

# Haverford Township Climate Action Plan

*Local Actions and Goals to Reduce Haverford Township's Greenhouse Gas Emissions and to Prepare the Township for the Impacts of Climate Change*

Approved by Haverford Township Board of Commissioners  
October 12, 2021



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# Executive Summary

With seasonal variations and catastrophic natural disasters becoming more intense and frequent, climate change threatens the health, safety, and overall well-being of communities across the globe. The Commonwealth of Pennsylvania and Haverford Township are no exception. The Township recognizes a growing need to address its own contribution to climate change, as well as to adapt to the impacts that will occur and be exacerbated by the changing climate. This Climate Action Plan includes a community-wide inventory of Haverford Township's greenhouse gas (GHGs) emissions, establishes emissions reduction targets and outlines feasible actions to achieve those targets. In addition, the Plan identifies ways in which GHG reduction actions can further the Township's ability to adapt to the present and future impacts of climate change.

Haverford Township has long demonstrated its commitment to community health, safety, prosperity and sustainability. The Township collaborated previously with ICLEI, an international membership association of local governments dedicated to addressing climate change in their jurisdictions, in 2007 to create its initial Climate Action Plan, which established the Township's initial community wide GHG reduction goals with the target year of 2020, while also enhancing community livability and mitigating the potential future impacts of a changing climate. As the target year approached and scientific findings pointed to a need for **more stringent global emissions reduction targets**, the Township stepped up and further strengthened its efforts in 2018 by the **unanimous passing of Resolution No. 2104-2018** by the Board of Commissioners which acknowledged the requirement for more comprehensive long-term reduction goals in order to meet consensus state and global reduction goals, thus Haverford Township set GHG reduction targets adopted by leading municipalities and cities to transition to 100% clean and renewable energy community-wide.

To effectively address GHG emissions, it is imperative to know the sources of these emissions. The objectives and actions within this plan are informed by the Delaware Valley Regional Planning Commission's most recent Regional Energy Use and Greenhouse Gas Emissions Inventory, which occur every 5 years. The 2018 inventory revealed that Haverford Township produced over 360,000 Metric Tons of GHG Emissions in 2018, with the lion's share emitted from Residential Energy use (46%), followed by Transportation and Mobile Sources (28%), Commercial Energy use (20%), Solid Waste (4.8%), Process and Fugitive Emissions (0.8%) and lastly, Water and Wastewater (0.4%). This data provides opportunities to productively address the emissions within the community.

In 2018 the Township transitioned its municipal electricity contract to 100% nuclear energy, eliminating GHG emissions from the municipal operations sector, a switch catalyzed by Resolution No. 2104-2018. The primary challenges remaining to meeting the goals of **100% clean renewable electricity by 2035** and **100% renewable energy for heat and transportation by 2050** as set by the Resolution lies within the Residential, Transportation and Commercial sectors. It is evident significant strides must be made in engaging community members and businesses to participate in GHG emissions reduction strategies. Haverford Township's success in reducing emission from municipal operations has demonstrated its leadership in emissions reduction and meeting rigorous future goals; however, it will require the widespread participation of all other sectors to meet the reduction targets outlined in this plan, and those set in the Commonwealth of Pennsylvania's 2018 Climate Action Plan, as well as the global targets set by the Paris Climate Accord and recommended by climate scientists. This plan recognizes the need for State and Federal legislation to promote wider community action and changes in the mix of regional energy supply. This plan will be updated to reflect changes in legislation and local energy practices.

# Introduction

Climate change is the greatest environmental challenge of the 21st century, with overwhelming evidence in the past decade. It poses a serious threat not just to Haverford Township's natural resources, but also to our jobs and our health. Climate action also presents huge opportunities for creating a healthier, safer, and more equitable zero-carbon world. Haverford Township has an unparalleled 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. These impacts could drag down our economy, stress our 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 5.4°F by 2050. Similarly, annual precipitation in Pennsylvania has increased by approximately 10% since the early 20<sup>th</sup> century and is expected to increase by another 8% by 2050, with a 14% increase during the winter season (Shortle et al, 2015).

These impacts are caused by the accumulation of greenhouse gas (GHG) such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) 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 GHG in the atmosphere leads to too much heat and radiation being trapped. Carbon 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 carbon dioxide 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%, electricity production at 30%, and transportation at 23% (Pennsylvania Department of Environmental Protection (PA DEP, 2019). 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 and our carbon footprint is now.

In addition to national and state efforts to make systemic changes that will reduce global emissions, local governments can play a powerful 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 impacts the amount of energy we use and the volume of GHG emissions we produce. It is critical that communities like Haverford Township demonstrate that it is possible to dramatically reduce GHG emissions while creating more vibrant and prosperous places to live and do business.

## Statewide Climate Action

In 2008, the Pennsylvania Climate Change Act was passed which requires the Department of Environmental Protection (DEP) 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 Climate Action Plan, as well as greenhouse gas inventory, were released in 2019. 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 greenhouse gas 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% by 2025 and 80% by 2050 from 2005 levels, consistent with an executive order signed by Governor Wolf in 2019 (PA DEP, 2019). To ensure consistency with the PA Climate Action Plan, Haverford Township's reduction targets meets statewide targets.

## Local and Regional Climate Policy

The Delaware Valley Regional Planning Commission's "Long-Range Plan" contains strategies and actions supportive of a 60% reduction in regional greenhouse gas emissions by 2040, putting the region on track to achieve the latest scientific recommendation of an 80% reduction in GHG emissions by 2050. These targets are informed by the GHG reductions necessary to keep the impacts of global climate change within an acceptable range. This is supportive of the Township's reduction targets and positions the Township as a leader in emissions reduction and sustainability in the region.

## Purpose and Scope of the Climate Action Plan

Haverford Township is joining an increasing number of local governments committed to addressing climate change at the local level, in particular through the goals established in Resolution No. 2104-2018 as well as its participation in the Sierra Club's "Ready For 100" initiative which supports local communities' transition to 100% renewable energy and the "Sustainable PA Communities Certification" the Township has achieved.

Haverford Township recognizes the risk that climate change poses to its residents and businesses and is acting now to reduce the GHG emissions of the community at-large through the actions detailed in this Climate Action Plan. Furthermore, it is recognized that Haverford Township needs to address existing climate risks such as stormwater flooding to adapt its systems and infrastructure to new conditions. This Climate Action Plan takes advantage of common-sense approaches and cutting-edge policies that our local government is uniquely positioned to 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 Haverford Township for years to come.

### Purpose

The Climate Action Plan is a framework for the development and implementation of actions that reduce Haverford Township's GHG emissions. The Plan provides guiding objectives and actions to realize Haverford Township's GHG reduction goals and implement climate adaptation measures. In addition to addressing mitigation concerns, the Climate Action Plan considers the vulnerability of Haverford Township to hazards that are and will continue to be exacerbated by climate change. The plan prioritizes GHG reduction measures that support climate adaptation and does not propose any actions that are maladaptive to foreseen climate change impacts.

### Limitations and Need for Federal and State Action

This plan identifies local action and realistically assesses the effectiveness of local measures. All local plans must recognize the critical role of Federal and State actions beyond goal setting to include legislative action to create the incentives that will motivate businesses and the public to implement the measures that are needed to achieve the GHG reduction targets. These may include, but are not limited to: green technology infrastructure improvements, grey infrastructure mitigation and resiliency improvements; carbon pricing; community solar; building retrofit incentives; alternative vehicle incentives; etc. Updates to this plan will consider the effects of enacted Federal and State incentives and the new actions that may be appropriate in response.

## Scope

This Plan covers objectives and actions for reducing GHG emissions resulting from local government and community-wide activities within Haverford Township. It addresses the major sources of emissions in Haverford Township and sets forth objectives and actions in the following 5 sectors that both the Township and community members can implement together to reduce greenhouse gas emissions:

- Residential Energy
- Commercial Energy
- Transportation and Mobile Sources
- Waste Management
- Water & Wastewater Management

The Plan creates a framework to document, coordinate, measure, and adapt efforts moving forward. In addition to listing actions, the Plan discusses how each action will be implemented via timelines, and financing.

## Vision Statements and Objectives

1. Engage the community to achieve widespread participation in using clean, renewable electricity and building heating systems.
2. Transform our buildings into high-performing places to live, work, learn, and play.
3. Ensure the benefits of climate action are equitably distributed and empower historically underserved populations to participate in the process of transitioning to a carbon-free community
4. Transform Haverford Township into a community where people walk, use electric vehicles, bike, take public transit, or carpool for most trips in a safe, accessible, and affordable transportation network.
5. Transition towards a clean, carbon-free transportation system that improves health and livability for the Haverford Township community and assist to assist in minimizing global disruptions and impacts from climate change.
6. Make Haverford Township a leader in the region for using clean and local energy that comes from the sun, wind, or other innovative renewable technologies.
7. Understand potential climate-related risks and mitigate these risks while preparing our community for chronic and extreme weather events.

This Climate Action Plan offers a robust set of objectives and actions to address climate hazard vulnerabilities and assist the community in achieving the goals adopted by the Board of Commissioners in Resolution No. 2104-2018 in 2018. Each action and objective were created and reviewed by a group of stakeholders who considered local government and technological limitations, funding constraints, public support, feasibility of implementation, environmental justice considerations, and other barriers.

Resolution No. 2104-2018 established the following targets to maintain a vibrant, healthy, and safe community for future generations, while improving the quality of life for those who live here today:

**2035: 100% Renewable Electricity Community-Wide**

**2050: 100% Renewable Energy Community Wide for Heating and Transportation**

# Co-Benefits of Climate Action

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

## 1. Improving Public Health

Climate change mitigation activities, particularly those related to transportation, help to clean the air by reducing vehicle emissions and therefore improve public health. Mitigation activities help to engender a greater degree of choice for Haverford Township 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 transport. This creates more connected and resilient neighborhoods.

