Buckingham Township Climate Action Plan

Photo 1: Buckingham Township Municipal Building

Local Actions and Policies to Reduce Greenhouse Gas Emissions

Approved by Buckingham Township Board of Supervisors

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Produced by Buckingham Township in partnership with Penn State's Local Climate Action Program, ICLEI – Local Governments for Sustainability, and the Pennsylvania Department of Environmental Protection

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Executive Summary

Introduction and motivation

Climate change is widely recognized as one of the greatest social, economic, and environmental challenges of the 21st century, with overwhelming evidence of its accelerating impacts. It poses a serious threat not only to Buckingham Township's natural resources, but also to the local economy, infrastructure, and public health. However, taking climate action also presents significant opportunities to build a healthier, safer, and more resilient community while supporting local job creation and economic growth. This climate action plan builds on its Energy Transition Plan, its Sustainable Pennsylvania certification, and other initiatives and provides Buckingham Township with another important step to take.

Scientists warn that without reductions in greenhouse gas (GHG) emissions, Americans will experience more frequent and severe heat waves, droughts, heavy rainstorms, flooding, and other extreme weather events. These climate-related changes could strain Buckingham Township's infrastructure, stress natural resources, increase energy costs, and worsen existing economic and social disparities.

In Pennsylvania, temperatures have already risen by more than 1.8°F since the early 20th century, and projections indicate an increase of up to 5.9°F by 2050. Similarly, annual precipitation has increased by approximately 10% over the past century and is expected to rise by another 8% by 2050, with a 14% increase during the winter season (Shortle et al., 2015). These shifts are primarily driven by the accumulation of greenhouse gases—such as carbon dioxide (CO_2) and methane (CH_4)—resulting from the burning of fossil fuels and land use changes.

While the natural greenhouse effect is essential for maintaining Earth's climate, human activities have greatly accelerated GHG emissions, leading to excessive heat retention and climate instability. Carbon emissions from human activities have reached their highest levels in history, with half of all carbon dioxide emissions since 1750 occurring in just the past 40 years (IPCC, 2014). In Pennsylvania, the industrial sector (31%), electricity production (30%), and transportation (23%) are the leading contributors to emissions (PA DEP, 2019). Without proactive intervention, emissions will continue to rise due to population growth, urbanization, and reliance on personal vehicles.

Given the increasing impacts of climate change, the time for action is now. In addition to national and state-led initiatives, local governments play a crucial role in reducing GHG emissions and fostering sustainability. The way communities develop land, design buildings, and manage transportation directly affects energy consumption and emissions levels. It is essential for communities like Buckingham Township to lead by example, demonstrating that it is possible to reduce GHG emissions while enhancing quality of life, protecting natural resources, and fostering economic prosperity.

State-Initiated Climate Action

According to the Pennsylvania Climate Action Plan 2021, former Governor Tom Wolf has pledged to address climate change by implementing 18 strategies aimed at reducing greenhouse gas (GHG) emissions by 26% by 2025 and 80% by 2050, compared to 2005 levels. Buckingham Township acknowledges the importance of aligning with Pennsylvania's Priority Climate Action Plan, using its nine priority action areas as a framework to transition to renewable energy, enhance community resilience, and ensure a sustainable, secure future for its residents.

Joining the Community Effort

Buckingham Township is not alone in its commitment to climate action. Several nearby municipalities, including Doylestown Township, Solebury, and Warrington, have adopted "Ready for 100" resolutions to transition to 100% clean and renewable energy. Buckingham Township's government has taken significant steps toward this goal, including contracting with PECO in 2023 to source 50% of its electricity from renewable sources such as solar, wind, geothermal, and low impact hydro. By implementing its own Energy Transition Plan (ETP), Buckingham Township is building on this momentum, setting clear emissions reduction targets and actionable strategies to minimize climate change impacts at the local level.

Buckingham Township has joined Sustainable Pennsylvania, a voluntary certification program that supports municipalities in setting and achieving sustainability goals. This participation demonstrates the township's strong commitment to a sustainable and responsible future. The program provides tools to help conserve resources, reduce carbon emissions, and promote disaster resilience, energy-efficient buildings, and environmentally conscious planning. It also enables Buckingham to track its achievements, set future targets, and better understand the broader benefits of its sustainability efforts. Achieving certification through Sustainable Pennsylvania

positions Buckingham as a leader in environmental stewardship and highlights its dedication to creating an inclusive, resilient, and high-quality living environment for all residents.

Photo 2: Native Plants Event

Climate Change's Impacts

In recent years, Buckingham Township has directly experienced the escalating impacts of climate change, with several notable events highlighting the increasing risks:

- **Tornado Incident (September 2021):** An EF1 tornado struck Buckingham Township as a result of Hurricane Ida's remnants. This tornado caused significant damage to local infrastructure and properties, underscoring the township's vulnerability to severe weather events (Ciavaglia, 2021).
- **Increased Flooding Risks:** The township has faced heightened flooding concerns due to more frequent and intense rainfall events. These floods have strained stormwater management systems and posed challenges to municipal resources.
- **Rising Temperatures and Heat Waves:** Projections indicate a significant increase in the number of days with temperatures exceeding 90°F in the coming decades, leading to heat waves that threaten public health, particularly among vulnerable populations (Bucks County Planning Commission, 2024).
- **Drought Conditions (March 2025):** Despite recent rainfall, Bucks County, including Buckingham Township, experienced moderate to severe drought conditions in early 2025. Such droughts can adversely affect water supply, agriculture, and increase the risk of wildfires (Buckingham Township Environmental Advisory Commission, 2024).

These events exemplify the tangible effects of climate change on Buckingham Township, emphasizing the need for proactive measures to enhance community resilience and adapt to evolving environmental challenges.

resources.

The Threat of Greenhouse Gas Emissions

With greenhouse gas emissions continuing to rise, pollutants such as carbon dioxide (CO_2) and methane (CH_4) from fossil fuel consumption are disrupting natural environmental balances. In Buckingham Township, the primary sources of emissions are transportation and energy use in residential and commercial buildings. The ETP outlines a structured plan to reduce emissions, transition to clean energy, and improve energy efficiency across multiple sectors.

Key reduction strategies include:

1. Expanding energy efficiency initiatives for homes, businesses, and municipal buildings
2. Encouraging green energy purchasing and the installation of solar photovoltaic systems
3. Enhancing bike and pedestrian infrastructure to promote alternative transportation
4. Increasing access to public transit and supporting electric vehicle adoption
5. Utilizing state and federal funding opportunities (such as the Inflation Reduction Act and Bipartisan Infrastructure Law) to accelerate clean energy projects

By implementing these strategies, Buckingham Township aims to achieve an emissions reduction target aligned with state and regional goals, ensuring a cleaner, healthier, and more sustainable community.

Vision statement and objective

Buckingham Township envisions a sustainable future where energy efficiency, conservation, and renewable energy drive economic growth, improve public health, and enhance community resilience. The township is committed to reducing reliance on fossil fuels, promoting clean energy investments, and fostering an inclusive, community-driven approach to sustainability. By leading with innovation, strategic partnerships, and responsible energy management, Buckingham Township aims to become a model for other municipalities in achieving 100% clean energy by 2050.

– Derived from Buckingham Energy Transition Plan

Co-Benefits of Climate Action

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

1. Improving Public Health

Climate change mitigation efforts, particularly those related to transportation and energy efficiency, help improve air quality by reducing vehicle emissions and fossil fuel reliance. Enhancing public transit options, expanding bike and pedestrian infrastructure, integrating electric vehicle (EV) infrastructure and vehicle adoption, and promoting clean energy sources contribute to a healthier and more connected community. These actions reduce respiratory illnesses, create more walkable neighborhoods, and improve the overall quality of life for Buckingham Township residents.

