



Climate Action Plan

Commercial



Residential



Storm Mitigation



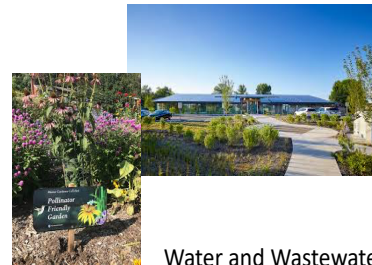
Tree City



Waste Materials



Transportation



Water and Wastewater

**Adopted by Forest Hills Borough Council
December 16, 2020**

The Forest Hills Climate Action Plan is dedicated
To the children of the 21st century.

PROCLAMATION OF THE MAYOR
BOROUGH OF FOREST HILLS, PENNSYLVANIA

We Are Still In Proclamation

Whereas: In December 2015 in Paris, world leaders signed the first global commitment to fight climate change. The landmark agreement succeeded where past attempts failed because it allowed each country to set its own emission reduction targets and adopt its own strategies for reaching them. In addition, nations - inspired by the actions of local and regional governments, along with businesses - came to recognize that fighting climate change brings significant economic and public health benefits.

Whereas: The Trump administration's announcement that the United States would withdraw from the Paris Accord undermines a key pillar in the fight against climate change and damages the world's ability to avoid the most dangerous and costly effects of climate change. Importantly, it is also out of step with what is happening in the United States.

Whereas: In the U.S., it is state and local governments, along with businesses, that are primarily responsible for the dramatic decrease in greenhouse gas emissions in recent years. Actions by each group will multiply and accelerate in the years ahead, no matter what policies Washington may adopt.

Whereas: In the absence of leadership from Washington; states, cities, counties, local governments, colleges and universities, businesses and investors, representing a sizeable percentage of the U.S. economy will pursue ambitious climate goals, working together to take forceful action and to ensure that the U.S. remains a global leader in reducing emissions.

Whereas: It is imperative that the world know that in the U.S., the people that will provide the leadership necessary to meet our Paris Accord commitment are found in city halls, state capitals, borough buildings, colleges and universities, and businesses. Together, we will remain actively engaged with the international community as part of the global effort to hold warming to well below 2°C and to accelerate the transition to a clean energy economy that will benefit our security, prosperity, and health.

Now, therefore be it resolved, that I, Frank Porco, Mayor of the Borough of Forest Hills, in collaboration with the Forest Hills Borough Council are joining forces for the first time to declare that we will continue to support climate action in our community and declare "We are still In" the Paris Accord.

In witness thereof, I hereunto set my hand and caused the Seal of the
Borough of Forest Hills, PA to be affixed this 18th day of April, 2018.




Frank Porco, Mayor

Credits and Acknowledgments

Local Government Officials

- Mayor Frank Porco
- William Tomasic, Chairman, Borough Council
- Patricia DeMarco, Vice President, Forest Hills Borough Council
- Jack Lawrence, Chairman, Operations and Policy Committee
- William Burleigh, Borough Council
- Thomas Theilacker, Borough Council
- Markus Erbedinger, Borough Council
- William Gorol, Borough Council
- Steven J. Morus, Forest Hills Borough Manager

External Agencies and Partners

- Heidi Kunka, Pennsylvania Department of Environmental Protection
- Calyn Hart, ICLEI – Local Governments for Sustainability USA
- Jesse Carpentier, ICLEI – Local Governments for Sustainability USA
- Blake Martin, Falk School of Sustainability, Chatham University
- Marissa Stakeley, Chatham University
- Tim Hawkins and Ben Stein, University of Sharpsburg

Stakeholders and Planning Team:

The Climate Action Plan for Forest Hills was coordinated by Council Vice President Patricia DeMarco in collaboration with Borough Manager Steven Morus. The planning effort was supported by Chatham University Falk School of Sustainability graduate student intern Blake Martin and Chatham University undergraduate intern Marissa Stakeley. The Environmental Advisory Council reviewed monthly progress reports and held informational community meetings on energy, conservation and climate issues.

Environmental Advisory Council Members:

Barbara Martin, Chair
Angelo Baiocchi
Patrick Cooper
Meredith Juchniewicz
Joann Morse
Gary Morse
Elise Yoder

This Climate Action Plan was made possible through a grant agreement between ICLEI – Local Governments for Sustainability and the PA Department of Environmental Protection, which was funded by the US Department of Energy State Energy Program. The template was developed by ICLEI – Local Governments for Sustainability, USA and was originally published in April 2018. It was later edited by PA Department of Environmental Protection in December 2019.

Forest Hills Climate Action Plan Summary

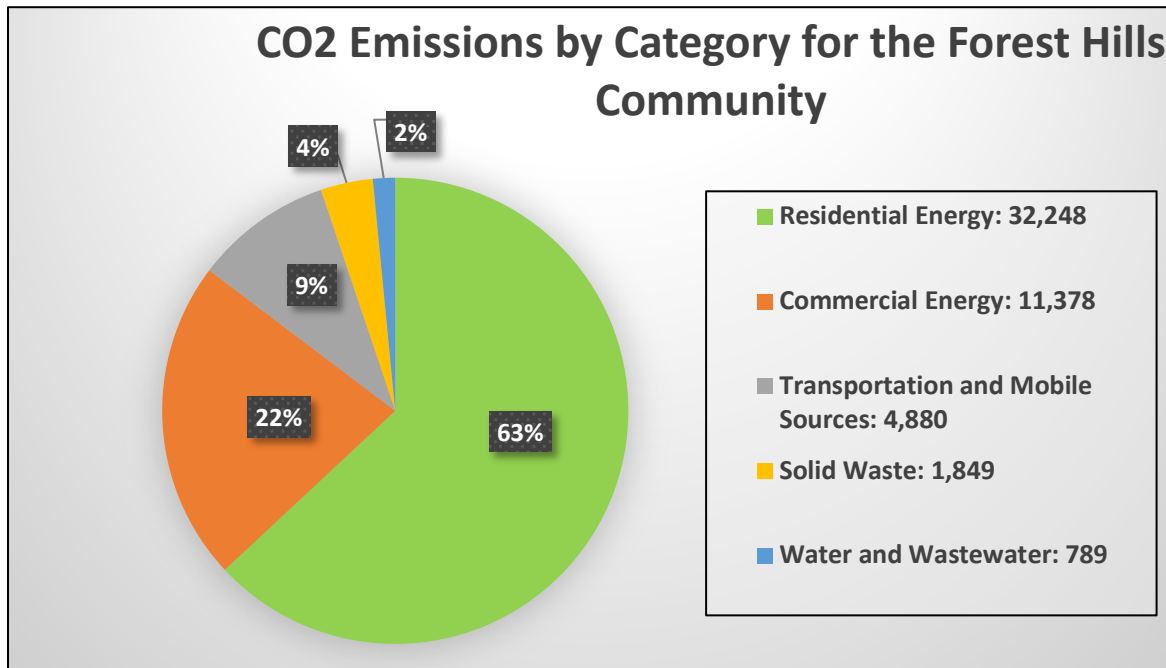
Vision and Goals:

Based on extensive evidence it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century. For the warming over the last century, there is no convincing alternative explanation supported by the extent of the observational evidence.

In addition to warming, many other aspects of global climate are changing, primarily in response to human activities. Thousands of studies conducted by researchers around the world have documented changes in surface, atmospheric, and oceanic temperatures; melting glaciers; diminishing snow cover; shrinking sea ice; rising sea levels; ocean acidification; and increasing atmospheric water vapor.

Through Proclamation and by action of the Forest Hills Borough Council, we have resolved to adhere to the Climate Action Goals of the Paris Climate Accord of 2015 and have established a **goal of achieving net zero carbon emissions throughout the community by 2050**. This plan recognizes particularly the climate vulnerabilities Forest Hills faces from extremes of weather causing summer or winter storm damage, periodic drought effects, and landslide vulnerability over 40% of the land area. Mitigating these already experienced and likely increasing vulnerabilities drives the priority actions in this plan.

Greenhouse Gas Emissions Profile

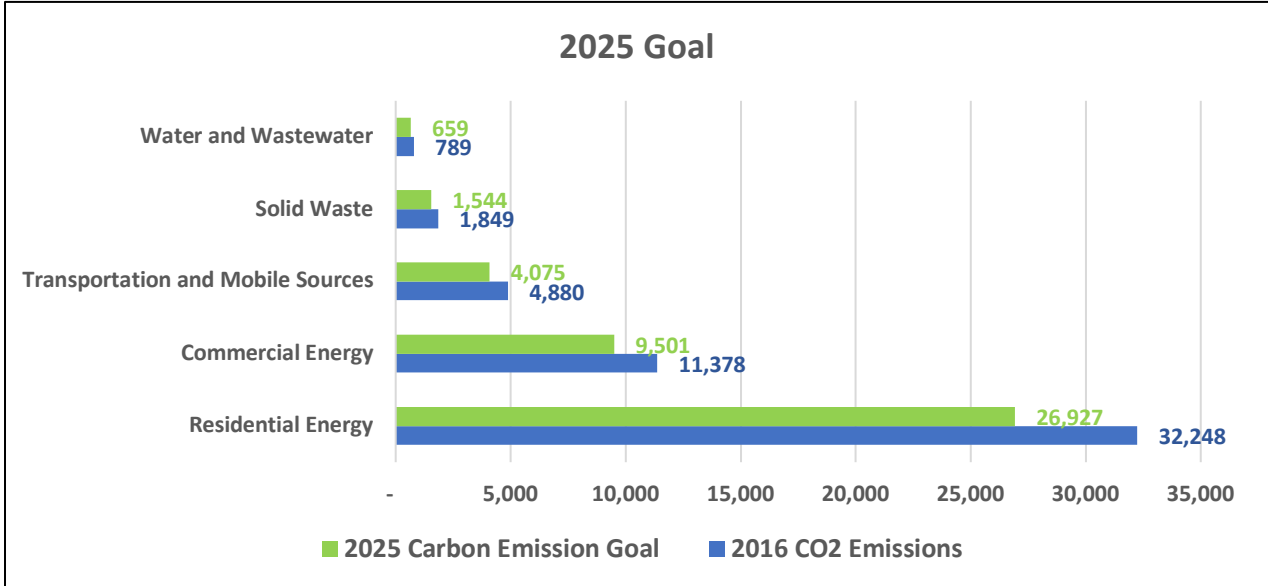


The base year of 2017 established the emissions profile for all sectors of the Forest Hills community using data gathered from the electric, gas and water utility companies and aggregated by sector. The total Carbon Emissions for Forest Hills for all sectors in the base year 2017 is

51,144 Metric Tons, with the primary contributor from the residential sector. A ClearPath model established Milestones for five years, ten years and 30 years into the future. The Forest Hills Climate Action Plan defines actions and policy recommendations to meet these milestones. Milestones for Short-term Action to 2025, Mid-term Action to 2030 and Long-term Action to 2050 assume a 3.3% per year overall reduction in carbon emissions across all sectors.

Short-term Actions to Reduce Carbon Emissions by 15% by 2025

A 3.3% reduction per year in all sectors will reduce the total Carbon emissions by 8,438 Metric Tons in five years. Actions in this short-term period rely on low-cost and no-cost actions and behavior changes in all sectors.



Action Recommendations to 2025:

Residential: Choose 100% renewable electricity provider; Weatherize doors and windows, convert lights to LED

Commercial: Choose 100% renewable electricity provider; convert lighting to LED; install smart meters to track energy use

Transportation: Increase pedestrian walkways, trail access and bicycle lanes to encourage non-motorized travel within one mile of residences

Waste Reduction: Reduce single-use plastics; enhance recycling options

Water and Wastewater: low-flow shower heads and toilets; cold water laundry and air-dry clothing; install rain barrels and plant native plants and trees

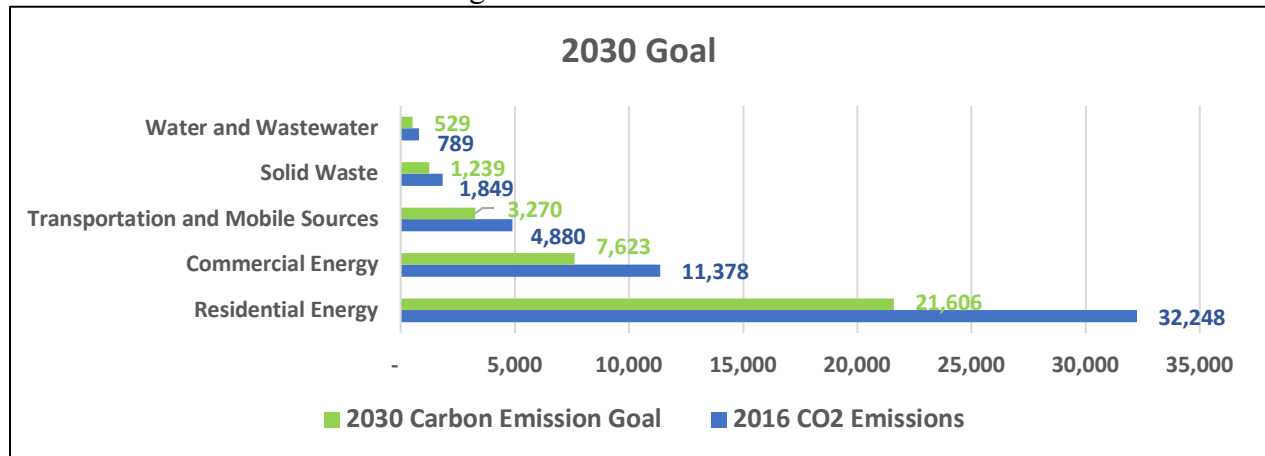
Policy Recommendations to 2025 (highlights)

1. Advocate for state and federal grant assistance and tax incentives to support residential energy efficiency improvements
2. Establish zoning for enhanced parking and shared parking in business district.
3. Promote regional recycling policies, including a statewide bottle deposit law.
4. Establish an Active Transportation Plan to enhance pedestrian safety.
5. Implement the measures for the MS4 Consent Decree for water and wastewater management.

Mid-term Actions to reduce Carbon Emissions by 30% to 2030

A continued 3.3% per year reduction in greenhouse gas emissions across all sectors will achieve a further reduction of 16,877 CO₂ Metric tons by 2030. Mid-term actions rely on increased investment in energy efficiency, conservation of resources and substitution of renewable resources for fossil resources, including fuels and plastic materials.

Effective action in this next decade will require regional collaboration and supportive policy measures from the state and federal government.



Action Recommendations to 2030:

Residential: Retrofit residences for energy and water efficiency retrofits for windows; doors and furnace upgrades or replacements; add solar to south-facing roofs

Commercial: Retrofit buildings for efficient windows and doors, increase insulation in ceilings and walls; upgrade furnaces and retrofit replacements with electric systems

Transportation: Increase use of public transit in electrified transit vehicles; Implement regional non-motorized transportation infrastructure.

Solid Waste Materials: reduce or eliminate use of single-use plastics; establish recycling for glass, metals, paper and appropriate plastic waste.