## 2. Saving Money and Reducing Risk

In addition to addressing climate change, measures taken to reduce greenhouse gas emissions have other important benefits. The most obvious of these is the potential for significant cost savings. In FY 2019-2020, Haverford Township spent over \$470,000 on energy to power buildings and fuel its vehicle fleet. Many of the measures in this plan pay for themselves quickly by reducing direct costs, such as fuel or energy used, and also indirect costs such as maintenance. For example, the Township spent approximately \$1.8m retrofitting all 3,000+ streetlights to LED fixtures for an estimated **annual** savings of \$180,000 in electrical and maintenance cost. Encouraging energy efficiency, public transit use, building improvements, and other measures will also result in lower energy and water bills for residents and employers as well.

Additionally, important to note is the cost of inaction; in 2018 PennDOT experienced “record breaking impacts from floods and landslides that cost over \$125.7 million extra for infrastructure replacement in 2018 alone” (PA DEP PA Climate Change Impacts Assessment, April 2020). 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 winter sports.

## 3. Enhancing Resource Security

A key strategic side benefit of climate change mitigation activities is enhanced energy security through reduction in total demand. This will put less strain on the energy system as a whole as we transition to clean renewable energy. Similarly, demand shifts can help with improving water and food security as well. Many of the actions identified here to mitigate GHG emissions will also help Haverford Township’s municipal operations, 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 efficiency across the Township, such service disruptions are less likely, and the community 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 flooding and other extreme weather events.

## 4. Creating Jobs

Renewable energy is a growing sector. U.S. Department of Energy reports that sustainable tourism, green construction, and urban agriculture can provide job opportunities that didn't exist in the past. These climate protection measures can 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 Haverford Township.

## 5. Fostering Social Equity

Social equity and justice are major concerns for addressing climate change and were an integral consideration for this plan. 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 ensures fair treatment and meaningful involvement in the development of laws, policies and regulations and the identification of issues impacting vulnerable communities. As detailed in the Appendices, Haverford Township's community-driven planning process generated solutions that will both address climate change and ensure a better quality of life for communities of color and low-income communities.

# Haverford Township's GHG Emissions

Since the early 1990s, U.S. cities have developed community-wide and local government operations greenhouse gas (GHG) inventories based on accounting protocols created by ICLEI. Known as the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions and the Local Government Operations Protocol, these standards created a credible and defensible methodology which accelerated the number of inventories created and provides consistency within and across U.S. communities. In 2014, ICLEI partnered with the World Resources Institute and C40 Climate Leadership Group to create the Global Protocol for Community Scale GHG Emissions, which allows communities around the world to compare their emissions footprint.

Through the completion of Delaware Valley Regional Planning Commission's most recent Greenhouse Gas Inventory in 2018, the Township has determined emissions levels for the community as a whole. Community-wide emissions represent the sum total of emissions produced within Haverford Township limits as well as emissions resulting from electricity use within the jurisdiction, even if said electricity is generated elsewhere. In this way, the community-wide figures represent all emissions for which the community is responsible.

## Haverford Township Community-Wide GHG Emissions

The following figure breaks down community-wide emissions in Haverford Township. Note that emissions from Township municipal operations are embedded within the community-wide totals; however, the municipal operations use clean electricity that does not contribute to energy use emissions. For example, emissions from government buildings are included in the "Commercial" sector and emissions from Haverford Township fleet vehicles are included in the "Transportation" figure above.

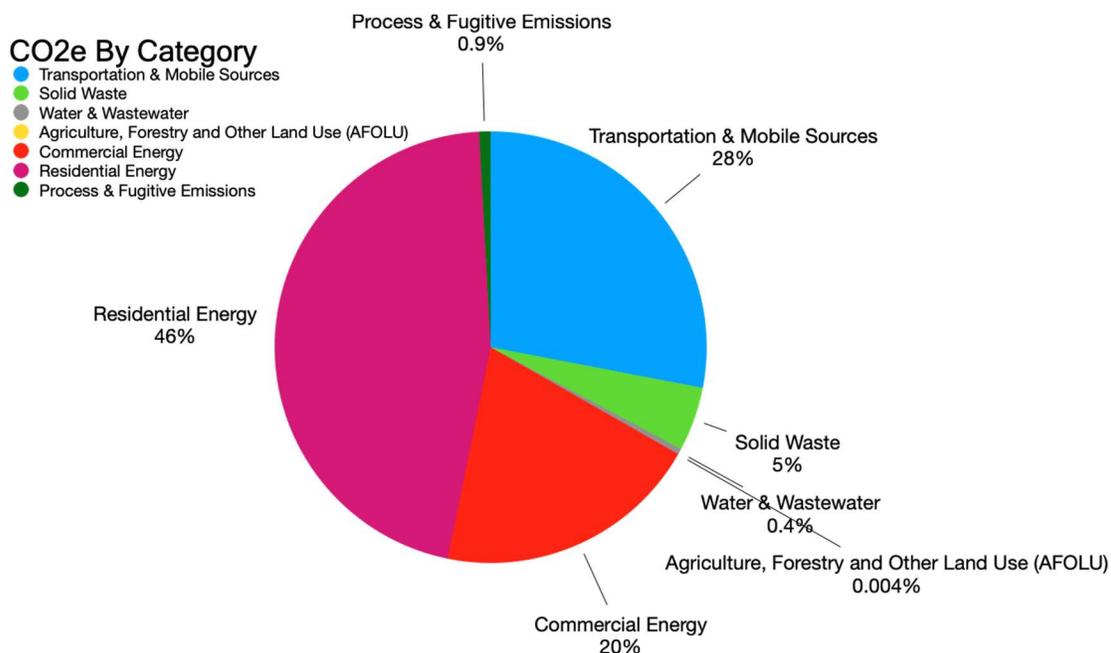


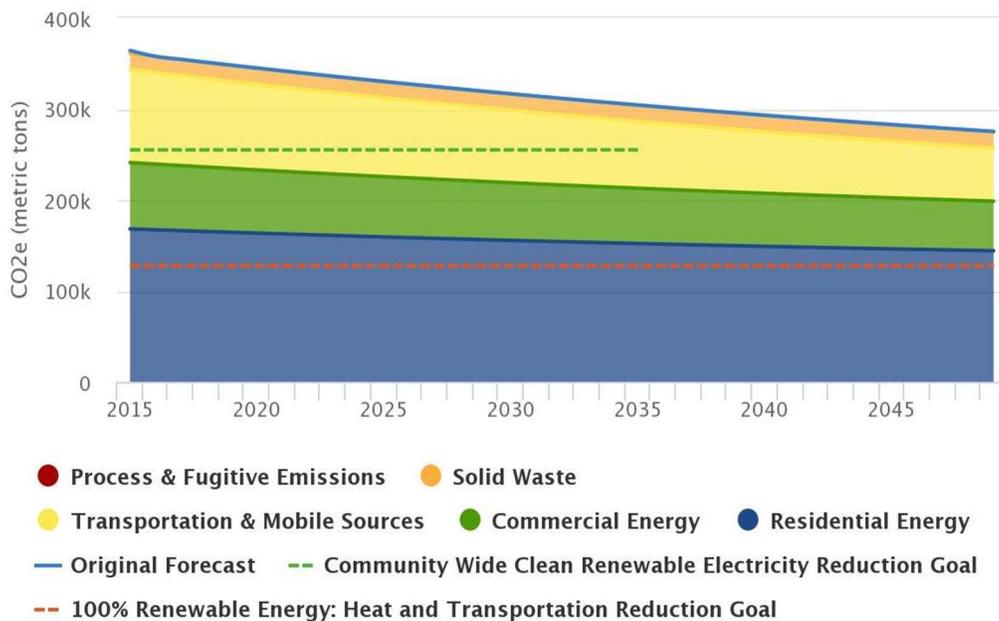
Figure 1: Haverford Township Community-Wide GHG Emissions

## Forecasting Haverford Township's GHG Emissions

Haverford Township has also completed an emissions forecast based on projections of current data and expected future trends. This emissions forecast is the “Original” forecast (also known as a “Business As Usual” forecast), a scenario estimating future emissions levels if no further local action (i.e., projects within this Climate Action Plan) were to take place. The forecast indicates that, if we do not take action, GHG emissions will continue to increase.

### Projected Growth in GHG Emissions

Figure 2 shows the projected growth in GHG emissions in Haverford Township from 2015 to 2050. For complete information regarding the emissions inventory and forecast, including methodology and supporting data, please reference accompanying document “Haverford Township Climate Action Plan: Appendices”.



**Figure 2: Projected "Business as Usual" Growth in GHG Emissions from 2015 to 2050**

## Haverford Township's GHG Reduction Targets

Haverford Township has set targets to reduce 100% of its GHG emissions from community-wide electricity by 2035, and to reduce 100% of its GHG emissions from heating and transportation by 2050. Figure 4 compares the reduction target with the business-as-usual forecast. The combination of measures that Haverford Township has already implemented, are currently planned, and are presented through this Climate Action Plan are designed to help achieve the 2035 and 2050 targets. Reductions in 2035 and 2050 rely on the best information currently available pertaining to population forecasts, future changes to building codes, and vehicle fuel efficiency standards among other information.

Haverford Township's reduction target is both consistent and progressive to the statewide target of 26% reduction by 2025 and 80% by 2050 from 2005 levels, as it exceeds its local percentage of the total emissions reduction needed in order to achieve that target.

## The Haverford Township Climate Action Plan

While a local government cannot address climate change by itself, government policies and practices can dramatically reduce greenhouse gas emissions from a range of sources and help prepare Haverford Township for the anticipated impacts of climate change. In addition, the Township will assist residents and businesses in their endeavors to reduce emissions through programs explained in this Plan. By working together, Haverford Township can not only do its part toward achieving a stable climate - but we can also reap the benefits of healthier air, lower costs for utilities and services, improved transportation and accessibility, a more vibrant local economy, and many other positive side effects of reducing our carbon footprint.

# Taking Action

In the following sections, a series of objectives with supporting actions are explored for each emissions sector. An “Objective” is a goal, end result, or target, and an “Action” is a means of realizing the objective. Each sector draws on the actions of the local government, residents, and businesses, although some areas may be largely one or the other.

