



Buildings and Energy



Waste Management



**Transportation
and Land Use**



**Agriculture, Food,
and Forestry**

Buildings and Energy



County Facilities & Operations

- A. Increase energy-management capabilities.
- B. Increase building energy efficiency.
- C. Incorporate sustainable design into County buildings and facilities.
- D. Transition to renewable energy.



Community-wide Engagement

- E. Promote sustainable energy, energy efficiency, and communications.
- F. Establish and support an Environmental and Energy Advisory Board.

Waste Management



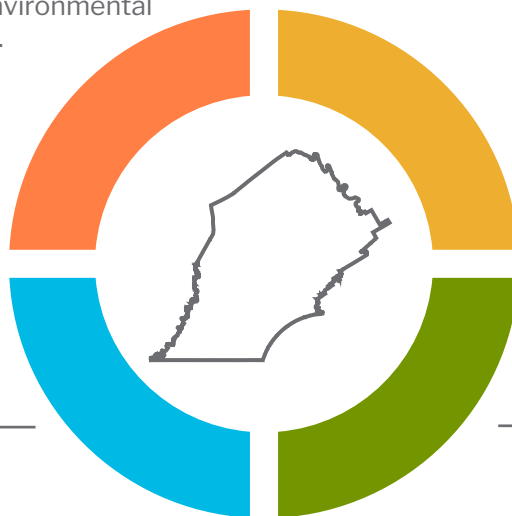
County Facilities & Operations

- A. Increase County Operations waste diversion.



Community-wide Engagement

- B. Increase county waste diversion and other best practices through partnerships and collaborations.



Transportation and Land Use



County Facilities & Operations

- A. Reduce employee commuter vehicle miles traveled.
- B. Optimize the County fleet.
- C. Encourage low/no carbon travel.



Community-wide Engagement

- D. Encourage smart growth balanced with land preservation.
- E. Promote efficient commuting and transit options.
- F. Encourage no/low emissions travel and transportation actions.

Agriculture, Food, and Forestry



County Facilities & Operations

- A. Manage County open spaces responsibly.



Community-wide Engagement

- B. Grow and preserve open spaces.
- C. Support local food production, the agricultural community, and sustainable agricultural practices.



2 PROGRESS TO DATE

Chester County has a long history of stewardship, conservation, and caring for our natural resources. In the past decade, County and municipal officials and residents have applied this ethic to address the climate change challenge through a variety of Chester County government operation and community engagement activities, many of which were recommended by the original 2010 Greenhouse Gas Reduction Report.

American Reinvestment and Recovery Act Initiatives

Through the American Reinvestment and Recovery Act of 2009 Chester County completed several initiatives that reduced County GHG emissions and advanced County sustainability, including:



High efficiency lighting was installed throughout county buildings.

- Created a County sustainability website (now incorporated into www.chescoplanning.org).
- Completed County and municipal building energy audits.
- Replaced interior and exterior lighting fixtures throughout County government buildings.
- Installed new HVAC systems in the district justice offices.
- Installed energy efficient appliances at the prison and Pocopson Home.

Identified and implemented energy and cost savings measures in County government buildings using an ESCO (Energy Service Company)—See GESA results on page 17.

County Buildings

Over the past decade, additional energy improvements have been made throughout County buildings including:

- Installed a geothermal HVAC system at Hibernia Mansion.
- Installed solar panels and high efficiency HVAC systems at the Downingtown and Oxford District Courts.
- Certified 313 West Market building as a LEED green building. This building was awarded LEED Silver certification in June 2011.

County Vehicles

The County has also completed various activities in the areas of transportation and land use, such as:

- In 2015, the County contracted with a “fleet management” consulting firm to perform an assessment on how we manage and use County vehicles.
- In the past five years, the County fleet has decreased from 235 to 216 vehicles.



313 West Market Street is LEED Silver certified.

Guaranteed Energy Savings Act (GESA) Initiatives

The County completed an energy-savings performance contract from 2015 to 2018 using the Guaranteed Energy Savings Act for 313 Market, Pocopson Home, Government Services Center, the prison, the youth center, and Henrietta Hankin Library. The work included lighting retrofits, water conservation, fuel-switching and steam valve and pipe insulation as well as installation of cooling tower sub-metering. Outcomes of the GESA program include the following:

- At least \$2,000,000 of savings have been achieved through 2020 through energy saving measures installed during the Phase 1 GESA (includes years 2016–2020). This equates to at least \$400,000 on a yearly basis, which will match the original capital outlay of \$5,932,487 by the year 2030.
- The Guaranteed Energy Savings Act (GESA) Phase 1 project resulted in:
 - 2,222,989 kWh of electricity are saved per year.
 - 8,356 MMBTU of natural gas are saved per year.
 - 18,000,000 gallons of water are saved per year. This is equivalent to 30 Olympic-size swimming pools.
- 2,007 tons of CO₂ emissions are avoided on an annual basis. This is the equivalent of the total yearly energy usage of 212 homes.
- As of 2019, the County had reduced electricity usage by 4.647% compared to year 2018.

Renewable Energy Credits

Chester County also began to purchase renewable energy credits (RECs) in April 2020 to offset GHG emissions associated with electricity purchases for County government facilities.

Other County Sustainability Initiatives

The Planning Commission’s municipal assistance, the Vision Partnership Grant program (VPP), the Act 247 Subdivision and Land Development Reviews, and the Department of Parks and Preservation support sustainability in the following ways:

- Provide funding to assist municipalities to amend ordinances to establish mixed use walkable communities, consistent with Smart Growth principles.
- Support ordinance revisions that establish mixed use communities, support adaptive reuse, increase density in growth areas, reduce parking demand, allow taller buildings where appropriate, enable and support transit oriented development, encourage the redevelopment of brownfield sites, and support effective agricultural zoning. (Planning Commission, VPP)
- Continue to support Open Space and Farmland Preservation grant programs and ordinances that encourage open space preservation. (Parks & Preservation)

The County has also established an employee sustainability initiative called “Go Green Chesco” and provides sustainability information on the County website.⁵



PHOTO CREDIT: John Felicetti
Landscapes Photo Contest Entrant

3 CO-BENEFITS OF CLIMATE ACTION

Greenhouse gas reduction and climate resilience are not the only beneficial outcomes of an effective climate change response. The following outcomes are referred to as “co-benefits,” and they illustrate how taking action on climate change results in a more prosperous, sustainable, and healthy community.



+ Improving Public Health

Climate change mitigation activities, particularly those related to transportation, help improve the quality of air by reducing vehicle emissions and therefore improve public health. Reduced electricity use, related lower power plant emissions, and reduced stationary fossil fuel combustion also benefit public health. Mitigation activities help to engender a greater degree of choice for Chester County's residents. More transit options, combined with transit-oriented development practices, make for a more vibrant, livable community with shorter commute times and more opportunities for active transportation. This creates more connected and resilient neighborhoods.

Chester County's most recent Comprehensive Plan, *Landscapes3*, includes goals to Preserve, Live, and Connect. These goals incorporate measures to improve public health that also reduce GHG emissions and increase climate resiliency, such as adding or improving parks and trails, as an example. This will not only better support public health by providing more outdoor activities, but also help combat climate change by increasing green space capable of sequestering carbon and absorbing rainwater. Urban trees and green infrastructure can also improve air quality and help decrease the urban heat island effect.

+ Saving Money and Reducing Risk

In addition to addressing climate change, measures taken to reduce GHG emissions can provide significant cost savings. In 2015, households and businesses across Chester County spent \$600 million on electricity, \$125 million on natural gas, and \$220 million on propane and fuel oil as well as an additional \$500 million on gasoline and diesel fuel for vehicles. Totaling more than \$1.5 billion dollars, these energy-related costs can be converted into significant cost savings by implementing energy efficiency and conservation measures and increasing vehicle fuel economy. Energy savings performance contracts (ESPCs) use these cost-savings to pay for the initial capital investment involved in implementing energy efficiency and other projects. Additionally, current energy expenditures demonstrate the magnitude of investment potential available for transitioning to an advanced renewable energy economy. Fire and EMS agencies are tasked with increased call volumes to incidents such as water rescues or natural cover fires due to more extreme climate events. Preparing for and responding to these types of emergency incidents is often manpower intensive at a time when Pennsylvania has already declared an emergency services staffing crisis and financial resources are limited.

Acting now will also save on runaway costs on climate change, especially in the longer term. These costs range from infrastructure damage in extreme storms and pest control to industry losses, particularly for industries that depend on environmental conditions, such as agriculture and outdoor recreation.



Flood damage is a cost associated with increased extreme weather events.



Enhancing Resource Security

A key strategic co-benefit of climate change mitigation activities is enhanced energy security through reduction in total energy demand. This will put less strain on the energy system as we transition to clean renewable energy. Similarly, demand shifts can help with improving water and food security.

Many of the actions identified here to mitigate GHG emissions will also help Chester County's government, businesses, and residents adapt to a changing climate. For example, extreme and prolonged heat waves can put considerable strain on the reliability of energy delivery in peak periods, possibly leading to service disruption during times when cooling is most needed. By increasing energy efficiency across Chester County, such service disruptions are less likely and Chester County will be able to better cope with those situations. Similarly, climate actions can secure food and water sources and prevent damage and service disruptions to these systems from heat, flooding, and ice storms. Efforts to improve

watershed quality and stormwater control will also improve resilience of infrastructure to withstand extreme weather events.

Energy infrastructure is vulnerable to climate change as increasing temperatures and precipitation threaten the reliability of the electric network. Major energy vulnerabilities include increased asset deterioration, decreased system capacity, increased load, and decreased system reliability. Internal temperature of electric power equipment is influenced by both ambient temperature and amount of power that is being used. Climate projections predict that Chester County will experience an increase in temperature through the end of the century. As ambient temperature rises, demand for cooling power and internal equipment temperature will increase, resulting in less reliable equipment with a reduced capacity and lifespan. Food security is also enhanced through supporting a more localized food supply network rather than reliance on a national or global supply chain.



The addition of clean renewable energy sources reduces the strain on the energy system and increases its reliability.

+
Creating Jobs

Renewable energy is a growing sector. The U.S. Department of Energy reports that sustainable tourism, green construction, and urban agriculture can provide job opportunities that did not exist in the past. According to the PA DEP, Pennsylvania ranks 11th among all 50 states and Washington DC for clean energy jobs (energy efficiency, renewable energy, energy storage, and clean vehicles). The climate protection measures achieved by this Climate Action Plan will continue to spur business and job growth during the design, manufacture, and installation of energy efficient technologies, which presents a particular opportunity to reinvest in the local economy and generate green jobs within Chester County. According

to the 2018 PA Climate Action Plan, there were approximately 13,000 people who were employed by clean energy supply technologies, and that number will continue to grow with each year. Clean energy jobs in Pennsylvania grew from 57,000 jobs in 2014 to nearly 91,000 jobs in 2018 and added jobs five times faster than the overall state employment rate. Clean energy, renewable energy, and energy efficiency have provided approximately 8,500⁶ jobs within Chester County, demonstrating that work to increase clean energy jobs not only addresses climate change, but also supports economic development.

Clean Energy Jobs in Pennsylvania



Source: Clean Jobs Pennsylvania, E2, 2019.⁶



Clean energy, renewable energy, and energy efficiency jobs have grown dramatically in Pennsylvania.



Fostering Social Equity

Climate Equity ensures the just distribution of the benefits of climate protection efforts and alleviates unequal burdens created by climate change. Implementation of this concept requires intentional policies and projects that simultaneously address the effects of and the systems that perpetuate both climate change and inequity. Social inequity can create disparities in public health; food, energy, and housing security; air and water quality; economic prosperity, and overall quality of life.

Climate change is expected to amplify the impacts of inequities. Residents of frontline communities which often include lower income neighborhoods, communities of color, immigrants, unhoused, outdoor workers, the very young, and the elderly may disproportionately bear the burdens of climate change impacts.

Equity is when all individuals have access to the opportunities necessary to satisfy their essential needs, advance their well-being and achieve their full potential. Environmental justice addresses fair treatment and meaningful involvement in the development of laws, policies, and regulations and the identification of issues impacting vulnerable communities.

Multiple proposed actions in this plan are identified as having the co-benefit of addressing social equity. Current county policies and activities are also addressing this issue. For example, *Landscapes3*, Chester County's Comprehensive Plan, includes activities to advance equity across the county using approaches that also address climate change. As an example, work to update housing policies and regulations to include fair, green, and affordable housing, includes locating housing in central areas that provide citizens, especially populations that are vulnerable to climate change impacts,

access to employment, transportation, and social services. Incorporating universal design and multi-generational housing helps to support social resiliency and equity. The plan discusses creating public and private housing opportunities to help seniors, young adults, workers, and those with limited incomes. The plan also states that seniors are one of the populations expected to grow in the coming years, they are also one of the populations most vulnerable to climate change due to heat-related illnesses. Access to healthcare facilities and adequately-conditioned senior living communities will be particularly important for senior populations.⁷

The Chester County Department of Community Development⁸ provides significant support in advancing social equity through their many programs that support affordable housing, neighborhood improvement, workforce development, and social services to citizens so that they can have the opportunity to live and work in a safe, stable, and diverse community. Assistance through the Urban Revitalization program includes funding for infrastructure improvements such as stormwater management facilities that can help to mitigate the impacts of extreme weather events.

Addressing Resiliency & Mitigation

In addition to addressing the factors that create climate change, dealing with the impacts of climate change that are already being experienced is important. The Chester County Hazard Mitigation Plan (2021) includes actions for addressing the impacts of such related issues as drought, flooding, extreme heat events, utility interruptions, and invasive species. For more information and links to the plan, see Chapter 6, Resiliency & Mitigation.