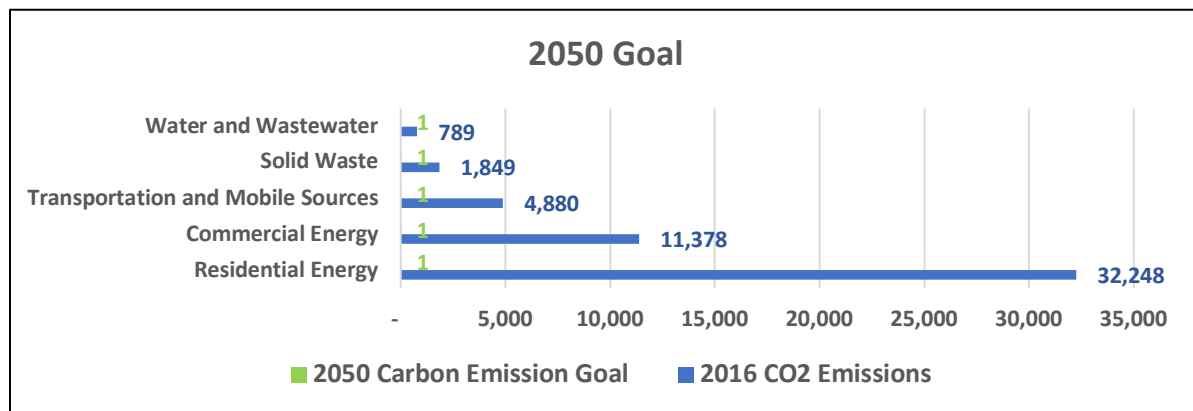
Water & wastewater: Retrofit faucets showers and toilets with low-flow installations; upgrade water heaters & appliances to energy-efficient electric operations.

Mid-term Policy Recommendations to 2030:

1. Establish a zero interest revolving loan fund to support efficiency retrofits for residential and commercial buildings.
2. Refine zoning ordinances to make optimum use of commercial space integrated with mixed uses and allowing for flexible parking accommodations.
3. Establish public electric vehicle quick charge stations and multi-modal transportation centers.
4. Establish local ordinances for waste material diversion from landfill through recycling, composting or re-use including recovery of rare metals from electronics.
5. Support regional collaboration in adopting green infrastructure for water treatment and storm water management by watershed area rather than by municipal boundaries.
6. Adopt Borough ordinances to enhance stormwater management including maintaining mature trees and bioswales along paved surfaces.

Long-term Actions to Eliminate Carbon Emissions by 2050

This thirty-year forecast was calculated by taking the total of all current emissions and reducing them to zero GHG Emissions, attaining the Forest Hills Borough goal. Using action strategies that consist of higher-range costs, while implementing new policy and continuing to change policy in supporting GHG emission reduction, 100% reduction over a 30-year span would be a tremendous achievement for Forest Hills to accomplish. This goal will need to be taken in the context of supportive state and national policies. Collaboration on a regional basis will improve the effectiveness of actions, especially those that depend on system changes or major infrastructure improvements and additions.



Long-term Actions to reach Zero Carbon Emissions by 2050:

Residential: Convert all HVAC systems to efficient electric systems; install solar PV with community net metering and **interconnected interactive grid**.

Commercial: Convert all buildings to efficient electric HVAC systems; install solar PV on all flat roofs; integrate with community virtual net metering.

Transportation: Incorporate possible electrified rail system (revival of the streetcar?)

Waste Material: Utilize anaerobic digestion technology to divert compostable materials from landfill

Water & Wastewater: Construction of Rain Gardens for better filtration of stormwater runoff

Long-term Policy Recommendations for Zero Emissions by 2050:

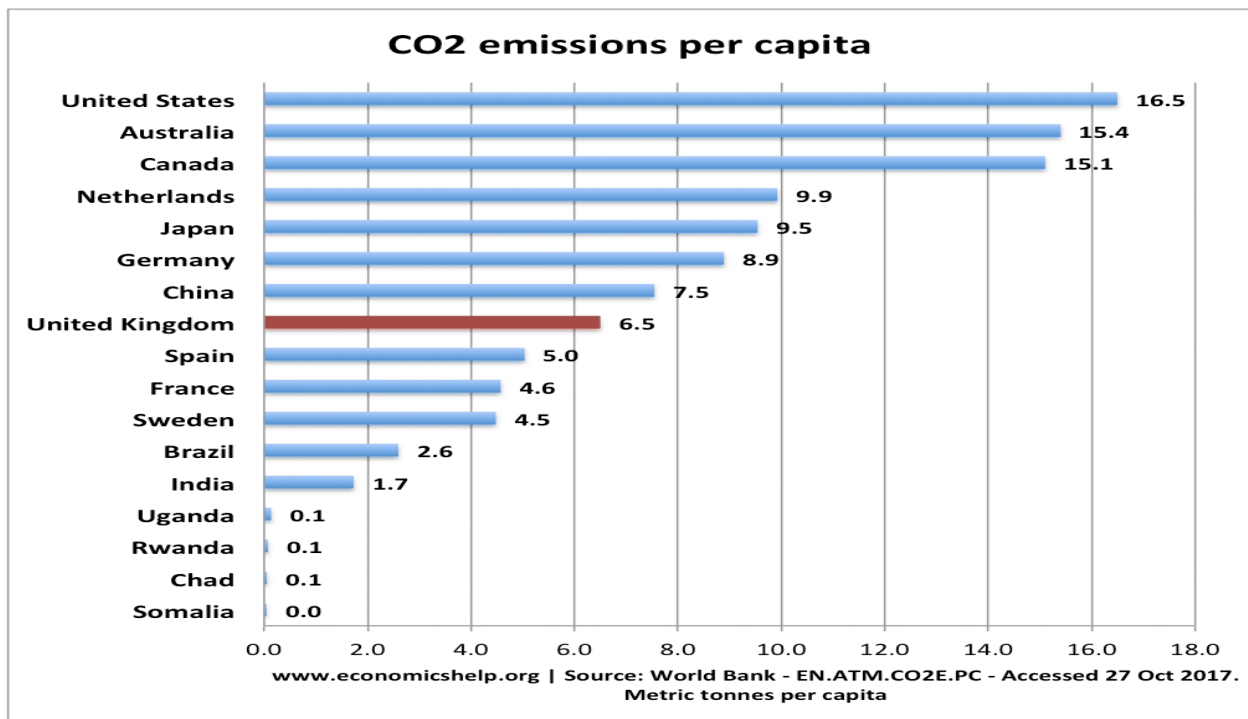
1. Establish local cooperative action mechanisms for residences and businesses to adopt photovoltaic solar electricity locally generated but not on individual residences.
2. Empower a robust Community Development Corporation to enable planning and financing for innovative projects, building improvements and infrastructure upgrades in the commercial sector.
3. Address ways to fund transportation infrastructure as taxes from liquid fossil fuels decline.
4. Establish procurement standards for municipal purchasing that require recycled or reused materials to help support circular materials systems.
5. Pass local graywater and rainwater use legislation to facilitate irrigation/toilet flushing with graywater and rainwater

Forest Hills Citizen Climate Challenge



Woodland Hills High School Climate Action Team 2020

The Woodland Hills High School Climate Action Team began as eighth graders to petition the Woodland Hills School Board to adopt a climate action plan. The Woodland Hills School Board adopted the first school district climate action resolution in July 2019. The students, now in high school, worked together to plan and present a Youth Climate Action Summit on October 23, 2020. Part of their action plan included empowering students to raise their voices to advocate for climate action at all levels, including their local communities.



The existential crisis facing everyone in the world developed gradually over the last 100 years, most acutely in the last 50 years from the accumulation of greenhouse gases, especially carbon dioxide from burning fossil fuels- coal, oil, and natural gas. Mitigating the worst of the effects of climate change will require everyone to move from awareness to action. Every person can take

action to reduce their personal carbon footprint. Americans rank highest among industrialized nations in average annual per person carbon emissions.

As part of the Forest Hills Climate Action Plan, on behalf of the children in our community and at the urging of the Woodland Hills Climate Action Team, we are challenging every citizen in Forest Hills to make a personal commitment to reducing their household carbon footprint by at least 3.3% per year to meet the goal of achieving a net zero carbon emissions profile for the entire community by 2050.

There are several free Carbon Footprint Calculators available with varying degrees of complexity.

1. EPA Carbon Footprint Calculator: <https://www3.epa.gov/carbon-footprint-calculator/>
2. Nature Conservancy Carbon Footprint Calculator <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/> also offers offsets.
3. Carbon Footprint International <https://www.carbonfootprint.com/calculator.aspx> offers offset information and global comparisons.

The main idea is to develop greater awareness of how your personal and household behavior affects your carbon footprint. Track your annual consumption of electricity, heating fuel, transportation choices, food choices and water use options. You will find that in the first five-year period of our Climate Action Plan, we are looking at implementing low cost and no cost actions. Adopting behaviors that reduce waste in food, energy, water, and unnecessary travel also saves money. Can YOU reduce your own carbon footprint by 3.3% each year?

We are all citizens of the living Earth, and we depend on the ecosystem services that provide fresh water, clean air, fertile ground and the diversity of species we depend on for our life support system. There are no healthy people in a polluted world. All of us can contribute to the health of our community by reducing our carbon footprint. One way to improve health and reduce carbon in the food system is to select local food with minimum packaging, and to reduce the amount of meat in the diet, especially commercially raised beef. Choose local free-range options for a lower carbon toll from food choices, as illustrated below.

Much of our carbon emissions are embedded in goods that we use. Reducing the amount of single-use material we consume can improve the entire materials management system to reduce waste. As we work together to find better and more effective options for recycling and material reclamation for reuse, we can begin by asking the question at the point of purchase: Do I need this? How long will I have this? What happens to it when I am finished with it? Can I send to for re-use to another person? Can I recycle or re-purpose this?

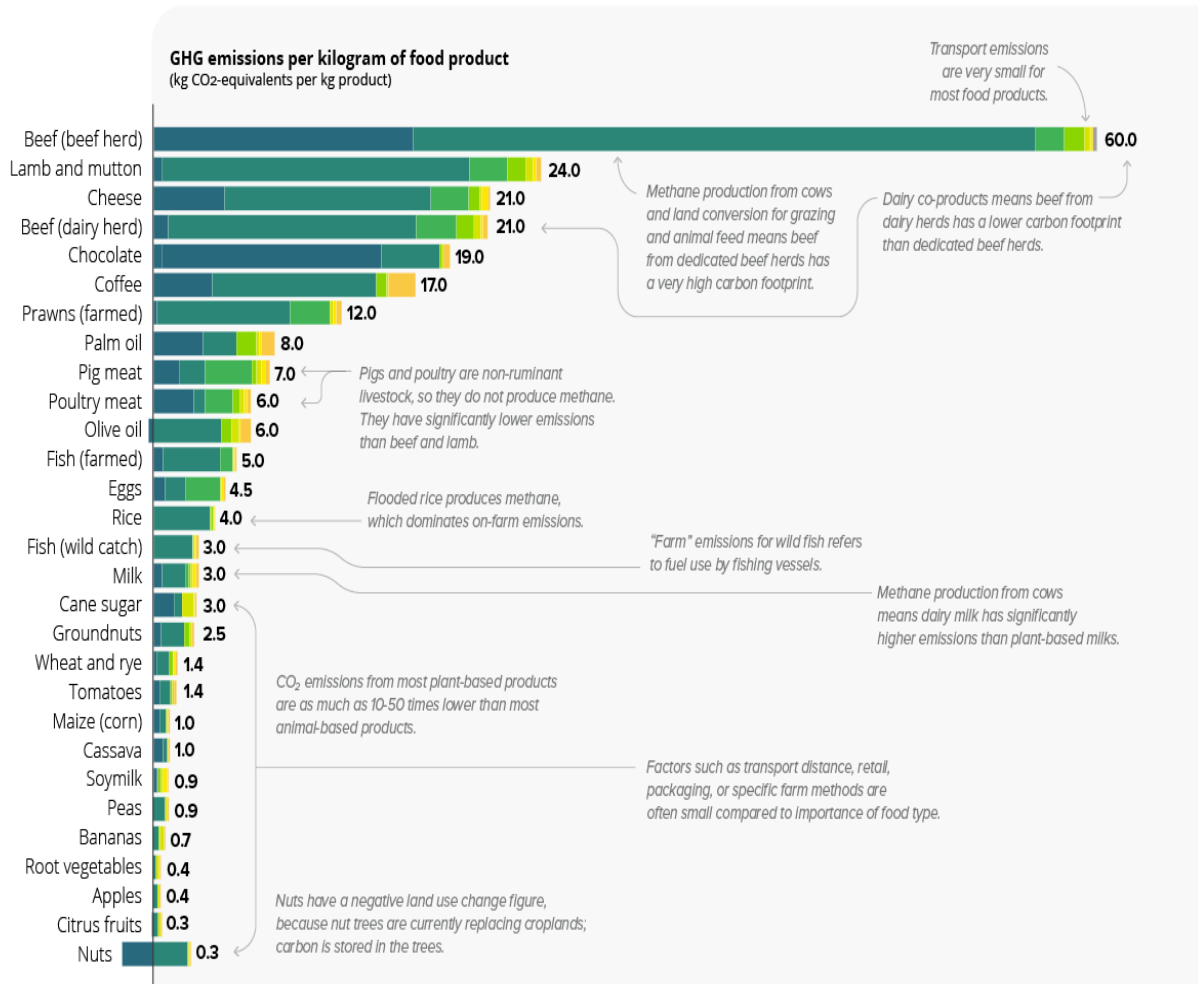
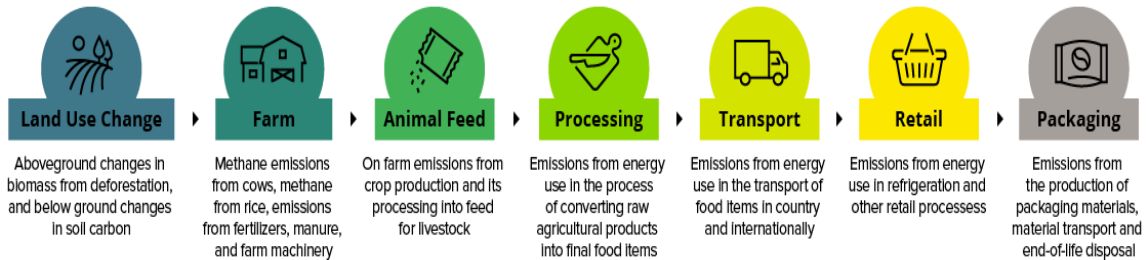
Addressing the challenge of mitigating climate change involves all of us. We can share ideas and suggestions on the Forest Hills Facebook page and on the web site <https://foresthillspa.org>. The Environmental Advisory council will be posting regular community information to help engage every citizen in this Climate Action Plan. Together we have the power to shape a better future for our children.

FOOD / Greenhouse gas emissions across the supply chain

Original graphic by

Our World in Data

There is a vast difference in greenhouse gases (GHG) that are produced across various food types.



Note: Greenhouse gas emissions are given as global average values based on data across 38,700 commercially viable farms in 119 countries. Data source: Poore and Nemecek (2018). Reducing food's environmental impacts through producers and consumers. Science. Images sourced from the Noun Project. OurWorldinData.org - Research and data to make progress against the world's largest problems.



Forest Hills Climate Action Plan

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Part 1. Introduction and Background

1.0. Introduction

The Borough of Forest Hills develops this Climate Action Plan as part of the implementation of the Comprehensive Plan for Development adopted in January of 2020. This plan was developed in the context of the global, national and Pennsylvania climate assessments. The principal science findings and economic impact findings of these reports are summarized here.

1.1. Fourth National Climate Assessment, Major Science Findings¹

The *Fourth National Climate Assessment* was filed in November 2018, as mandated by the Global Change Research Act of 1990. Global annually averaged surface air temperature has increased by about 1.8°F (1.0°C) over the last 115 years (1901–2016). This period is now the warmest in the history of modern civilization. The last few years have also seen record-breaking, climate-related weather extremes, and the last three years have been the warmest years on record for the globe. These trends are expected to continue over the climate planning timeframe.