2. Saving Money and Reducing Risk

Measures taken to reduce greenhouse gas emissions also offer significant financial benefits. Buckingham Township spends a substantial amount on energy consumption for municipal buildings, street lighting, and fleet operations. Implementing energy efficiency upgrades, renewable energy projects, and sustainable transportation solutions can lower these costs, allowing for reinvestment in community services.

By acting now, the township can also reduce long-term climate-related expenses, including storm damage repairs, flood mitigation, and public health impacts from heat waves and air pollution.

Increasing energy security through demand reduction and resilience strategies will also help protect water and food supplies, ensuring stable resources for the community.

3. Creating Jobs

The transition to clean energy and sustainable infrastructure presents an opportunity for economic growth and job creation. The renewable energy sector, including solar installation, green construction, and energy efficiency consulting, is rapidly expanding. Investing in local workforce training and green job development programs will help Buckingham Township residents access employment in these growing industries while strengthening the local economy.

Since the early 1990s, U.S. municipalities have developed community-wide and local government greenhouse gas (GHG) inventories using standardized protocols established by ICLEI – Local Governments for Sustainability. These methodologies, including the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions and the Local Government Operations Protocol, ensure consistency in emissions tracking across jurisdictions. In 2014, ICLEI collaborated with the World Resources Institute and C40 Climate Leadership Group to create the Global Protocol for Community-Scale GHG Emissions, allowing global communities to benchmark their carbon footprints.

To align with Pennsylvania's Climate Action Plan, Buckingham Township follows these established protocols in conducting its GHG inventory and emissions analysis. The Pennsylvania Climate Action Plan 2021 sets ambitious statewide reduction targets—26% below 2005 levels by 2025 and 80% by 2050—which guide local strategies for reducing emissions, increasing energy efficiency, and expanding renewable energy deployment.

Through the completion of a local emissions study, or "greenhouse gas inventory," Buckingham Township assesses total community-wide emissions, represented as CO_2e (carbon dioxide equivalent) emissions. This analysis accounts for all emissions produced within township limits, as well as indirect emissions from electricity consumption, transportation, and waste management. By identifying key emissions sources, Buckingham Township can implement targeted strategies to reduce its carbon footprint, ensuring alignment with state and federal climate goals while fostering long-term sustainability.

Progress in Greenhouse Gas Emission Reductions (2005–2023)

Buckingham Township has made significant strides in reducing greenhouse gas (GHG) emissions over the past two decades. By implementing various strategies, the township has already aligned itself with Pennsylvania's statewide climate objectives, successfully lowering emissions across multiple sectors while continuing to face challenges in others.

Since 2005, Buckingham Township has reduced its total emissions from 226,942 metric tons of CO_2 equivalent ($MTCO_2e$) to 176,277 $MTCO_2e$, representing an overall reduction of 22.3%. The

township has met and exceeded key reduction targets set for the 2015 milestone and continues to push toward its 2023 and future goals.

Table 1: $MTCO_2e$ Reductions since 2005.

Year	Total Emissions ($MTCO_2e$)	Reduction from 2005 (%)	Reduction from 2005 ($MTCO_2e$)
2005	226,942	-	
2015	190,252	16.1%	36,690
2023	176,277	22.3%	50,665

Sector-Specific Changes

Residential Sector

- Emissions dropped from 99,835 $MTCO_2e$ in 2005 to 68,832 $MTCO_2e$ in 2015, showing a 31% reduction.
- However, a slight increase to 69,207 $MTCO_2e$ was recorded by 2023. This suggests a need for renewed residential energy efficiency initiatives.

Commercial Sector

- Emissions rose from 27,262 $MTCO_2e$ in 2005 to 43,831 $MTCO_2e$ in 2015, a 60.8% increase.
- By 2023, emissions had dropped significantly to 17,542 $MTCO_2e$, marking a 35.7% reduction from 2005 levels and a 60% reduction from 2015.

Industrial Sector

- Emissions were reduced to zero by 2015 and remained at zero in 2023.

Transportation Sector

- Emissions declined from 67,354 $MTCO_2e$ in 2005 to 61,489 $MTCO_2e$ in 2015, reflecting a 8.7% reduction.

- However, by 2023, emissions had increased to 72,900 $MTCO_2e$, exceeding 2005 levels. This suggests a growing need for enhanced transportation sustainability efforts, including electric vehicle infrastructure and improved public transit access.

Key Takeaways

- Buckingham Township has achieved significant reductions in the residential and commercial sectors.
- The commercial sector saw the most dramatic improvements between 2015 and 2023.
- Transportation emissions have risen, highlighting an area requiring additional focus.
- Overall, the township is on track to meet its long-term emission reduction targets but must implement further policies to address transportation-related emissions and maintain progress in the residential sector.

Measuring Buckingham's GHG emissions

The following data provides a breakdown of community-wide emissions in Buckingham Township. Emissions from municipal operations, including government buildings and fleet vehicles, are embedded within these totals. For example, emissions from township buildings are categorized under the "Commercial" sector, while emissions from Buckingham Township's vehicle fleet fall under "Transportation". As a result, government operations represent a subset of the township's total emissions, reinforcing the importance of a holistic community approach to emissions reductions.

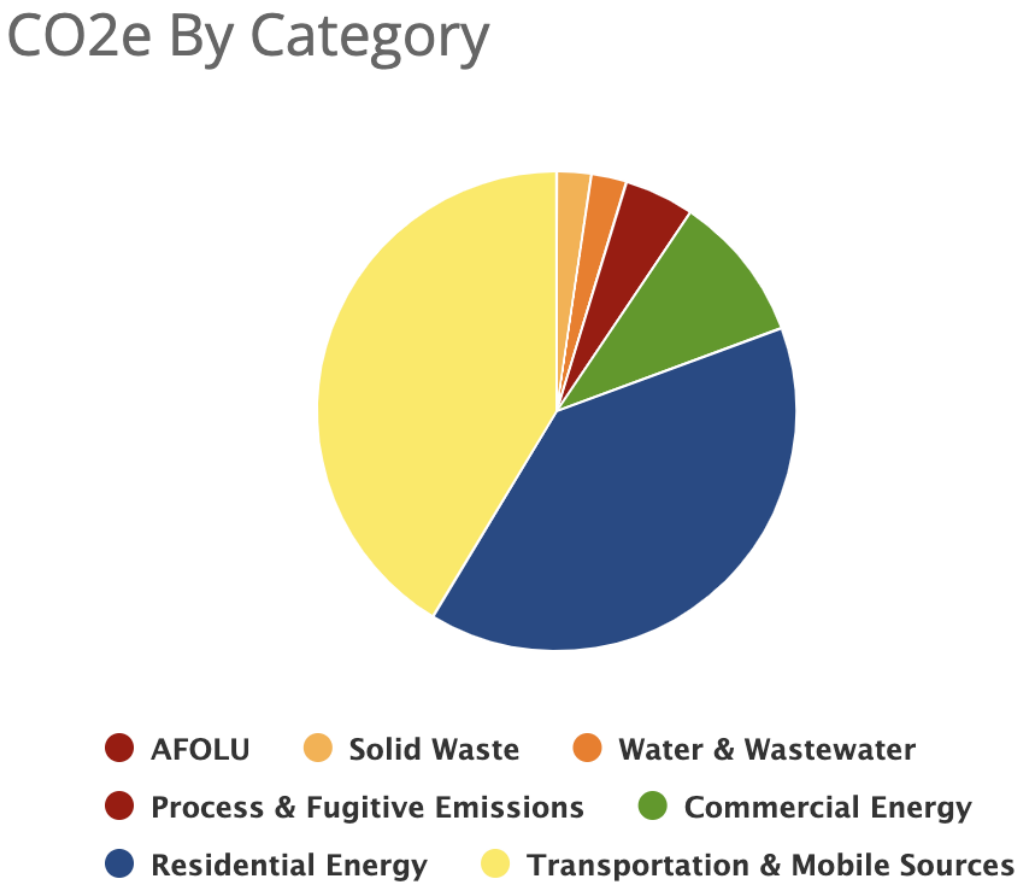

Figure 1: Buckingham's Community Wide GHG Emissions

Government emissions include all sources for which the local government exercises direct operational control including water and wastewater, process and fugitive emissions, solid waste, transportation and mobile services, and residential, commercial, and industrial energy.