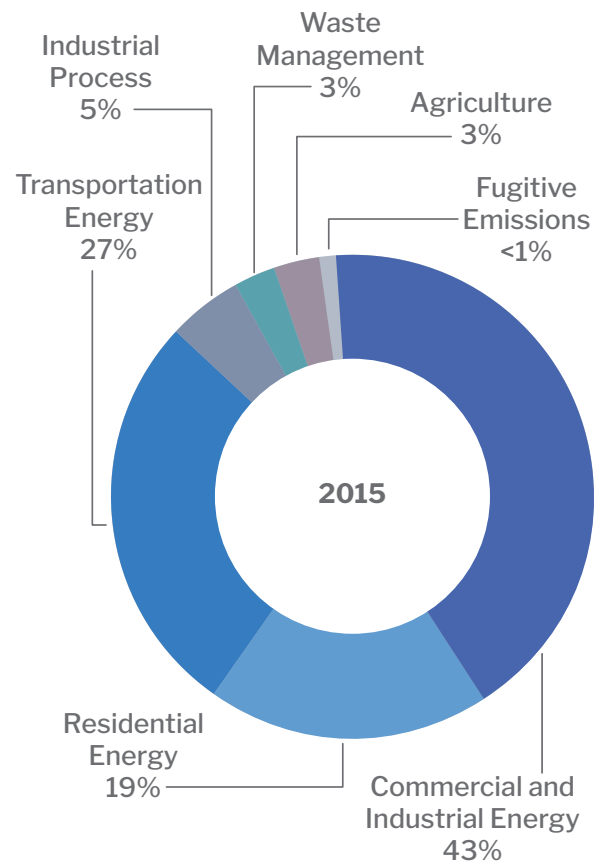
PHOTO CREDIT: Sarah Rafferty
Landscapes3 Photo Contest Entrant

4 GREENHOUSE GAS EMISSIONS

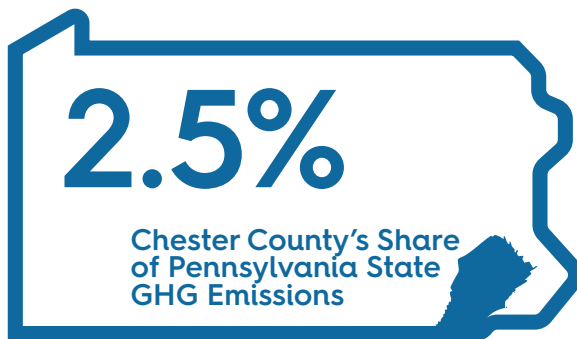
Chester County’s county-wide GHG emissions totaled 7.2 million metric tons of carbon dioxide equivalent (MTCO₂E) in 2015. Net emissions, which account for carbon sequestered by urban trees and managed lands, totaled 7.0 million MTCO₂E.

At 4.5 million MTCO₂E, energy use accounts for the majority (62 percent) of Chester County’s GHG emissions (Figure 5). Commercial and industrial buildings alone account for 43 percent (3.1 million MTCO₂E) of Chester County’s gross emissions while residential energy use accounts for 19 percent of overall emissions (1.4 million MTCO₂E). At 2.0 million MTCO₂E, transportation energy accounts for 27 percent of total emissions. At 1.9 million MTCO₂E, motor vehicles account for nearly all transportation emissions. Remaining transportation emissions result primarily from off-road vehicles (69,514 MTCO₂E) and commuter rail (8,138 MTCO₂E). Remaining gross emissions result from industrial processes (348,615 MTCO₂E, 5 percent of total), waste management (210,828 MTCO₂E, 3 percent of total), agriculture (203,475 MTCO₂E, 3 percent of total), and fugitive emissions (26,717 MTCO₂E, <1 percent of total) (Figure 5).⁹

FIGURE 5
County-Wide Greenhouse Gas Emissions by Sector, 2015



Source: Chester County’s GHG 2015 GHG emissions were provided by the Delaware Valley Regional Planning Commission.



Chester County’s GHG emission total of 7.2 million MTCO₂E accounts for approximately 2.5 percent of Pennsylvania’s emissions, which totaled 287 million MTCO₂E in 2015.

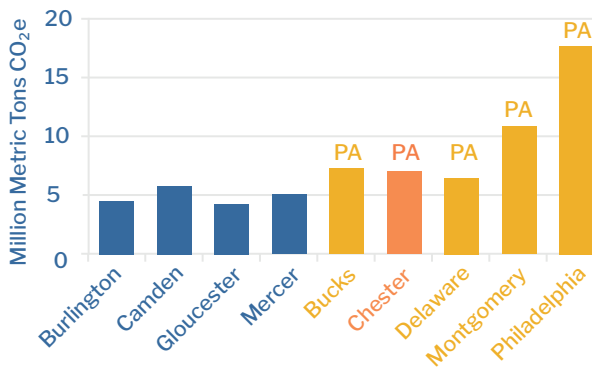
FIGURE 6
County-Wide Greenhouse Gas Emissions by Sector and Source, 2015

	GHGs (MMTCO ₂ E)*	Percent	Source Description
Commercial & Industrial Energy	3.1	43%	
Electricity	1.7		Carbon dioxide (CO ₂), methane (CH ₄), and nitrous oxide (N ₂ O) emissions from the combustion of fossil fuels to generate electricity.
Stationary Combustion	1.4		CO ₂ , CH ₄ , N ₂ O from the combustion of fossil fuels to supply energy for purposes other than electricity generation and transportation (e.g., heating).
Residential Energy	1.4	19%	
Electricity	0.6		Carbon dioxide (CO ₂), methane (CH ₄), and nitrous oxide (N ₂ O) emissions from the combustion of fossil fuels to generate electricity.
Stationary Combustion	0.8		CO ₂ , CH ₄ , N ₂ O from the combustion of fossil fuels to supply energy for purposes other than electricity generation and transportation (e.g., heating).
Transportation Energy	2.0	27%	
Motor Vehicle	1.9		CO ₂ , CH ₄ , N ₂ O from the combustion of fossil fuels to power motor vehicles such as light- and heavy-duty, gas- and diesel-powered vehicles and trucks.
Rail	<0.1		CO ₂ , CH ₄ , N ₂ O from the combustion of diesel fuel and indirect use of electricity to power passenger and freight rail.
Off-Road Vehicle	0.1		CO ₂ , CH ₄ , N ₂ O from the combustion of fossil fuels to power off-road equipment such as agricultural equipment, construction equipment, and industrial equipment.
Industrial Process	0.3	5%	
Iron and Steel Productions	0.1		Non-energy GHG emissions that result from steel plate production at the Arcelor Mittal facility in Coatesville.
ODS Substitutes (Ozone depleting substances)	0.3		Fugitive emissions of high global-warming-potential (GWP) GHGs from the use of chemicals for refrigeration, air-conditioning, fire suppression, and other purposes.
Waste Management	0.2	3%	
Landfill	0.2		CH ₄ from the anaerobic decomposition of landfilled waste.
Wastewater	0.1		CH ₄ and N ₂ O from the anaerobic decomposition of nitrification/denitrification of biosolids in wastewater.
Agriculture	0.2	3%	
Enteric Fermentation	0.1		CH ₄ from primarily ruminant livestock.
Manure Management	<0.1		CH ₄ and N ₂ O from the decomposition of waste manure.
Agricultural	0.1		CH ₄ and N ₂ O from the decomposition of livestock manure, fertilizer use and plant residue on agricultural lands.
Fugitive Emissions	<0.1	<1%	
Natural Gas Systems	<0.1		Non-combustion GHG emissions (CH ₄) from the production, transmission and distribution of natural gas.
Petroleum Refining	<0.1		CO ₂ and CH ₄ emissions associated with venting, leaking and other losses associated with the production, refining and transportation of petroleum products.
TOTAL GROSS EMISSIONS**	7.2		
LULUCF (Land use, land use change, and forestry)	-0.2		
Urban Trees	-0.1		Carbon stored (sequestered) in trees in urban areas.
Forest Loss/Gain & Sequestration	-0.1		Net carbon sequestration and emissions associated with the growth and decomposition of trees on forested lands.
TOTAL NET EMISSIONS	7.0		

* Million metric tons of carbon dioxide equivalent

** Totals may not sum due to rounding

FIGURE 7
GHG Emissions by County (MMTCO₂e), 2015



Chester County ranked 2nd lowest in GHG Emissions of the Pennsylvania counties in the DVRPC region.¹⁰

Source: DVRPC 2018

FIGURE 8
GHG Emissions per Capita by County (MTCO₂e) per Person/Job, 2015

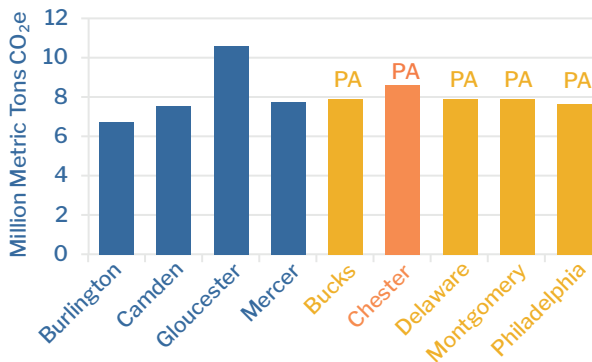
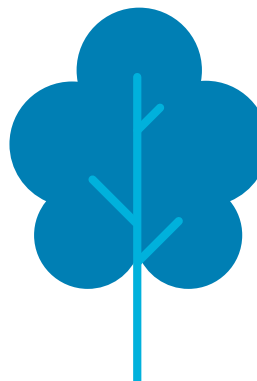


Figure 8 shows Chester County’s GHG Emissions per Capita in comparison to other counties in the DVRPC region. In 2015, Chester County had a per capita GHG Emission of 8.4 MTCO₂e which was higher than, but still comparable to, most other Pennsylvania counties in the Region.¹¹ The county’s lower population density may be one factor in the higher per capita emissions.

Source: DVRPC 2018

Chester County Carbon Offset Efficiency

Offsetting Chester County’s annual GHG emissions would require planting approximately 120 million tree seedlings and allowing them to grow for at least ten years.¹² Between 620,000 and 1.1 million acres would be needed to accommodate 120 million seedlings. For context, Chester County’s total area is 485,845 acres and the latest tree coverage for the County is 133,055 acres or 27% of the County’s area (DVRPC, 2015).



Offsetting Chester County’s annual GHG emissions would require planting approximately 120 million tree seedlings and allowing them to grow for at least ten years.

Government Operations GHG Emissions

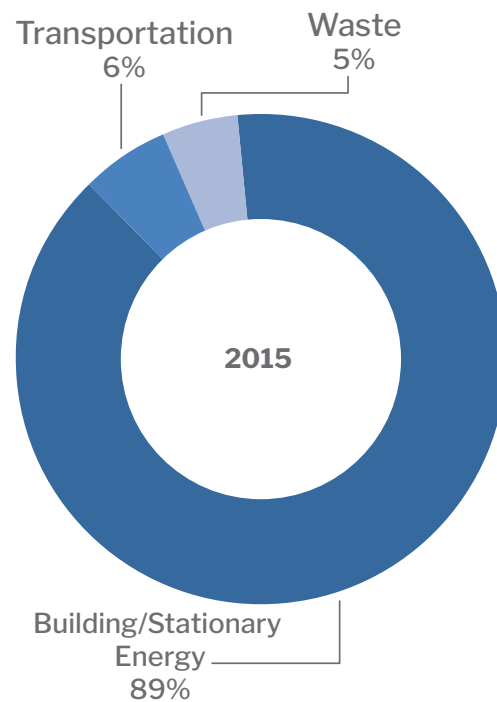
Chester County also prepared a limited GHG emission inventory of Chester County’s government operations in addition to the county-wide GHG emission inventory.¹³ GHG emissions from Chester County’s buildings, fleet vehicles, and waste disposal were included in the government operations GHG inventory, which totaled 15,951 MTCO₂E in 2015 (Figure 9). Building energy emissions, including electricity, natural gas and heating fuel use in County government buildings totaled 14,121 MTCO₂E. GHG emissions from County vehicles totaled 1,040 MTCO₂E and GHG emissions from waste disposal totaled 790 MTCO₂E (Figure 9). Government emission estimates do not include GHG emissions from employee commuting and business travel, refrigerants used in County buildings, and emissions associated with wastewater treatment, among other sources. County emissions are embedded within the county-wide totals. For example, emissions from government buildings are included in the “Commercial” sector and emissions from Chester County’s fleet vehicles are included in Transportation emissions. Government operations are therefore a subset of total community emissions.

We note that the energy-related GHG emissions produced by Chester County government facilities account for a small percentage (0.3%) of the total emissions in the county overall. It will only be through a concerted effort at all levels of the public and private sectors that significant reductions in GHG emissions can be realized in Chester County.

FIGURE 9
Chester County Government Operations Greenhouse Gas Emissions by Sector, 2015*

SECTOR	GHGS (MTCO ₂ E)	PERCENT OF TOTAL EMISSIONS
Energy	14,121	89%
Transportation	1,040	6%
Waste	790	5%
TOTAL	15,951	100%

* Excludes transportation emissions associated with employee commuting and business travel, among other sources.



Renewable Energy Credits (RECs)

Starting in April 2020, Chester County began to purchase renewable energy credits (RECs) to offset GHG emissions associated with electricity purchases. The RECs that Chester County are utilizing are sourced from domestic wind energy, and have been purchased for 100% of County facilities' electricity supply through January 2024. While an updated Managing for Results (MFR) Facilities GHG inventory has not yet been prepared, purchasing RECs significantly reduces Chester County's current GHG emissions from the use of electricity relative to what they would be in the absence of REC purchases. While this purchase program does not directly add renewable energy sources to the power grid, it does reduce the County's carbon footprint and supports the use of renewable energy sources.



To offset GHG emissions associated with its electricity purchases, Chester County has been purchasing renewable energy credits sourced from domestic wind energy since April 2020.

Greenhouse Gas Emissions Forecast

Chester County government completed a county-wide emissions forecast based on projections of current data and expected future trends. This emissions forecast represents a business-as-usual (BAU) scenario where no further local actions are implemented. The forecast was prepared using Chester County's projected population growth as a proxy for emissions growth in each of the seven sectors: Commercial and Industrial Energy, Residential Energy, Transportation Energy, Industrial Processes, Waste Management, Agriculture and Fugitive Emissions.¹⁴ Chester County's GHG emissions are projected to be 9.6 million MTCO₂E by 2050 based on this forecast. The forecast indicates that, in the absence of efforts to reduce emissions, Chester County's county-wide total GHG emissions could increase by approximately 33 percent by 2050. (Figure 10).¹⁵

Under this scenario, energy GHG emissions are projected to be 5.7 million MTCO₂E, transportation emissions are projected to be 2.5 million MTCO₂E, industrial process emissions are projected to be 0.5 million MTCO₂E and waste management and agricultural GHG emissions are each projected to be less than 1 million MTCO₂E.