This assessment concludes, based on extensive evidence, that it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century. For the warming over the last century, there is no convincing alternative explanation supported by the extent of the observational evidence.

In addition to warming, many other aspects of global climate are changing, primarily in response to human activities. Thousands of studies conducted by researchers around the world have documented changes in surface, atmospheric, and oceanic temperatures; melting glaciers; diminishing snow cover; shrinking sea ice; rising sea levels; ocean acidification; and increasing atmospheric water vapor.

Changes in the characteristics of extreme events are particularly important for human safety, infrastructure, agriculture, water quality and quantity, and natural ecosystems. Heavy rainfall is increasing in intensity and frequency across the United States and globally and is expected to continue to increase. The largest observed changes in the United States have occurred in the Northeast.

Heatwaves have become more frequent in the United States since the 1960s, while extreme cold temperatures and cold waves are less frequent. Recent record-setting hot years are projected to become common in the near future for the United States, as annual average temperatures continue to rise. Annual average temperature over the contiguous United States has increased by 1.8°F (1.0°C) for the period 1901–2016; over the next few decades (2021–2050), annual average

¹ Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, B. DeAngelo, S. Doherty, K. Hayhoe, R. Horton, J.P. Kossin, P.C. Taylor, A.M. Waple, and C.P. Weaver, 2017: Executive summary. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 12-34, doi: [10.7930/J0DJ5CTG](https://science2017.globalchange.gov/chapter/executive-summary/). <https://science2017.globalchange.gov/chapter/executive-summary/>

temperatures are expected to rise by about 2.5°F for the United States, relative to the recent past (average from 1976–2005), under all plausible future climate scenarios.

The global atmospheric carbon dioxide (CO₂) concentration has now passed 400 parts per million (ppm), a level that last occurred about 3 million years ago, when both global average temperature and sea level were significantly higher than today. Continued growth in CO₂ emissions over this century and beyond would lead to an atmospheric concentration not experienced in tens to hundreds of millions of years. There is broad consensus that the further and the faster the Earth system is pushed towards warming, the greater the risk of unanticipated changes and impacts, some of which are potentially large and irreversible.

Fourth National Climate Assessment: The climate -induced economic effects findings²

- \$160 billion in lost wages a year from heat-induced productivity reduction;
- \$87 billion a year by 2100 in higher energy costs due to mounting demand on a power system made less reliable by extreme weather;
- \$507 billion worth of infrastructure damage from real estate at risk of being inundated by rising sea levels by 2100;
- \$1.2 to \$1.4 Billion/year from Inland flooding destruction of thousands of bridges by 2050;
- \$230 million/ year—loss on shellfish harvests;
- \$140 Billion/year recreation industry losses from disappearing coral reefs alone; and
- Cold-water fishing and skiing would also be affected.³

These costs are considered to be minimum estimates of the potential damages and resulting costs as the result of climate change. The economic damages on industries, communities, individuals and institutions are already accumulating across the country, and around the world.

The National Assessment of climate impact on communities:⁴

The impacts of climate change are already being felt in communities across the country. More frequent and intense extreme weather and climate-related events, as well as changes in average climate conditions, are expected to continue to damage infrastructure, ecosystems, and social systems that provide essential benefits to communities. Future climate change is expected to further disrupt many areas of life, exacerbating existing challenges to prosperity posed by aging and deteriorating infrastructure, stressed ecosystems, and economic inequality. Impacts within and across regions will not be distributed equally. People who are already vulnerable, including lower-income and other marginalized communities, have lower capacity to prepare for and cope

² Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondízio E.S., H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany. 56 pages. <https://doi.org/10.5281/zenodo.3553579>
<https://www.ipbes.net/news/Media-Release-Global-Assessment>

³ (Full citation at Footnote 1) <https://nca2018.globalchange.gov>

⁴ (Full citation at footnote 1) <https://nca2018.globalchange.gov>

with extreme weather and climate-related events and are expected to experience greater impacts. Prioritizing adaptation actions for the most vulnerable populations would contribute to a more equitable future within and across communities.

1.2. Commonwealth of Pennsylvania Climate Action

In 2008, the Pennsylvania Climate Change Act was passed, and 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 2015,⁵ and the most recent Climate Action Plan, as well as greenhouse gas inventory, were released in 2019.⁶ 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 2019⁷.

1.3. Climate Action in Forest Hills: Vision Statement and Goals

In 2020, the effects of the changing climate are evident: increased drought conditions, more frequent and intense storm events, all complicated by a global COVID virus pandemic. Forest Hills Borough recognizes the conditions facing us now and the importance of planning for the future. The Comprehensive Plan for Development updated through an extensive series of community dialogues beginning in 2018 and adopted by the Forest Hills Borough Council in January 2020 set forth a vision for the community:

The Borough of Forest Hills carries a tradition of innovation as the community grows in leadership toward a resilient future. The community values the natural beauty of its environment and enjoys the inclusiveness and diversity of its citizens, offering cultural, recreational, and educational services for all generations in safe and secure neighborhoods.

Preserving the character of the community into the future will require understanding the effects climate change will have on the environment, public health, and economic and social conditions.

⁵ Commonwealth of Pennsylvania. 2018 Pennsylvania Climate Action Plan Update. Department of Environmental Protection. April 29, 2019.

<http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1454161&DocName=2018%20PA%20CLIMATE%20ACTION%20PLAN.PDF%20%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e>

⁶ <https://www.dep.pa.gov/Citizens/climate/Pages/default.aspx>

⁷ Executive Order: 2019-01 – Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance. <https://www.governor.pa.gov/newsroom/executive-order-2019-01-commonwealth-leadership-in-addressing-climate-change-and-promoting-energy-conservation-and-sustainable-governance/>

Even though we are a small community, we will need to prepare for climate effects and take measures to mitigate the worst of them to the extent possible. Because every person, business, organization and institution contribute to the greenhouse gas emissions, everyone has a role to play in mitigating climate change effects to the extent feasible.

The Borough of Forest Hills has pursued a Climate Action Planning process beginning with a Proclamation of the Borough Council dated April 18, 2018, which includes in relevant part:

Whereas It is imperative that the world know that in the U.S., the people that will provide the leadership necessary to meet our Paris Accord commitment are found in city halls, state capitals, borough buildings, colleges and universities, and businesses. Together, we will remain actively engaged with the international community as part of the global effort to hold warming to well below 2°C and to accelerate the transition to a clean energy economy that will benefit our security, prosperity, and health.
Now, Therefore, be it resolved that I, Frank Porco, Mayor of the Borough of Forest Hills, in collaboration with the Forest Hills Borough Council are joining forces for the first time to declare that we will continue to support climate action and to declare “We are Still IN” The Paris Climate Accord.

The Climate Action goals were included in the two- year process of updating and adopting a Comprehensive Plan for the Borough of Forest Hills, including four community input sessions attended by over 120 people, a communitywide survey for feedback on the proposals, and public hearings before the Borough Council. The Comprehensive Plan adopted in January 2020 is here: <https://foresthills.org/Document%20Center/Borough-Budget/Comprehensive%20Plan.pdf>

On April 22, 2020, The Borough Council adopted a Resolution to reach a goal of net zero carbon emissions by 2050 in Borough operations and to support a zero- carbon footprint for the entire community by that date. This goal was set in recognition of the gravity of the consequences for our community and our children’s future if we fail to act to mitigate the worst effects of climate change. While the 2050 goal is slightly more aggressive than the Commonwealth of Pennsylvania goals, this goal is within the range of targets set by global and national studies and international agreements. Oversight for developing the Forest Hills Borough Climate Action Plan was remanded to the Environmental Advisory Council, under the jurisdiction of the Council Operations and Policy Committee in May 2020.

The Forest Hills Borough Climate Action Plan was developed taking account of the following goals from the Comprehensive Plan.

Governance Goals:

- Develop a modern communications system to exchange information with all citizens.
- Increase transparency and tracking for code enforcement actions.
- Define responsibility for maintaining Borough Trees vs private property trees.
- Establish non-motorized transportation options including pedestrian mobility and safety, bicycle travel, and access to public transportation.
- Maintain Borough public safety capacity through strong police, volunteer fire department, and emergency response services.

Infrastructure: Building and Zoning Goals

Increase mixed use zoning, especially in the business district. Expand small business options intermixed in neighborhoods to increase convenience and pedestrian access to local destinations.

Update parking requirements to allow shared use of parking areas among businesses, residences, and visitors.

Preserve open space and park areas and consider vacant space for future park amenities.

Community Environmental Goals:

Address resilience and advanced planning for changes due to climate warming.

Maintain leadership position expressed in the Net Zero Energy Borough Building and maintaining Tree City status

Address concerns for recycling and permanent management of waste streams through regional collaboration

Develop contingency and emergency management plans for storm water crises and infrastructure deterioration.

Establish a Walkable Neighborhoods and trails access policy.

Business Development Goals:

Develop capacity for marketing and to form public-private partnerships.

Develop desirable attributes to attract “Cradle of Innovation” businesses

1.4. Scope of the Climate Action Plan

Forest Hills moved the Administrative Offices, C. C. Mellor Library, Police Department and Community Room from two older buildings into a new net zero energy borough building that has served as an emblem for our commitment to this process. With the evidence of continuous zero net electricity bills from the operation of this building, it is clear that properly designed buildings can produce more energy than they use, on an annual net basis, even through the winter months. This accomplishment has stimulated renewed interest in advancing the process of improving the energy profile of the entire community.

The Climate Action Plan addresses the following sectors:

- 1) Residential sector actions,
- 2) Commercial sector actions,
- 3) Transportation actions,
- 4) Water and stormwater management,
- 5) Waste management

Each of these have specific Short-term (2020-2025), Mid-term (2020-2030) and Long-term (2020-2050) Milestones and action strategies presented in Parts Two and Three below.

Climate objectives for the Borough operations will be established through the Borough Property Committee of Council during 2021. Using the model of the successful net zero energy borough building, further innovations will be incorporated into Borough buildings and operations.

1.5. Co-Benefits of the Climate Action Plan

Although the Climate Action Plan is focused on reducing greenhouse gas emissions as the primary goal, many additional benefits come from the actions entailed in this plan. Reducing emissions of greenhouse gases also reduces the level of pollution in the ambient air. The Climate Action Plan has the following co-benefits to the community:

Improve public health. Forest Hills lies in the airshed of the industrial emissions from Braddock and Homestead where ongoing operations cause orange or red air quality alert on 10.6 days in the three -year average from 2017 to 2019.⁸ Reducing local emissions, especially from transportation within the community and from local heating systems, can improve ambient air and reduce asthma and respiratory distress. Increasing safe non-motorized transportation options also encourages people to walk and exercise more frequently. Safe and accessible sidewalks, local park amenities and public transportation options improve the health of the community. Likewise, maintaining the mature tree canopy contributes to quality of life and also captures carbon from the atmosphere into the trees. The water and waste management goals of the Climate Action Plan also contribute to public health by assuring a safe water supply and reducing exposure to toxic chemicals.

Economic Benefits. As residences and businesses improve the efficiency of energy use and water consumption and reduce waste, savings will accumulate. The evidence of the Forest Hills Borough Building documents the cost effectiveness of high energy performance. Achieving efficiency in current and future use of resources will incorporate lower economic burdens for all citizens. In addition, economic opportunities abound in the energy conservation, efficiency and renewable energy fields. Energy management skills and technical assistance to accomplishing climate action goals open job opportunities and business options that can be attracted to Forest Hills as new developments.

Reduced Risks. The primary risks related to climate mitigation revolve around storms and storm water management. While Forest Hills manages these issues through a regional collaboration with ALCOSAN, specific local actions in the climate initiative that are outside of this effort will also be helpful. In particular maintaining the mature tree canopy and providing for the continued planting and replacement of trees over the thirty-year planning horizon has significant benefits. Careful planning of tree locations and attention to pruning can mitigate storm risk to infrastructure such as power lines and communications.

Social Equity. Many of the actions incorporated into this Climate Action Plan depend on individual action and broad participation to achieve the necessary levels of reductions to greenhouse gas emissions. We recognize that everyone has different levels of capacity to participate, especially regarding financial contributions. It is important for this Climate Action Plan to address access to technical assistance, financial support and services for this plan to succeed. It is also important to recognize that portions of our population are more susceptible to harms from the effects of climate change and pollution caused by greenhouse gas emissions. Addressing these issues within the scope of Borough capacity is an important consideration in the elements of this Climate Action Plan.

⁸ Allegheny County Health Department. Air Quality Annual Data Summary – Criteria Pollutants and Selected Other Pollutants For 2019. Page 8.
https://www.alleghenycounty.us/uploadedFiles/Allegheny_Home/Health_Department/Resources/Data_and_Reportng/Air_Quality_Reports/2019-data-summary.pdf

1.6 Climate Action Planning Process

The Borough of Forest Hills secured a grant through ICLEI and PA Department of Conservation and Natural Resources to secure a database and forecasting model to use in developing the Climate Action Plan. We participated in the ICLEI Climate Action Project as one of 20 Pennsylvania communities in a pilot program to develop local climate action plans. Participation in this program allows Forest Hills to develop tools to guide continuing efforts to address a climate action plan. Access to the ClearPath model for evaluating and forecasting emissions was part of the grant. A continuing participation in ICLEI through CONNECT ⁹will maintain this data management tool throughout this process and expand our community coordination with our regional neighbors, including the City of Pittsburgh. The COVID-19 virus response put an abrupt halt to our community engagement efforts in mid-March. The Borough offices went to restricted hours and rotating staff presence and planned public outreach sessions for April 10 and 24 were postponed, then cancelled. In addition, we lost the service of our grant-funded intern as The University of Sharpsburg depopulated the campus in response to the COVID-19 pandemic. In April, The Borough of Forest Hills secured the service of a graduate student intern from the Chatham University Falk School of Sustainability to bring the process to conclusion.

The climate action planning process has five steps repeated in annual iterations. This initial Climate Action Plan establishes a baseline for the ongoing engagement with climate action.

Figure 1.1 ICLEI Planning Cycle



The Environmental Advisory Council conducted two surveys seeking input from residential sector and from the business community. In addition, public presentations at regularly scheduled Borough Council meetings and Committee meetings were held to explore specific topics such as forming an Eco-District in Forest Hills and to discuss an Active Transportation Plan as part of this process. See Appendix A for Public Information Topics Addressed, Appendix B for Residential Sector Survey Results and Appendix C for Business Sector Survey Results.