Forecasting Buckingham's GHG emissions

Buckingham Township has also completed an emissions forecast based on projections of current data and expected future trends. This forecast represents a "Business As Usual" (BAU) scenario, which estimates future emissions levels if no further local action—such as projects within this Climate Action Plan—were implemented.

The forecast indicates that, without intervention, overall GHG emissions would remain relatively stable, but per capita emissions would increase due to expected changes in population growth, energy demand, and transportation use. According to regional planning data and census trends, Buckingham Township's population is projected to grow modestly by 2035 and exceed its base-year population by 2040. This underscores the importance of implementing GHG reduction strategies to ensure a sustainable and climate-resilient future for the township.

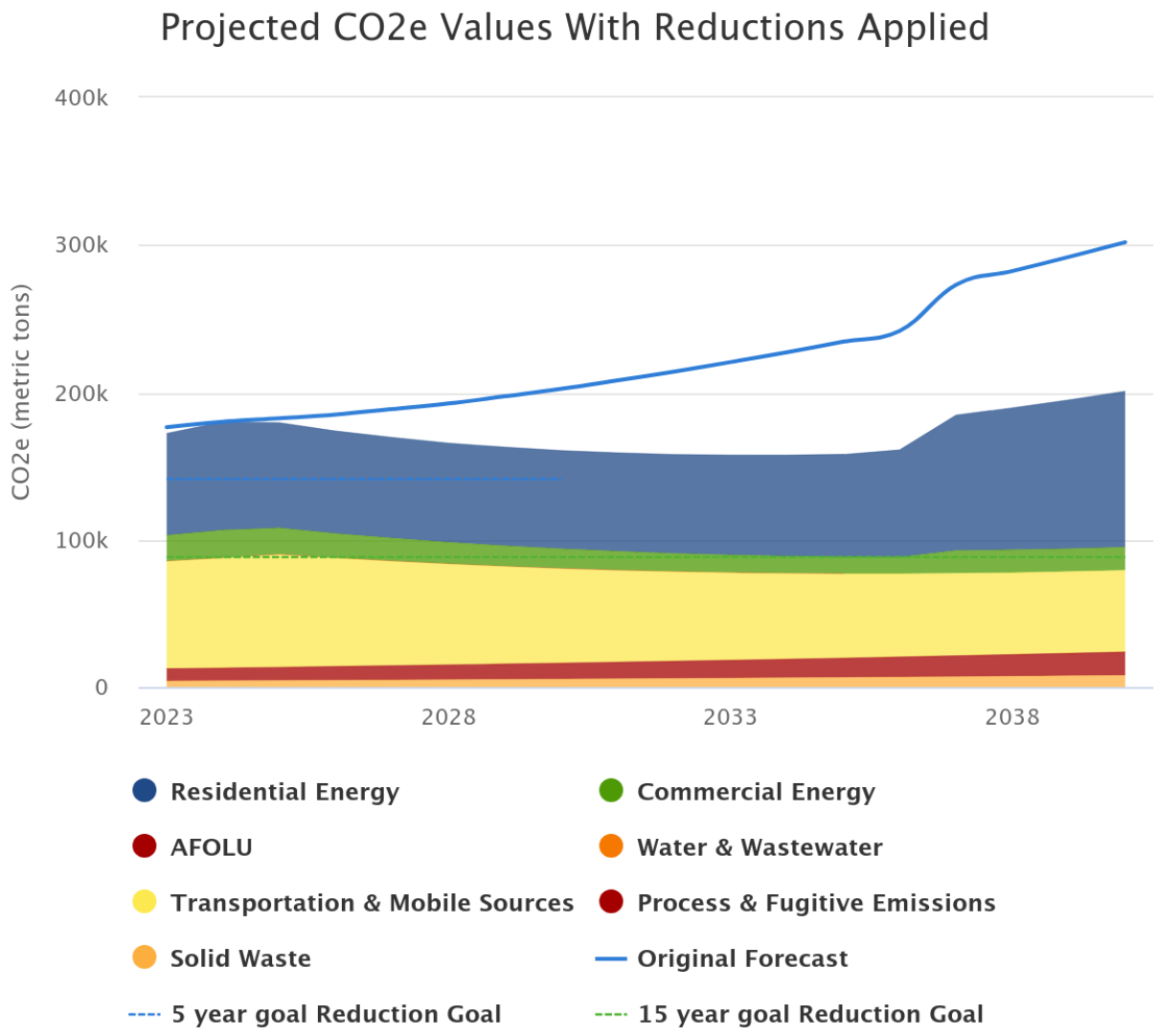

Figure 2: Forecasting GHG Measures through 2040

TAKING ACTION

In the following sections, a series of measurable objectives with supporting actions are outlined for each emissions sector. An 'Action Title' represents a broad goal or desired outcome, while each 'Objective' identifies specific steps required to achieve that goal. These objectives are informed by ClearPath modeling, ensuring they are both feasible and essential to achieving Buckingham Township's overall goal of an as-yet-to-be-quantified emissions reduction by 2030 and 2040.

Each sector relies on actions from local government, residents, and businesses, though some areas may be more dependent on one group than others. Beyond achieving their designated objectives, these actions also support Buckingham Township's broader sustainability goals, as detailed in the executive summary.

Emissions Reduction Potential

Estimating emissions reductions for each objective and action requires making assumptions about future implementation levels, technological advancements, and behavioral changes. Due to the uncertainties in these projections, assigning precise reduction values to each measure is challenging.

To address this, a set of symbols and percentage ranges has been developed to provide a clear yet flexible reference for expected emissions reductions. Additionally, the most critical actions necessary to meet Buckingham Township's reduction goals are highlighted to emphasize their importance.

Emissions Reduction Potential Table

Symbol	Reduction Potential
	Small Impact
	Moderate Impact
	Significant Impact

Evaluating Co-Benefits

In addition to assessing the GHG reduction potential, each objective and action is also evaluated for additional benefits, including public health, equity and justice, job creation and economic growth, and environmental conservation. The symbols below represent the co-benefits associated with each measure.

Evaluating Co-Benefits Table

Symbol	Reduction Potential
	Environmental Benefits – Represents sustainability, carbon sequestration, and reduced greenhouse gas emissions.
	Public Health Benefits – Indicates improvements in air quality, reduced pollution-related illnesses, and overall community well-being.
	Energy Efficiency & Cost Savings – Symbolizes improved energy use efficiency, cost reductions for businesses, and enhanced grid stability.

Transportation Emissions Reduction Strategies

Beyond contributing to 41.4% of Buckingham Township's total greenhouse gas (GHG) emissions, transportation also releases air pollutants from fossil fuel combustion, reducing local air quality and impacting residents' health. To address these challenges, the township is committed to reducing transportation-related emissions through a combination of design-oriented solutions and sustainable mobility initiatives.