## Emissions Reduction Potential

Calculating expected emissions reductions for each objective and action requires making assumptions about the degree of implementation, technology, and individual behavioral changes several years into the future. The uncertainty associated with these assumptions makes it difficult to assign exact reduction totals to each objective or action. To address this uncertainty and provide a simple but useful reference for reduction potential percentage ranges has been devised to represent the emission reductions associated with each objective and its actions as currently some actions are not necessarily quantifiable. Scale minimal, medium, significant, exact estimates when applicable, some actions while necessary cannot be quantified

Symbol	GHG Reduction
	Small Impact Range
	Moderate Impact Range
	Significant Impact Range

## Evaluating Co-Benefits

In addition to measuring the GHG reduction potential, each objective and action is also evaluated for other benefits such as public health, equity and justice, jobs and prosperity, and environmental conservation. Co-benefits for each objective and action have been identified where applicable.

## Climate Adaptation

Some of the proposed actions reduce risk to climate hazards as well as greenhouse gas emissions. This Plan does not propose any actions that would foreseeably increase the community’s risk to climate hazards, but some actions are more directly supportive of climate adaptation than others. The “Climate Adaptation” section describes climate hazards and related actions in more detail.

## Schedule

The proposed actions each vary in implementation timeline. The following classifications are given to each action as to demonstrate how it supports and aligns with the 2035 and 2050 targets.

**Continuous:** Implemented with regularity as needed from start date to target years

**Immediate:** Implemented within 5 years

**Short-term:** Implemented before 2035

**Long-term:** Implemented before 2050

# Residential Energy

Energy consumed in residential buildings accounts for **46%** of Haverford Township’s total GHG emissions, the largest contributor of emissions across all sectors. The following objectives and actions seek to aggressively engage the community and provide resources to enlist large-scale residential participation in this emissions reduction effort as it is imperative to achieving the reduction targets. The following actions acknowledges the limitations of local government and the need for further legislative support from state and federal government to make achieving 100% clean renewable electricity community-wide easier. It also recognizes that achieving these goals will take a united community-wide effort. Simultaneously, the Township has immense opportunity to move rigorously towards those targets by improving the efficiency of residential building stock, creating greater internal capacity for regular community engagement focused on increasing residential participation in renewable energy and encouraging sustainable behaviors to ensure low-carbon future development.

## Objective 1: Improve Energy Efficiency in Residential Building stock

<b>Action 1</b>	<b>Implement “Green Point” system</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Applicants for building permits for new construction, additions, or remodeling may apply for “Green Points” to reduce the cost of permit fees in accordance with the established “Green Building Incentive Program”             <ol style="list-style-type: none"> <li>a. <a href="#">Green Point System model example</a></li> </ol> </li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	<p>Ensures energy efficiency and water efficiency for utility savings</p> <p>Improved indoor environmental quality and waste reduction</p> <p>Operations and maintenance optimization</p>
<b>Schedule</b>	Short-term; <i>continuous</i>
<b>Estimated Cost</b>	\$62,500 per year <i>If 10% discount on permits</i>

<b>Action 2</b>	<b>Increase community residential energy consumption and emissions awareness outreach and education</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Create schedule for rotating PSA’s, infographics and signage for Township cable channel, podcasts, and signage in high traffic areas on:             <ol style="list-style-type: none"> <li>a. Basic behavioral changes using “Energy Vampire” as a design theme (i.e., turn water off while brushing teeth, unplug countertop appliances when not in use, washing laundry in cold water, etc.)</li> <li>b. Opting for renewable electricity versus fossil fuels</li> <li>c. “Warm Weather Wednesdays” by encouraging no-cooking on Wednesdays during the</li> </ol> </li> </ol>

	<p>warmer weather months and instead having salads, outdoor grilling, etc.</p> <ol style="list-style-type: none"> <li>2. Produce community public service video on weatherization and co-benefits of improved insulation efforts</li> <li>3. Promote PECO Energy Efficiency programs, home energy audits, etc. <ol style="list-style-type: none"> <li>a. <a href="#">Promote PECO rebate resources</a> in addition to federal tax rebates</li> </ol> </li> <li>4. Facilitate workshops on sustainable home landscaping techniques and practices <ol style="list-style-type: none"> <li>a. Encourage native plants/change from monoculture grass lawn to more diverse plantings.</li> <li>b. Encourage the use of non-toxic pesticides and fertilizers</li> <li>c. May require changes to the 8" front yard mowing requirement.</li> </ol> </li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Enhanced community health and climate resilience
<b>Schedule</b>	Short-term; <i>continuous</i>
<b>Estimated Cost</b>	1. \$2,500 PR expenses per year, 2. \$2,500, 3. \$2,500, 4. \$2,500

<b>Action 3</b>	<b>Create internal township weatherization program with Community Action Agency of Delaware County</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Investigate opportunities to work with <a href="#">CAADC</a> for a discounted/income scaled weatherization program for eligible residents <ol style="list-style-type: none"> <li>a. Set goals for number of homes to address per year</li> </ol> </li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Increased utilities savings
<b>Schedule</b>	Immediate & Short-term; <i>continuous</i>
<b>Estimated Cost</b>	\$25,000 Proposed Township funding to CAADC maximum

<b>Action 4</b>	<b>Expand residential tree canopy</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Expand Shade Tree Commission Tree Giveaway promotions to 400 trees per year using native tree species <ol style="list-style-type: none"> <li>a. Increase by 25 trees annually</li> </ol> </li> <li>2. Execute comprehensive street tree survey to increase percent of shaded sidewalks <ol style="list-style-type: none"> <li>a. Use temperature maps to target least covered corridors and areas with highest average temperatures within the Township as a part of a strategic effort to deter AC system use, sequester carbon, and mitigate stormwater flooding</li> </ol> </li> <li>3. Require that trees planted are native and suitable for the climate expected over life of the tree</li> </ol>
<b>Reduction Potential</b>	

<b>Co-Benefits</b>	Increased tree canopy mitigates felt impacts of high temperature days, can reduce reliance on AC systems as well as mitigate stormwater flooding and sequester carbon
<b>Schedule</b>	Immediate & Short-term; <i>continuous</i>
<b>Estimated Cost</b>	\$1,250 – (2022) ( <i>Bare Root Tree: \$50 per Tree</i> ), and incremental increases over 8 years

**Objective 2: Increase participation in residential renewable, clean energy and electricity (i.e., Solarize DelCo, grid switches) by 2035**

<b>Action 1</b>	<b>Set solar rooftop installation goals</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Set Installation goals for rooftop solar on eligible properties to increase by 10% by 2035 <ol style="list-style-type: none"> <li>a. To increase by 25% of eligible properties by 2050</li> </ol> </li> <li>2. Create public website with interactive map database that shows # of solar projects and solarized/renewable grid switched homes within the Township.</li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Potential net-metering opportunities for eligible properties
<b>Schedule</b>	Short-term, Long-term; <i>continuous</i>
<b>Estimated Cost</b>	\$2,000 for website/database implementation

<b>Action 2</b>	<b>Increase outreach and PR for residential participation in renewable energy programs</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Promote Solarize DelCo, MakeBenProud <ol style="list-style-type: none"> <li>a. Increase visibility and awareness through targeted information campaigns and outreach</li> <li>b. Target high density residential blocks and roads</li> </ol> </li> <li>2. Promote additional buy-in programs and solar eligibility assessments</li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Contribute to local economy
<b>Schedule</b>	Short-term; <i>continuous</i>
<b>Estimated Cost</b>	\$2,500 PR expenses per year

# Transportation

Transportation accounts for **28%** of Haverford Township’s total GHG emissions. Emissions from transportation is a one of the most easily perceivable sources of pollution. Besides emitting greenhouse gases, transportation from fossil fuels also produces a host of criteria air pollutants when combusted, reducing local air quality and affecting our health. This chapter focuses on programs and policies to reduce emissions from transportation and includes design-oriented approaches as well as expansion of alternate modes such as walking, biking, or public transportation to and from the most common destinations in Haverford Township.

## Objective 1: Increase Quantity of Electric-Powered Vehicles Registered in Haverford Township to 30% by 2035

<b>Action 1</b>	<b>Increase community education and infrastructure for electric vehicles (EV)</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Install additional public dual port EV charging stations               <ol style="list-style-type: none"> <li>a. Survey to determine high density locations</li> <li>b. Review permitting process for installing EV home charging to ensure its ease of implementation</li> </ol> </li> <li>2. Recommend Township allow installing EV charging stations as permitted use in all zoning areas</li> <li>3. Increase Outreach Campaigns on co-benefits of EV’s               <ol style="list-style-type: none"> <li>a. PSA on prevalence of EV charging stations in Township</li> <li>b. PSA on connection between climate action goals and residential EV participation</li> </ol> </li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	EV's can reduce air pollutants in immediate area that contribute to climate change and smog
<b>Schedule</b>	1. Short-term, 2. Short-term; <i>immediate, continuous</i>
<b>Estimated Cost</b>	1. \$32,000, 2. N/A 3. \$1000

## Objective 2: Decrease Gallons of Gasoline and Diesel Fuel Used by Vehicles Registered in Haverford Township by 30% by 2035

<b>Action 1</b>	<b>Township to create and encourage “soft” infrastructure that supports decreased time spent on road through communications outreach</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Encourage employers to consider reducing mid-day break periods               <ol style="list-style-type: none"> <li>a. Counter with a later start or earlier end of day</li> <li>b. Discourages employees from using break time for additional errands, going home at lunch, etc. – thus eliminating additional trips.</li> <li>c. Advise employers to communicate with employees to gauge support first</li> </ol> </li> <li>2. Encourage employers to continue limited “Work at Home” rotations               <ol style="list-style-type: none"> <li>a. Reducing energy consumed at the office and transportation energy by eliminating the commute.</li> </ol> </li> <li>3. PSA: residents to meal plan for 1x per week grocery trips (also eliminating food waste).</li> </ol>