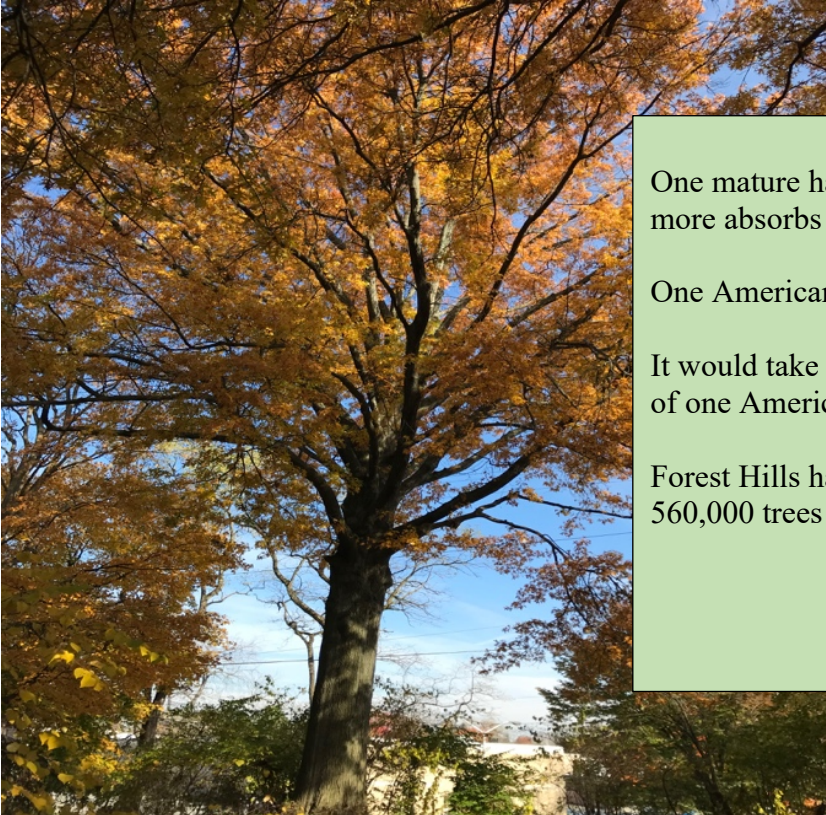
⁹ The Congress of Neighboring Communities surrounding Pittsburgh <https://www.connect.pitt.edu>

We recommend that this cyclical review process be repeated on an annual basis as part of the budget process, with the Environmental Advisory Council offering recommendations for implementation actions to track Climate Action Plan implementation over time.

The Environmental Advisory Council approved the Climate Action Plan Draft for Comment at its regular meeting of November 19, 2020. The Borough Council considered the draft plan at its meeting of December 2, 2020 in the Operations and Policy Committee and scheduled for a public hearing on December 16, 2020. Eight citizens provided written or oral comments at the Public Hearing. Citizens supported initiatives for recycling and energy efficiency improvements; citizens supported the goal of achieving a net zero carbon footprint by 2050; and supported improving pedestrian safety and non-motorized transportation as well as maintaining the tree canopy. Two citizens expressed concerns about regulations that would compel energy efficiency or heating system changes upon transfer of property in the mid-term to long-term periods. One citizen urged consideration of modular nuclear power. Upon deliberation and following discussion, the Forest Hills Borough Council adopted the Climate Action Plan by unanimous vote at its Business meeting of December 16, 2020.

1.7 Climate Vulnerabilities

The most critical climate hazards and vulnerabilities in Forest Hills arise from extreme weather conditions and storm damage. These include power outages from downed wires, and drought stress and storm damage to mature trees. Forest Hills has a 50% land coverage with a mature tree canopy, as illustrated in Map 1. As a U.S. Tree City since 1976, protecting and preserving this attribute is an important community value. Mature trees (25 years or older) also biologically sequester carbon and serve a significant function in the carbon emissions control process.



One mature hardwood tree at 25 years of age or more absorbs 400 pounds of CO₂ in one year.

One American creates 20 Tons of CO₂ in a year.

It would take 100 trees to absorb the emissions of one American person for one year.

Forest Hills has 5,600 people. Do we have 560,000 trees over 25 years old in Forest Hills?

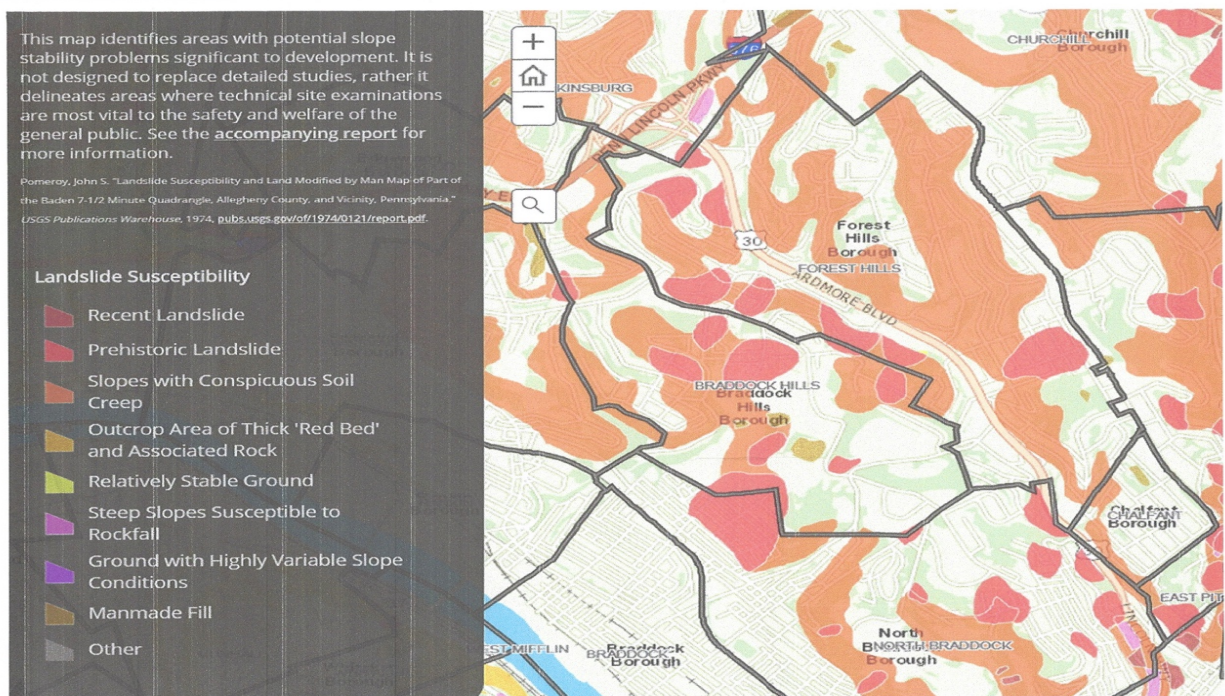
Map 1.1. Forest Hills Borough Tree Canopy



<https://www.google.com/earth/> Forest Hills Pennsylvania.

A second serious vulnerability comes from landslide hazards. Forest Hills has 40% of its 1.5 square mile area vulnerable to landslides due to the steep terrain, undermined areas from prior coal mining, and past building on filled land. Four significant landslides with house destruction and road collapse have occurred within the last three years. This issue receives ongoing consideration and analysis with the assistance of the Council engineering firm, Glenn Engineering, and Public Works staff.

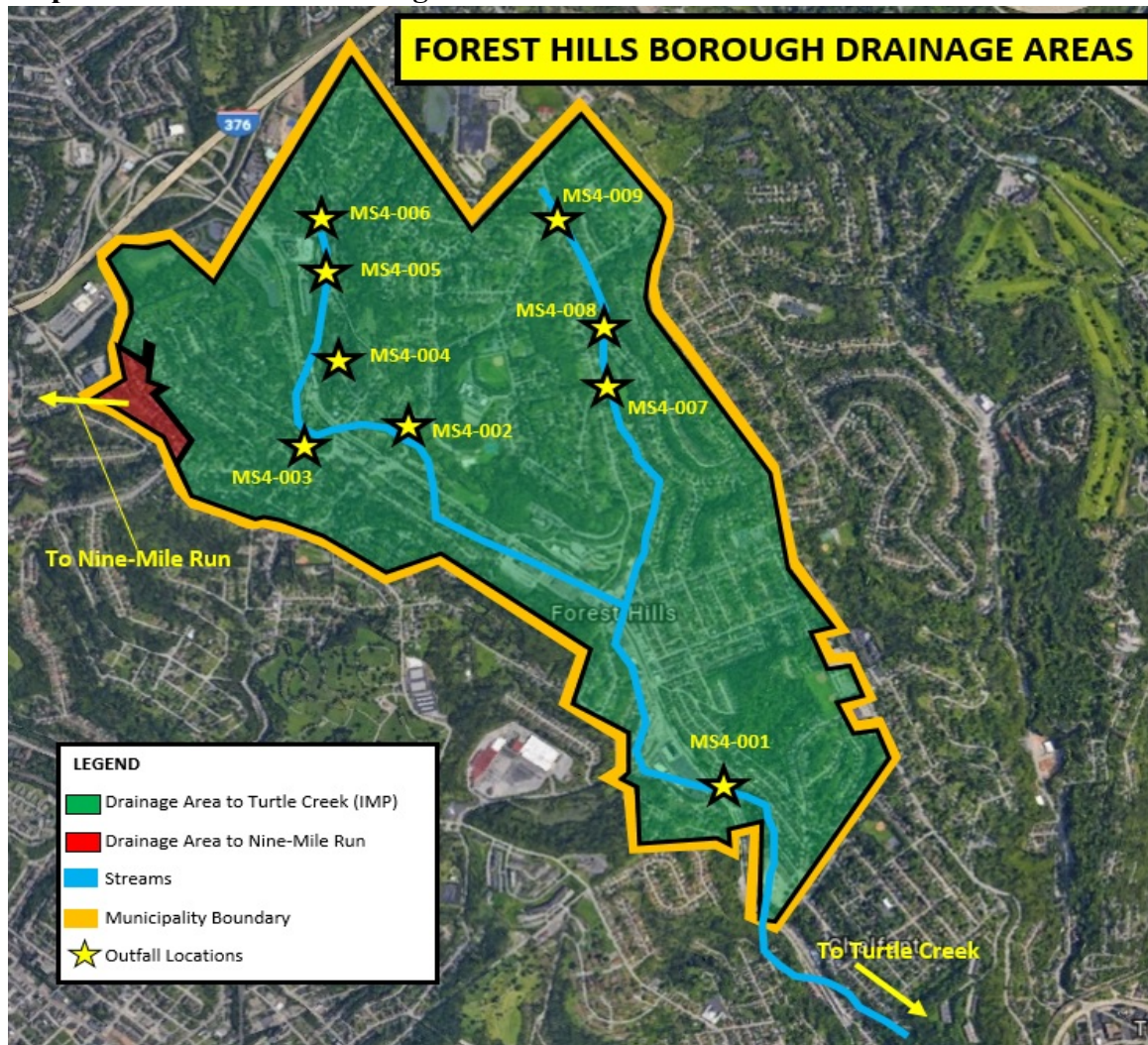
Map 1.2. Landslide Prone Areas



Vulnerability from storm and weather extremes include drought, which has implications for both the tree canopy and the water supply if prolonged over time. There are also significant and escalating concerns with storm surge events. Many of the conditions resulting from surges of storm water require collaboration with neighboring communities that share the watershed. Mitigation measures are in the planning stages through ALCOSAN and MS4 Consent Decree as well as through collaborative efforts of CONNECT who work together on this issue.

The Consent Decree for MS4 compliance will govern Forest Hills Borough actions for sewer and stormwater infrastructure. The thirty-year planning horizon can include water conservation and storm damage mitigation measures beyond the requirements for this Consent Decree. Forest Hills lies within the Turtle Creek drainage area.

Map 1.3. Turtle Creek Drainage Area



<https://www.foresthillspa.org/Document%20Center/Informational-Memos/Environment/Borough%20of%20Forest%20Hills%20MS4%20Pollution%20Reduction%20Plan.pdf>

Part 2.0 GHG Emissions and Goals

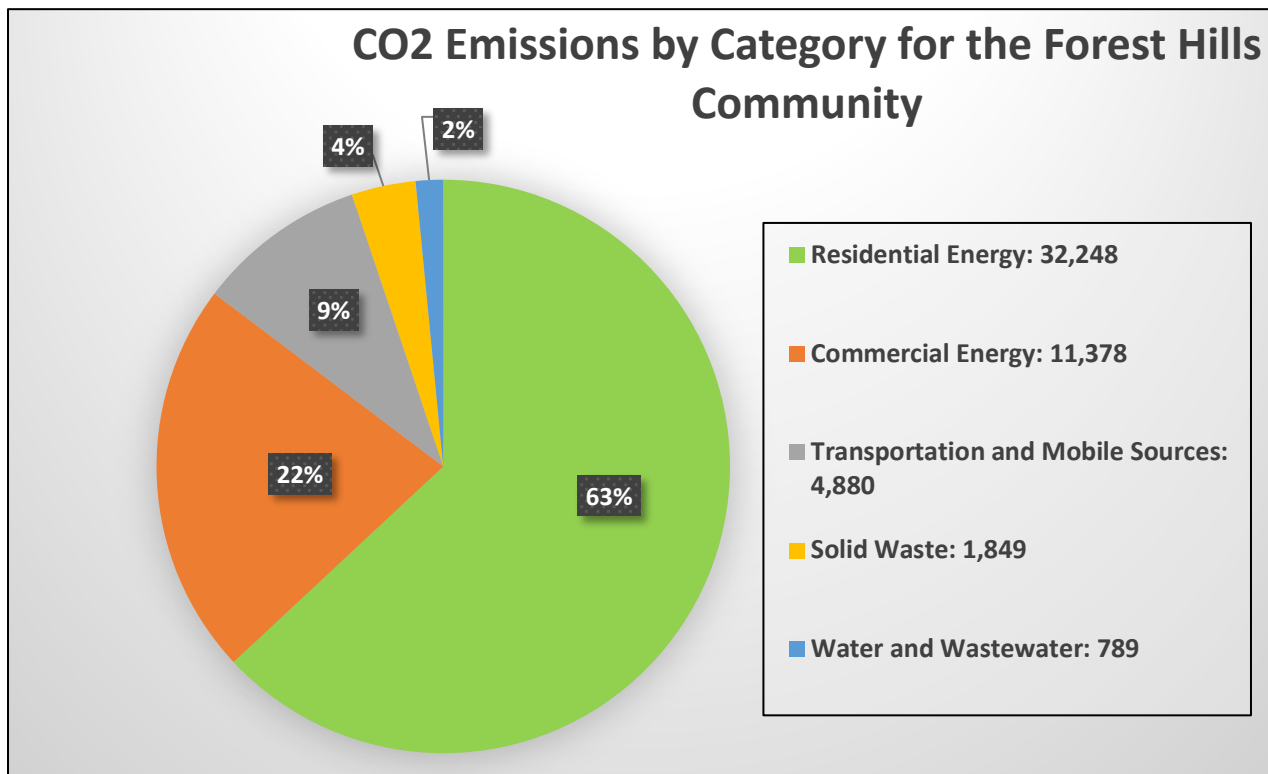
Part 2.0 Forest Hills Borough Community-GHG Emissions and Forecasts

The base year of 2017 greenhouse gas emissions was used as a benchmark for projected reductions in emissions to reach the goals established by policy. The emissions and goals for each sector are presented in this section.

2.1. Benchmark Emissions

The Climate Action Plan begins by establishing a benchmark for action to achieve defined goals. The Forest Hills goal to be completely Carbon Neutral by 2050 means that the community must reduce the total (51,144 metric tons) Greenhouse Gas emissions by 3.3% or 1,687.75 metric tons per year from the Base Year Benchmark set at 2017, the most recent period for which complete data were available. (Some data are from 2016 as the most recent date for information.) Figure 1 shows the current CO₂ emissions by category for Forest Hills Borough. Data collection and methodology are explained in Appendix D. Total greenhouse emissions were tabulated from data obtained from the utility companies serving Forest Hills. All data were consolidated by category to protect the privacy of individual customers. Data were compiled from Duquesne Light Company for electricity information; from Peoples Natural Gas Company for natural gas consumption, from ALCOSAN for water and wastewater consumption data; and from Waste Management for refuse data. See consolidated data tables in Appendix E.