This section highlights programs and policies aimed at expanding alternative transportation options, including walking, biking, public transit, and electric vehicle (EV) adoption. Encouraging the shift to EVs—through increased charging infrastructure, incentives, and community awareness programs—is a key strategy in reducing reliance on fossil fuels. Additionally, residents have prioritized investments in bicycle and pedestrian infrastructure, such as bike racks, crosswalks, ramps, and repair stations, to further support carbon-free transportation methods and create a more sustainable, accessible community.

Advancing Sustainable Transportation in Buckingham Township

Buckingham Township has set ambitious transportation goals, aiming to reduce emissions from transportation by 10%-20% by 2030. Additionally, projections indicate that 57% of all vehicles will be electric by 2040, aligning with government estimates for EV adoption. These efforts are critical in curbing transportation-related emissions, which, if left unchecked, are projected to increase from 72,900 metric tons of CO_2 equivalent ($MTCO_2e$) in 2023 to 111,838 $MTCO_2e$ by 2040.

Photo 3: Electric Charging Station.

By reducing vehicle miles travelled (VMT) and supporting the transition to electric vehicles (EVs), Buckingham Township can help reverse this trajectory, achieving a 10,000 $MTCO_2e$ reduction within the next

five years and cutting projected emissions nearly in half, to 55,414 $MTCO_2e$, by 2040. These reductions will be further supported by expanding EV charging infrastructure, both in public spaces and at residences.

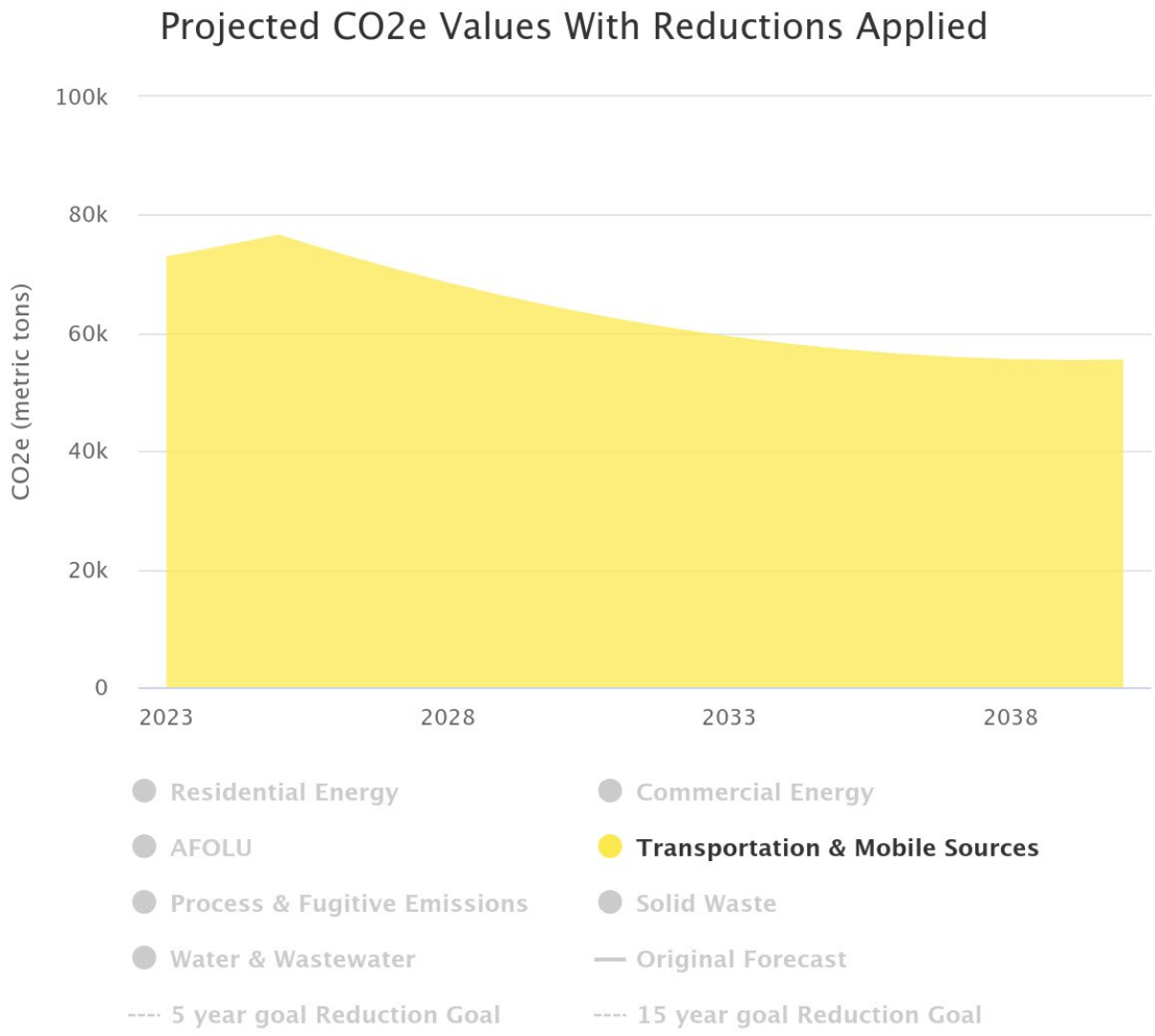

Figure 3: Transportation Emissions with Reductions.

With an estimated 80% of EV owners charging at home, integrating residential solar systems into the township's energy strategy will lower reliance on fossil-fuel-based electricity and amplify the

impact of transportation emissions reductions. Encouraging homeowners to invest in solar energy and home EV chargers will be a key strategy in creating a sustainable, self-sufficient transportation system.

To further support this transition, Buckingham Township is exploring the installation of public EV charging stations throughout the community. According to Blink Charging, municipalities that invest in public EV infrastructure benefit from:

1. Increased property values
2. Attracting and supporting green businesses
3. Generating long-term revenue from charging stations
4. Providing valuable service to residents and visitors
5. Enhancing overall sustainability
6. Measurable reductions in carbon emissions

By combining strategic policies, investments in EV infrastructure, and the expansion of renewable energy solutions, Buckingham Township is committed to reducing transportation emissions, improving air quality, and building a cleaner, more resilient future for its residents.

Transportation Reduction Table-The following tables contain overarching goals, objectives, and potential actions to achieve 5-year targets.

TR1-Facilitate non-vehicular travel to reduce VMT			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
TR-2A	Determine safe areas for bike paths and dangerous streets that can benefit from bike lanes.		
TR-1B	Implement new bike infrastructure, paths, and lanes		

TR2-Increase electric vehicle use in the community by 5%-10%			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
TR-2A	Require energy efficient and alternative fuels use in fleet vehicles and equipment.		
TR-1B	Implement a strategic plan/incentives for increasing electric vehicle use by the community.		
TR-2C	Incentivize large parking lot owners to install solar arrays with electric vehicle charging stations and electric vehicle car rentals.		

Solid Waste Reduction

Buckingham Township's solid waste is transported to a disposal facility located outside of the township's jurisdiction. While the township does not host a landfill, emissions from the transport and decomposition of waste still contribute to its overall greenhouse gas (GHG) footprint. These emissions stem not only from the decay of organic materials but also from the hauling of waste to and from the external facility, indirectly impacting the Transportation sector. Significant environmental benefits and cost savings can be realized by reducing waste generation, increasing material reuse, and expanding local recycling efforts. Residents of Buckingham Township have expressed strong interest in a local composting initiative and in strengthening the township's recycling infrastructure. As such, it is in the township's long-term interest to focus on reducing waste at its source, minimizing food waste, promoting the reuse of materials, and improving recycling accessibility. This section explores opportunities to achieve these goals and reduce the community's environmental impact.