FIGURE 10
County-Wide GHG Emissions Forecast Under Current Trends (2015–2050)

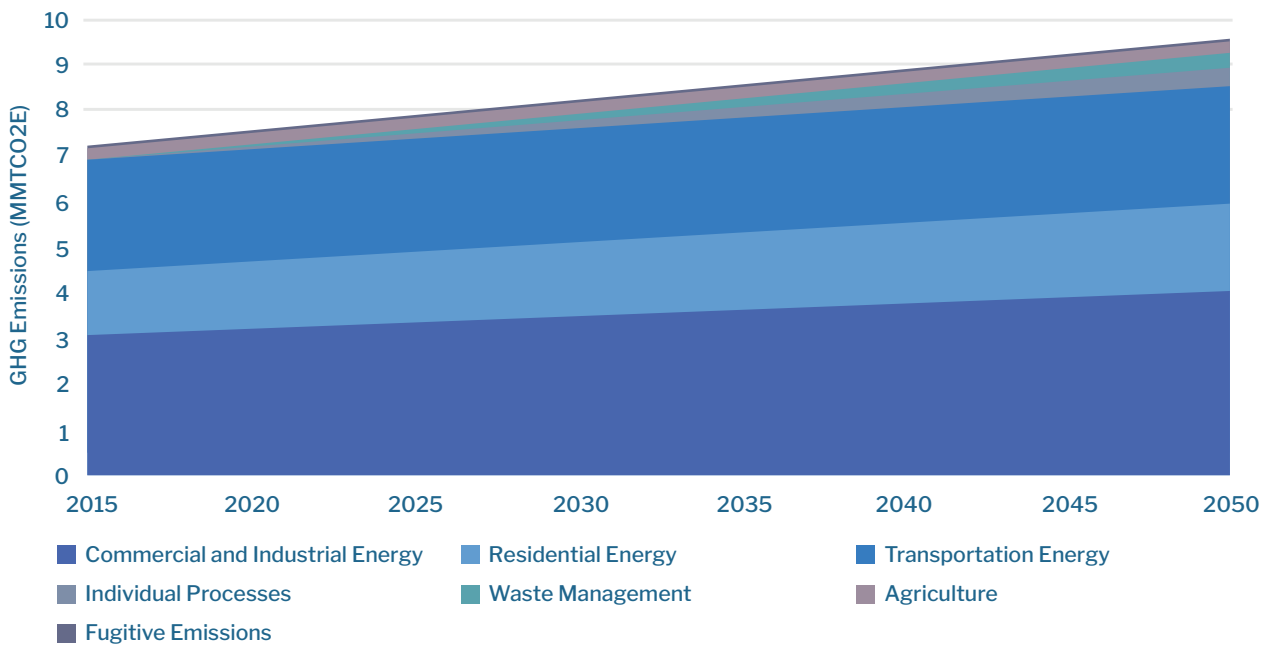


FIGURE 11
Chester County 2050 GHG Emissions Forecast Under Current Trends

Sector	GHG Emissions, 2015 (MMTCO2E)*	GHG Emissions, 2050 (MMTCO2E)*
Commercial and Industrial Energy	3.1	4.1
Residential Energy	1.4	1.9
Transportation	2.0	2.6
Industrial Processes	0.3	0.4
Waste Management	0.2	0.3
Agriculture	0.2	0.3
Fugitive Emissions	<0.1	<0.1
Total	7.2	9.6 (+33%)

*Totals may not sum due to rounding.

Greenhouse Gas Reduction Goal

In support of the Pennsylvania Climate Action Plan and the DVRPC Long Range Plan, the Chester County Climate Action Plan proposes to reduce county-wide GHG emissions through a wide range of County and local actions. **The target reduction goal for both the County government and county-wide is an 80 percent reduction in GHG emissions by 2050 from 2005 levels**, in alignment with the state and regional greenhouse gas reduction goals. Chester County recognizes that the specific percentages for reduction will only be achievable through significant actions at the state and federal level as well as extensive changes in personal behavior and economic choices. Figure 12 indicates the types of reductions that would be needed to achieve these goals and the actions needed county-wide to achieve those targets.

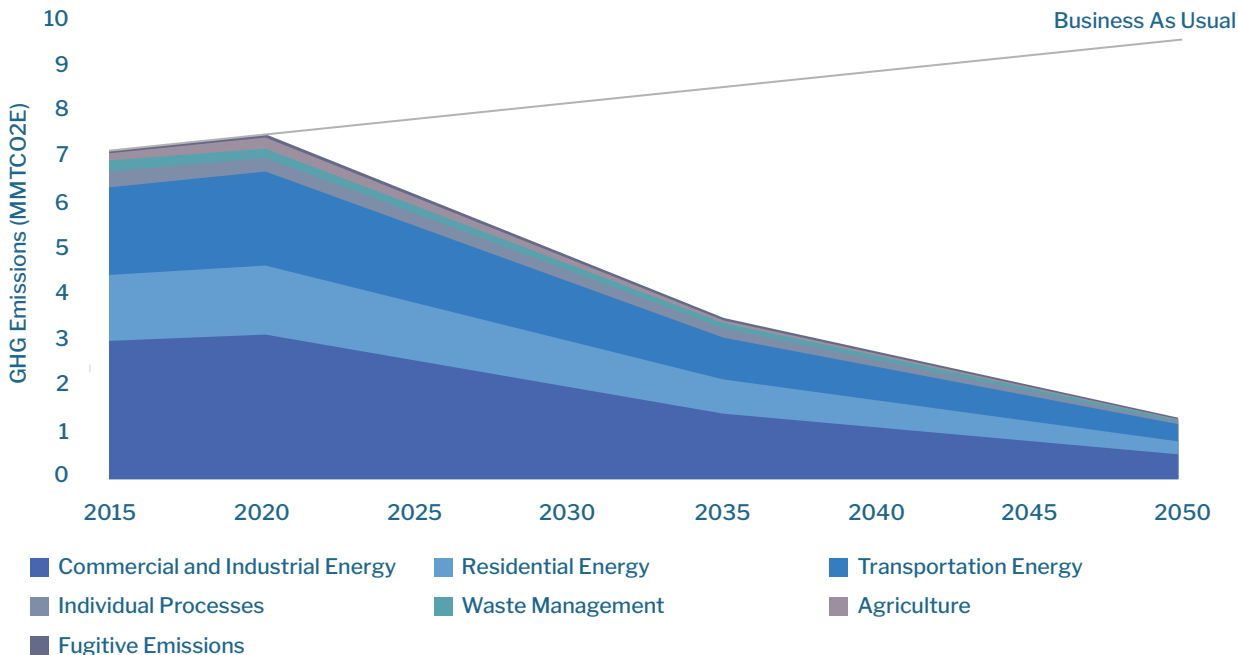
To set an implementable course, the Chester County Climate Action Plan, focuses on those actions that can be implemented or influenced by County government (Facilities and Operations and other departments) and community-wide through municipal governments and local stakeholders. The overriding goal of the plan is to support and assist with meeting the state and regional reduction targets for 2050. Specific performance measures to assess whether we are successfully moving towards this goal and the objectives, and actions of the plan are presented in Chapter 7.

Achieving an 80 percent reduction goal by 2050 will require intermediate steps, stages, and objectives to reduce GHG. The Environmental & Energy Advisory Board (EEAB) has reviewed and recommended appropriate milestones linked to achievable strategies that help guide the overall county plan to achieve the goals. The implementation steps of the plan would mirror the Landscapes approach that develops a unified vision using input from stakeholders and accessing resources from federal, state and local sources. The EEAB analysis also prioritizes and sets time frames to achieve the intermediate goals and implementation steps.

Significant reductions in GHG emissions will only be possible by reducing our energy footprint in all sectors through increases in energy efficiency and conservation, electrifying most, if not all, building heating and transportation uses, and transitioning to clean renewable sources of energy. Doing so will require increased and sustained coordination among businesses, organizations, and residents within Chester County as well as broader coordination among local, regional, state, and federal government.

The remainder of this plan provides specific actions that Chester County will take to reduce GHG emissions in support of this goal. Actions include those that Chester County government will take to reduce GHG emissions within its own operations as well as those that the broader community can pursue collaboratively.

FIGURE 12
DVRPC and PA Goals Applied to Chester County



Achieving an 80% reduction goal by 2050 will require significant reductions in most emission sectors and dramatic changes in the economic policies and consumer preferences. An example approach to achieve this scenario in Chester County would be to:

- **Source 100% of electricity from renewables** county-wide.
- **Achieve a 75% reduction in emissions from stationary combustion in residential, commercial and industrial sectors** through energy conservation and efficiency improvements through electrification to transition away from onsite fossil fuel combustion by promoting electric technologies for space heating, domestic hot water, and cooking purposes.
- **Convert 75% of the county-wide vehicle fleet to electric vehicles** or other low emission vehicles.
- **Reduce industrial process emissions by 20%** through efficiency and other improvements.
- **Reduce emissions associated with waste management by 100%** by transitioning to a zero-waste framework (everything is recycled, reused or composted).
- **Reduce agricultural emissions by 30%** by implementing methane capture and sequestering carbon in agricultural soils through management practices.
- **Reduce fugitive emissions by 75%** through reduced transmission of natural gas as an example.



PHOTO CREDIT: David.Deaville
Landscapes3 Photo Contest Entrant

5 TAKING ACTION

This chapter provides an approach for Chester County to begin reducing Chester County’s GHG emissions through its own operations as well as by engaging the broader Chester County community. Actions are organized under the following four categories based on the primary source of emissions and the focus of the proposed actions.

Each set of actions is further organized according to whether it is to be implemented by County Facilities or through community-wide efforts. Potential impact of the action, priority, timeframe, co-benefits, and implementers are identified in the action tables.



Buildings and Energy



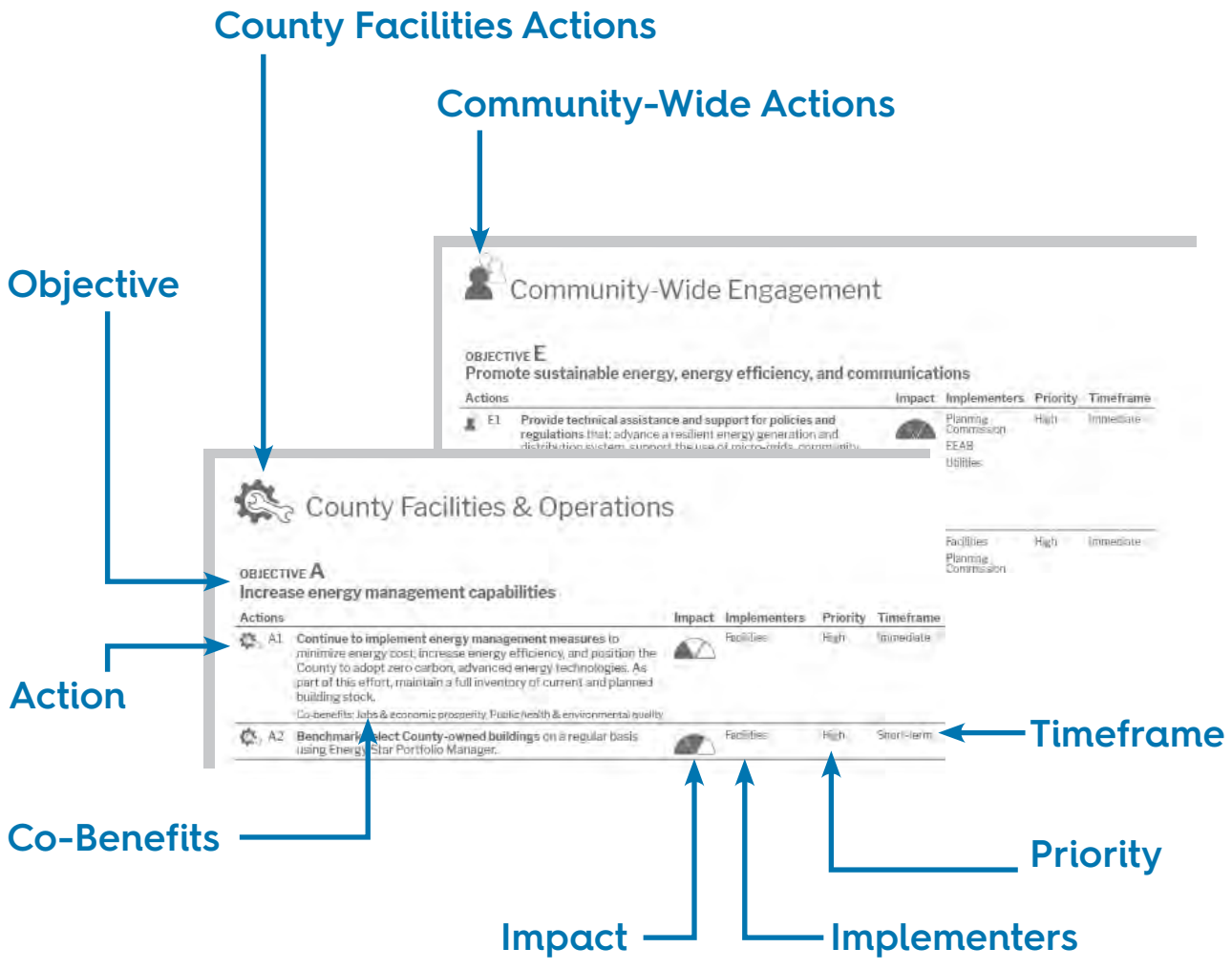
Waste Management



Transportation and Land Use



Agriculture, Food, and Forestry



Objectives and Actions

This Climate Action Plan provides objectives and actions to reduce GHG emissions from the County's operations and through community-wide engagement

County Facilities vs. Community-Wide Actions

Each section differentiates between the County's efforts to reduce GHG emissions from its own operations (County Facilities & Operations) and efforts to engage the broader Chester County community (Community-wide Engagement). A series of broad objectives with supporting actions are explored for each sector. The changing regulatory environment, and how it drives energy policies in the future, may impact some actions and their effectiveness and feasibility.

County Facilities & Operations



Community-wide Engagement



Impacts

Calculating expected emissions reductions for each objective and action requires making assumptions about degree of implementation, technology, and individual behavioral changes several years into the future. The uncertainty associated with these assumptions makes it difficult to assign the exact reduction achievable by each objective or action. To address this uncertainty and provide a simple but useful reference for reduction potential, a gauge symbol below and impact level have been devised to represent the emission reductions associated with each objective and its actions.



Low Impact



Moderate Impact



High Impact

Priorities

Each action has been assigned a priority of **Low, Medium, or High**. A significant factor in assigning priorities was the impact the action would have on the reduction of greenhouse gas emissions. Therefore a lower priority should not necessarily be viewed as an action of less importance except as it relates to the goal of GHG reduction in this plan.

Co-Benefits

In addition to measuring the GHG reduction potential, each objective and action is also evaluated for other benefits

- Jobs & economic prosperity
- Public health & environmental quality
- Social equity

Timeframe

Actions are also assigned a timeframe for initiation or completion (depending on the type of action) of Immediate, Short-term, and Long-term. Those timeframes should be interpreted as follows, starting with the adoption date of the plan:

Immediate

Start within one year or continue as an on-going action if already underway

Short-term

Start within two to three years

Long-term

Start within three to five years

Any action can be started sooner than the assigned timeframe if specific opportunities arise that make implementation possible.

Review and assessment of plan actions should take place on an annual basis.

Implementers

The “Implementer” category identifies those parties who would take a leading role in the implementation of a proposed strategy.