Figure 2.1.1. CO₂ Emissions by Category for Forest Hills Borough



The baseline emissions data, through the ICLEI Clear Path model, formed the basis to construct forecasts to reach the Forest Hills goal of achieving Net-zero CO₂ Emissions by 2050. See Appendix F. ClearPath Forecast Methodology. To reach this long-term goal, an average of 3.3% reduction in emissions from combined sources must be reached in each year from 2020 to 2050. Using this model, targets were established for Short-term Actions in 2025, Mid-term Actions in 2030 and Long-term Actions leading up to 2050. Short-term actions are low cost and no cost actions driven by disbursement of knowledge and introduction to potential policies the community could implement. Mid-term actions include mid-range cost developments and will require policy support and some financial assistance to the community. Long-term actions consist of large-scale community development and policy implementation that will need both state and federal financial and policy support for implementation.

Figure 2.1.2. Current Emissions and Goals for 2025, 2030, & 2050 by Sector

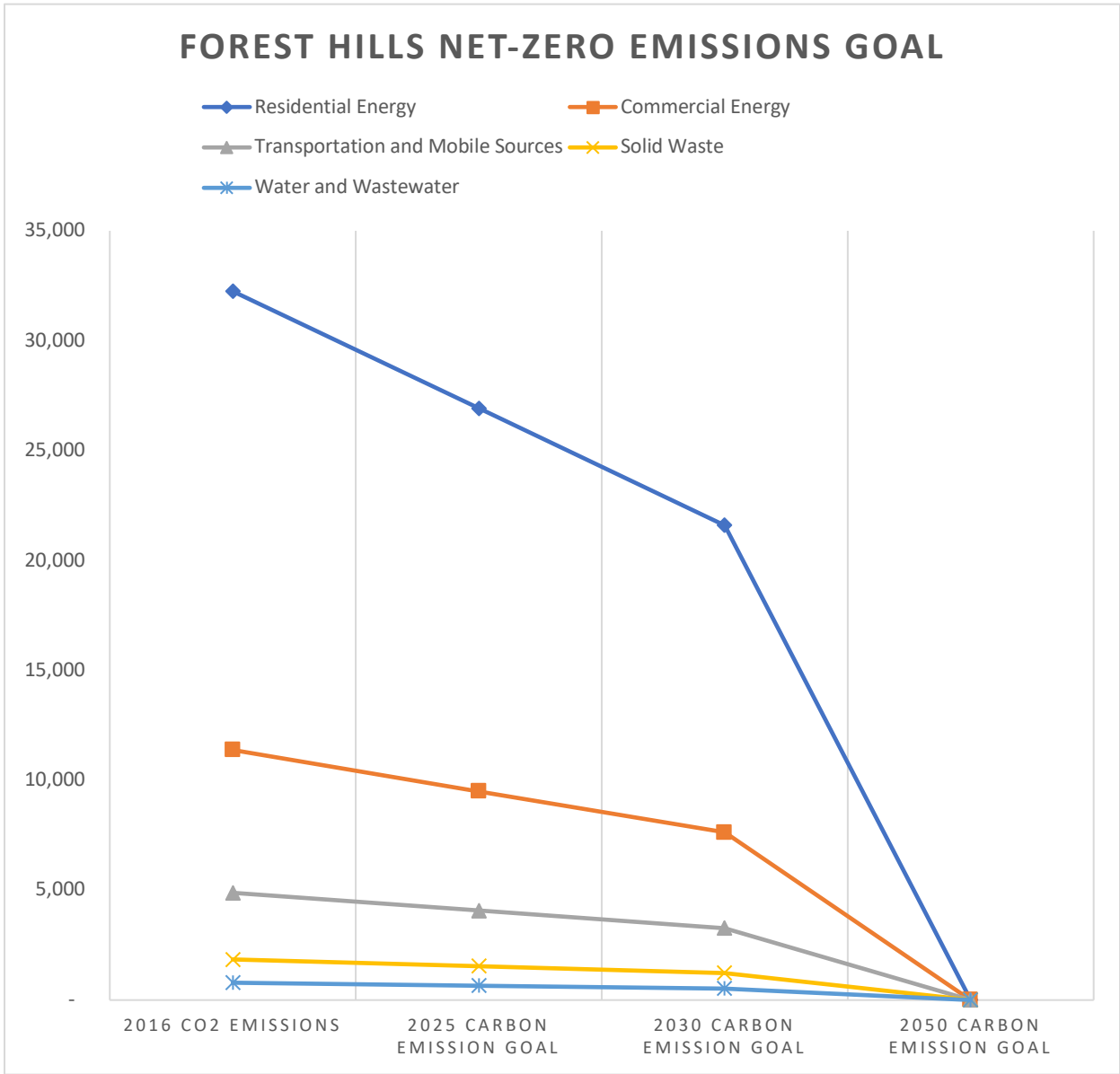


Table 2.1.1 identifies the metric tons of Carbon Dioxide equivalent¹⁰ emissions goals for a 5-year, 10-year, and 30-year plan. Reaching these Milestones in the proposed timeframes will lead to achieving zero CO₂ Emissions by 2050. Action Recommendations for each goal establish the path to successful climate response.

Table 2.1.1. Greenhouse Gas Emissions Base Year and Goals by Sector

CO₂ Emissions Sector	Metric Tons emissions 2017 base year	2025 Goal	2030 Goal	2050 Goal
Residential Energy*	32,248	26,927	21,606	1
Commercial Energy	11,378	9,501	7,623	1
Transportation and Mobile Sources	4,880	4,075	3,270	1
Solid Waste	1,849	1,544	1,239	1
Water and Wastewater	789	659	529	1

These reduction targets are guidelines for actions. Movement will not be even across all sectors as some require considerably more structural adjustments than others. However, establishing a progression toward reducing fossil- based combustion emissions across all energy-using sectors will allow steady progress. It is critical to understand that this plan moves forward within a framework of transforming our economy and culture smoothly to activities based on renewable and sustainable systems. We make the assumption that energy requiring activities such as heating and cooling and transportation will shift to non-fossil sources, and that the electricity producing system regionally and nationally will also be shifting away from fossil fuels during this planning period. Likewise, the provision of clean water and removal of wastewater will continue, with conserving measures increasing for mitigation of drought conditions, but the energy source for these functions will progress as well toward renewable energy systems. We also assume that the waste stream will move toward a circular materials management system, eventually displacing the “raw material to trash” approach currently in place. This should result eventually in a zero - waste end point but entails a robust materials management system based on reclamation and re-use rather than raw waste disposal.

2.2. Forecasts and Milestones.

Each of the Milestones established here are based on forecasts of a generic nature, not a sector specific production cost simulation. As more advanced tools emerge in the future, we can adjust and adapt a more refined approach. Much of the tracking and metrics process associated in this Climate Action Plan will rely on the aggregated data that can be collected through the public

¹⁰ Carbon Dioxide Metric Tons Equivalent means all sources of emissions are converted to British thermal units for equivalent comparisons. See this resource for calculations <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>

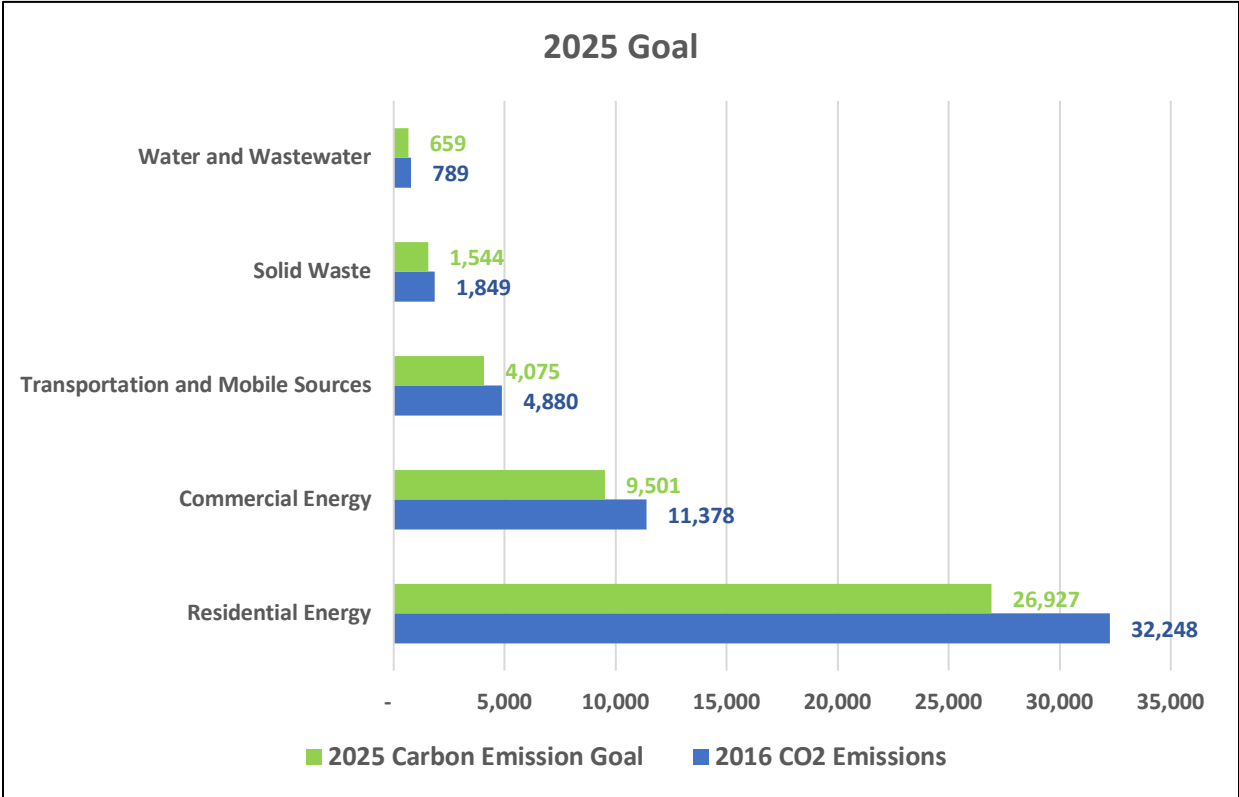
utilities and utility service providers. Annual surveys and other community interactive tools will also be developed as we progress in implementing this plan.

Maintaining a data collection process that is updated regularly is an important part of achieving these climate action and mitigation goals. Integrating these functions within the operations of the Borough of Forest Hills will require specific attention from dedicated staff. At this point, the effort has been driven by volunteer and intern activity, however, a consistent implementation process at some point will require a dedicated Sustainability Coordinator position within the Borough operations. The metrics of CO₂ equivalent emissions consolidated utility data will continue as established for tracking metrics in each sector.

2.2.1. Five- Year Forecast and Milestones

Figure 3 illustrates the Five -year Forecast Milestone for greenhouse gas emissions in each of the five sectors by 2025. This five-year forecast was calculated by taking the total of all current emissions and reducing them by 3.3% per year, roughly 16.5% in five years. Using action strategies that consist of no cost or low costs, while promoting awareness and knowledge about how GHG Emissions occur, 16.5% reduction is a realistic mark for Forest Hills to achieve in a five- year span. Achieving this milestone will require community engagement, outreach. Information and technical assistance will focus on engaging many people to take action through increased awareness and commitment to shared goals. Detailed strategies for each sector will be presented in Part 3 below.

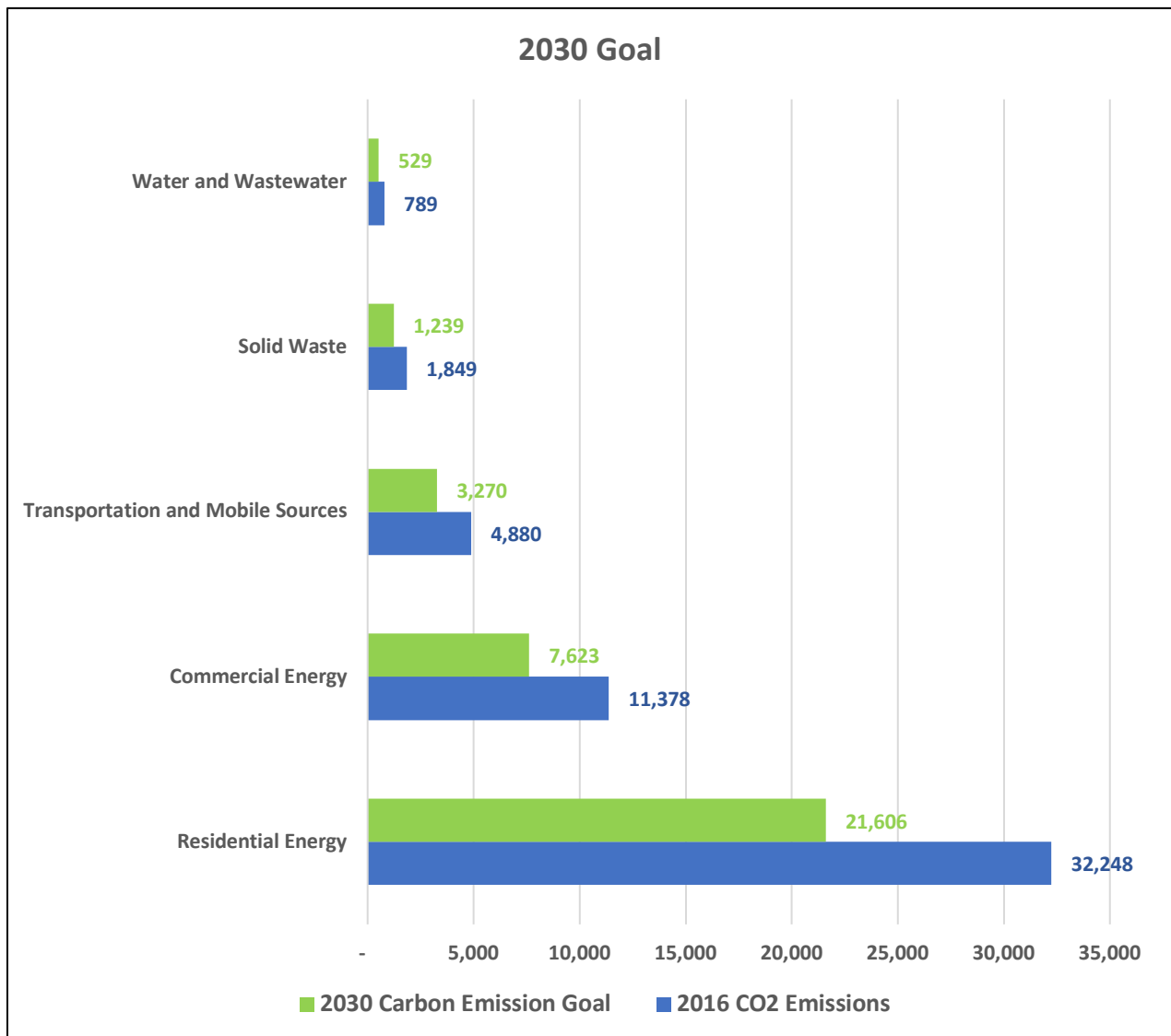
Figure 2.2.1 2025 Goals for Emission reduction in each of the five sectors



2.2.2. Ten-Year Forecast and Milestones

Figure 4.0 illustrates the ten-year forecast Milestone for greenhouse gas emissions in 2030. This ten-year forecast was calculated by taking the total of all current emissions and reducing them by an additional 3.3% per year to result in a total reduction of 10,505 CO₂ MTe, approximately 33% from the base year. Using action strategies that consist of mid-range costs, while implementing new policy and policy changes to support GHG emission reduction, a 33% reduction over a ten-year span is a realistic goal for Forest Hills to achieve. The strategies to meet this Milestone will require some specific community support such as community investment in infrastructure improvements and upgrades to the electricity system. These will be detailed in each sector strategy section.