Solid Waste Reduction Table-The following tables contain overarching goals, objectives, and potential actions to achieve 5-year targets

SW 1-Reduce solid waste generation by 7%			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
SW-1A	Conduct a public education and outreach campaign to encourage citizens and business to properly handle recyclable materials and reduce personal waste.		
SW-1B	Explore options for creating a composting program that reduces yard litter and food waste sent to landfill.		

Land Use

Land use practices that are not climate-conscious not only contribute to greenhouse gas emissions but also increase Buckingham Township's vulnerability to extreme weather events—risks that are growing more frequent and intense due to climate change. While Buckingham may not face the same level of urban development as a more densely populated area, it is still challenged by issues like flooding and stormwater runoff. For example, increased rainfall intensity has led to frequent pooling on rural roadways, and developments near creeks have contributed to erosion and downstream flooding in low-lying areas. Fortunately, the township's extensive green spaces and forested areas serve as natural carbon sinks, helping to remove carbon dioxide from the atmosphere. While the loss of these natural resources may not directly increase emissions, it significantly weakens Buckingham's ability to sequester carbon—an essential strategy in climate

mitigation. These open spaces also provide valuable co-benefits, including recreational opportunities, wildlife habitat, and mental health support through access to nature.

Photo 4: Wetlands with Neighboring Preserved Farm.

Sustainable land use planning is key to preserving these critical assets, enhancing infrastructure resilience, and fostering a more connected and adaptive community. By prioritizing sustainable development, Buckingham can protect these multifunctional landscapes while addressing both current and future climate-related challenges, ultimately supporting long-term community well-being.

The following section outlines potential actions that align with these goals, offering strategies to reduce emissions associated with land use while enhancing Buckingham Township's resilience to climate-related extreme weather events.

Land Use Table-The following tables contain overarching goals, objectives, and potential actions to assist Buckingham Township in preserving its green spaces as the community grows.

LU 1-Implement sustainable land use practices in the community.			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
LU-1A	Continue preserving and transforming vacant lots into green spaces, parks, and trails that support natural stormwater and flood management, while also providing residents with opportunities for outdoor recreation and fostering a stronger sense of community connection		
LU-1B	Incorporate green spaces and expand the tree canopy as key elements in future urban development projects throughout Buckingham Township. Prioritizing natural landscaping and tree planting within new developments can enhance community well-being, improve air quality, manage stormwater, and contribute to local climate resilience.		

Commercial Sector

Commercial buildings contribute significantly to Buckingham Township's greenhouse gas (GHG) emissions, with this sector being responsible for approximately 17,542 metric tons of CO2e emissions in 2023. To address these emissions, the township is focused on reducing energy usage, improving energy efficiency, and encouraging the adoption of renewable energy sources, including solar power, within the commercial sector.

This section highlights key programs and strategies aimed at reducing emissions from commercial buildings. These include energy efficiency improvements, solar energy adoption, and updates to building codes to ensure new construction and major renovations meet higher sustainability standards. By supporting these efforts, Buckingham Township aims to make substantial progress toward its climate goals, fostering a more sustainable future for the community.

Goals

- Reduce CO2e emissions from commercial buildings by 5% by 2030, lowering emissions from 17,542 metric tons to approximately 16,664 metric tons.
- Achieve a 50% reduction in CO2e emissions from commercial buildings by 2040, lowering emissions to approximately 8,771 metric tons.

Implementation Timeline

Years 1-5: Focus on energy audits, offering incentives through applying for federal and state funding for energy-efficient retrofits and solar adoption, and updating building codes. Launch outreach campaigns to engage commercial property owners.

Years 6-10: Expand solar adoption, streamline financial incentives, and increase the number of businesses pursuing green building certifications. Continue improving energy efficiency across the commercial sector.

Years 11-15: Achieve 5% energy reductions by 2030 and 50% by 2040, with widespread adoption of solar energy, high-efficiency upgrades, and sustainable building practices.

C-1 Commercial Buildings Solar Improvement Objective			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
C-1A	Solarize municipal-owned, including the Township building and the Water Authority maintenance building.		
C-1B	Utilize GET Solar's free technical assistance to assess potential sites for solar installations across the community. This could include municipal buildings, schools, and private sector buildings.		
C-1C	Encourage broad implementation of recent commercial CPACE legislation to fund energy projects		
C-1D	Work with solar experts like PA Solar Center to assess the feasibility of solar in the community, considering factors such as roof orientation, shading, energy demand, and budget constraints.		

C2-Commercial Buildings Efficiency Improvements			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
C2-1A	Increase the number of commercial buildings pursuing green building certifications. Such as, schools, medical care, township operated buildings.		
C2-1B	Provide resources on how to integrate energy conservation measures into daily operations.		
C2-1C	Encourage local businesses to adopt energy-efficient practices such as upgrading to LED lighting, improving insulation, and utilizing ENERGY STAR appliances. These measures can lead to significant reductions in energy consumption and associated emissions.		
C2-1D	Encourage broad implementation of recent commercial CPACE legislation to fund energy projects		

Buckingham Township's commercial energy strategy will lead to significant reductions in energy consumption and greenhouse gas emissions. By prioritizing energy efficiency, solar energy adoption, and sustainable building practices, the Township will reduce its carbon footprint, lower energy costs for businesses, and contribute to a sustainable, thriving community. This Climate Action Plan sets the foundation for creating a low-carbon, resilient commercial sector and ensures Buckingham Township remains a leader in environmental stewardship.

Residential

The residential sector is a significant contributor to Buckingham Township's overall greenhouse gas (GHG) emissions, accounting for approximately 69,207 metric tons of CO2e in 2023. These emissions primarily stem from energy use in homes for heating, cooling, and electricity consumption. As the township continues to grow, addressing residential emissions is critical to meeting long-term climate goals and ensuring a sustainable, healthy future for all residents. The transition to energy-efficient practices and renewable energy solutions presents an opportunity to reduce residential emissions, lower utility costs for homeowners, and improve overall quality of life within the community. By reducing emissions from this sector, Buckingham Township can help lower its overall carbon footprint while creating a more resilient, energy-efficient community.

Goals

- Reduce CO2e emissions from residential buildings by 5% by 2030 from the 2023 level of 69,207 metric tons, which would lower emissions to approximately 65,746 metric tons by 2030.
    - Achieve a 50% reduction in CO2e emissions from residential buildings by 2040, lowering emissions to approximately 34,604 metric tons from the 2023 level.

Years 1-5:

Focus on energy audits, promoting energy-efficient retrofits, and offering incentives for solar adoption and home electrification. Support weatherization programs and outreach campaigns to engage homeowners in reducing energy consumption.

Years 6-10:

Expand solar adoption and electrification efforts, targeting 10-15% of homes with solar installations and 15-20% with electrified heating systems. Continue offering incentives and educational programs to support energy-efficient upgrades and weatherization across the residential sector.

Years 11-15:

Achieve a 5% emissions reduction by 2030 and 50% by 2040, with widespread adoption of solar energy, energy-efficient upgrades, and home electrification. Continue expanding weatherization programs and ensure ongoing community engagement for sustainable residential practices.

R-1 Residential Solar Improvement Objective			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
R-1A	Encourage homeowners to install solar PV systems to generate renewable electricity, reducing reliance on fossil fuel-based energy sources.		
R-1B	Expand residential access to solar programs for renters and homeowners with unsuitable roofs, enabling them to benefit from solar energy without needing to install their own systems.		
R-1C	Change application fees to a max $500		
R-1D	Promote the installation of solar-powered EV chargers in residential properties, allowing homeowners to charge their electric vehicles using clean energy.		