For the Community-wide Engagement objectives and actions, an on-going stakeholder outreach is needed to identify opportunities, priorities and listen for feedback to improve the actions and resources. Chester County, in conjunction with the Environmental and Energy Advisory Board (EEAB), will play a significant role in initiating and maintaining this engagement to the stakeholder groups identified in this chapter.

County Government

Agricultural Development Council (ADC)
Commissioners
*Conservation District (CCCD)**
Community Development
*Emergency Services (DES)**
Environmental & Energy Advisory Board
*Facilities**
Finance/Risk Assessment
*Health (CCHD)**
Parks and Preservation (Formerly Parks and Open Space)*
*Planning Commission (CCPC)**
Procurement
*Water Resources Authority (CCWRA)**
Chester County Recycling Committee (employees with guidance from CC Solid Waste Authority)

Municipalities

*Municipal Government, CCATO**

Regional Planning Organizations

Delaware Valley Regional Planning Commission (DVRPC)

Transportation Agencies

Public Transit, Transportation Management Associations, PennDOT

Utilities

*Energy, Sewer, Water**

Businesses (including CCEDC and Chambers)*

Land Trusts & Conservancies*

Environmental Advocacy Groups*

Solid Waste Authorities (Chester County and SECCRA)

Education (School Districts, Private Schools, Universities, Technical and Post-Secondary Schools)

Other Federal and State Agencies

National Park Service, PaDEP, DCNR

Historic Preservation Network

Citizens*

Residents and other volunteers

* Groups represented on the Environmental & Energy Advisory Board (EEAB)

Next Steps

Following Plan adoption, implementation will begin with outreach to stakeholders and initiating those actions identified as Immediate. Actions will be further organized by implementers, timeframe, and priority to facilitate work with specific groups of stakeholders and volunteers.



Buildings and Energy



County Facilities and Operations

To reduce energy-related greenhouse gas emissions from its operations Chester County will:

- A. Increase energy-management capabilities
- B. Increase building energy efficiency
- C. Incorporate sustainable design into county buildings
- D. Transition to renewable energy



Community-wide Engagement

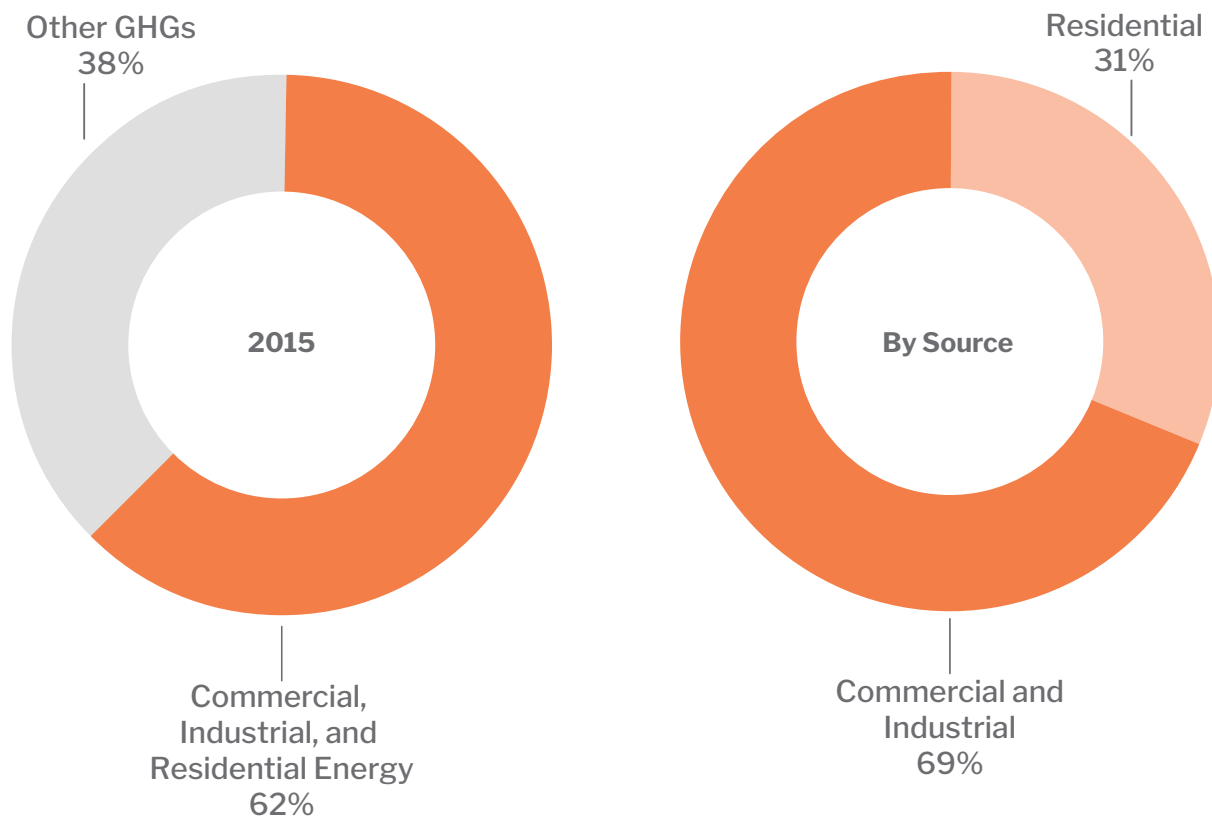
Chester County will reduce community-wide energy-related greenhouse gas emissions by implementing the following objectives:

- E. Promote sustainable energy, energy efficiency, and communications
- F. Establish and support an Environmental and Energy Advisory Board

The Challenge

Energy consumed in Chester County's commercial, industrial and residential buildings and other infrastructure (e.g., wastewater treatment plants, water distribution systems) account for 62 percent of the County's total emissions. The majority (69 percent) of these emissions stem from commercial and industrial activities, with the remainder (31 percent) stemming from residential buildings.

FIGURE 13
Chester County's Energy-Related Greenhouse Gas Emissions





















County Facilities & Operations

OBJECTIVE A

Increase energy management capabilities









Actions	Impact	Implementers	Priority	Timeframe
<p> A1 Continue to implement energy management measures to minimize energy cost, increase energy efficiency, and position the County to adopt zero carbon, advanced energy technologies. As part of this effort, maintain a full inventory of current and planned building stock.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Facilities	High	Immediate
<p> A2 Benchmark select County-owned buildings on a regular basis using Energy Star Portfolio Manager.</p>		Facilities	High	Short-term

OBJECTIVE B**Increase building energy efficiency**

Actions	Impact	Implementers	Priority	Timeframe
 B1 Continue to retrofit interior and exterior lighting to LED or other high efficiency lighting. Co-benefits: Jobs & economic prosperity		Facilities	High	Immediate
 B2 Continue to install timers and procedures to shut off County building exterior lighting within one hour of building, park and parking lot closure (excluding safety and security lighting). Co-benefits: Jobs & economic prosperity		Facilities	High	Immediate
 B3 Participate in opportunities for energy-savings and water savings performance contracts to increase energy efficiency in County buildings such as through the PaDEP Shared Energy Manager Program, Guaranteed Energy Savings Act (GESA), and similar programs. Co-benefits: Jobs & economic prosperity		Facilities	High	Immediate
 B4 Investigate opportunities for replacing existing fossil fuel space heating and domestic hot water with electric systems such as heat pumps (either air source or geothermal) and waste heat recovery in new construction and when upgrading building heating and cooling systems and hot water systems. Co-benefits: Jobs & economic prosperity		Facilities	High	Short-term
 B5 Establish energy efficiency performance targets using Net Zero Ready ▶ for new building construction starting in two years. Co-benefits: Jobs & economic prosperity		Facilities	Medium	Short-term
 B6 Explore opportunities to install solar panels and arrays at Chester County facilities and properties. (See also Building and Energy Action D3) Co-benefits: Jobs & economic prosperity		Facilities	Medium	Long-term









OBJECTIVE C

Incorporate sustainable design in County buildings & facilities

Actions	Impact	Implementers	Priority	Timeframe
 C1 Implement green building standards (e.g., LEED, Living Building) for new construction and major renovation of all County buildings with LEED Silver as preferred minimum standard. Co-benefits: Jobs & economic prosperity		Facilities	High	Short-term
 C2 Install Electric Vehicle (EV) chargers at County parking facilities. (See also Transportation and Land Use Action E8)		Facilities	High	Short-term
 C3 Create a webpage to track the County’s energy efficiency initiatives including past initiatives and new initiatives as they are implemented.		Facilities	Medium	Short-term
 C4 Analyze the potential for green/vegetated roofs at County buildings; install where preferable to solar panel installation.		Facilities	Low	Long-term

OBJECTIVE D

Transition to renewable energy

Actions	Impact	Implementers	Priority	Timeframe
 D1 Maximize opportunities to continue procuring 100% of electricity from renewable sources for government operations. (See also Buildings and Energy Action E2) Co-benefits: Public health & environmental quality		Facilities	High	Immediate
 D2 Limit new easements for fossil fuel infrastructure related projects on County property , including but not limited to liquefied natural gas projects. Co-benefits: Public health & environmental quality		Commissioners Facilities	High	Immediate
 D3 Analyze the potential to expand on-site solar energy generation including rooftop panels and ground solar arrays. (See also Buildings and Energy Action B6) Co-benefits: Jobs & economic prosperity		Facilities	High	Short-term
 D4 Promote electrification of heating, cooking, hot water and landscaping equipment to increase renewable energy market demand. Co-benefits: Public health & environmental quality		Facilities	Low	Long-term



Community-Wide Engagement

OBJECTIVE E

Promote sustainable energy, energy efficiency, and communications










Actions	Impact	Implementers	Priority	Timeframe
 E1 Provide technical assistance and support for policies and regulations that: advance a resilient energy generation and distribution system, support the use of micro-grids, community solar and local energy management; promote energy conservation; support renewable energy sources; and reduce greenhouse gas emissions. Develop effective outreach and communication to implementers and stakeholders on these issues. Co-benefits: Jobs & economic prosperity, Public health & environmental quality		Planning Commission EEAB Utilities	High	Immediate
 E2 Work with DVRPC to coordinate energy and climate programs at a regional level. Explore the feasibility of establishing a solar Power Purchase Agreement (PPA) program for the region's counties, interested municipal governments, and other large energy users such as water and wastewater authorities, schools, and libraries. Explore the value of participating in a Regional Energy Consortium. Co-benefits: Jobs & economic prosperity, Public health & environmental quality		Facilities Planning Commission DVRPC Municipalities EEAB	High	Immediate
 E3 Develop and promote ordinances and other materials that support the use of alternate and emerging energy technologies, energy efficiency, sustainable construction, beneficial electrification, and development of renewable energy (including the orientation of buildings to maximize solar gain and the allowance of rooftop solar by Homeowner Associations). Provide model ordinances and related information and resources on the County website and promote through a variety of avenues. Co-benefits: Jobs & economic prosperity, Public health & environmental quality		Planning Commission Municipalities	High	Immediate
 E4 Support participation in the regional streetlight procurement program organized by the Delaware Valley Regional Planning Commissions (DVRPC) that converts streetlights to LED. Co-benefits: Jobs & economic prosperity, Public health & environmental quality		Planning Commission DVRPC Municipalities	High	Immediate
 E5 Use Vision Partnership Planning grants to support development and implementation of local community renewable energy planning and ordinances. Co-benefits: Jobs & economic prosperity		Planning Commission Municipalities	High	Immediate
 E6 Provide information on financial assistance resources for weatherization and energy improvements for homeowners, including seniors and low-income residents with older homes. Co-benefits: Jobs & economic prosperity, Public health & environmental quality, Social equity		Municipalities Planning Commission Utilities	Medium	Immediate
 E7 Establish community-wide renewable energy targets with a goal to achieve 100% renewable electricity county-wide by 2050. Co-benefits: Jobs & economic prosperity		County Municipalities	High	Short-term
 E8 Promote energy efficiency in outdoor lighting and buildings, including smart thermostats, energy efficient lighting and HVAC systems, building weatherization, passive heating, waste heat recovery, and green building design. Require energy efficient features in new building construction. Co-benefits: Jobs & economic prosperity, Public health & environmental quality		Municipalities Utilities Planning Commission	High	Short-term

Actions	Impact	Implementers	Priority	Timeframe
<p> E9 Reduce soft costs of local (aka distributed) solar by streamlining the local application, permitting, and inspection processes.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Municipalities	Medium	Short-term
<p> E10 Continue to adopt and promote exterior lighting guidelines for residents and business that are Dark Sky Friendly and encourage retrofitting exterior lighting to LEDs, upgrading exterior lighting to solar-powered devices, and installing timers and procedures to shut off exterior lighting within one hour of building, park, and parking lot closure (excluding safety and security lighting).</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Municipalities Planning Commission	High	Short-term
<p> E11 Work towards establishing a dedicated, secure funding source to support renewable energy programs and financial incentives. Fully implement and promote the Commercial Property Assessed Clean Energy (C-PACE) program to support clean energy financing on commercial properties. Explore cooperative purchases or grants for solar panels and EV charging stations for municipalities. Convene and support outreach with local lenders to provide home energy loans that are affordable for all income groups.</p> <p>Co-benefits: Jobs & economic prosperity, Social equity</p>		Municipalities Utilities CCEDC Assessment Office (C-PACE)	High	Short-term
<p> E12 Support renewable energy development among community service organizations such as schools (public and private), libraries and fire departments through knowledge sharing and aggregate purchasing. (See also Buildings and Energy Action E2)</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality, Social equity</p>		Municipalities Utilities	High	Short-term
<p> E13 Promote workforce development in renewable energy technology in conjunction with the CCEDC and their Smart Energy Initiative.</p> <p>Co-benefits: Jobs & economic prosperity, Social Equity</p>		CCEDC/SEI Education (technical & post-secondary)	High	Short-term
<p> E14 Assess building codes and provide guidance on how they could be enhanced to support alternative energy, greater energy efficiency, and EV use. This could include offering incentives to use the Green Building Code (IGcc) or the ICC Zero Code, promoting passive house and zero energy design and construction, and incorporation of renewable energy infrastructure into new construction. Consider requiring new construction such as commercial developments, multifamily developments, single family construction, and major renovations to be EV-ready to ensure that new buildings are properly equipped to handle the installation and operation of EV charging infrastructure. Provide municipal guidance on installation of public charging stations such as those found on this website ►.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Municipalities	Medium	Short-term
<p> E15 Implement an Energy Performance Policy requiring all non-residential buildings of 50,000 square feet and larger to achieve a high-performance standard or complete a building tune-up once every five years.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Municipalities	Medium	Short-term