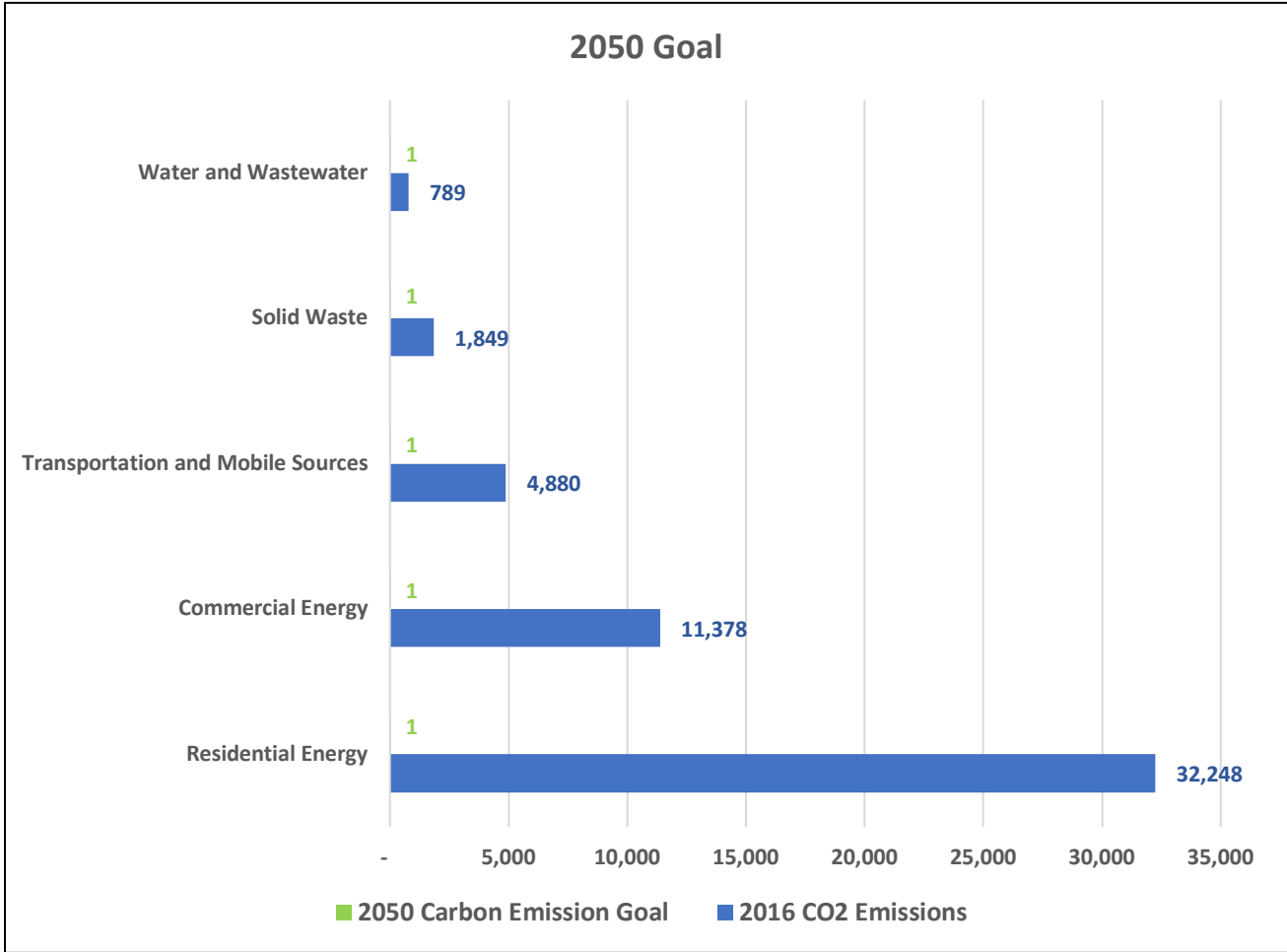
Figure 1. 2.2. Forecast of Emissions to 2030 in all five Sectors.



2.2.3. Thirty-Year Forecast and Milestones

Figure 2.2.3 illustrates the emissions reduction targets for the 30 -year milestone at 2050 for each of the five sectors. This thirty-year forecast was calculated by taking the total of all current emissions and reducing them to zero GHG Emissions, attaining the Forest Hills Borough goal. Using action strategies that consist of higher-range costs, while implementing new policy and continuing to change policy in supporting GHG emission reduction, 100% reduction over a 30-year span would be a tremendous achievement for Forest Hills to accomplish. This goal will need to be taken in the context of supportive state and national policies. Collaboration on a regional basis will improve the effectiveness of actions, especially those that depend on system changes or major infrastructure improvements and additions.

Figure 2.2.3. Goals for 2050 for Emission reduction in each of the five sectors



(*The graph shows a number 1 instead of zero as a default of the graphics program.)

Part 3. Emission Reduction Actions by Sector

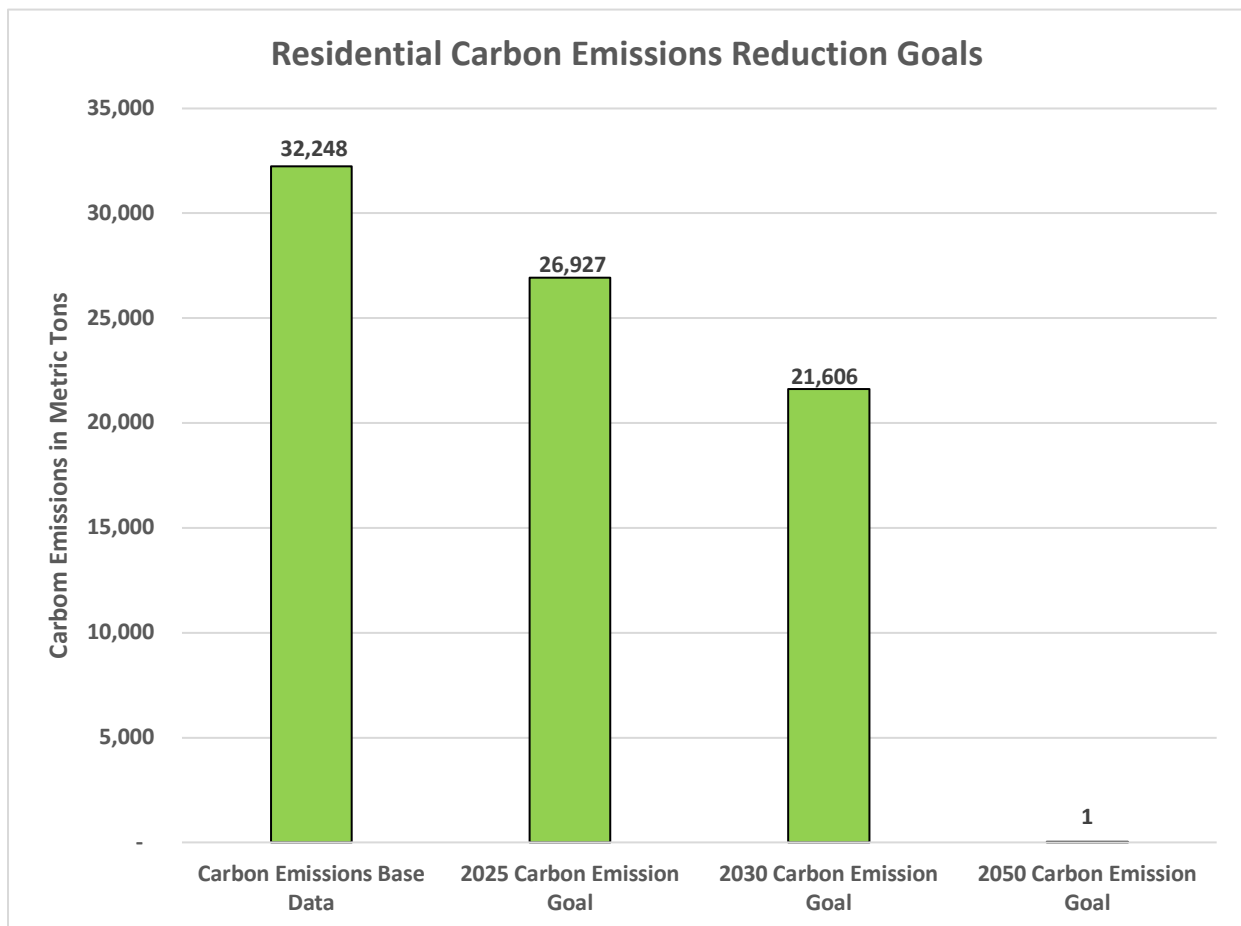
Part 3.0 Actions to Achieve GHG Reduction Goals by Sector

Implementing these climate response and mitigation actions within the community will not only make the area more sustainable, but additionally raise the equity of Forest Hills and reduce costs long term. Actions are applied to goals by considering organization, community involvement, cost of investment, proposal of new policy, change of current policy, and effect on the reduction of metric tons of greenhouse gas emissions.

3.1. Residential Sector Milestones and Actions

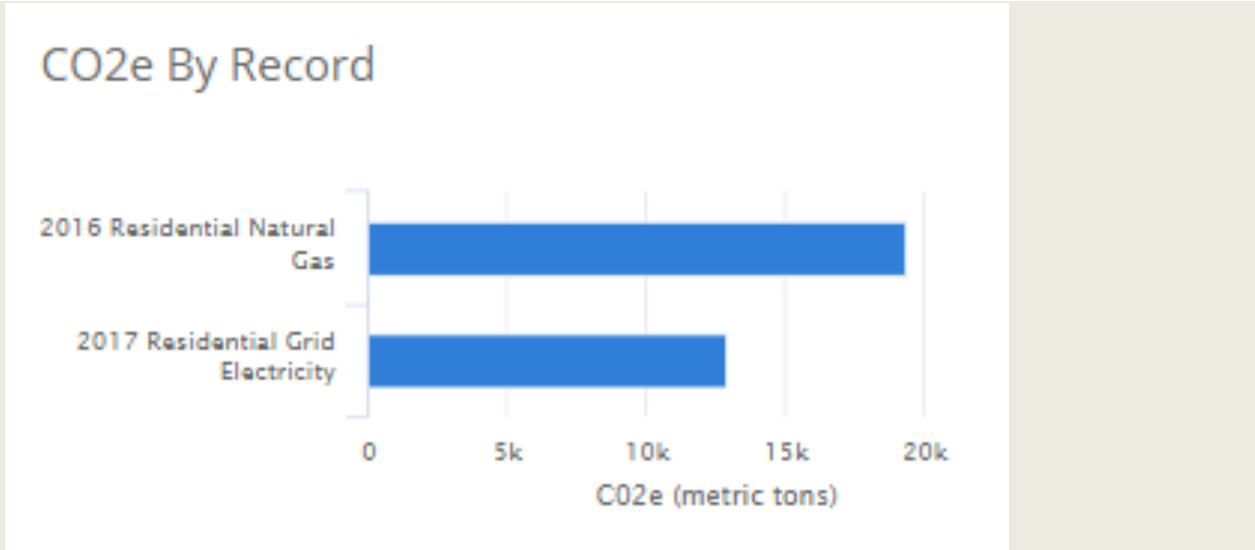
The Residential category is responsible for the largest portion of Carbon Emissions throughout the Borough of Forest Hills. Figure 6 depicts how implementing short, mid, and long-term actions over the next thirty years will help in reducing overall GHG Emissions toward a net-zero community.

Figure 3.1.1 – Residential GHG Reduction Goals by Metric Tons



Residential emissions come from heating and cooling, cooking, appliances, electronics and lighting in residential buildings, apartments and condominium dwellings. Residential gas consumption is from heating, some hot water, and some cooking use. Electricity provides power for lighting, electronics, some hot water and cooking, and air conditioning.

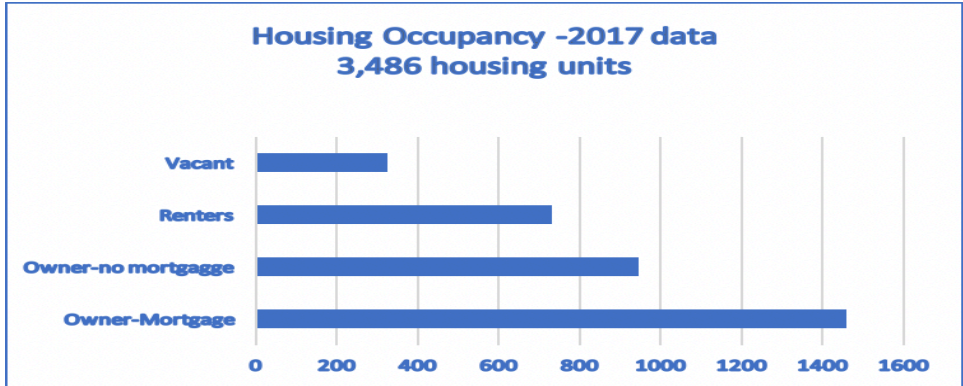
Figure 3.1.2. Residential Energy Use by Fuel Type Base Year



Data from Comprehensive plan sector profiles.

Forest Hills residential sector is predominantly owner-occupied, with a significant portion of residence owners over the age of 65. (Comprehensive Plan demographic data.) This feature has implications both for the need for financial assistance to home owners who may be on a fixed retirement income, and for the probability of property turnover in ownership during the thirty year planning cycle. The Renter population will also have different motivation for climate action based on building or infrastructure improvements, but may have a more positive attitude towards behavior changes or broader community goals.

Figure 3.1.3. Forest Hills Housing Occupancy ¹¹



¹¹ Borough of Forest Hills Comprehensive Plan 111919 FINAL.pdf. Page 6

3.1.1. Residential Short-Term Actions to Reduce Emissions by 16.5% by 2025 Milestone

These suggested actions can increase the efficiency of energy use and can also save money for the individual households. Most measures require little direct investment. There are eight residences with solar arrays providing some of the power to the home in Forest Hills. Increasing the installation of solar on homes, especially when aligned with electric vehicle adoption can improve the emissions profile. Pennsylvania is a state that allows choice in electricity provider. There are several providers with 100% renewable energy supply available in Forest Hills. Using renewable energy providers based in Western Pennsylvania is especially helpful in promoting a transition because locally sourced renewable energy generation immediately displaces fossil fuels from the same electricity supply area, and the same air pollution plume area.

Table 3.1.1. Residential Short-term Actions to 2025

Short term Actions target 5,320 Mte CO₂ reduction	
Action Categories	Potential Actions
Homeowner Modifications (\$)	Switch to LED lighting
	Choosing 100% renewable energy power company
	Improve gas line leak detection
	Install smart meters to provide better customer data access
Community Awareness	Promote knowledge of renewable energy
	Promote knowledge of importance of LED lights
	Promote Green and Healthy Homes Initiative and related programs
	Promote Passive House building guidelines
	Promote home energy scores and home energy audits
	Educate homeowners and renters on existing energy efficiency programs including appliance choice and annual cleaning of HVAC systems
Data Collection	Collect monthly electricity consumption data by sector by zip code
	Collect monthly natural gas consumption data by sector by zip code
	Collect monthly potable water use data by sector by zip code
	Develop and implement Forrest Hill’s District Energy Plan renewable power generation in order to meet Pennsylvania’s Alternative Energy Portfolio Standards (AEPS) for Provider of the Last Resort (POLAR) customers
	Calculate reasonable estimates for annual transmission loss for local grid

Residential Short-term Policy Recommendations:

1. Develop Residential Customer information to guide adoption of emission control measures. Focus on low-cost or no-cost actions for residential buildings. Encourage demand response program participation. Provide seminars and technical assistance workshops to residents as community service actions.
2. Establish assistance for residential building owners to have an Energy Audit to identify energy efficiency measures and to help establish costs. This can come from Borough negotiation with audit providers for community wide savings on the audits, or through grants to give such assistance to home owners. The Borough can advocate for free technical assistance for such energy audits through Community College, union apprenticeship or other technical assistance providers.
3. Require energy audits upon transfer of property.
4. Advocate for state and federal grant assistance and tax incentives to support residential energy efficiency improvements.
5. Support regulatory reform to allow for community source aggregation and renewable energy approvals.