R2-Residential Efficiency Improvement Objective			
Action Number	Reduction Measure	Reduction Potential	Co-Benefits
R2-1A	Offer energy audits to identify areas where homes are losing energy, such as air leaks, poor insulation, or inefficient appliances, and provide recommendations for improvements.		
R2-1B	Partner with local Electricity Distribution Companies to educate residents about available Act 129-funded rebates and incentive programs.		
R2-1C	Launch community awareness campaigns to educate residents about the benefits of energy efficiency, renewable energy, and available incentives. Use workshops, newsletters, and social media to reach a broad audience.		
R2-1D	Encourage residents to replace old, drafty windows and doors with energy-efficient models by providing discounts or low-interest loans for installation.		

By focusing on energy efficiency, clean energy adoption, and electrification, Buckingham Township can significantly reduce residential emissions, lower energy costs for residents, and create a more sustainable, resilient community. These efforts will contribute to the township's broader climate goals, making Buckingham a model for sustainable living in the region. Through continued education, incentives, and community engagement, residential emissions can be reduced in a way that benefits both the environment and the local economy.

Climate Risks and Community Resilience

Climate Risks and Adaptive Strategies for Buckingham Township

This section provides a high-level assessment of potential climate impacts and highlights GHG reduction actions that support adaptation for each type of hazard. While Buckingham Township may not currently have the capacity to conduct a comprehensive climate vulnerability assessment and adaptation plan, the following analysis is designed to educate the public on local impacts and inform future planning efforts.

Anticipated Climate Impacts

Over the past century, Pennsylvania has experienced a long-term warming trend of more than 1.8°F, along with an increase in wet months. This trend is expected to accelerate, especially if GHG emissions continue their current trajectory. By 2050, Pennsylvania could be approximately 5.9°F warmer than it was at the end of the 20th century (Pennsylvania Department of Environmental Protection,2025). In addition to rising temperatures, more days exceeding 90°F are projected, which may increase health risks for vulnerable populations and place stress on energy infrastructure (ClimateCheck, 2025).

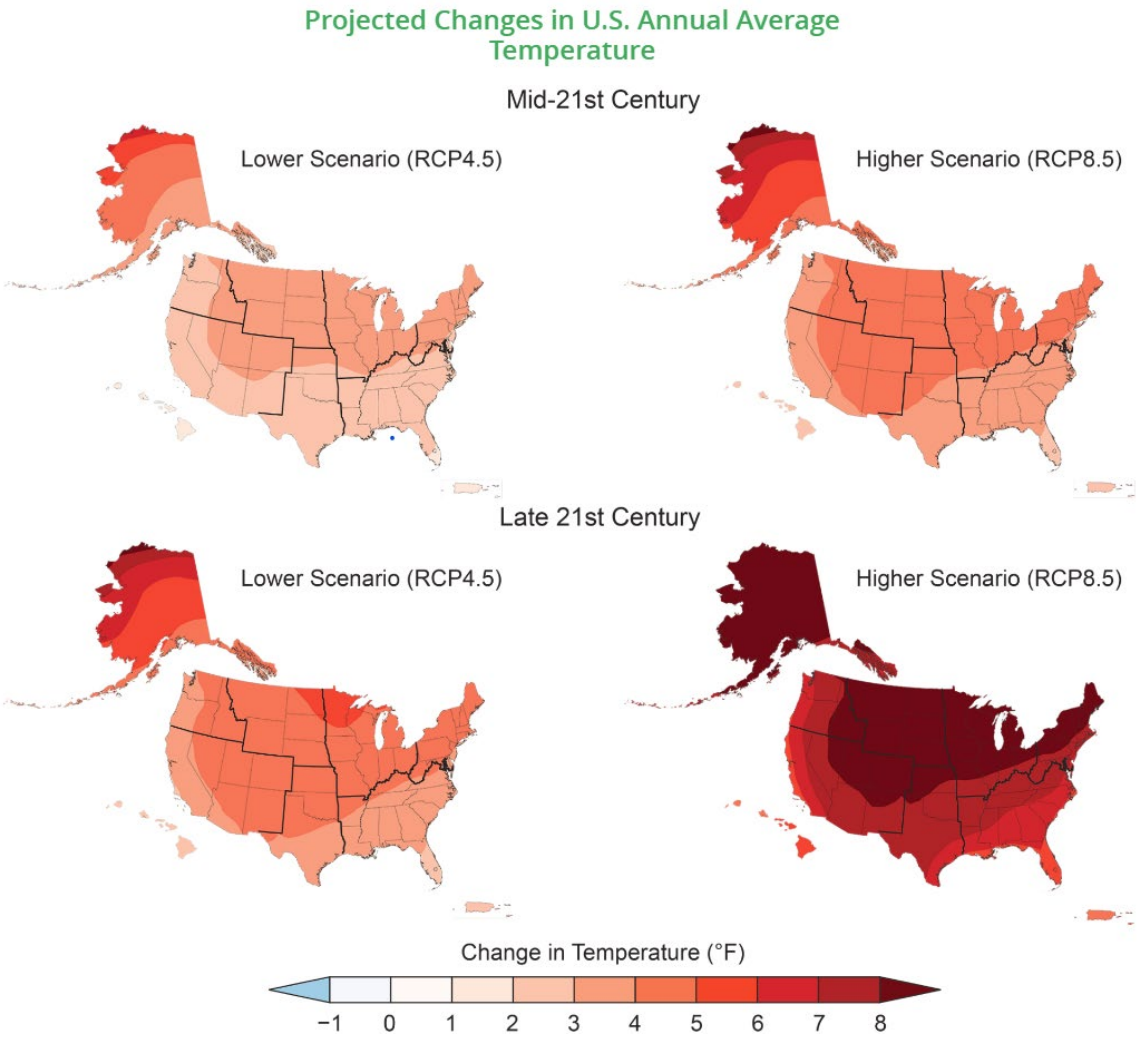

Figure 4: Changes in national temperatures based on 2021 Pennsylvania Climate Impacts Assessment.

Rising Temperatures & Heat

Increased average temperatures are already observable across the Commonwealth. By mid-century, regions in Pennsylvania are projected to experience around 40 extremely hot days annually (ClimateCheck, 2025). This poses direct risks to public health, especially among elderly and low-income residents, and may also reduce crop yields and stress water and energy systems.

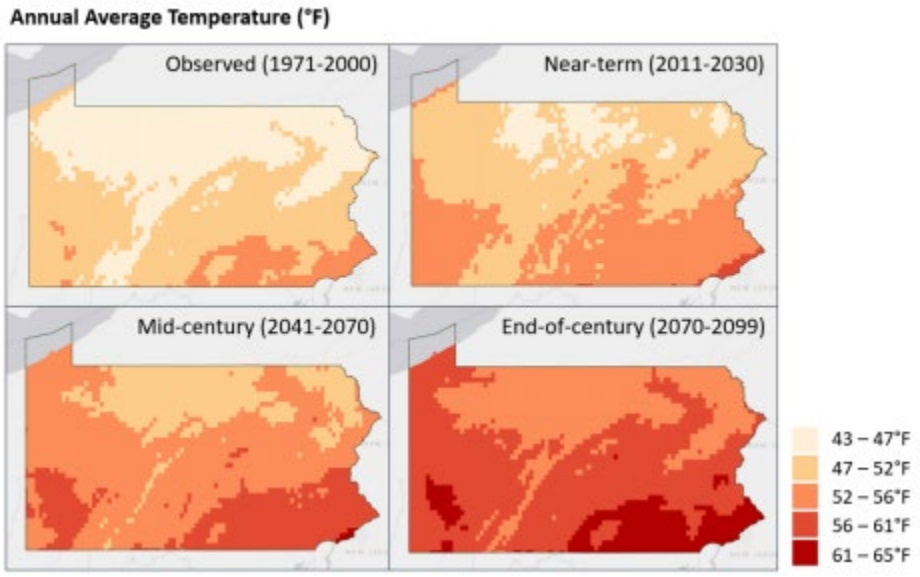

Figure 5: Observed and projected annual average temperatures in Pennsylvania.