Actions	Impact	Implementers	Priority	Timeframe
<p> E16 Develop voluntary Building Energy Benchmarking program to be established and managed by CCEDC Smart Energy Initiative, supported by County authorization, and funded via federal and state resources (DOE, DEP, EPA). Consider partnering with DOE’s Better Building Challenge program to identify relevant businesses, and facilitate training, participation, and recognition.</p>		CCEDC/SEI Businesses Municipalities	Medium	Short-term
<p> E17 Organize a Strategic Energy Management style cohort program where local wastewater treatment plants, municipalities, and School Districts share best practices for energy savings, recycling, and other energy efficient practices with their peers.</p>		EEAB	Medium	Short-term
<p> E18 Develop outreach programs to work with commercial and industrial sectors to encourage emission reductions actions. (e.g. Webinar on Portfolio Manager, education about federal or state level incentives to develop climate action plans, etc.)</p>		CCEDC EEAB Planning Commission	Medium	Short-term
<p> E19 Create an outward facing, green business recognition program at the County level to recognize businesses that adopt mitigation policies or are committed to 2050 emissions reduction goals. The program could also recognize adoption of adaptation policies and implementation of sustainability initiatives.</p>		CCEDC EEAB Planning Commission	Medium	Short-term
<p> E20 Consider suppliers’ commitment to sustainability as part the local government, business, and non-profit procurement process and in household purchasing decisions. Develop a list of measurable best practices to help assess commitment.</p>		Municipalities Businesses Non-Profits Citizens	Medium	Short-term
<p> E21 Promote increased recovery of methane gas from agriculture, wastewater, and landfill operations for use as energy. Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Municipalities Solid Waste Authorities Conservation District Ag Council	Medium	Long-term
<p> E22 Promote use of wood in construction as a sustainable material that sequesters carbon and replaces GHG steel and concrete manufacturing emissions.</p>		CCEDC EEAB	Medium	Long-term
<p> E23 Explore SolSmart certification for County and provide guidance to municipalities that are interested in seeking certification. Coordinate and support SolSmart designations for municipalities and/or clusters of municipalities using the existing regional planning areas currently in place. Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Planning Commission	Low	Long-term
<p> E24 Research the harvest and use of biomass feedstocks for thermal energy including the proper technology for capturing emission of particulates. Co-benefits: Jobs & economic prosperity, Public health & environmental quality Note: This strategy entails the use of waste wood or unused cropped biomass for thermal energy to replace fossil fuel. Fossil fuel is sequestered carbon which, when burned, releases sequestered carbon into the atmosphere. Biomass pulls carbon out of the atmosphere when growing and burning it puts the carbon back into the atmosphere for no net gain or loss. However, burning of biomass presents other issues such as the emission of particulates if not properly incinerated.</p>		Planning Commission	Low	Long-term

OBJECTIVE F

Establish and support an Environmental and Energy Advisory Board

Actions	Impact	Implementers	Priority	Timeframe
<p> F1 Explore the creation of a Climate Action Office or Sustainable Energy Advocate Office to lead, coordinate, educate, and engage stakeholders in the implementation of the Climate Action Plan with a focus on both county operations and assistance to municipalities and other stakeholders. Investigate potential state and federal funding sources for this new office and the use of consultants to assist with specific actions and technical aspects of the work.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality, Social equity</p>		EEAB Commissioners	High	Immediate
<p> F2 Recommend best environmental and energy practices in the areas of buildings, facilities and operations; fuels, vehicles, and transportation; food; responsible purchasing; housing; energy sources; air quality; stormwater management; natural resource protection; and climate change.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality, Social equity</p>		EEAB	High	Immediate
<p> F3 Recommend environmental and energy related actions, projects, and programs to the Board of Commissioners for implementation.</p> <p>Co-benefits: Public health & environmental quality</p>		EEAB	High	Short-term
<p> F4 Identify environmental and energy policies the County has adopted and recommend ways to promote and educate about Chester County’s environmental and energy initiatives.</p> <p>Co-benefits: Public health & environmental quality</p>		EEAB	Medium	Short-term
<p> F5 Identify and recommend voluntary actions, projects, and programs for municipalities, businesses, non-profits, and other partners to implement County environmental and energy policies.</p> <p>Co-benefits: Jobs & economic prosperity, Public health & environmental quality, Social equity</p>		EEAB	Medium	Short-term
<p> F6 Implement community-wide climate awareness outreach and incentives strategy.</p>		EEAB	Medium	Short-term

Note:
 Actions F2-F6 above reflect the EEAB bylaws.



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RESERVED

Transportation and Land Use



County Facilities and Operations

Chester County government and facilities will reduce transportation-related greenhouse gas emissions from its operations by implementing the following objectives:

- A. Reduce employee commuter vehicle miles traveled
- B. Optimize the County fleet
- C. Encourage low/no carbon travel



Community-wide Engagement

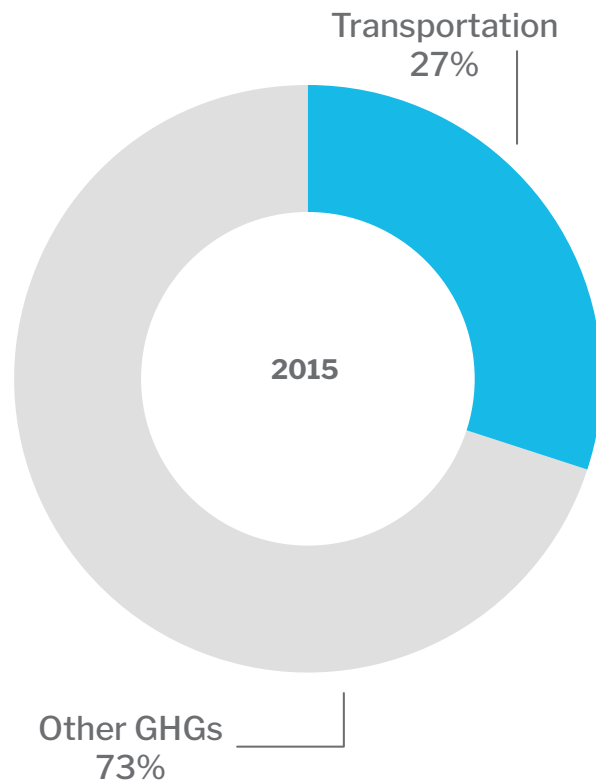
Chester County will reduce community-wide energy-related greenhouse gas emissions by implementing the following objectives:

- D. Encourage smart growth
- E. Promote efficient commuter and transit options
- F. Encourage no/low emissions travel and transportation strategies

The Challenge

Emissions from transportation is a common sight to nearly everyone in Chester County. Besides emitting GHGs, transportation fossil fuels also produce a host of criteria air pollutants when combusted, reducing local air quality and affecting our health. Transportation accounts for 27 percent of Chester County's total GHG emissions (Figure 14).

FIGURE 14
**Chester County's Transportation-Related
Greenhouse Gas Emissions**













County Facilities & Operations

OBJECTIVE A





Reduce employee commuter vehicle miles traveled

Actions	Impact	Implementers	Priority	Timeframe
<p> A1 Promote teleconferencing for County sponsored meetings when possible and encourage County employees to attend meetings remotely when feasible; track County’s business travel use and needs.</p> <p>Co-benefits: Public health & environmental quality</p>		Commissioners	High	Immediate
<p> A2 Establish policies to reduce greenhouse gas emissions created by employee commuting through flex-time work schedules during peak commuting hours and allowing employees to work remotely when feasible and appropriate.</p> <p>Co-benefits: Public health & environmental quality</p>		Commissioners	Medium	Immediate
<p> A3 Establish a program to support employee bike-to-work opportunities including the provision of facilities and incentives. Investigate strategies to provide employee bike share station locations with access to trails and/or bikeways.</p> <p>Co-benefits: Public health & environmental quality</p>		Commissioners	High	Short-term
<p> A4 Establish a ride-share policy and program for County employees, including carpooling and consideration of providing preferred parking for alternative fuel, hybrid and electric vehicles, and car and vanpools. Consider offering employee incentives for carpooling, walking/cycling, and taking public transportation. (See also Transportation and Land Use Action C1.)</p> <p>Co-benefits: Public health & environmental quality</p>		Commissioners	Low	Short-term
<p> A5 Locate future County facilities and services in proximity to employees and clients, including in higher density areas or within walking or biking distance of transit facilities.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Commissioners Facilities	Medium	Long-term
<p> A6 Explore the provision of on-site day care facilities for employees to reduce work-day care trips.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Commissioners	Medium	Long-term
<p> A7 Explore participation in a car-share program in West Chester and other County facility locations.</p> <p>Co-benefits: Public health & environmental quality</p>		Commissioners	Low	Long-term

OBJECTIVE B**Optimize the County fleet**

Actions	Impact	Implementers	Priority	Timeframe
 B1 Adopt a no-idling policy at County facilities. Co-benefits: Public health & environmental quality		Commissioners	Medium	Immediate
 B2 Conduct a County fleet vehicle use analysis and establish standards for optimized use. Co-benefits: Public health & environmental quality		Finance/Risk Management	High	Short-term
 B3 Electrify the County fleet of vehicles , including light and heavy duty vehicles, unless exempt due to emergency services ¹⁶ or maintenance activities. Move towards a fleet of 10% EV by 2025. Consider use of contracting requirements to facilitate transition to electric vehicles. Reassess every three years due to rapidly evolving market. Co-benefits: Public health & environmental quality		Finance/Risk Management	Medium	Long-term
 B4 Convert County lawn maintenance equipment to electric vehicles and equipment where practical. Co-benefits: Public health & environmental quality		Facilities	Medium	Long-term















OBJECTIVE C**Encourage low/no carbon travel**















Actions	Impact	Lead Entity	Priority	Timeframe
 C1 Install electric vehicle charging stations at County facilities. (See also Building and Energy Action C2) Co-benefits: Public health & environmental quality		Facilities	High	Short-term
 C2 Incorporate alternative fuel requirements into trash hauling and other contracts. Co-benefits: Public health & environmental quality		Procurement	Low	Long-term

Community-Wide Engagement

OBJECTIVE D

















Promote sustainable energy, energy efficiency, and communications

Actions	Impact	Implementers	Priority	Timeframe
<p> D1 Advance efficient, reliable and innovative transportation, utility, and communications infrastructure systems that responsibly service thriving and growing communities.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Planning Commission Municipalities Transportation Agencies Utilities	High	Immediate
<p> D2 Continue to provide funding through the Vision Partnership Program to assist municipalities to amend zoning ordinances to establish mixed use, diverse, walkable communities.</p> <p>Co-benefits: Public health & environmental quality</p>		Commissioners Planning Commission	High	Immediate
<p> D3 Provide smart growth model ordinances for municipalities to focus higher intensity and denser development in designated growth areas.</p> <p>Co-benefits: Public health & environmental quality</p>		Planning Commission	High	Immediate
<p> D4 Promote diverse and well-rounded communities with a balance of residential opportunities and convenient access to community facilities, services, and amenities.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Planning Commission Municipalities	High	Short-term
<p> D5 Expand the Urban Center Revitalization grant program to include a “green” building component, where applicable and permitted under program rules. Environmental best practices and energy efficient standards, such as LEED silver, should be incorporated into the program.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Commissioners Dept. of Community Development	High	Short-term
<p> D6 Encourage the redevelopment of Brownfield sites by providing incentives within zoning. Consider their potential use for “solar community gardens” where residents with homes and apartments “not appropriate for solar” could subscribe to regional clean energy generation.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Planning Commission Municipalities	High	Short-term
<p> D7 Encourage municipalities to coordinate and maintain signal timing to reduce idling time at intersections and to install closed-loop signal systems where feasible.</p> <p>Co-benefits: Public health & environmental quality</p>		Planning Commission Municipalities Transportation Agencies	High	Short-term
<p> D8 Participate in multi-municipal traffic control plans and congestion management programs on a corridor-wide basis.</p> <p>Co-benefits: Public health & environmental quality</p>		Planning Commission Municipalities Transportation Agencies	High	Short-term

Actions	Impact	Implementers	Priority	Timeframe
 D9 Promote the creation of partnerships between developers, the environmental community, and conservation and watershed organizations early in the development planning stage to explore win-win solutions for sustainability and energy conservation. Co-benefits: Public health & environmental quality		EEAB Land Trusts and Conservancies Environmental Advocacy Groups	High	Short-term
 D10 Engage the business and development community on opportunities to maintain sidewalks and provide trees, street furniture and other amenities while increasing safety to increase walkability. Co-benefits: Public health & environmental quality		Municipalities Dept. of Community Development Planning Commission	Medium	Short-term
 D11 Develop an awards program for projects that qualify under the LEED Neighborhood program. Co-benefits: Public health & environmental quality		EEAB	Low	Short-term
 D12 Continue to support the implementation of green stormwater infrastructure solutions to reduce impervious surfaces, excessive stormwater runoff, and increased flooding. Co-benefits: Public health & environmental quality, Social equity		Water Resources Authority Municipalities	High	Long-term
 D13 Include open space and community garden opportunities when planning for housing in urban and other higher density areas. Co-benefits: Public health & environmental quality, Social equity		Planning Commission Ag Council Dept. of Community Development Municipalities	Medium	Long-term
 D14 Establish a student parking pass fee schedule that off-sets the cost and greenhouse gas emissions associated with busing students to discourage the use of individual cars. Co-benefits: Public health & environmental quality		School Districts	Low	Long-term
 D15 Consider pursuing Sustainable Pennsylvania Community Certification. ▶ Co-benefits: Public health & environmental quality		Municipalities EEAB Planning Commission	Low	Long-term













OBJECTIVE E

Promote efficient commuting and transit options

Actions	Impact	Implementers	Priority	Timeframe
<p> E1 Work with DVRPC on the Transportation Improvement Plan to increase funding for transit-related projects. Support additional bus and rail transit and transit stops in the county. Explore the feasibility of express bus service (“Bus Rapid Transit”) in Chester County. Co-benefits: Public health & environmental quality, Social equity</p>		<p>Planning Commission DVRPC Transportation Agencies Commissioners</p>	High	Immediate
<p> E2 Encourage municipalities to reduce parking requirements where uses are in close proximity to alternative modes of transportation. Co-benefits: Public health & environmental quality</p>		<p>Planning Commission Municipalities</p>	High	Immediate
<p> E3 Adopt a no-idling policy at municipal buildings and businesses.</p>		<p>Municipalities Businesses</p>	Medium	Immediate
<p> E4 Support transit-oriented development along transit stops by establishing higher density zoning districts near transit facilities. Co-benefits: Public health & environmental quality, Social equity</p>		<p>Planning Commission Municipalities</p>	High	Short-term
<p> E5 Support the selection of climate-literate and pro-public transit members to applicable boards. Co-benefits: Public health & environmental quality</p>		<p>Commissioners</p>	Medium	Short-term
<p> E6 Establish policies to reduce greenhouse gas emissions created by employee commuting including remote work schedules, facilitating carpooling, providing preferred parking for alternative fuel, hybrid and electric vehicles, and use of car and vanpools. Consider offering employee incentives for carpooling, walking/cycling, and taking public transportation.</p>		<p>Municipalities Businesses</p>	Medium	Short-term
<p> E7 Provide for diverse and affordable housing meeting the needs of all residents so they can live in proximity to job opportunities. Co-benefits: Public health & environmental quality, Social equity</p>		<p>Planning Commission Municipalities Dept. of Community Development</p>	High	Long-term
<p> E8 Promote conversion of parking lots to include solar canopies and electric vehicle charging facilities and car share parking spaces. Provide incentives for installation of listed facilities. Encourage the installation of park-and-ride lots along arterial roads where appropriate. Co-benefits: Public health & environmental quality</p>		<p>Planning Commission Municipalities Transportation Agencies</p>	Medium	Long-term