3.1.2. Residential Mid-Term Actions to meet 2030 Milestone

The combination of these actions will reach a 30% reduction in emissions from the base year benchmark. Emission reduction requires investment in building retrofits and may reflect some conversions of gas heating systems to electric heat pump option, as these units age and require replacement in this time frame.

Table 3.1.2. Residential Mid-term Actions to 2030

Action Categories	Potential Actions to reduce an additional 5,320 CO ₂ MTe, Totaling 10,640 CO ₂ MTe
Community Action & Reform on Policy	Create a local Energy Authority to enable community choice aggregation, power purchase agreements, and renewable regulatory approvals
	Create legal framework for Property Assessed Clean Energy (PACE) program
	Create a location efficiency overlay and use transfer of development rights to encourage density while protecting open space
	Create a revolving loan fund for energy and water efficiency retrofits

	Create a map/matrix of resources for energy efficiency retrofits
	Create a building owner manual and expand first-time building owner classes
	Allow for 'green' information to be included in the Allegheny County Multi List Service
Community Action & Reform on Policy at the State Level	Support state level legislation enabling residential energy and water disclosure
	Support state level legislation enabling adoption of most recent building codes
Homeowner Modifications (\$\$)	Retrofit housing and buildings with new windows and doors
	Add insulation to attics and walls
	Retrofit Toilets
	Install smart meters to provide better customer data access
	Add solar to south-facing roofs on annual net meter billing
	Calculate reasonable estimates for annual transmission loss for local grid

Residential Mid-Term Policy Recommendations:

1. Establish a local revolving loan fund to assist homeowners with making infrastructure improvements such as heating system conversions, window and door replacements with high efficiency items and adding insulation to attics and walls.
2. Develop a collaboration with energy utilities to perform energy audits and appliance efficiency upgrades.
3. Establish local technical assistance providers to help home owners with solar financing, installation and integration into the electric grid.
4. Establish energy efficiency ranking and standards checklist for transfer of property.
5. Establish a carbon credit allocation for home owners for maintaining mature trees (over five years old) on their property.

3.1.3 Residential Long-Term Actions to 2050

Achieving reductions to net zero emissions in the residential sector by 2050 will require system changes supported at the state and federal levels. The residential sector in Forest Hills can retain

the sense of community with improved quality of life. Conditions that will support this goal while achieving zero net carbon emissions will require broad adoption of electric heating and cooling systems powered by renewable energy both from solar photovoltaic additions to existing buildings and development of the broader renewable energy power system. Innovations such as automated load management based on time of use and integrating power generation with power use will become mainstream attributes of a net zero energy society. Re-shaping the utilities to become energy system integrators rather than supply generators has already begun to take place. Incorporating energy storage and back-up systems into the scope of utility services may offer ways to partially fund these transformations.

Table 3.1.3. Residential Long-term Actions to 2050

Action Categories	Potential Actions to reduce additional 21,606 CO ₂ MTe, Totaling 32,248 CO ₂ MTe
Large Scale Community Investment (\$\$\$)	Duquesne Light to install solar microgrid pilot
	Install solar panels throughout the community
	Change HVAC units to be energy efficient, non fossil fueled
	Transition to LED streetlights
	Local Green Power Purchase
	Low income weatherization program
	Residential Heat pumps

Long-term Residential Potential Policy

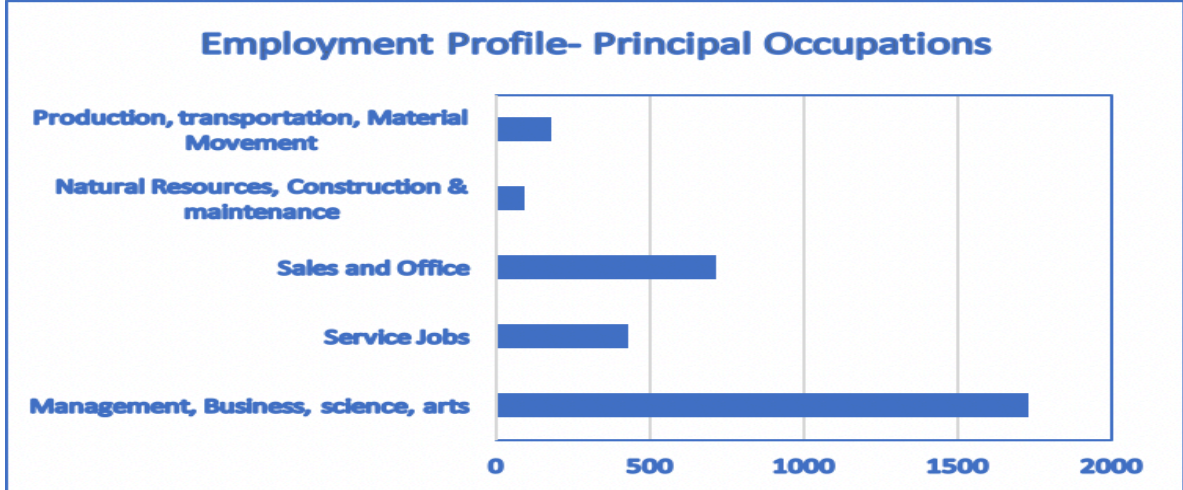
Policy actions at the local level will be driven by state and federal enabling legislation to grant local authority over implementation.

1. Adjust local occupancy requirements to require energy efficiency improvements upon property transfer, including replacement of gas heat.
2. Establish local cooperative action mechanisms for residences in Forest Hills to adopt photovoltaic solar electricity locally generated but not on individual residences.
3. Update zoning ordinances and planning criteria to incorporate climate goals for net zero emissions in the residential sector.
4. Implement a long-term infrastructure plan to replace aging natural gas delivery lines and to optimize electricity delivery grids.
5. Implement a stormwater fee to improve green infrastructure and prevent stormwater from entering the combined sewer.

3.2 Commercial Sector Milestones and Actions

The commercial Sector in Forest Hills Borough is a mixture of professional services, retail with Health Care, Education Services and Professional Services dominant. There are significant numbers of people not in the labor force, largely due to occupants of nursing homes and senior retired residents. The unemployment rate remains very low compared to surrounding areas. As of 2016, 90.4% of workers worked within Allegheny County and 7.1% of workers worked at home.¹²

Figure 3.2.1. Commercial Sector Employment Profile



The emissions profile of the commercial sector differs from the Residential Sector. Here, the benchmark use of electricity is higher due to the greater use of electricity for heating and cooling and for the higher loads for electronics, lighting and commercial scale communications equipment.

Figure 3.2.2 Commercial Sector Fuel Use in Base Year

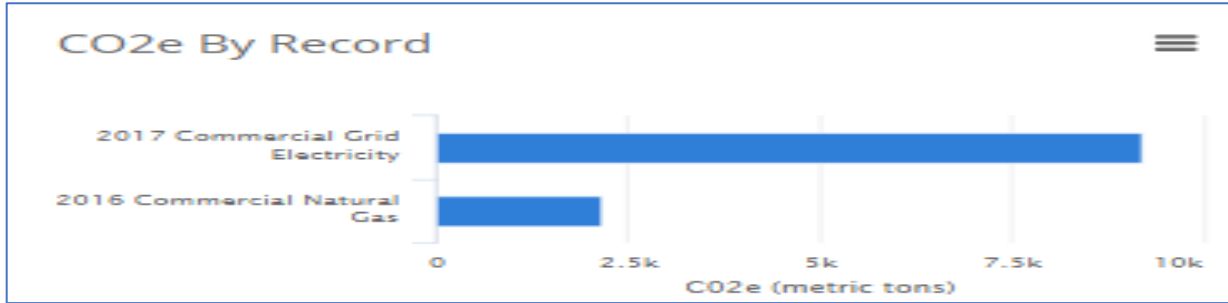
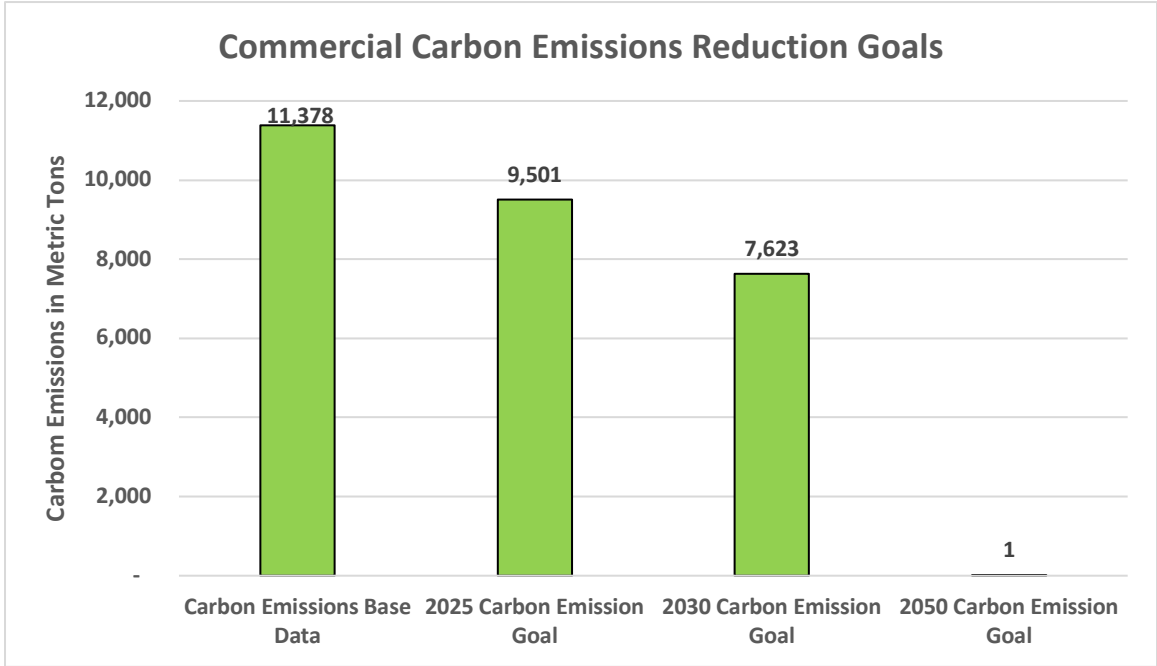


Figure 3.2.3. Describes the Commercial Sector Carbon emissions reduction goals for the Short-term, Mid-term and Long-term. These projections do not incorporate changes in the greenhouse gas emissions or energy consumption patterns that may emerge as the composition of the commercial sector changes over the thirty-year planning timeframe. The majority of the emissions profile in this sector is based on building performance.

¹² Forest Hills Comprehensive Plan. Page 11. Data source: <http://www.city-data.com/housing/houses-Forest-Hills-Pennsylvania.html>

Figure 3.2.3. Commercial GHG Reduction Goals by Metric Tons



3.2.1 Commercial Sector Short-term Actions to 2025

The Commercial Sector may change over the planning period as the nature and composition of the business community modernizes to adapt to emerging opportunities. Adopting a directed marketing approach to attract more high technology operations and revitalizing the business district through improved access, parking and connections to the community will influence the growth and resilience of the Commercial Sector. Positioning the Forest Hills business district for positive development will include energy efficiency improvements in all commercial buildings to enhance operating efficiency as well as to enhance appeal to workers and business owners. Addressing the pedestrian safety and accessibility to both local and out of town clients is an essential feature of the plan to improve the resilience of the community.

Table 3.2.1. Commercial Short-term Actions to be implemented by 2025

Action Categories	Potential Actions to reduce GHG Emissions by 1,877 CO ₂ MTE
Business Owner Modifications (\$)	Switch to LED lighting
	Choosing clean energy with the power company
	Improve gas line leak detection

	Install smart meters to provide better customer data access
Expanding Community Knowledge	Promote knowledge of renewable energy
	Promote knowledge of importance of LED lights
	Promote building energy scores and building energy audits
	Educate building owners on existing energy efficiency programs
Data Collection	Collect monthly natural gas and electricity consumption data by sector
	Collect monthly potable water use data by sector
	Develop and implement Forrest Hill's District Energy Plan renewable power generation in order to meet Pennsylvania's Alternative Energy Portfolio Standards (AEPS) for Provider of the Last Resort (POLAR) customers
	Calculate reasonable estimates for annual transmission loss for local grid

Commercial sector actions noted above will contribute to the 15% reduction in emissions within the five-year milestone to 2025. Developing an Eco-District overlay in the business district will create a platform for interaction and communication about low-cost and no-cost measures to be enacted in each business. Technical assistance and financial assistance for improvements will be important to the success of these initiatives.

Commercial Sector Short-term Policy Recommendations:

1. Establish an Eco-District zoning overlay to elevate the energy efficiency improvements in the Commercial Sector. Encourage demand response program participation
2. Develop a source of technical assistance and financing assistance for business owners to promote adoption of energy efficiency improvements.
3. Engage business owners in implementing the Active Transportation Plan and Complete Streets plans of the Borough to enhance pedestrian and client access in the business district.
4. Engage the Forest Hills Community Development Corporation in developing public-private partnerships to accomplish efficiency improvements and business marketing strategy.
5. Support alternative utility ratemaking in Pennsylvania such as decoupling, formula rates, cost recovery mechanisms, etc. and allow for community source aggregation and renewable regulatory approvals

3.2.2. Commercial Sector Mid-Term Milestones and Actions

The actions presented here will allow the Commercial Sector to reach a 30% reduction in emissions against the benchmark year. These actions entail energy efficiency retrofits to existing

buildings as well as more forward -looking standards for major modifications and new construction for commercial buildings. The addition of tools for public-private partnerships to upgrade the business buildings will play an important role in shaping the commercial sector in the next ten years.

Table 3.2.2. Commercial Mid-term Actions to be implemented by 2030

Action Categories	Potential Actions to Reduce Emissions by total of 3,754 CO ₂ MTe
Community Action & Reform on Policy	Create a local Energy Authority to enable community choice aggregation, power purchase agreements, and renewable regulatory approvals
	Create legal framework for Property Assessed Clean Energy (PACE) program
	Create a location efficiency overlay and use transfer of development rights to encourage density while protecting open space
	Create a revolving loan fund for energy and water efficiency retrofits
	Create a map/matrix of resources for energy efficiency retrofits
	Create a building owner manual and expand first-time building owner classes
	Allow for ‘green’ information to be included in the Allegheny County Multi List Service
Building Owner Modifications (\$\$)	Refit buildings with new windows
	Retrofit Toilets
	Install smart meters to provide better customer data access

Commercial Sector Mid-Term Policy Recommendations:

1. Work with regional collaborations to enhance the performance of commercial buildings using the Forest Hills Community Development Corporation as a facilitator and catalyst for these actions.
2. Participate in the Eco-District goals for improved energy efficiency in all commercial buildings.
3. Refine zoning ordinances to make optimum use of commercial space integrated with mixed uses and allowing for flexible parking accommodations.