	<p>4. Encourage employers to have a “Walk to Work” day each week.</p> <ul style="list-style-type: none"> <li>a. Between 5-10% of Haverford Township residents live and work within the Township</li> <li>b. Emphasize co-benefits between personal health and transportation emissions reduction (exercise, air quality etc.)</li> </ul> <p>5. Communicate with shopping center business owners to determine feasibility of reserved space in parking lots for transit or carpool parking</p> <ul style="list-style-type: none"> <li>a. Kohl’s parking lot, Manoa Shopping Center parking lot</li> <li>b. Identifiable with parking passes</li> </ul>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	<b>Increased incentives to walk can improve public health by offering a passive form of exercise</b>
<b>Schedule</b>	Short-term; <i>continuous</i>
<b>Estimated Cost</b>	\$2,500 PR expenses per year

<b>Action 2</b>	<b>Improve and create “hard” infrastructure that supports alternative, non-fuel intensive methods of transportation</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Increase bike lanes by 30% by 2035 <ul style="list-style-type: none"> <li>a. Consider developing a “Strategic Bike Plan” that ensures bike paths are well connected to central points throughout the township <ul style="list-style-type: none"> <li>i. Township to engage with PennDot for long term advance planning regarding street widening for formalized and dedicated bike lanes i.e., path from Haverford YMCA connecting to transit stops, shopping centers, etc.</li> </ul> </li> </ul> </li> <li>2. Improve existing bike lanes <ul style="list-style-type: none"> <li>a. Conduct spatial survey to see where lanes are needed to limit vehicle density</li> <li>b. Consider path connections between fitness and shopping centers</li> </ul> </li> <li>3. Include bicycle parking in Township's parking requirements for retail establishments</li> <li>4. Increase number of dedicated bike racks in each district/commercial center</li> <li>5. Township to engage with PA's Department of Health "Walk Works" program to organize walking paths throughout Township</li> <li>6. Determine improvement goals for Township Walk Score and Bike Score <ul style="list-style-type: none"> <li>a. Township to inventory areas without sidewalks and analyze possibility for installation of sidewalks in neighborhoods lacking them to increase walkability</li> </ul> </li> <li>7. Increase cover or install green roofs at five (5) busiest bus stops <ul style="list-style-type: none"> <li>a. Increase cover or install green roofs at ten (10) bus stops more by 2035</li> </ul> </li> <li>8. Identify areas in Township without public sidewalks and look into feasibility of installing sidewalks to improve safe walkability</li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Greater walkability and bike infrastructure can improve the health of residents in the Township through increased physical exercise and improved local air quality
<b>Schedule</b>	1 - 2. Long-term 3 - 7. Short-term; <i>continuous</i> 8. Long-term

<b>Estimated Cost</b>	1 - 2. \$50,000 - \$1,000,000+ <i>*Potential Significant Investment</i> 3. N/A 4. 5. N/A 6. N/A 7. \$30,000 - \$50,000 8. TBD depending on quantity <i>*Potential Significant Investment</i>
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### Objective 3: Replace 100% of Township Vehicles with Electric, Hybrid or Propane Power by 2050

<b>Action 1</b>	<b>Replace Township fleet only with alternative fuel vehicles thru 2050</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Annually increase Township budget to include cost to replace with hybrid, EV, or propane             <ol style="list-style-type: none"> <li>a. Re-apply for grants to offset replacement costs i.e., alternative fuel vehicle grants*</li> </ol> </li> <li>2. Install additional captive charging stations for increased inventory of Township vehicles</li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Contribute to improved local air quality
<b>Schedule</b>	2. Short-term; <i>continuous</i> 3. Short-term
<b>Estimated Cost</b>	1. \$50,000 annual cost differential estimate* 2. \$30,000-\$35,000 per station

*\*Please note that this may not necessarily require any increase in Township budget, as vehicle prices are continuing to decrease, grants are available, and fuel/maintenance savings are significant. Initial infrastructure investment will apply but will likely have long term offsetting savings, after 1-10 Twp. could see net capital outflow*

# Commercial Energy

Energy used in commercial buildings accounts for **20%** of Haverford Township’s total GHG emissions. Similar to residential energy, engaging the commercial sector will be crucial to achieving the Township’s goals. Improving the efficiency of our commercial building stock will contribute significantly to achieving Haverford Township’s reduction targets, while saving commercial business owners money on utility bills where possible. This section focuses on opportunities to retrofit existing commercial buildings, increase the quality of new construction, and to ensure that future activities in these sectors are compatible with our community’s climate protection goals.

## Objective 1: Improve Energy Efficiency in Commercial Building Stock

<b>Action 1</b>	<b>Amend Township services and building codes to support reduced energy practices and buildings</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Expand Shade Tree Commission Program to include commercial properties             <ol style="list-style-type: none"> <li>a. Plant twenty-five (25) trees annually for commercial properties</li> </ol> </li> <li>2. Encourage involvement in “Green Point Systems” building practice discussed under Residential             <ol style="list-style-type: none"> <li>a. <a href="#">Green Point System model example</a></li> </ol> </li> <li>3. Adopt zoning regulations that require new buildings over 45-feet tall to be designed and built to earn ENERGY STAR or LEED certification.             <ol style="list-style-type: none"> <li>a. The zoning code should also require buildings to be annually benchmarked for the ENERGY STAR label.</li> </ol> </li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Tree shade will contribute to cooling and heat mitigation as well as local air quality.
<b>Schedule</b>	1. Immediate; <i>continuous</i> 2. Short-term; <i>continuous</i> 3. Long-term; <i>continuous</i>
<b>Estimated Cost</b>	<ol style="list-style-type: none"> <li>1. 2022: \$1,250; 2023: \$1,300; 2024: \$1,325; 2025: \$1,350 = Total estimate = \$5,225</li> <li>2. TBD/minimal, 3. No cost</li> </ol>

## Objective 2: Encourage and Increase Outreach for Commercial Building Retrofit Projects and Participation in Renewable Energy Programs

<b>Action 1</b>	Increase communications with commercial sector to encourage reduced energy consumption and implement stronger energy saving practices
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. PR outreach to encourage businesses to turn off (or sleep mode) all computer equipment when closed</li> <li>2. Encourage employers to continue limited “Work at Home” rotations             <ol style="list-style-type: none"> <li>a. Can reduce energy consumed at office and transportation emissions by eliminating the commute.</li> </ol> </li> <li>3. Engage with commercial sector to ensure business owners are aware of following programs to</li> </ol>

	<p>increase participation:</p> <ul style="list-style-type: none"> <li>a. <a href="#">C-PACE</a>, <a href="#">Solar loan program</a>, <a href="#">PA power switch</a>, <a href="#">Energy-Efficient Commercial Buildings Tax Deduction</a>, <a href="#">Make Ben Proud</a></li> <li>b. Emphasize and educate business owners on the importance of purchasing from suppliers with Green-e Certification and end of term rate increase possibility</li> </ul> <p>4. For municipal operations, investigate participation in DVRPC Power Purchase Program.</p>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Mitigates impacts of higher temperature days, reduced reliance on AC systems, carbon sequestration potential, stormwater flood mitigation potential
<b>Schedule</b>	1. Immediate, <i>continuous</i> 2. Immediate, <i>continuous</i> 3. Immediate, <i>continuous</i> 4. Short-term, <i>continuous</i>
<b>Estimated Cost</b>	\$2,500 PR expenses per year; 4. TBD

# Waste, Composting, & Recycling

Emissions from waste contribute **4.8%** of Haverford Township’s total GHG emissions and contribute to emissions in the Transportation sector via hauling of waste to and from facilities. Haverford Township’s solid waste is disposed of primarily by incineration at the Covanta Delaware Valley Resource Recovery Facility in Chester, Delaware County, PA. The Covanta Delaware Valley Resource Recovery Facility incinerator is the largest source of Nitrogen Oxide (NOx) pollution in Chester and in all of Delaware County, it comes second to the Philadelphia International Airport. In addition to the environmental implications, the incinerator presents an ethical dilemma. The City of Chester, itself, contributes just 1.5% of the waste that is burned at the Covanta Incinerator, with 80% of the residences within a mile of Covanta being African American. The additional waste is sourced from wealthier suburban areas within Delaware County, Philadelphia, and New York. This leaves Chester residents to experience the health consequences associated with air pollution. Such pollution has contributed to significant poor health outcomes in the community, with children in Chester being three times more likely than the state average to be hospitalized due to asthma. The burning of waste has been linked to toxins that contribute to cancers, birth defects and learning disabilities. For both its emissions and environmental justice impacts, it is in Haverford Township’s long-term interest to reduce waste at its source, expand recycling facilities, reduce food waste, enable re-use of materials, and explore alternative waste management providers. This section focuses on opportunities to reduce waste, reuse materials, and recycle what cannot be reused.

## Objective 1: Reduce Waste Generated Community-Wide by 20% by 2035

<b>Action 1</b>	<b>Reduce waste that enters the trash stream by 20% from 2020-2021 levels.</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Instate “Zero Organic Waste Policy” at Township facilities             <ol style="list-style-type: none"> <li>a. Cease purchase and use of single use plastics at Township facilities in tandem</li> </ol> </li> <li>2. Instate “Pay as you Throw” program to reduce consumption</li> <li>3. Sell “Reduced Consumption” cans to residents             <ol style="list-style-type: none"> <li>a. 30 gal. barrels</li> <li>b. Incentivized by a reduced waste collection fee, <a href="#">Lower Merion example</a></li> </ol> </li> <li>4. Institute compost program through weekly collection or drop-off service sponsored, either in whole or in part, by the Township             <ol style="list-style-type: none"> <li>a. Expand education to engage community to do their own onsite composting</li> <li>b. Schedule composting demonstrations during public meetings</li> <li>c. Encourage residents to meal plan to eliminate food waste</li> </ol> </li> <li>5. Utilize the EPA's WARM tool to track emissions from waste streams             <ol style="list-style-type: none"> <li>a. Commit to annual comprehensive evaluations of waste streams</li> </ol> </li> <li>6. Incorporate eco-centric program offerings with Parks &amp; Rec that dissuade wasteful behavior             <ol style="list-style-type: none"> <li>a. Instate the “Eco-Brick project” at recreational facilities</li> </ol> </li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Decreased trash truck emissions will contribute to improved air quality
<b>Schedule</b>	<ol style="list-style-type: none"> <li>1. Immediate; <i>continuous</i></li> <li>2. Short-term; <i>continuous</i></li> <li>3. Long-term; <i>continuous</i></li> <li>4. Short-term; <i>continuous</i></li> <li>5. Short-term; <i>continuous</i></li> <li>6. Short-term; <i>continuous</i></li> </ol>