OBJECTIVE F**Encourage no/low emissions travel and transportation actions**

Actions	Impact	Implementers	Priority	Timeframe
 F1 Expand and maintain the local and regional trail network for walking, running, and cycling for both recreational and commuting purposes. Create “first and last mile connectivity” to public transit from the local and regional trail system to better connect neighborhoods and work centers to the bike/ped system. Co-benefits: Public health & environmental quality, Social equity		Parks & Preservation Facilities Municipalities	High	Immediate
 F2 Encourage municipalities to complete the pedestrian/sidewalk system in designated growth areas to provide an alternative to the automobile. Co-benefits: Public health & environmental quality, Social equity		Planning Commission Municipalities	High	Immediate
 F3 Support establishing bike lanes and share the road infrastructure and policies. Enable pedal/battery powered non-vehicular travel and commuting where appropriate. Co-benefits: Public health & environmental quality, Social equity		Planning Commission Municipalities Transportation Agencies	High	Immediate
 F4 Promote use of electric vehicles and high-fuel efficiency vehicles to municipalities and residents. Co-benefits: Public health & environmental quality		EEAB Environmental Advocacy Groups	Medium	Immediate
 F5 Work with municipalities to assess barriers to expanding electric vehicle charging stations. Explore opportunities to collaboratively purchase electric vehicles such as the Climate Mayors EV Purchasing Collaborative; promote apps that allow drivers to find charging stations wherever they are located such as Plug in America and Plug Share; and provide links to DVRPC’s Alternative Fuel Vehicles webpage. Consider adding a county EV resource webpage. Co-benefits: Public health & environmental quality		Transportation Agencies Municipalities	High	Short-term
 F6 Provide recommendations for establishing municipal fleet fuel efficiency standards including light and heavy duty vehicles. Recommendations should consider EV economics and should be revisited every three years. Co-benefits: Public health & environmental quality		Transportation Agencies Municipalities	Medium	Short-term
 F7 Consider implementing bike share programs in boroughs and other high density growth areas.”		Municipalities	Medium	Short-term
 F8 Assess the feasibility of converting the County paratransit service vehicles to CNG or replacing with Electric Vehicles (EV) considering availability, cost, and PennDOT funding. Co-benefits: Public health & environmental quality, Social equity		Dept. of Community Development	Medium	Long-term

Actions	Impact	Implementers	Priority	Timeframe
<p> F9 Encourage school districts to place a minimum, average fuel efficiency standard on district vehicles and the exploration of the use of EV buses. Reassess every three years due to rapidly evolving market. Explore incentives for these actions.</p> <p>Co-benefits: Public health & environmental quality</p>		Transportation Agencies School Districts	Medium	Long-term
<p> F10 Explore the use of alternatives to asphalt for use in some low-traffic back roads, bike trails, and walking paths to reduce heat absorption and lower surface temperatures.</p>		Municipalities	Medium	Long-term
<p> F11 Provide recommendations and support for police and public works departments to transition to alternative fuels/fuel-efficient vehicles for police and public works departments.</p> <p>Co-benefits: Public health & environmental quality</p>		Transportation Agencies Municipalities	Medium	Long-term
<p> F12 Increase training for police officials on the rights and responsibilities of bicyclists and state laws on passing bicyclists.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Emergency Services Municipalities	Medium	Long-term
<p> F13 Implement traffic calming techniques, such as complete streets, in appropriate areas.</p> <p>Co-benefits: Public health & environmental quality</p>		Planning Commission Municipalities	Medium	Long-term
<p> F14 Enhance Safe Routes to School activities and school zone infrastructure - work to reduce the pickup queue of cars at end of school day.</p> <p>Co-benefits: Public health & environmental quality, Social equity</p>		Education Groups	Low	Long-term



Waste Management



County Facilities and Operations

Chester County will reduce waste-related greenhouse gas emissions from its operations by implementing the following objective:

- A. Increase county operations waste diversion



Community-wide Engagement

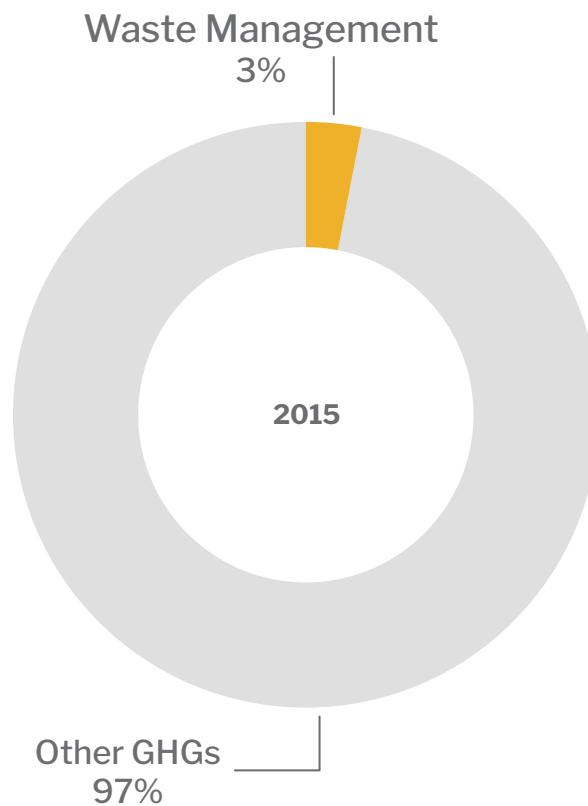
Chester County will reduce community-wide waste-related greenhouse gas emissions by implementing the following objective:

- B. Increase county waste diversion and other best practices through partnerships and collaborations

The Challenge

Chester County's solid waste is disposed of primarily at the Lanchester and SECCRA landfills. Emissions from decaying putrescible material directly contribute 3 percent of Chester County's total GHG emissions and contribute to emissions in the Transportation sector via hauling of waste to and from facilities (Figure 15). Additionally, embodied energy within the items that are thrown away might be harnessed through reuse and recycling of materials. It is in Chester County's long-term interest to reduce waste at its source, expand recycling facilities, reduce food waste, and enable re-use of materials.

FIGURE 15
**Chester County's Waste-Related
Greenhouse Gas Emissions**





County Facilities & Operations

OBJECTIVE A

Increase County Operations Waste Diversion



















Actions	Impact	Implementers	Priority	Timeframe
 A1 Continue to conduct employee training on recycling practices as part of orientation and through the ongoing efforts of the Chester County Recycling Committee. Co-benefits: Jobs & economic prosperity		Human Resources Chester County Recycling Coordinator	Low	Immediate
 A2 Develop a solid waste management and waste diversion plan for County Operations including a waste stream analysis of each County government building to identify opportunities to increase waste diversion. Co-benefits: Public health & environmental quality		Facilities Solid Waste Authorities (partner) Health	Medium	Short-term
 A3 Explore the development of a food waste composting program for Pocopson Home, Prison, and the Youth Center. Seek input from groups that have established such programs (e.g., Arboganic Acres). Co-benefits: Public health & environmental quality		Staff of respective facilities Solid Waste Authorities	Medium	Short-term
 A4 Assess and reduce plastic usage in County facilities and procurement of single-use plastic products. Co-benefits: Public health & environmental quality		CC GoGreen and Recycling and Committee County Departments	Medium	Short-term
 A5 Establish a Construction and Demolition Waste Diversion program for major County capital projects. Co-benefits: Jobs & economic prosperity		Facilities	Medium	Long-term





















Community-Wide Engagement

OBJECTIVE B

Increase county waste diversion and other best practices through partnerships and collaborations

Actions	Impact	Implementers	Priority	Timeframe
 B1 Continue to require recycling service for all residents, businesses, institutions, parks, entertainment and community events according to Act 101 and municipal ordinances. Co-benefits: Public health & environmental quality		Municipalities	High	Immediate
 B2 Support historic preservation and the adaptive reuse of buildings to reduce construction waste, lower energy use related to demolition, and promote sustainability of resources. This action includes transitioning vacant or depreciated office and retail spaces to meet housing needs. (See also Waste Management Action B16.) Co-benefits: Public health & environmental quality		Historic Preservation Network Planning Commission Municipalities	High	Immediate
 B3 Promote sustainable waste management practices including source reduction, reuse, recycling and home composting through education and outreach. Co-benefits: Public health & environmental quality		Planning Commission Solid Waste Authorities Municipalities	High	Immediate
 B4 Continue utilizing methane produced at landfills to generate energy for use at the landfills and for resale to power companies. Co-benefits: Jobs & economic prosperity		Solid Waste Authorities	High	Immediate
 B5 Promote and support www.chestercountyswa.org as the official County waste/recycling information site through website links and social media. Review site regularly for possible expansion of information, including eWaste disposal sites and public education on current recycling practices. Co-benefits: Public health & environmental quality		Solid Waste Authorities CC Recycling Committee Planning Commission Municipalities	Medium	Immediate
 B6 Encourage all municipalities to participate in the Regional Household Hazardous Waste initiative. Expand to implement County sponsored drop-off points for eWaste and hazardous materials beyond annual events. Co-benefits: Public health & environmental quality		Solid Waste Authorities Planning Commission Commissioners	Medium	Immediate/ Short-term (part 2)
 B7 Promote the policy of requiring trash collection service for all residents, businesses, and institutions to prevent illegal dumping. Co-benefits: Public health & environmental quality		Municipalities Solid Waste Authorities	High	Short-term
 B8 Promote residential municipal “single hauler” contracting to reduce truck miles and GHG emissions. Co-benefits: Public health & environmental quality		Municipalities Solid Waste Authorities	Medium	Short-term
 B9 Affirm Chester County’s no-burn ordinance, (Chester County Health Code Section 502.7.1) with municipalities and encourage its enforcement. Develop an education program for municipalities and county residents on the detrimental effects of burning refuse and solid waste. Co-benefits: Public health & environmental quality		Health Dept. Municipalities Fire Marshal Office	Medium	Short-term

Actions	Impact	Implementers	Priority	Timeframe
 B10 Encourage county-wide yard waste collection by municipalities. Co-benefits: Public health & environmental quality		Municipalities Solid Waste Authorities	Medium	Short-term
 B11 Promote a “buy recycled” policy and encourage the purchase of products made from recycled materials. Explore innovative ways to recycle plastics such as 3D printers (“recyclebot”) which can convert recyclable plastic into 3D objects. Co-benefits: Public health & environmental quality		Procurement Solid Waste Authorities Municipalities Businesses Citizens	Medium	Short-term
 B12 Conduct a waste characterization study as a precursor to a future waste diversion analysis that identifies downstream waste disposal pathways, explores opportunities to increase recycling and composting, and reduces waste to extend the life of the county’s landfills. Co-benefits: Public health & environmental quality, Jobs & economic prosperity		Solid Waste Authorities	Medium	Short-term
 B13 Educate and promote reduction in food waste. Reduce food waste in conjunction with a food composting facility to divert more food waste from landfills. Promote composting initiatives including small, neighborhood composting sites, use of composting “pick-up” services where available, and composting workshops or online videos. Co-benefits: Public health & environmental quality		Solid Waste Authorities	Medium	Short-term
 B14 Continue to improve the data collection system and encourage reporting on solid waste and recyclables. Co-benefits: Public health & environmental quality		Solid Waste Authorities Municipalities	Low	Short-term
 B15 Work with Chester County Solid Waste Authority to continue the promotion of cost effective and environmentally correct processing solutions through their education programs. Co-benefits: Public health & environmental quality		Solid Waste Authorities	Low	Short-term
 B16 Investigate opportunities to develop a county-wide construction and demolition waste recycling program. In renovation and demolition, promote re-use (e.g. "Habitat for Humanity ReStore Stores"), deconstruction techniques, and architectural salvage. Address the recycling of construction material and the reuse of still-usable home fixtures in vacant or underutilized buildings. Consider creating a staffed drop-off center for small-medium sized businesses for certain types of universal wastes such as fluorescent bulbs, batteries, aerosols, mercury thermostats, and/or certain electronics. (See also Waste Management Action B2.) Co-benefits: Public health & environmental quality, Jobs & economic prosperity, Social equity		Solid Waste Authorities Municipalities	Medium	Long-term
 B17 Work with the Chester County Solid Waste Management Authority and waste haulers to encourage practices that limit trash collection to once per week. Co-benefits: Public health & environmental quality		Municipalities Solid Waste Authorities	Low	Long-term
 B18 Conduct a feasibility study on waste to energy conversion technologies as a potential long term solution for waste disposal. Co-benefits: Public health & environmental quality, Jobs & economic prosperity		Solid Waste Authorities	Low	Long-term



Agriculture, Food, and Forestry



County Facilities and Operations

Chester County will reduce greenhouse gas emissions and increase carbon sequestration from its operations by implementing the following objective:

- A. Manage county open spaces responsibly



Community-wide Engagement

Chester County will reduce community-wide agriculture and forestry GHG emissions and increase carbon sequestration by implementing the following objectives:

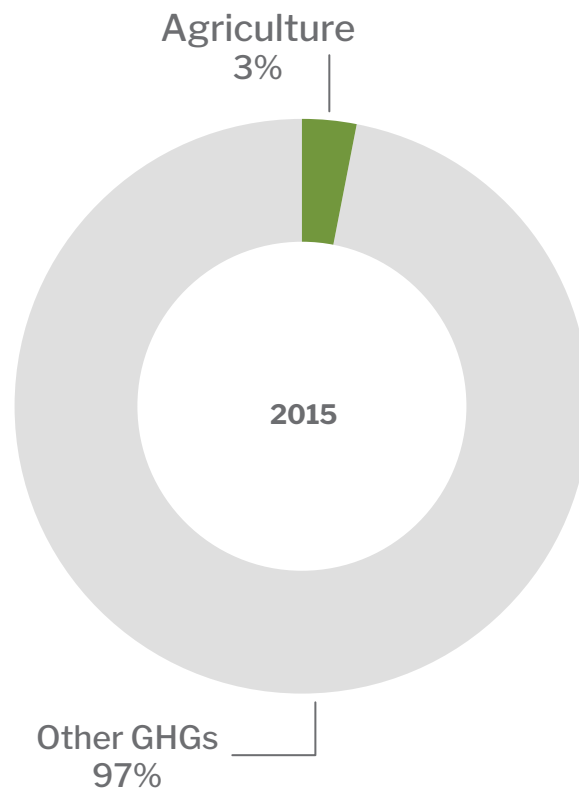
- B. Grow and preserve open spaces and natural areas
- C. Support local food production, the agricultural community, and sustainable agricultural practices

The Challenge

While agricultural practices such as managing livestock contribute to GHG emissions, the management of agricultural and forested lands also has the potential to reduce GHG emissions. Agriculture emissions associated with enteric fermentation among livestock, manure management, and management of agricultural soils account for 3 percent of the county's gross GHG emissions.