Precipitation Changes and Flooding Risk

Changing precipitation patterns are likely to cause Buckingham Township to experience:

- More Frequent Heavy Rainfall Events: Historically, areas like Scranton, PA, experienced approximately 10 heavy rainfall days (1.4 inches or more) per year. By 2050, this could increase to 13 such events annually (ClimateCheck, 2025).
- Increased Flooding and Stormwater Stress: Buckingham Township, located within Bucks County — a region that has experienced significant impacts from hurricanes and severe flash flooding events — is increasingly vulnerable to intensified stormwater challenges. Projected increases in the frequency and severity of extreme precipitation events may exacerbate flash flooding, streambank erosion, and stormwater overflows, particularly along Neshaminy Creek and its tributaries. Stormwater runoff from impervious surfaces is expected to place additional strain on the township's existing drainage infrastructure (PA DEP, 2025).
- Stormwater Infrastructure Strain: Buckingham Township has developed stormwater ordinances and management protocols to address these issues (Buckingham Township,2024).

Community Engagement and Environmental Planning

Buckingham Township has taken a proactive approach to sustainability and environmental planning:

- Environmental Advisory Commission (EAC): Established in 1989, the EAC advises the Board of Supervisors on environmental issues and has led projects like native plant sales, public education events, and support for sustainable energy initiatives (Buckingham Township, 2024).
- Local Climate Action Program (LCAP): In 2024, Buckingham Township joined Pennsylvania's LCAP. The EAC has since made LCAP a standing agenda item while the township works toward implementing a Climate Action Plan, including a Climate Impacts and Vulnerability Assessment. The program connects local governments with Penn State University faculty and students to develop greenhouse gas inventories and planning tools.

Green Infrastructure and Park-Based Solutions

Buckingham Township is investing in park and land-based climate adaptation strategies. Notably, the Township was awarded a $10,000 grant from the PA Department of Conservation and Natural Resources (DCNR) to support reforestation at the 1.93-acre Holicong Park. This project will increase native canopy cover, mitigate heat island effects, and help absorb stormwater runoff—offering both mitigation and adaptation benefits (Bucks County Herald, 2024).

Key Takeaways

Key Takeaway 1: Rising Temperatures and Changing Precipitation Pose Growing Risks

- Buckingham Township is expected to experience significantly warmer temperatures and more frequent heavy rainfall events by 2050. These changes will increase risks to public health, agriculture, infrastructure, and local waterways like Neshaminy Creek.

Key Takeaway 2: The Township is Taking Proactive Steps Toward Climate Resilience

- Through initiatives like the Environmental Advisory Commission (EAC) and participation in the Local Climate Action Program (LCAP), Buckingham Township is actively engaging in

climate planning, education, and collaboration with academic partners to develop data-driven strategies.

Key Takeaway 3: Green Infrastructure Projects Are Central to Local Adaptation

- The township is investing in nature-based solutions, such as the $10,000 reforestation grant for Holicong Park, which aims to manage stormwater, reduce heat impacts, and restore native vegetation—demonstrating how local green space can play a key role in climate adaptation.

Photo 5: Red-winged Blackbird, Buckingham Township Park.

Projected Temperature Variations for High and Low Emissions Scenarios

	Observed Baseline (1971–2000)	Mid-Century (2041–2070)		End-of-Century (2070–2099)	
		Projected Value (10th–90th Percentile)	50th Percentile Absolute Change	Projected Value (10th–90th Percentile)	50th Percentile Absolute Change
Average annual temperature (°F)	48.3	54.1 (52.7–55.9)	5.9	57.6 (54.9–60.0)	9.4
Average annual minimum temperature (°F)	37.6	43.4 (42.1–45.2)	5.9	46.8 (44.5–49.3)	9.2
Average annual maximum temperature (°F)	58.9	64.9 (63.1–66.9)	6.0	68.2 (65.7–71.3)	9.3
Heating degree days (degree days)	6,600	5,165 (4,695 –5,503)	-1,435	4,430 (3,848–4,978)	-2,170
Cooling degree days (degree days)	483	1,185 (959–1,432)	703	1,722 (1,283–2,274)	1,239
"Very hot" (95th percentile) temperature (°F)	85.4	92.5 (89.9–96.6)	7.1	96.7 (92.1–103.5)	11.2
Days with temperature above "very hot" baseline temperature (°F)	18.3	69.7 (51.1–80.1)	51.4	98.6 (71.2–114.2)	80.3
"Extremely hot" (99th percentile) temperature(°F)	90.1	97.6 (94.7–103.2)	7.5	101.6 (96.6–107.9)	11.5
Days above baseline "extremely hot" temperature	3.7	35.1 (19.7–50.3)	31.4	65.1 (34.3–87.9)	61.4
Days with temperature >90°F	5.1	37.0 (22.0–51.2)	31.9	65.5 (35.8–89.0)	60.5
Days with temperature >95°F	0.6	12.1 (5.1–26.9)	11.5	31.1 (10.0–62.0)	30.5
Days with temperature >100°F	0.0	2.4 (0.6 - 11.6)	2.4	9.3 (1.5 - 34.8)	9.3
Days with low temperature > 68°F	3.6	25.0 (18.6–36.5)	21.4	47.7 (30.6–72.4)	44.1
Consecutive days above 90°F	1.4	6.2 (1.8–12)	4.8	11.4 (4.6–27.2)	10.0
Consecutive days above 95°F	0.1	2.4 (0.2–5.3)	2.3	4.9 (1.2–13.7)	4.8
Growing degree days (degree days)	2,472	3,698 (3,351–4,033)	1,226	4,482 (3,865–5,145)	2,010

Table 3: Statewide average observed and projected temperature variables for mid-century and end-of-century. Higher emissions scenario RCP 8.5. Data taken from Pennsylvania Climate Impacts Assessment 2021.

	Observed Baseline (1971–2000)	End-of-Century RCP 4.5 (2070–2099)	
		Projected Value (10th–90th Percentile Range)	50th Percentile Absolute Change
Average annual temperature (°F)	48.3	53.8 (51.7–55.9)	5.5
Average annual minimum temperature(°F)	37.6	43 (41.2–45)	5.4
Average annual maximum temperature(°F)	58.9	64.4 (62.4–66.6)	5.5
Heating Degree Days (degree days)	6,600	5,178 (4,772–5,706)	-1,422
Cooling degree days (degree days)	483	1,089 (815–1,484)	606
"Very hot" (95th percentile) temperature (°F)	85.4	91.5 (89–96.4)	6.1
Days with temperature above baseline "very hot" temperature(°F)	18.3	62.8 (41.1–79)	44.5
"Extremely hot" (99th percentile) temperature(°F)	90.1	96.2 (94.5–102.5)	6.1
Days above baseline "extremely hot" temperature	3.7	28.8 (15.3–48.6)	25.1
Days with temperature >90°F	5.1	31.0 (17.4–50.4)	25.9
Days with temperature >95°F	0.6	8.7 (4.4–26.2)	8.1
Days with temperature >100°F	0.0	1.3 (0.6 - 10.4)	1.3
Days with low temperature > 68°F	3.6	20.4 (13.7–39.2)	16.8
Consecutive days above 90°F	1.4	7.4 (2.3–14.1)	6.0
Consecutive days above 95°F	0.1	2.7 (0.3–6.9)	2.6
Growing Degree Days (degree days)	2,472	3,588 (3,116–4,126)	1,116

Table 4: Statewide average observed and projected temperature variables for mid-century and end-of-century. Lower emissions scenario RCP 4.5. Data taken from Pennsylvania Climate Impacts Assessment 2021.