<b>Estimated Cost</b>	1. Approx. \$250 cost savings per year, 2. TBD, 3. TBD, 4. TBD, offset by savings from reduced tonnage, 5. TBD/minimal 6. Minimal
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## Objective 2: Increase Recycling and Composting Opportunities & Efforts within Township

<b>Action 1</b>	<b>Increase community outreach/opportunities on recycling and composting to residents</b>
<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Produce podcasts on recycling and composting</li> <li>2. Township to underwrite three (3) additional E-Waste event each year <ol style="list-style-type: none"> <li>a. Four (4) quarterly events in total <ol style="list-style-type: none"> <li>i. Two (2) events dedicated to bulk items; two (2) events to smaller items</li> <li>ii. Investigate feasibility of pre-pay program for heavier bulk items</li> <li>iii. Allow “drop off option” during weeks leading up to event to increase participation</li> </ol> </li> <li>b. Ensure proper AC refrigerant recycling</li> </ol> </li> <li>3. Promote and schedule “Ward-Centric” Free-Cycle days <ol style="list-style-type: none"> <li>a. Instate Township wide quarterly “Giveaway Days” where residents can put out gently used goods for others to take</li> </ol> </li> <li>4. Promote &amp; expand ‘niche’ recycling programs <ol style="list-style-type: none"> <li>a. Friends of EAC recycling drop off program through <a href="#">Teracycle</a> &amp; Haverford Township <a href="#">Reduce Reuse Recycle</a></li> </ol> </li> <li>5. Create a “Tool Library” at Township building or “Free Store”</li> <li>6. Publicize and promote neighbor to neighbor reuse &amp; repurpose through <a href="#">free online "yard sale" sites</a></li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Reduces need for new resources and consumption, low emissions due to proximity of acquiring from nearby neighbors
<b>Schedule</b>	1. Immediate; <i>continuous</i> 2. Short-term; <i>continuous</i> 3. Immediate; <i>continuous</i> 4. Immediate; <i>continuous</i> 5. Short-term; <i>continuous</i> 6. Immediate; <i>continuous</i>
<b>Estimated Cost</b>	1. \$1,000 PR expense, 2. \$10,000 per event 3. \$1,000 PR expense 4. \$1,000 PR expense 5. Personnel and Shed expenses TBD; 6. \$1,000 PR expense

## Objective 3: Encourage Delaware County Council and the Delaware County Solid Waste Authority to Explore Environmentally Conscious Policies and Contract Terms with its Incinerator Providers

<b>Action 1</b>	Establish educational campaign
<b>Action Item(s)</b>	Engage community in information campaigns that inform resident on where their waste goes upon leaving Township, how it is manage and disposed of, and impacts of waste management and incinerator specifically in the City of Chester where the Covanta plant resides

<b>Reduction Potential</b>	
<b>Co-Benefits</b>	Increased awareness on ill effects of waste incineration for the City of Chester may encourage behaviors to reduce household waste and encourage local governments to investigate waste disposal alternatives
<b>Schedule</b>	Immediate; <i>continuous</i>
<b>Estimated Cost</b>	\$2,500 PR expenses per year

# Water & Wastewater Management

Energy used in Water and Wastewater Management accounts for **.4%** of Haverford Township’s total GHG emissions. While minimal compared to other sectors, the way in which potable water, wastewater and storm water move through the community is an important consideration not only for emissions reductions but climate adaptation, as increased precipitation and frequent intense storms systems are projected to impact the Township.

## Objective: Mitigate Ground Pollutants from Entering Water Stream and Mitigate Stormwater Flooding

<b>Action Item(s)</b>	<ol style="list-style-type: none"> <li>1. Township to invest in new and expanded green stormwater infrastructure projects             <ol style="list-style-type: none"> <li>a. Conduct spatial survey to determine most vulnerable, flood prone areas</li> </ol> </li> <li>2. Investigate green roof construction on eligible municipal buildings</li> <li>3. Increase % of permeable surfaces on Township buildings and properties             <ol style="list-style-type: none"> <li>a. When surfaces are eligible to be replaced</li> <li>b. Amend residential building code to encourage replacement of driveway and other hard surfaces with permeable materials</li> <li>c. Reduce permit fees for permeable pavement, de-paving or green stormwater infrastructure projects</li> </ol> </li> <li>4. Increase onsite management of stormwater             <ol style="list-style-type: none"> <li>a. Enact a 'Stormwater fee' based on impervious area</li> <li>b. Lower the thresholds for mitigation to 600 square feet cumulative new impervious and require whole property mitigation when the threshold is exceeded</li> </ol> </li> <li>5. Recommend changing regulations as to size of gutters and downspouts to mitigate backups during extreme events</li> <li>6. Campaign to encourage residents to install sewer vent extensions OR Township buys in bulk and residents install themselves</li> <li>7. Create information campaigns on the connection between dumping detergents, personal care products etc. derived from petroleum down the drain and wastewater treatment plant emissions</li> </ol>
<b>Reduction Potential</b>	
<b>Co-Benefits</b>	<p>Green roofs can act as a water catchment measure to mitigate stormwater flooding events while reducing reliance on cooling systems for the structure</p>
<b>Schedule</b>	<ol style="list-style-type: none"> <li>1. Short-term/long-term; <i>continuous</i></li> <li>2. Long-term</li> <li>3. Long-term</li> <li>4. Short-term/Long-term; <i>continuous</i></li> <li>5. Immediate; <i>continuous</i></li> <li>6. Immediate/Short-term; <i>continuous</i></li> <li>7. Immediate; <i>continuous</i></li> </ol>
<b>Estimated Cost</b>	<ol style="list-style-type: none"> <li>1. \$5,000 - TBD</li> <li>2. \$50,000 - \$1,000,000+ <i>*Potential Significant Investment</i></li> <li>3. \$5,000 + \$1,000,000+ <i>*Potential Significant Investment</i></li> <li>4. TBD</li> <li>5. N/A</li> <li>6. \$2,500 PR expenses per year/TBD depending on quantity</li> <li>7. \$2,500 PR expenses</li> </ol>



# Climate Change Adaptation

This section provides a high-level assessment of potential climate impacts and highlights the proposed greenhouse gas reduction actions simultaneously supportive of climate adaptation for each type of hazard. For the most local and accurate assessment Haverford Township referenced the PA Department of Environmental Protection’s “2021 Pennsylvania Climate Impacts Assessment” to identify likely changes from today through 2050. The following sections discuss the top climate hazards according to those projections. For more information about the science behind climate change, see dedicated “Climate Change Science” in the appendix.

## Anticipated Climate Impacts

Over the last 110 years, the Commonwealth of Pennsylvania has experienced a long-term warming of more than 1.8°F, as well as an increasing number of wet months. The warming and wetting trend is expected to continue at an accelerated rate, especially if the world continues on its current path of greenhouse gas emissions. Under this scenario, Pennsylvania will be about 5.4°F warmer than it was at the end of the 20<sup>th</sup> century, and the annual precipitation will increase about 8%. 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 (Shortle et al, 2015). **Haverford Township is likely to experience...**

## Rising Temperatures & Increased Daily Averages

Extreme heat events will continue to increase and become more frequent. For example, temperatures are expected to reach at least 90°F on 37 days per year on average across the state, a 5 day increase from the baseline period. Days reaching temperatures above 95°F and 100°F will become more frequent as well. The following heat map indicates that average daily temperatures have been increasing and will continue to rise through 2090, which could impact agriculture, public health, and other sectors of the community. The southern corners of the state are projected to experience the highest temperatures in both the near and long term which will be felt in Haverford Township. Increasing temperatures will continue to alter the growing season and increase the number of days that people need to cool buildings and homes but will also decrease the number of days that people will need to use heating due to an overall temperature increase.

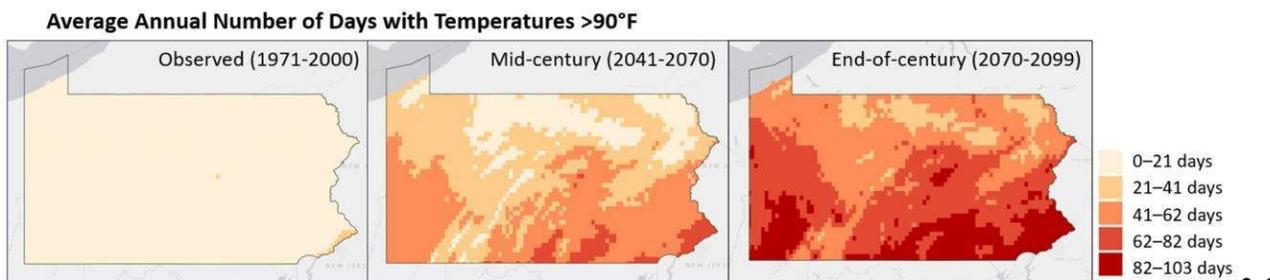


Figure 5: Average Daily Temperature Between 1950-2090 (PA DEP 2021 Climate Impacts Assessment)

## Increased Precipitation and Heavy Rainfall Events

Haverford Township will also experience more total average rainfall that occurs in less frequent but heavier rain and storm events. These extreme rainfall events are projected to increase in magnitude, frequency, and intensity. These events are otherwise known as cloudbursts, are often responsible for flash flooding.

The Southeastern region of Pennsylvania will continue to experience the highest number of days with very heavy precipitation throughout the century, posing considerable impacts for Haverford Township's built environment if not addressed.