Protecting and managing agricultural and forested lands as well as trees in urban areas across Chester County sequestered approximately 237,000 MTCO₂E in 2015. The net effect was an overall reduction of Chester County's GHG emissions from approximately 7.2 million MTCO₂E to 7.0 million MTCO₂E. Protecting open space not only sequesters carbon, it provides value through naturally occurring environmental processes. If these lands were developed, Chester County would be forced to replicate vital services such as flood control and air and water pollution mitigation through costly alternative methods. In relying on the natural features on protected open spaces to provide these valuable services, Chester County and its communities avoid significant expenses. The carbon stored by trees on Chester County's protected open spaces alone would require \$120 million to replicate¹⁷

FIGURE 16
Chester County's Agriculture-Related Greenhouse Gas Emissions





















County Facilities & Operations

OBJECTIVE A















Manage County open spaces responsibly

Actions	Impact	Implementers	Priority	Timeframe
<p> A1 Provide education and outreach materials that promote the economic and environmental value of open spaces and agriculture in County parks. Incorporate examples of climate change impacts on County lands into these outreach efforts.</p> <p>Co-benefits: Public health & environmental quality</p>		Parks & Preservation Water Resources Authority	High	Immediate
<p> A2 Establish a sustainable landscape management plan for County lands, including increased green infrastructure, native plants, and naturalized stormwater basins.</p> <p>Co-benefits: Public health & environmental quality</p>		Facilities Parks & Preservation Conservation District Water Resources Authority	High	Short-term
<p> A3 Investigate, identify, and pursue reforestation opportunities on County lands where appropriate and develop forest management plans for their long-term health.</p> <p>Co-benefits: Public health & environmental quality</p>		Parks & Preservation Facilities Conservation District	High	Short-term
<p> A4 Ensure that County policies and planning identify and protect environmentally sensitive and ecologically significant lands, agricultural lands, and civic/historic places on County properties.</p> <p>Co-benefits: Public health & environmental quality</p>		Planning Commission Facilities Water Resources Authority Parks & Preservation	High	Short-term
<p> A5 Encourage, integrated pest management, soil conservation, nutrient management plans, and other best management practices for agricultural operations located on County property.</p> <p>Co-benefits: Public health & environmental quality</p>		Parks & Preservation Water Resources Authority Conservation District	Medium	Short-term
<p> A6 Design new County parks or expansions of existing parks with climate resiliency in mind (i.e. aspects that address riverine flooding, extreme heat, plant species and wildlife habitat)</p> <p>Co-benefits: Public health & environmental quality</p>		Parks & Preservation Facilities	High	Long-term
<p> A7 Convert lawn maintenance equipment to electric vehicles and equipment where practical. (See also Buildings and Energy Action D4 and Transportation and Land Use Action B4.)</p> <p>Co-benefits: Public health & environmental quality</p>		Facilities Parks & Preservation Procurement	Medium	Long-term
<p> A8 Identify and replace non-native plants with native species; consider expanding species to include native plants adaptable to a warmer climate. Identify opportunities to convert grass lawns to wildscapes.</p> <p>Co-benefits: Public health & environmental quality</p>		Parks & Preservation Facilities	Medium	Long-term



















Community-Wide Engagement

OBJECTIVE B**Grow and preserve open spaces and natural areas**







Actions	Impact	Implementers	Priority	Timeframe
 B1 Continue to advance the protection and stewardship of open space, farmland, woodlands, wetlands, and other natural and cultural features. Consider modifying preservation programs to factor in climate change (i.e. lands with greater carbon sequestration potentially receive points on non-agricultural conservation easement applications.) Co-benefits: Public health & environmental quality		Parks & Preservation Ag Council Land Trusts & Conservancies Planning Commission	High	Immediate
 B2 Investigate amendments to the County’s Vision Partnership Program (VPP) that will enable municipalities to develop their own woodlands inventory and reforestation and management plans. Co-benefits: Public health & environmental quality		Planning Commission Municipalities	High	Immediate
 B3 Continue to develop and disseminate model municipal ordinance language that conserves existing woodlands, requires tree replacement /reforestation for lost woodlands, and protects trees to remain on developed sites. Require planting of new trees as part of land development process to enhance sequestration and moderate heat island effects resulting from new development.* Co-benefits: Public health & environmental quality		Planning Commission Land Trusts and Conservancies Municipalities	High	Immediate
 B4 Explore implementing a no-net loss tree policy to encourage natural carbon capture for County-facilities and community-wide. ¹⁸ Consider a “net gain” tree policy as an even better alternative to “no-net loss” of trees. Co-benefits: Public health & environmental quality		Municipalities Facilities Parks & Preservation	High	Immediate
 B5 Support and promote tree planting in urban settings to address heat mitigation and the urban heat island effect. Explore funding sources and programs such as Treevitalize and Tree Tenders to assist with tree planting and maintenance. Co-benefits: Public health & environmental quality, Social equity		Municipalities Conservation District PA DCNR	High	Immediate
 B6 Investigate the allocation of a portion of the County’s open space funds for the strategic conservation and preservation of woodlands within the County. Consider establishing and building a County Forest Reserve system; explore use of an Official Map as a tool for such establishment. Co-benefits: Public health & environmental quality		Parks & Preservation Commissioners Planning Commission (Official Map)	Medium	Short-term
 B7 Establish a Woodland Conservation and Restoration Committee (WCRC) for Chester County consisting of representatives of a broad spectrum of organizations. Co-benefits: Public health & environmental quality		Parks & Preservation Land Trusts & Conservancies Conservation District EEAB	Medium	Short-term

* Note: This action does not apply to commercial forestry or timber-harvesting operations protected under ACRE.

Actions	Impact	Implementers	Priority	Timeframe
 B8 Coordinate and promote the PADEP TreeVitalize program in Chester County. Co-benefits: Public health & environmental quality		Conservation District	Medium	Short-term
 B9 Modify the Chester County Preservation Partnership Grants to incentivize the planting and managing of trees. Co-benefits: Public health & environmental quality		Parks & Preservation	Medium	Short-term
 B10 Identify opportunities and promote reforestation and afforestation on degraded lands not used for agriculture. Co-benefits: Public health & environmental quality		Conservation District Parks & Preservation Municipalities	Medium	Short-term
 B11 Use lessons learned from County efforts to assist municipalities in identifying opportunities to convert grass lawns to wildscapes; identifying and replacing non-native plants with native species; and investigating, identifying and pursuing reforestation opportunities on municipal lands where appropriate. Co-benefits: Public health & environmental quality		Conservation District Parks & Preservation Municipalities	Low	Short-term
 B12 Support conservation and maintenance of woodlands through tax incentives and/or easements for tree conservation on land that is not preserved, and assistance with conservation on land that already is preserved with easements as a public benefit.¹⁹ Explore incentives for landowners to not harvest trees such as those offered in the Family Forest Carbon Program and the Working Woodlands Program. Explore ways for such programs to work for smaller woodland owners, such as grouping interested landowners together to qualify for carbon credits. Support and incentivize the maintenance of existing woodlands, including managing invasive species, to ensure their longevity and health. Co-benefits: Public health & environmental quality		Parks & Preservation Land Trusts and Conservancies PA DCNR	High	Long-term
 B13 Reforest public land that has been cleared or where woodlands are declining or degraded to address this area’s regeneration debt, similar in principle to wetlands restoration. Work with land owners who are interested in reforesting private lands. Co-benefits: Public health & environmental quality		Parks & Preservation Land Trusts & Conservancies Municipalities	High	Long-term
 B14 Ensure that municipal management policies and plans are in place to protect and manage forested lands, including canopy goals, tree planting programs, and tree hazard and health assessments, replacement programs. Co-benefits: Public health & environmental quality		Municipalities Land Trusts & Conservancies Parks & Preservation	High	Long-term
 B15 Improve the connectivity of open space to protect green infrastructure and further mitigate climate change. Co-benefits: Public health & environmental quality		Parks & Preservation Land Trusts & Conservancies Municipalities	Medium	Long-term

OBJECTIVE C

Support local food production, the agricultural community, and sustainable agricultural practices

Actions	Impact	Implementers	Priority	Timeframe
<p> C1 Continue to support local farmer’s efforts to produce food and the places where the food is made available within the region. Co-benefits: Public health & environmental quality</p>		Ag Council	High	Immediate
<p> C2 Promote regenerative agricultural and practices, such as no till, cover cropping open space tree planting, agroforestry, and other techniques that increase carbon sequestration in soils.* Co-benefits: Public health & environmental quality</p>		Conservation District	High	Immediate
<p> C3 Encourage agricultural uses that are high users of power to consider the use of solar arrays for their electricity needs (e.g., mushroom growers, greenhouse operations, commercial poultry operations). Explore other ways to track and reduce energy usage such as digesting manure into renewable methane.” Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		CCEDC	High	Short-term
<p> C4 Continue to encourage residents and businesses to support the local food system. Co-benefits: Jobs & economic prosperity, Public health & environmental quality</p>		Ag Council Municipalities	Medium	Short-term
<p> C5 Promote use of compost and manure to build up organic matter and increase soil carbon content. Co-benefits: Public health & environmental quality</p>		Conservation District	Medium	Short-term
<p> C6 Promote use of protected nitrogen fertilizers or additives to urea and ammonium sulfate such as N-Serve, Agrotain, and other products that protect nitrogen. Co-benefits: Public health & environmental quality</p>		Conservation District	Low	Long-term

* Note: "Regenerative Agriculture" describes a system of farming and grazing practices that, among other benefits, addresses climate change by rebuilding soil organic matter and restoring degraded soil biodiversity, resulting in both carbon drawdown and improving watersheds. "Agroforestry" is the integration of trees and shrubs into crop and animal farming systems enhancing long-term carbon sequestration, soil enrichment, biodiversity, and air and water quality.



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6 RESILIENCY & MITIGATION

As Chester County takes action to reduce GHG emissions, it must also plan ways to adapt to changes in climate.

Pennsylvania

In Pennsylvania, temperatures have increased by more than 1.8°F since the early 20th century and are expected to increase by an additional 5.4°F by 2050. Similarly, annual precipitation in Pennsylvania has increased by approximately 10% since the early 20th century and is expected to increase by another 8% by 2050, with a 14% increase during the winter season. While the likelihood of meteorological drought is projected to decrease, months with above-average precipitation will continue to rise. These changes will have a variety of ecological, economic, and social impacts on the Commonwealth, particularly related to agriculture, energy, forests, human health, outdoor recreation, water, wetlands and aquatic ecosystems, and coastal resources.²⁰

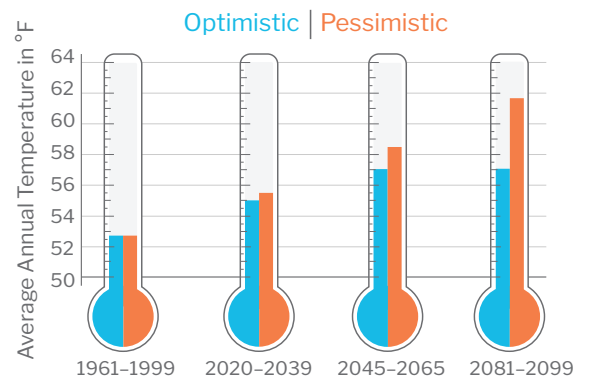
Southeast Pennsylvania

The southeast region of Pennsylvania will continue to get warmer and there will be more intense storms. While the degree of change depends on global efforts to reduce GHG emissions, some change is already being experienced and more change is inevitable. Those municipalities that incorporate future climate change scenarios into their planning will be better positioned to protect and serve their residents than those that do not.²¹

Chester County

According to analyses prepared by the DVRPC, Chester County will continue to get warmer and wetter in the coming decades. The analyses considered two different Representative Concentration Pathways (RCPs), RCP 4.5 and RCP 8.5 that represent optimistic and pessimistic scenarios of climate change based on emission levels for modeling purposes.²² Based on these analyses, average annual temperature may increase by 6-7°F by the end of the century (Figure 17) and the number of days per year above 90°F may nearly double (Figure 19). Over the same time period average annual precipitation is also likely to increase with increases varying by month (Figure 18).

FIGURE 17
Chester County Average Annual Temperature, Historic, and Projected



Source: DVRPC chart using data provided by ICF

Resiliency and Hazard Mitigation Planning (HMP)

Chester County government incorporated future climate scenarios and resiliency initiatives into its planning efforts in the most current update of the Chester County Hazard Mitigation Plan (HMP). The plan assesses the risk and vulnerability of people, property, the environment, and Chester County's own operations from these hazards. The Multi-Jurisdictional Hazard Mitigation Plan identifies risks and vulnerabilities related to natural and human caused disasters and develops short-term and long-term strategies for saving lives, reducing property damage, and protecting critical infrastructure including cultural assets in future disasters. This plan is on a five-year review cycle with the most current update completed in 2021.

Climate change will have systemic effects upon many of the identified hazards within the Chester County Hazard Mitigation Plan, and the 2021 update discusses these effects as they pertain to the prioritized hazards. The impacts of climate change, including more extreme weather, rising temperatures, rising sea levels, and increasing CO2 levels, will most likely make Chester County more vulnerable to identified natural hazards such as storms, floods, extreme temperatures, and even droughts. The 2021 HMP update aims to assess a potential increase in vulnerability to hazards not only as it relates to effects on critical infrastructure, but also how certain natural hazards affect public health. For example, as severe weather becomes more common as result of climate change, the HMP provides a comprehensive mitigation strategies that will include more robust mitigation actions focusing on all aspects of emergencies—from preparedness to recovery.