Action Plan Execution and Oversight

The following outlines the next steps for implementing and monitoring the progress of the Climate Action Plan in Buckingham Township. This process may evolve over time and could include additional outreach to stakeholder groups, further feasibility studies, identification of funding sources, and the formation of partnerships essential for successful implementation.

Beginning in June 2025, Buckingham Township should engage with residents, businesses, institutions, and other stakeholders through collaboration between the Environmental Advisory Committee and the Buckingham Township Board of Supervisors. This collaboration will help prepare for any prerequisite or supplementary actions needed to move the Climate Action Plan forward. These actions may include:

- Creating citizen working groups under the Environmental Advisory Committee to support efforts that require significant community participation.
- Soliciting bids for contracted services and equipment.
- Updating local policies, programs, or staffing to align with the goals of the Climate Action Plan.
- Launching early-stage programs and establishing opportunities for community members to get involved.

A monitoring process will be put in place to track the effectiveness of actions outlined in the plan. This includes measuring energy savings, renewable energy production, and greenhouse gas emissions reductions. Regular assessments will help determine whether actions are meeting expectations and guide any needed adjustments. This process will also help identify challenges, highlight successful strategies, and uncover new opportunities for continued progress.

Forecasting

As Buckingham Township continues to experience steady population growth, with an annual increase of 0.039% (U.S Census, 2024), it is crucial to assess the potential environmental impacts of this demographic change. Understanding the future energy demands and their corresponding emissions will be essential for guiding the township's climate action efforts. This section presents projections based on current population growth trends and the regional grid intensity values, as outlined by the U.S. Environmental Protection Agency (EPA). By utilizing these factors, we can forecast Buckingham Township's energy consumption and its associated greenhouse gas emissions, providing a roadmap for the township to effectively plan for sustainable energy use and reduce its carbon footprint in the coming years. Through these projections, we aim to identify key opportunities for mitigation strategies that will support a resilient, low-carbon future for the community.

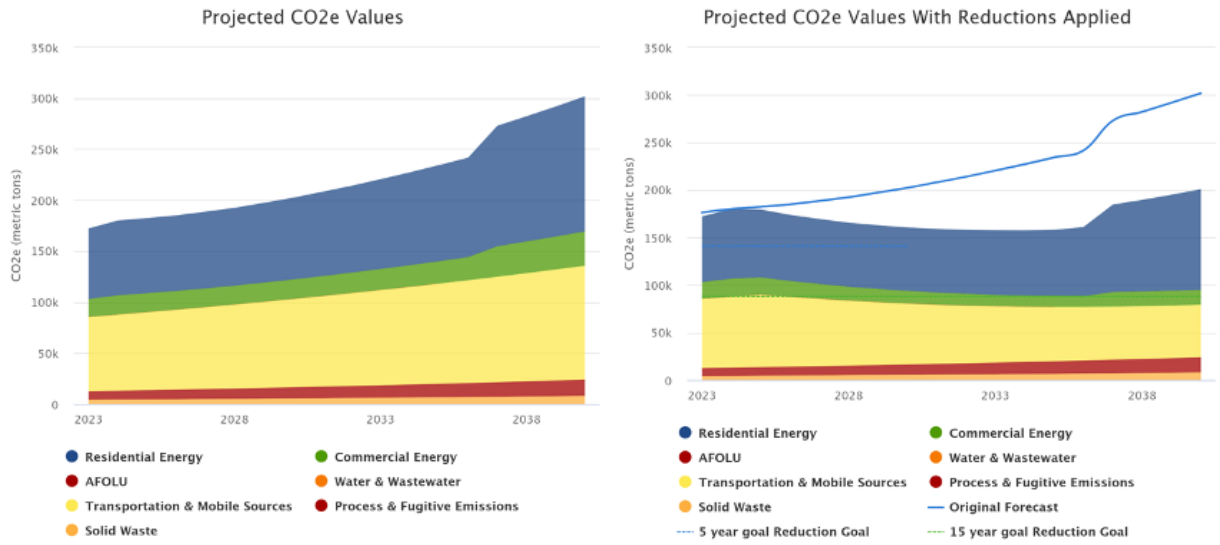

Figure 6: Comparison of MTCO2e Emissions BAU vs. Reductions Applied

Commercial Sector

- Projected Emissions (BAU, 2040): 33,614 metric tons CO2e
- Projected Emissions (With Action, 2040): 15,679 metric tons CO2e

Key Reduction Strategies:

- Install 1,000 kW of solar capacity annually
- Retrofit 5% of existing commercial square footage each year for energy efficiency
- Electrify both existing and new commercial buildings

These interventions represent a 53% reduction in emissions from the commercial sector, contributing to a more sustainable and energy-efficient built environment.

Residential Sector

- Projected Emissions (BAU, 2040): 132,622 metric tons CO2e
- Projected Emissions (With Action, 2040): 105,860 metric tons CO2e

Key Reduction Strategies:

- Install 400 kW of solar capacity annually
- Retrofit 5% of existing residential square footage each year
- Electrify both existing and new homes

Implementing these strategies could result in a 20% reduction in residential emissions, while also improving household energy performance and lowering utility costs over time.

Transportation Sector

- Projected Emissions (BAU, 2040): 111,838 metric tons CO2e
- Projected Emissions (With Action, 2040): 55,414 metric tons CO2e

Key Reduction Strategies:

- Reduce Vehicle Miles Traveled (VMT) by 10% annually through:
    - Enhanced public transportation options
    - Improved walkability and biking infrastructure
    - Support for telecommuting and shared mobility services
- Increase Electric Vehicle (EV) Adoption:

    - By 2030: 16% of U.S. light-duty vehicles expected to be electric (Rocky Mountain Institute)
    - By 2040: 57% of VMT projected to be driven by EVs
- Improve Fuel Economy:
    - EVs achieve an average of 92 MPGe, significantly reducing per-vehicle emissions
- Encourage Residential EV Charging:
    - Approximately 80% of EV charging expected to occur at home, allowing for efficient energy management

These measures can cut transportation-related emissions by more than 50%, supporting a cleaner and more modern mobility system.

Table 5: Projected Reduction by 2040 from 2023 GHG Inventory Levels.

Sector	BAU Emissions (metric tons CO2e)	Emissions with Action	Reduction (%)
Commercial	33,614	15,679	53%
Residential	132,622	105,860	20%
Transportation	111,838	55,414	50%
Total	**278,074**	**176,953**	**36% overall**

These projections underscore the township's ability to lead on climate action. With thoughtful planning and implementation, Buckingham Township can achieve substantial emissions reductions across all major sectors paving the way for a sustainable, low-carbon future.

Acronyms

BAU — Business As Usual

CH_4 — Methane

CO_2 — Carbon Dioxide

CO_2e — Carbon Dioxide Equivalent

DEP — Department of Environmental Protection (Pennsylvania)

DCNR — Department of Conservation and Natural Resources (Pennsylvania)

EAC — Environmental Advisory Commission

EPA — Environmental Protection Agency (United States)

EV — Electric Vehicle

GHG — Greenhouse Gas

ICLEI — International Council for Local Environmental Initiatives – Local Governments for Sustainability

IRA — Inflation Reduction Act

kW — Kilowatt

LCAP — Local Climate Action Program

$MTCO_2e$ — Metric Tons of Carbon Dioxide Equivalent

PA — Pennsylvania

PECO — Philadelphia Electric Company

PV — Photovoltaic

RCP — Representative Concentration Pathway

VMT — Vehicle Miles Traveled

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