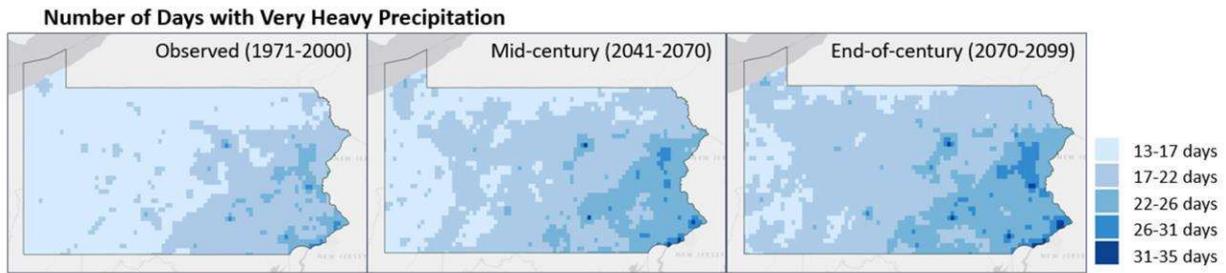


Figure 6: Average Daily Temperature Between 1950-2090 (PA DEP 2021 Climate Impacts Assessment)

Residents can also expect to see an increase in the number of cases of vector-borne diseases like Lyme Disease due to regional climate shifts making the area more suitable for pests such as ticks as well as other invasive species.

## Adaptive Greenhouse Gas Reduction Measures

Some greenhouse gas reduction actions also reduce risk to climate hazards. The following are a few of many examples of how these outcomes can be related to one another:

- Actions that improve energy efficiency and distribute renewable energy can (1) reduce pressure on the grid when there is higher energy demand for heating and air conditioning during extreme heat events, and (2) increase energy independence for households and businesses, as opposed to complete reliance on centralized power infrastructure that could fail during a catastrophic event. These types of actions include, but are not limited to:
  - Energy-efficient, electrically heated building design for new construction, and retrofits for existing buildings (e.g., retrofits and weatherization)"
  - Onsite combined heat and power (CHP) a
  - Smart grid technologies
  - Community solar microgrids
- Actions that reduce impervious surfaces can reduce the potential for flooding by retaining stormwater in place. These types of actions include, but are not limited to:
  - Expanding or restoring green space
  - Installing green roofs, rain gardens, bioswales, pervious pavers, and other green infrastructure (as well as requiring them for future development)
- Installing green roofs and planting trees adjacent to buildings can regulate indoor temperatures during extreme heat events

- Expanding and protecting alternative transportation routes (bicycle, pedestrian, bus, and rail) provides network redundancies and alternative routes for emergency evacuation
- Water efficiency and conservation actions can (1) reduce pressure on the grid from energy used for pumping, treating, and distributing water, and (2) make the community less vulnerable to drought

# Climate Equity

Climate equity was a core component of the planning process and will continue to be through implementation. 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. Under the status quo, however, not everyone is given the opportunity to participate and benefit. Communities of color and low-income populations have historically been under-served by programs and investments and under-represented in decision-making, including the development and implementation of climate policy. These frequently unintended but exclusionary processes can maintain or exacerbate disparities in public health; food, energy, and housing security; air and water quality; economic prosperity, and overall quality of life.

Climate change is likely to amplify the impacts of these existing inequities. Residents of frontline communities which often include lower income neighborhoods, communities of color, immigrants, unhoused, outdoor workers, the very young, and the elderly will disproportionately bear the burdens of climate change impacts. In addition, the many economic and health benefits of carbon reduction investments are sometimes not shared equitably across a community, especially among people of color and low-income levels. Haverford Township is committed to determining where it can address these instances of environmental injustice as they may occur inside and those it may be contributing to outside of the Township.

## Objective: Identify Instances of Environmental Justice and Exposure to Environmental Hazards Internally and those Potentially Exported to other Communities

<b>Action Items:</b>	<ol style="list-style-type: none"> <li>1. Conduct an Environmental Justice Assessment using EPA framework             <ol style="list-style-type: none"> <li>1. Investigate potential inequalities related to exposure to environmental hazards for residents within Township</li> <li>2. Determine if and where pollutant outputs generated by Haverford Township are being exported (i.e., trash burned in Chester)</li> <li>3. Guides and assistance:                  <a href="#">Toolkit for Assessing Potential Allegations of Environmental Injustice</a>  <a href="#">Technical Guidance for Assessing Environmental Justice in Regulatory Analysis</a> </li> </ol> </li> </ol>
<b>Schedule</b>	Long-term; <i>continuous</i>
<b>Estimated Cost</b>	1. \$50,000+ *Potential major investment

To ensure an equitable climate action plan, Haverford Township engaged residents and businesses to ensure a community-driven process which is described in accompanying document “Haverford Township Climate Action Plan: Appendices”

# Monitoring Plan

Establishing a monitoring process that enables Haverford Township to track the impacts of the actions included in the plan and compare estimated impacts to what is actually achieved in terms of energy savings, renewable energy production, and GHG emissions reduction. Assessing the implementation status of the actions will allow determination of whether the action is performing well and to identify corrective measures. This process is also an opportunity to understand barriers to implementation and identify best practices or new opportunities in moving forward.

The table below describes actions and reflective of the components of the monitoring reports. Action reports are to occur every two years and will only include status updates on the overall action, the mitigation action plan, and the adaptation action plan. The full monitoring report will occur every 2 years and in addition to the components in the action report, will include an updated community and municipal GHG inventory. This will help Haverford Township track its GHG emissions reduction progress. With the approval of this Climate Action Plan in 2021, the first monitoring action report will be due in 2023 and the first full monitoring report with the updated GHG inventories will be due in 2028. Ideally, the most recent GHG inventories should be no more than four years old.

<b>Action Items:</b>	<ol style="list-style-type: none"> <li>1. Township to hire or appoint a “Sustainability Manager”             <ol style="list-style-type: none"> <li>a. Manages and tracks CAP goals; coordinate with internal Township advocacy groups and in neighboring communities</li> <li>b. Develops, implements and monitors Township GHG reduction strategies</li> <li>c. Determines budgets for reduction and adaptation plans</li> <li>d. Engages closely with commercial and residential sectors</li> </ol> </li> <li>2. Regular (annual or biannual) reporting of emissions, energy use and costs for Township operations including breakdown for major departments:             <ol style="list-style-type: none"> <li>a. i.e. as police transition to hybrids/EVs, determine the emissions and cost reductions</li> </ol> </li> <li>3. Appoint small task force that formally reviews progress every 2-3 years until both 2035 and 2050 goals are achieved             <ol style="list-style-type: none"> <li>a. Ensures efficient and effective progress or amendments of CAP goals and township sustainability efforts</li> </ol> </li> <li>4. Upgrade SolSmart status from BRONZE to SILVER             <ol style="list-style-type: none"> <li>a. Future concerted effort to achieving GOLD status</li> </ol> </li> <li>5. Create a community-wide app or webpage that allows residents to log their sustainability adaptations, access resources and information about permits, retrofitting and weatherization programs, track sustainability progress and initiatives within Township             <ol style="list-style-type: none"> <li>a. Environmental Insights Explorer</li> <li>b. Interactive maps to show locations of solar panels, renewable energy projects, environmental center, compost and e-waste drop off sites etc.,</li> </ol> </li> </ol>
<b>Schedule</b>	1 - 5. Short-term; <i>continuous</i>
<b>Estimated Cost</b>	1. \$75,000 - \$150,000 (annual salary/benefit cost) 2. N/A 3. \$1,000 (minimal administrative cost) 4. \$5,000-\$10,000 5. \$50,000+ *Potential major investment UNLESS Township can purchase commercially available app

<b>Action Items:</b>	<ol style="list-style-type: none"> <li>1. Encourage more structured communication between Haverford Township EAC and other advocacy groups within Haverford Township and neighboring Townships <ol style="list-style-type: none"> <li>a. Establish coalition between neighboring municipality’s climate advocacy groups in coordination with county entities, such as the DelCo Sustainability Commission</li> <li>b. Schedule monthly or bi-monthly meetings between groups to focus on: accessibility to renewable energy, weatherization/ retrofitting programs, EV’s for residents as well as local environmental hazard exposures and exportation of environmental hazards</li> </ol> </li> </ol>
<b>Schedule</b>	Short-term; <i>continuous</i>
<b>Estimated Cost</b>	1.\$2,500 administrative costs

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# Haverford Township Climate Action Plan Appendices

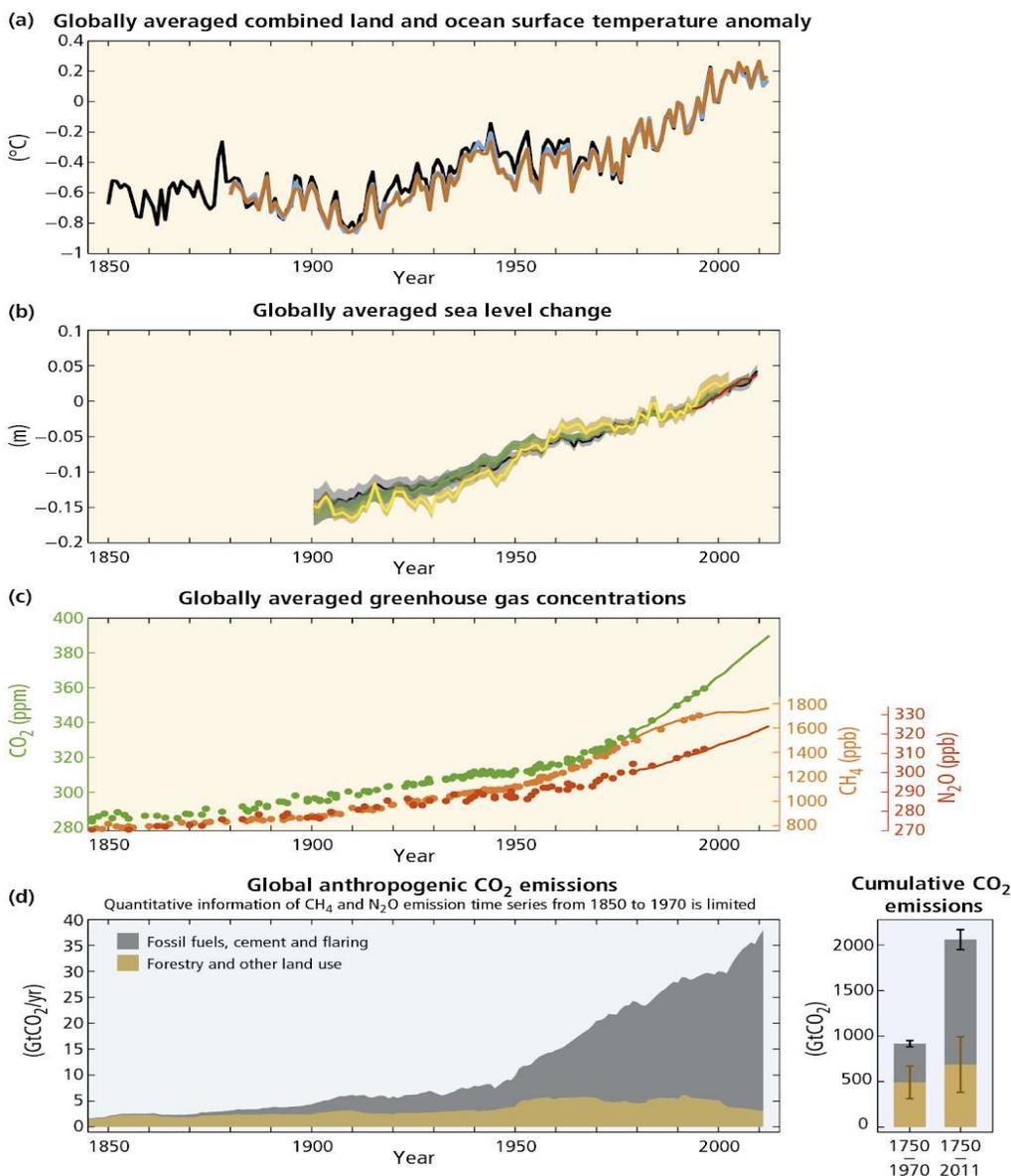
*Local Actions and Goals to Reduce Haverford Township's Greenhouse Gas Emissions and to Prepare the Township for the Impacts of Climate Change*