The 2021 Hazard Mitigation Plan includes strategies that address issues directly impacted by climate change including:

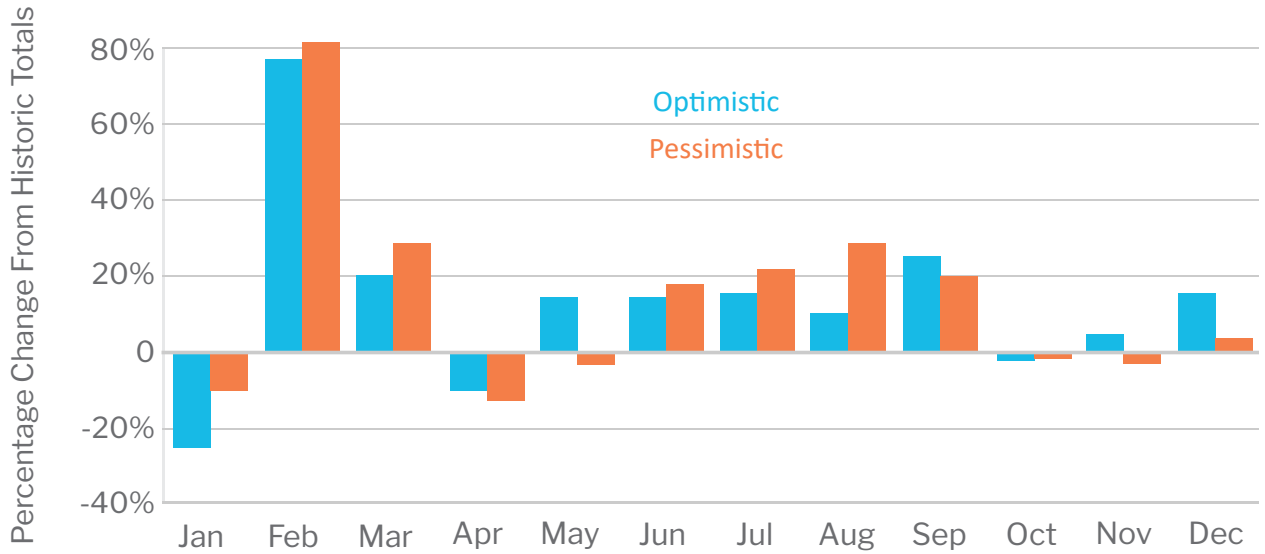
drought, flooding, extreme heat events, utility interruptions and invasive species.

Examples of resiliency and mitigation actions recommended in the plan include:

- Elevate or acquire properties within flood-prone areas as opportunities arise. “Wet and dry proof” commercial building which cannot be elevated or acquired.
- Encourage new development to bury utility cables.
- Install back-up power sources for traffic signals (generator, battery, solar) and emergency generators at critical facilities (identified by municipality in plan).
- Install roadway gates to close off flood-prone intersections and roads during flood incidents and signage to warn motorists of closed roads.
- Update the County-wide Model Stormwater Ordinance.
- Install emergency alerting systems.
- Work with long-term care facilities and nursing homes to ensure their emergency plans address potential hazards.

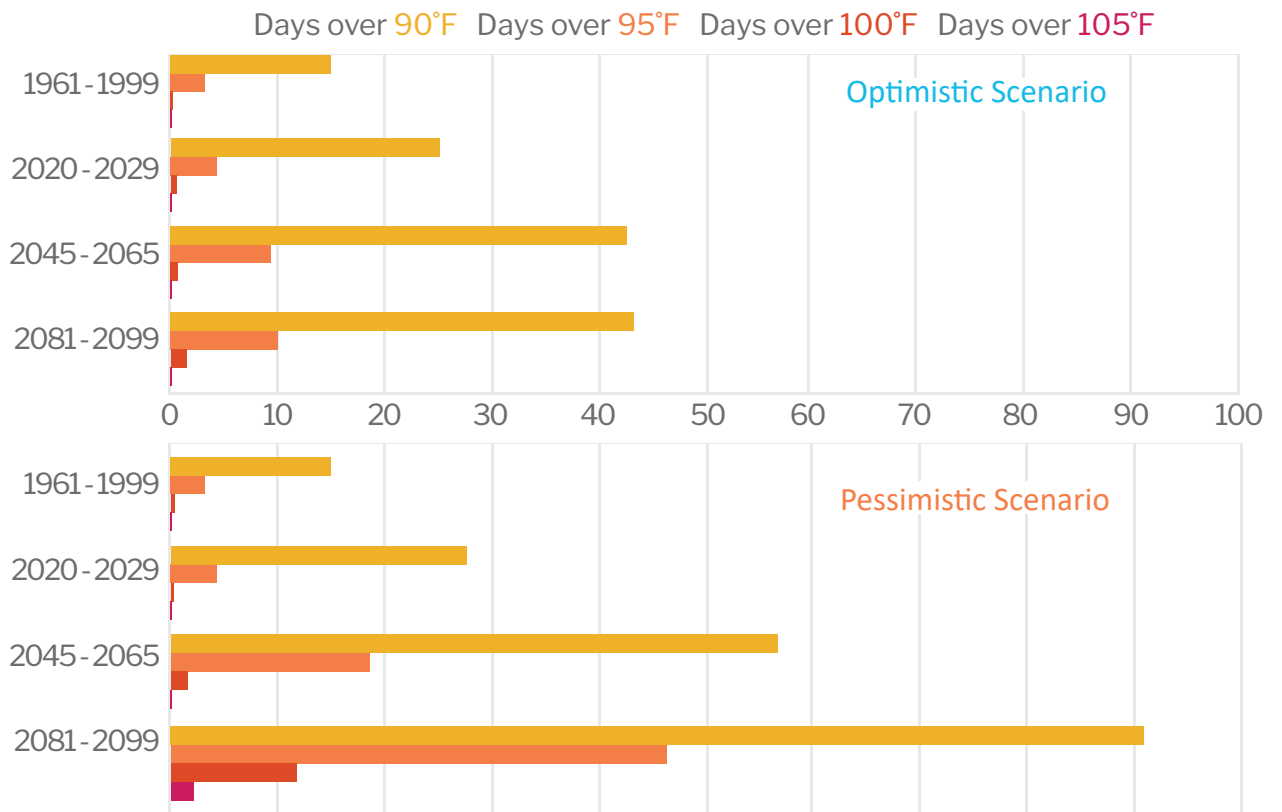
For information about specific hazards, follow the links to the Hazard Mitigation Plan. ▶ The complete list of mitigation strategies for the County and municipalities are located in Section 6 — Mitigation Strategy of the HMP.

FIGURE 18
Chester County Projected Percentage Change in Monthly Rainfall – Totals by 2081–2099



Source: DVRPC chart using data provided by ICF

FIGURE 19
Chester County Days per Year Above Specified Temperature, Historic, and Projected



Source: DVRPC chart using data provided by ICF



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7

KEY PERFORMANCE MEASURES

These examples of performance measures can be used to track progress in plan implementation. The use of these measures will depend in part on their reliable accessibility and availability on a regular basis. Unless otherwise indicated, the measures will be tracked annually, and posted on the Climate Action Plan webpage.

GHG Emissions Reduction

- 1. County-wide changes in Greenhouse Gas Emissions at 5 year intervals using the DVRPC emissions inventory.**
The next inventory interval will be for 2020 emissions, with a time lag of approximately two years before the inventory results are available.

Buildings and Energy

- 1. County-owned facilities benchmarking and energy use reduction using the Energy Star Portfolio Manager.**
Metric not currently tracked
- 2. Energy saving improvements implemented at County-owned facilities.**
Metric not currently tracked
- 3. Percentage of energy purchased from renewable energy sources.**
Metric not currently tracked
- 4. Number of alternative energy ordinances adopted or updated by municipalities.**
Metric not currently tracked
- 5. Total solar kilowatts installed county-wide.**
Metric not currently tracked

Agriculture, Food, and Forestry

- 1. Percent increase in protected open space.**
Metric tracked for *Landscapes3* and Chester County Managing for Results Strategic Plan
- 2. Percent increase in protected farmland.**
Metric tracked for *Landscapes3* and for Chester County Managing for Results Strategic Plan
- 3. Percent increase in protected woodlands.**
Metric not currently tracked
- 4. Net change in tree cover.**
Metric not currently tracked

Transportation and Land Use

- 1. Percent increase in multi-use trail, sidewalk, and bike lane mileage in the county.**
Metric tracked for *Landscapes3* and Chester County Managing for Results Strategic Plan
- 2. Percentage of residents using means other than single-occupant vehicles for transportation to work.**
Metric tracked for CCPC Strategic Business Plan
- 3. Change in public transit ridership trips in the county including bus routes, regional rail, and AMTRAK.**
Metric tracked for *Landscapes3*
- 4. Percentage of new housing units that are attached or multi-family.**
Metric tracked for *Landscapes3* and Chester County Managing for Results Strategic Plan
- 5. Percentage of proposed residential lots/units in designated Growth Areas.**
Metric tracked for CCPC Strategic Business Plan
- 6. Percentage of proposed non-residential square footage in designated Growth Areas.**
Metric tracked for CCPC Strategic Business Plan
- 7. Number of electric vehicles or electric charging stations county-wide.**
Metric not currently tracked
- 8. Number of municipalities that have adopted a clean energy transition plan.**
Metric not currently tracked

Waste Management

- 1. Percent change in municipal solid waste per capita in the county.**
Metric tracked for *Landscapes3*



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8 CONCLUSION

Chester County has the opportunity to address climate change while protecting the health and wellbeing of its residents, businesses, and cherished natural resources and open spaces.

This plan sets forth an approach for Chester County government, municipalities, and other stakeholders to respond to climate change by reducing GHG emissions and incorporating climate change impacts into broader county planning efforts. The plan's objectives and actions outlined in Chapter 5 provide specific guidance on how stakeholders at all levels can incorporate greenhouse gas reduction into their ongoing decision-making process, both in the short and long-term.

By improving the way that Chester County government and county-wide stakeholders assess and cope with climate change, and the risks associated with those changes, better decisions can be made at the county, municipal, and community level. These actions, undertaken in concert with state, regional, and national actions, provide the best opportunity for effectively addressing this significant environmental challenge and ultimately reaching the goal of an 80 percent reduction in GHG emissions by the year 2050.

ENDNOTES

Note: To return to the page where the endnote is listed within the report, click on the number of the endnote.

- ◀1 Pennsylvania Department of Environmental Protection (PaDEP) Climate Change website. ▶
- ◀2 Climate Change Impacts Assessments (2015, 2021), PA DEP Climate Change Impacts website. ▶
- ◀3 Connections 2045 Plan for Greater Philadelphia, DVRPC 2017. ▶
- ◀4 Chester County Greenhouse Gas Reduction Report. May 2010. ▶
- ◀5 Chester County Planning Commission Tools for Utilities and Infrastructure. ▶
- ◀6 Clean Jobs Pennsylvania, E2, 2019. ▶
- ◀7 Chester County Comprehensive Plan, Landscape 3. ▶
- ◀8 Chester County Department of Community Development website, 2020. ▶
- ◀9 Chester County's GHG 2015 GHG emissions were provided by the Delaware Valley Regional Planning Commission.
- ◀10 This DVRPC map provides Energy and GHG Emissions profiles for municipalities in the DVRPC region. ▶
- ◀11 The DVRPC figures are from Energy Use and Greenhouse Gas Emissions Inventory for Greater Philadelphia, DVRPC 2018. ▶
- ◀12 EPA Greenhouse Gas Equivalencies Calculator. ▶
- ◀13 The Chester County Operations GHG emissions/ Carbon Footprint is tracked as part of the County's Strategic Plan/Managing for Results (MFR). The inventory information contained in this plan is based on the 2015-2019 MFR results.
- ◀14 Chester County Population Forecasts 2020-2045. ▶
- ◀15 Population growth was used as the driver for emissions projections in this Plan for consistency with ICLEI's model which used level of population growth and because population data were also available for the full projection of the time series. While there are many factors that affect emissions growth, and population will not affect all sectors equally, it was not possible to reliably account for these differences. Future updates to the inventory could consider other drivers.
- ◀16 Related note from DES Fire Services Group: "As we look forward to the next thirty years of public safety, we are on the leading edge of emerging technologies in emergency services that will truly reduce our carbon footprint. We now have hybrid emergency response vehicles operating in Chester County and recently, one of the largest manufacturers of fire apparatus released a proto-type electric driven pumper. We should embrace these advances as they become available to ensure Chester County remains a healthy and safe community."
- ◀17 Return on Environment. The Economic Value of Protected Open Space in Chester County, Pennsylvania. May 2019. ▶
- ◀18 Example of no-net loss policy from New Jersey. ▶
- ◀19 Refer to the recent NWF report on the value of natural lands (The Protective Value of Nature - June 2020 ▶) and refer to 2017 Griscom et al Natural Climate Solutions in PNAS ("Reforestation and Avoided Forest Conversion remain the largest mitigation opportunities"). ▶
- ◀20 Shortle, James, David Abler, Seth Blumsack, Aliana Britson, Kuai Fang, Armen Kemanian, Paul Knight, Marc McDill, Raymond Najjar, Michael Nassry, Richard Ready, Andrew Ross, Matthew Rydzik, Chaopeng Shen, Shilong Wang, Denice Wardrop, Susan Yetter. 2015. Pennsylvania Climate Impacts Assessment Update, Pennsylvania State University. Retrieved from PaDEP. ▶
- ◀21 Municipal Management in a Changing Climate. Municipal Implementation Tool #31. DVRPC. ▶
- ◀22 Climate Projections for the DVRPC Region. ▶

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Chester County Commissioners

Marian D. Moskowitz
Josh Maxwell
Michelle Kichline

Chester County Environmental and Energy Advisory Board Members

Jess Cadorette, Chair
Paul Spiegel, Vice Chair
Brian N. O’Leary, Secretary

Citizen Representatives

Jess Cadorette
David Mazzocco
Will Williams
Jim Wylie

Business Representatives

Mark Connolly
Steven Krug
Rachel Roberts
Kevin Warren

Chester County Economic Development Council, Smart Energy Initiative

Paul Spiegel

Chester County Association of Township Officials

Carol DeWolf

Chester County Municipal Managers Consortium

Jon Altshul

Chester County Land Conservancies

Ann Hutchinson
Meredith Mayer Braine

Utilities

David Busch
Scott Neumann

Chester County Government Representatives (Ex-Officio Members)

Janet Bowers, Facilities
Seung Ah Byun, Water Resources Authority
Michael Murphy, Emergency Services
Brian N. O’Leary, Planning Commission
David Stauffer, Parks and Preservation
Chris Strohmaier, Conservation District

Chester County Planning Commission Staff

Brian N. O’Leary, AICP, Executive Director
Carol J. Stauffer, AICP, Assistant Director
Carrie Conwell, AICP, Senior Environmental Planner
Paul Fritz, AICP, RLA, Design & Technology Director
Diana Zak, Graphics Supervisor
Ian Mix, Graphics Specialist

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PHOTO CREDIT: Brandon Keen
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