Approved by Haverford Township Board of Commissioners  
October 12, 2021



# Climate Change Science

The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report affirms that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level" (IPCC, 2014, p. 151). Researchers have made progress in their understanding of how the Earth's climate is changing in space and time through improvements and extensions of numerous datasets and data analyses, broader geographical coverage, better understanding of uncertainties and a wider variety of measurements (IPCC, 2014). These refinements expand upon the findings of previous IPCC Assessments – today, observational evidence from all continents and most oceans shows that "regional changes in temperature have had discernible impacts on physical and biological systems" (IPCC, 2014, p. 151).

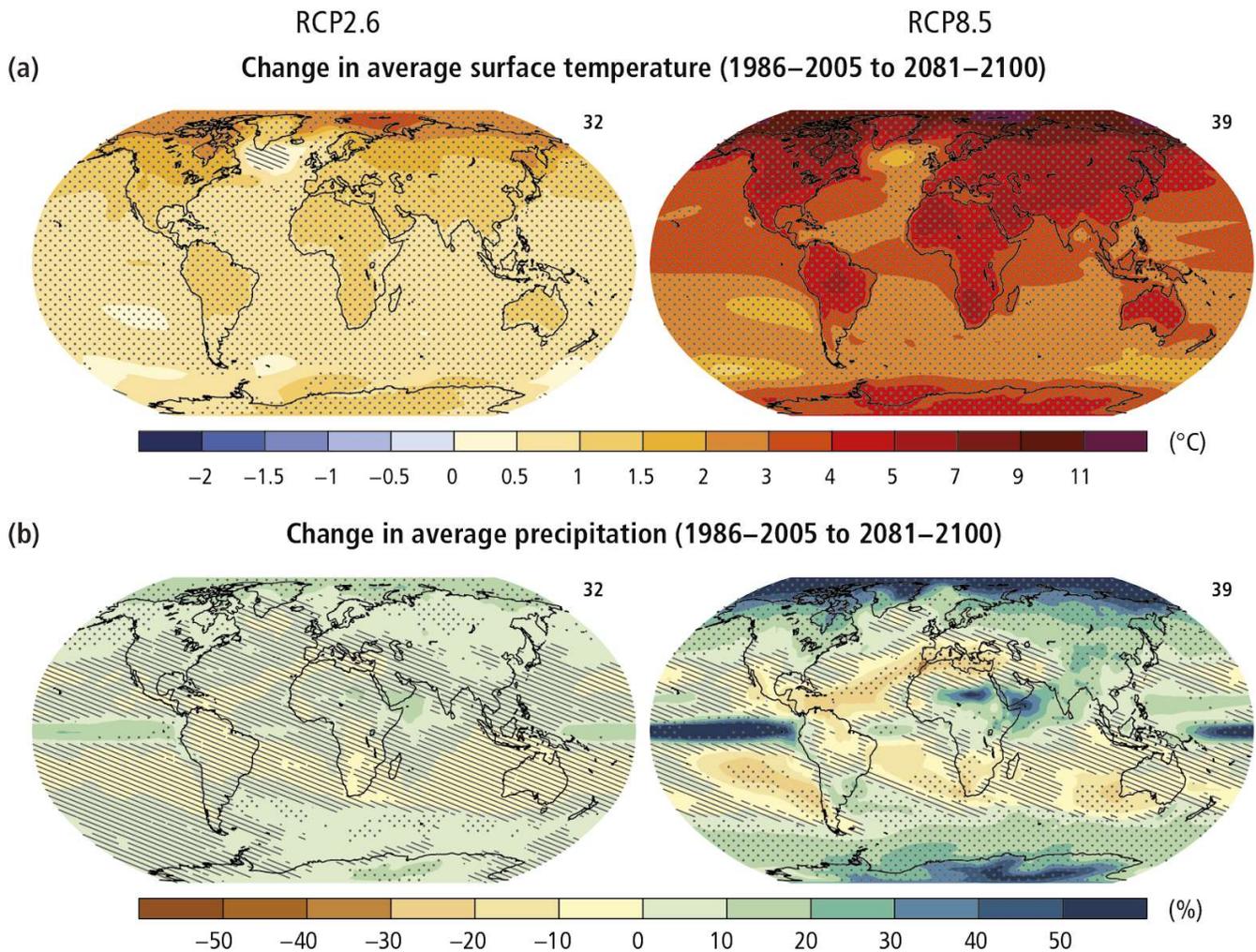


**Figure 1** Observations and other indicators of a changing global climate system

The Fifth Assessment also asserts that “it is *extremely likely* that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcings together. Globally, economic and population growth continued to be the most important drivers of increases in CO2 emissions from fossil fuel combustion. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions” (IPCC, 2014, p. 151).

In short, the Earth is already responding to climate change drivers introduced by mankind.

## Temperatures and Extreme Events are Increasing Globally



**Figure 2** Change in average surface temperature (a) and change in average precipitation (b) based on multi-model mean projections for 2081–2100 relative to 1986–2005 under the RCP2.6 (left) and RCP8.5 (right) scenarios.

Surface temperature is projected to rise over the 21st century under all assessed emission scenarios. It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an

increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions (IPCC, 2014).

## Climate Risks

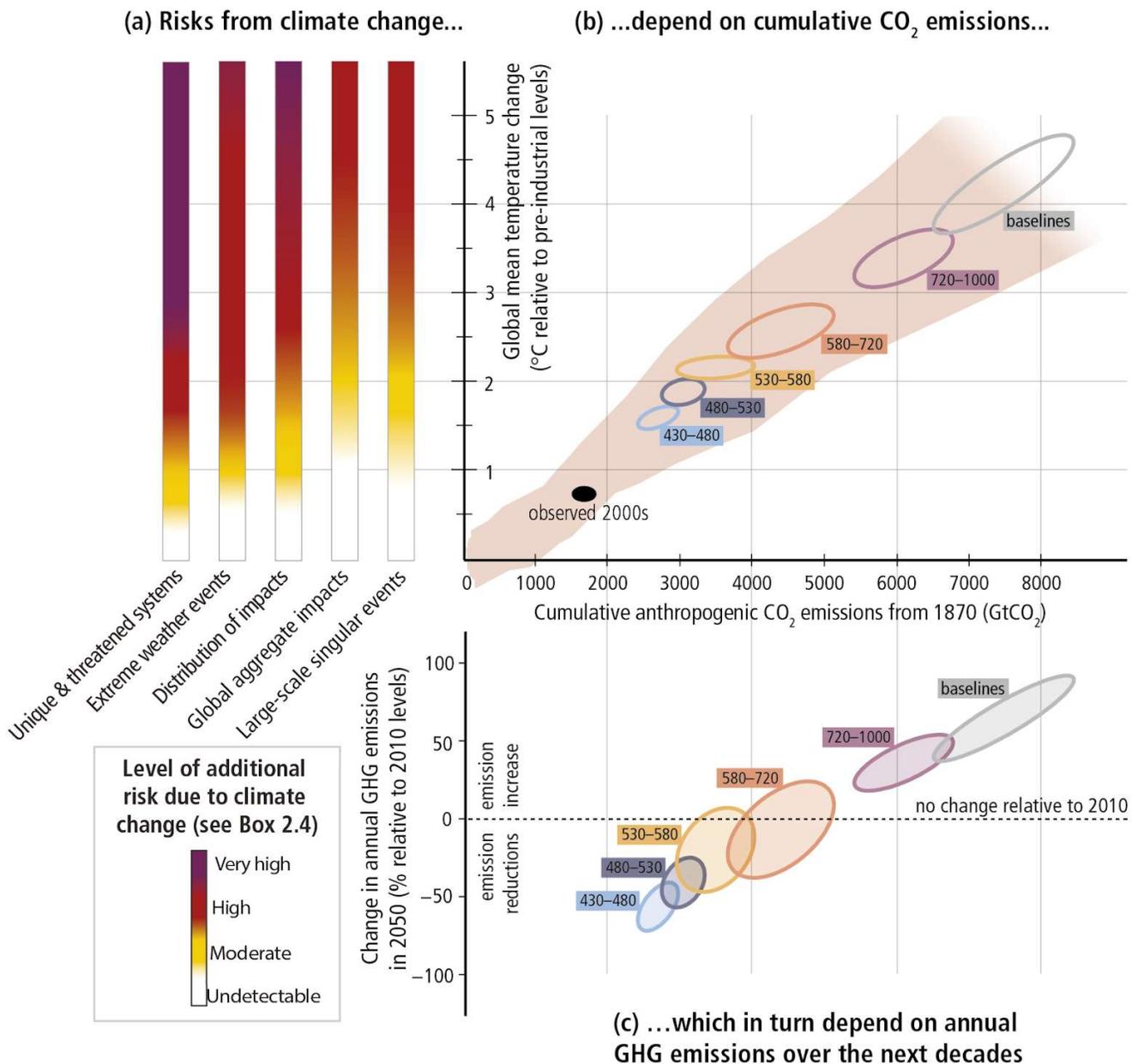
Climate change is projected to undermine food security. Due to projected climate change by the mid-21st century and beyond, global marine species redistribution and marine biodiversity reduction in sensitive regions will challenge the sustained provision of fishery productivity and other ecosystem services. For wheat, rice and maize in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late 20th century levels, although individual locations may benefit. Global temperature increases of ~4°C or more above late 20th century levels, combined with increasing food demand, would pose large risks to food security globally. Climate change is projected to reduce renewable surface water and groundwater resources in most dry subtropical regions, intensifying competition for water among sectors.

Until mid-21st century, projected climate change will impact human health mainly by exacerbating health problems that already exist. Throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions and especially in developing countries with low income, as compared to a baseline without climate change. Health impacts include greater likelihood of injury and death due to more intense heat waves and fires, increased risks from foodborne and waterborne diseases and loss of work capacity and reduced labor productivity in vulnerable populations. Risks of undernutrition in poor regions will increase. Risks from vector-borne diseases are projected to generally increase with warming, due to the extension of the infection area and season, despite reductions in some areas that become too hot for disease vectors.

In urban areas, climate change is projected to increase risks for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges. These risks are amplified for those lacking essential infrastructure and services or living in exposed areas. Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world.

Climate change is projected to increase displacement of people. Populations that lack the resources for planned migration experience higher exposure to extreme weather events, particularly in developing countries with low income. Climate change can indirectly increase risks of violent conflicts by amplifying well-documented drivers of these conflicts such as poverty and economic shocks (IPCC, 2014).

# Greenhouse Gas Emissions Must be Reduced



**Figure 3** The relationship between risks from climate change, temperature change, cumulative carbon dioxide (CO<sub>2</sub>) emissions and changes in annual greenhouse gas (GHG) emissions by 2050.

Limiting risks across Reasons for Concern (a) would imply a limit for cumulative emissions of CO<sub>2</sub> (b) which would constrain annual GHG emissions over the next few decades (c). Panel A reproduces the five Reasons for Concern. Panel B links temperature changes to cumulative CO<sub>2</sub> emissions (in GtCO<sub>2</sub>) from 1870. They are based on Coupled Model Inter-comparison Project Phase 5 simulations (pink plume) and on a simple climate model (median climate response in 2100), for the baselines and five mitigation scenario categories (six ellipses). Panel C shows the relationship between the cumulative CO<sub>2</sub> emissions (in GtCO<sub>2</sub>) of the scenario categories and their associated change in annual GHG emissions by 2050, expressed in percentage change (in percent GtCO<sub>2</sub>-eq per year) relative to 2010. The ellipses correspond to the same scenario categories as in Panel B, and are built with a similar method (IPCC, 2014).

The recent massive buildup of greenhouse gases in our atmosphere is conceivably even more extraordinary than changes observed thus far regarding temperature, sea level, and snow cover in the Northern hemisphere in that current levels greatly exceed recorded precedent going back much further than the modern temperature record.

Anthropogenic greenhouse gas emissions have increased since the pre-industrial era driven largely by economic and population growth. From 2000 to 2010 emissions were the highest in history. Historical emissions have driven atmospheric concentrations of carbon dioxide, methane and nitrous oxide to levels that are unprecedented in at least the last 800,000 years, leading to an uptake of energy by the climate system (IPCC, 2014).

In response to the problem of climate change, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. While this Plan is designed to reduce overall emissions levels, as the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

# Inventory Methodology

## Methodology

In 2018, the Delaware Valley Regional Planning Commission completed a regional energy use and greenhouse gas emissions inventory for the nine-county DVRPC region. This inventory served as the source of data for the community-wide emissions profile. The DVRPC's comprehensive methodology can be in their technical memo ["Energy Use and Greenhouse Gas Emissions Inventory for Greater Philadelphia: Methods and Sources"](#)

As part of this inventory, DVRPC allocated both energy use and greenhouse gas emissions to individual counties and municipalities based on 2015 data. Please note that not all sectors were allocated to the municipal level, including aviation, freight rail, and intercity rail.

# Planning Process and Community Engagement

While Haverford Township has already begun to reduce greenhouse gas emissions and climate risk through a variety of actions, this plan is a critical component of a comprehensive approach to reduce the Township's emissions. The planning process was based on the following overarching framework, developed by ICLEI – Local Governments for Sustainability, USA (ICLEI), and known as the Five Milestones for Climate Mitigation.

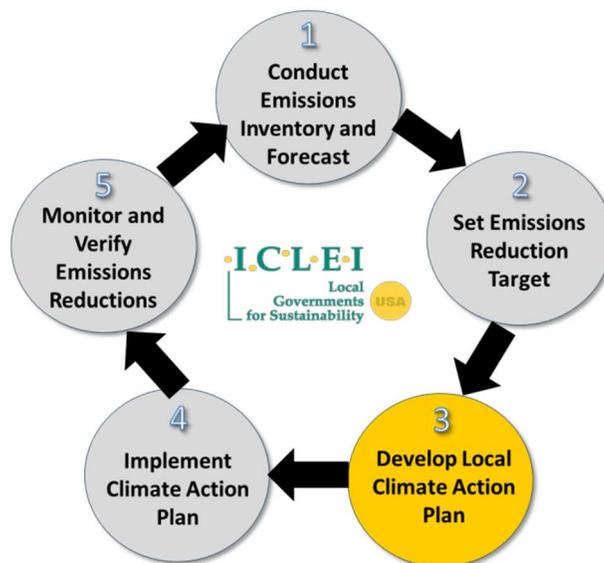


Figure 1 Five Milestones for Climate Mitigation

As indicated by the figure above, climate action planning is a continuing cycle and does not stop with the development of this document. However, this Climate Action Plan represents the Township's first planning cycle, including the completion of the first three milestones.

## Community Participation in Planning Process

Community engagement and participation is critical to effectively create plans to address climate change on the local and municipal level. To ensure the actions proposed are both effective and reflective of the concerns of the community it is designed to serve, community outreach becomes necessary in the planning process and the action process. Before devising the actions proposed in the Climate Action Plan document a series of community outreach efforts were executed, with many of the actions recommended in the document calling for regular community engagement and outreach programs. Community engagement becomes particularly crucial here in Haverford Township as it aims to reach its reduction goals of community-wide clean electricity by 2035 and community-wide renewable heat and transportation by 2050. It is evident it will take a continuous and close relationship between local government and community residents and local commercial business to meet those goals.

The purpose of the outreach strategies and activities presented in this Plan are to provide local communities, residents, stakeholders, interested parties, and other affected agencies and/or individuals with opportunities to become actively involved in development of the Township's CAP and the evaluation of associated environmental issues. The goals of outreach and engagement are to: (1) raise awareness of the Climate Action Plan and its goals; (2) educate the public and other organizations about the CAP; (3) provide opportunities for input at the various steps of CAP development and (4) galvanize community-wide participation in achieving Township goals from residents and businesses.

The actions proposed in this version of the CAP were informed largely by the responses of community members as well as suggestion by ICLEI, PA DEP and Haverford Townships Environmental Advisory Committee.

## Engagement Activities and Public Participation

The best practice for equitable planning is to have a community-driven process as described in the Community-Driven Climate Resilience Planning: A Framework from the National Association of Climate Resilience Planners. The Township will move forward with the GHG Inventory and this Climate Action Plan in order to engage the public in the planning process. These actions will be taken and informed by the following resources:

- U.S. Climate Resiliency Toolkit
- Equitable and Just National Climate Platform

In identifying which specific populations should be included in a community driven process, Haverford Township consulted:

- The [Pennsylvania Department of Environmental Protection's Environmental Justice Viewer](#):
- Haverford Environmental Advisory Committee

Due to the COVID-19 pandemic and CDC guidelines, all community outreach was conducted virtually. Information for involvement, surveys and meetings were broadcasted via Township social media pages, newsletters and the Township website.

- **February 26, 2021 - Initial Community Wide "Climate Impacts Awareness" Survey**

The first point of community engagement was initiated on February 26th, 2021 before the CAP action planning process. This 53-question survey covered areas such as awareness of climate change impacts, personal concerns, areas of interest, and a free response section for residents to provide suggestions, concerns, and other feedback.

*Survey results can be viewed [here](#)*

- **March 10, 2021 - Community Workshop "Exploring Climate Change in Haverford Township: Assessing Opportunities for Action"**

The meeting addressed climate change impacts in Haverford Township, opportunities for involvement in efforts presently and a Q&A section where attendees had the opportunity to ask questions, make suggestions or raise concerns.

*Meeting recording can be viewed [here](#)*

- **May 9, 2021 - Residential and Commercial energy survey**

This survey targeted the residential and commercial sectors to gauge the awareness of the Township's reduction targets set by Resolution No. 2104-2018 and interest in participation in renewable electricity programs. The results indicated that stronger outreach efforts and education is needed to assist in meet community wide goals.

*Survey results for Commercial sector can be viewed [here](#)*

*Survey results for Residential sector can be viewed [here](#)*

## Planning Team and Stakeholders

Haverford Township Environmental Advisory Committee (EAC) Sub-Committee on Climate Action.

- **February 2, 2021: Initial meeting during EAC monthly public meeting which included entire EAC**
- **February 12, 2021: Community engagement strategy planning**
- **February 26, 2021: Community workshop planning meeting**
- **March 12, 2021: Community workshop debrief**
- **April 1, 2021: CAP actions brainstorm and revisions**
- **May 24, 2021: First draft look and feedback debrief**
- **July 16 2021: Final draft look and feedback debrief**