3.2.3. Commercial Long-term Actions to be implemented by 2050

Achieving net zero carbon emissions in the commercial sector by 2050 will require completion of the transition to electricity for heating and cooling and commercial uses of gas. Financial assistance for these major infrastructure improvements will be necessary. Adding solar photovoltaic (PV) systems to flat roofed buildings would be enhanced by supportive utility tariffs and incentives at the state and federal level. Integrating new patterns of business into the commercial space will shape the emissions profile of the future. Forest Hills can strive to attract centers for innovation in electric grid coordination, broadband interconnectivity and circular materials management as business development opportunities in a resilient economy.

Table 3.2.3. Commercial Sector Long-term Actions to 2050

Action Categories	Potential Actions to reduce emissions by total of 11,378 CO ₂ MTe
Large Scale Community Investment (\$\$\$)	Duquesne Light to install solar microgrid pilot
	Install solar panels on all flat-roofed commercial buildings
	Change HVAC units to be energy efficient
	Transition to LED streetlights
	Local Green Power Purchase for all commercial buildings
	Commercial Heat pumps to displace gas HVAC units

Commercial Sector Long-term Policy Recommendations:

Policy adopted at the local level for commercial sector activities will be framed in the state level and federal level initiatives. It will be important of Forest Hills Borough to retain its intimate character taking advantage of technology innovations to maintain a resilient and flexible approach as new business models emerge. Hubs to support entrepreneurs, recognizing support for people working from home or remote from central company operations, providing services attuned to the needs of a more technology-based economy all will require flexibility in the rules governing local business operations. Assuring that new business opportunities find favor in Forest Hills will require forward thinking regarding the uses of commercial space.

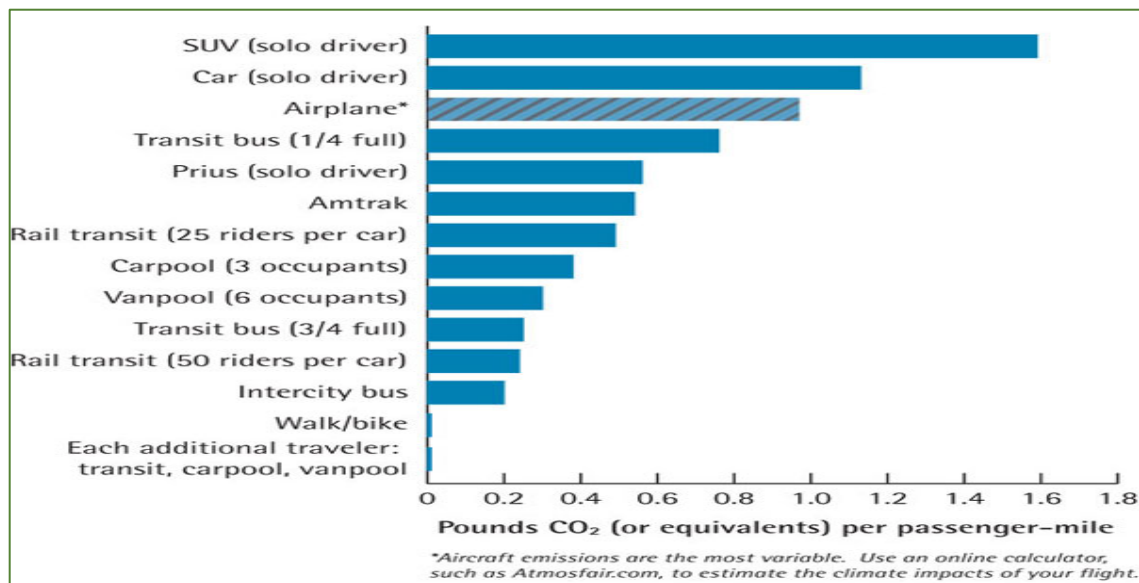
1. Implement building emission standards for transfer of commercial property.
2. Empower a robust Community Development Corporation to enable planning and financing for innovative projects, building improvements and infrastructure upgrades in the commercial sector.
3. Implement a long-term infrastructure plan to replace aging natural gas delivery lines and to optimize electricity delivery grids.
4. Implement Commercial Building Energy Benchmarking Ordinance as standard for all new commercial construction or major renovations.
5. Implement a stormwater fee to improve green infrastructure and prevent stormwater from entering the combined sewer.

3.3. Transportation and Mobile Services Milestones and Actions

The Transportation Sector carbon emissions strategy is based on two strategies. First moving from using vehicles with internal combustion engines powered by gasoline and diesel sources to electric engines. Over the thirty-year planning timeframe, electricity generation moves to 100% renewable electricity generated locally and regionally through a combination of solar photovoltaic, wind, anaerobic digestion producing hydrogen for fuel cells, and advanced battery storage systems. The internal combustion engine, the primary type of engine in vehicles in the base year of this plan, was invented in 1865. It has a 20% efficiency in converting liquid fuel (gasoline or diesel) to forward motion. Shifting from fossil fueled engines to electric engines will reduce the GHG emission profile of the transportation sector.

The second strategy focuses on changing the mode of transportation from more energy-intensive mobility to less energy-intensive mobility methods. The emissions per passenger mile vary greatly according to transportation mode, as illustrated in Figure 3.3.1.¹³

Figure 3.3.1. Greenhouse Gas Emissions by Mode of Transportation



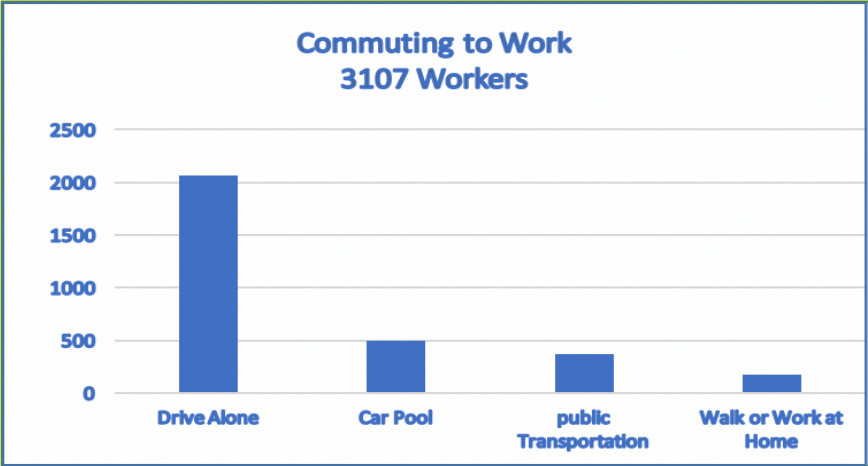
A significant feature of this strategy addresses the improved access and attractiveness and convenience of non-motorized modes of transportation. In this strategic path, it will be important to develop better pedestrian amenities for convenience and safety as well as to encourage

¹³ Transportation GHG Emissions and Trends. U.S. Department of Transportation. <https://www.transportation.gov/sustainability/climate/transportation-ghg-emissions-and-trends%20Accessed%20November%2022> Accessed November 22, 2020.

destination development to support community-based integrated living for residences, businesses and recreation destinations.

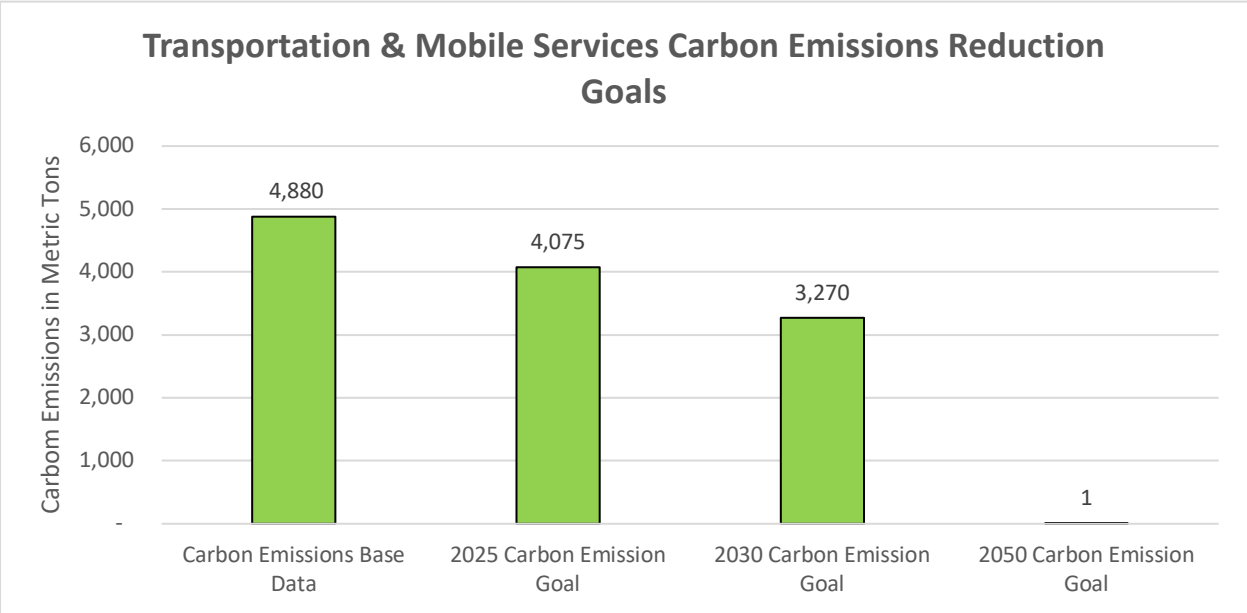
The predominant form of transportation in Forest Hills is by single occupancy vehicle travel.

Figure 3.3.2. Commuting Transportation Modes- Base Year¹⁴



The carbon emission goals and milestones for the Transportation Sector are shown in Figure 3.3.3. Transportation and Mobile Service not only cause Extensive GHG Emissions but apply to the safety and well-being of the residents within Forest Hills.

Figure 3.3.3. Transportation and Mobile Sources GHG Reduction Goals



Applying actions within this category will result in a safer, more equitable, livable, walkable, and overall sustainable community as the actions are implemented. Meeting the 2050 goal of net zero emissions from this sector will rest on both individual actions, especially in the short-term goals,

¹⁴ Data from Comprehensive Plan p 8.

as well as policy changes that will drive widespread adoption of electric vehicle technology in the mainstream transportation sector.

3.3.1. Transportation Short-term Milestones and Actions to 2025

Forest Hills was established as a commuting community. New patterns of live-work-play imposed by the COVID-19 pandemic response reveal a great potential for a shift to less distance commuting and more local interactions. Improving the pedestrian safety and non-motorized transportation options is an important aspect of our climate mitigation strategy.

Table 3.3.1. Transportation Short-term Actions to be implemented by 2025

Action Categories	Potential Actions to reduce emissions by 805 CO ₂ MTe
Community Awareness	Create awareness of public safety regarding public transportation access points & Sidewalk conditions
	Create awareness of why livability is important within a community
	Promote Electric Vehicle knowledge
Expanding Community Knowledge	Promote Compact Development
	Promote and grow bike share programs
	Promote importance of using public transit

Short-term Transportation Policy Recommendations:

1. Map and assess safety and accessibility of sidewalks in all residential and commercial neighborhoods. A WalkWorks Grant for an Active Transportation Plan for Forest Hills awarded in November 2020 will begin to address this issue.
2. Promulgate public information about the value of walking and bicycle travel to improve health and reduce transportation emissions.
3. Inform residents and fleet operators about value of converting to electric vehicles as internal combustion vehicles are replaced.
4. Work with current service stations to identify potential locations and processes for providing electric vehicle charging stations and service.
5. Adopt zoning ordinances to support shared parking areas and establish dedicated bicycle lanes and pedestrian sidewalks.

3.3.2. Transportation Mid-term Actions and Goals to 2030

In the next decade, migration to electric transportation modes will increase, with renewable energy systems providing the grid power. Fuel efficiency standards will play an important role in improving the availability of electric vehicles and bringing down the cost. In addition, it will be important to enhance not only non-motorized transportation (walking and bicycle riding) but also to enhance public transit options. Dedicated destination interconnections can play an important role in this process, as evident from the Flivver operation for Forest Hills seniors. Expanding this concept to a broader segment of the population and funding through public means can reduce the use of individual solo-occupancy vehicles.

Table 3.3.2. Transportation Mid-term Actions to be implemented by 2030

Action Categories	Potential Actions to reduce CO2 emissions by a total of 1,610 CO ₂ MTe
Reforming Current Transportation Structure	Synchronize traffic signals to ensure smooth traffic movement, bus prioritization, after hours freight prioritization, etc.
	Implement citywide bike plan and increase access to bike infrastructure
Changing Community Culture	Increase bike commute rate to 10% of trips
	Increase walking commute rates by 50%
	Increase public transit use frequency
	Introduce the use of Zip Cars and other shared vehicle platforms

Transportation Mid-term Policy Recommendations:

1. Establish multimodal transportation stations to encourage walk/bike/ride intersections with public transportation options.
2. Establish locations for shared transportation options such as Zip Cars, electric supported bicycles or scooters.
3. Establish public electric vehicle quick charge stations.
4. Coordinate with regional transportation developments to enhance public transit service options within Forest Hills including infrastructure for passenger access and safety such as sheltered transit stations.

3.3.3 Transportation Long-term Actions to 2050

Long term transportation options move toward more electrified and automated modes. Individual vehicles will be smaller, electric powered and linked with shared charging and storage systems.

Automated transportation for freight delivery and retail commerce will increase. Local autonomy for such actions as point of service assembly through 3-D printing of goods, for example, will change commercial transportation patterns. Computerized networks of shared vehicles will be more common. Adapting infrastructure to support modern transportation efficiency will require flexibility in land use and in public services. Communication advances in telecommuting will reduce the use of individual transportation for workers and will open opportunities for local business services that can be connected in walking or bicycle distance from residences. Expanding the telecommunications infrastructure will be an important part of reducing transportation emissions from fossil fuel combustion. Substituting telecommunication and highspeed rail for air travel will also improve the emissions profile of the transportation sector in the 30 -year time horizon. Potential long- term actions to reduce transportation emissions to net zero are shown in Table 3.3.1.

Table 3.3.1. Transportation Long-term Actions to be implemented by 2050

Action Categories	Potential Actions to reduce emissions by a total of 4,880 CO ₂ MTe
Expanding Transportation Infrastructure (\$\$\$)	Increase Port Authority ridership on electric transit vehicles
	Integrated bike infrastructure with public transit systems
	Expand transit hubs to promote multimodal trips
Large Scale Community Investment (\$\$\$)	Upgrade Public Transit Access points
	Redevelopment and Structure of Roads for non-motorized traveler safety
	Create barriers at edge of highways and safe sidewalks to ensure pedestrians safety
	Incorporation possible electrified rail system (revival of the streetcar?)
	Implement Bus Rapid Transit system

Transportation Long-term Policy Recommendations:

1. Address mechanisms to fund roads and transportation infrastructure as taxes from liquid fossil fuels decline.
2. Establish infrastructure to support electric vehicles, including solar photovoltaic canopies and electric vehicle charging stations in public parking lots.
3. Establish communication networks for connecting people with destinations through optimum transportation modes.
4. Establish a robust broadband communications capacity for telecommunication connectivity.

3.4 Waste Material Management

Material Management is a key cornerstone in the aim to achieve Net-Zero Emissions as it helps transition from a linear economy and promotes a circular as seen in figure(Add Figure). “A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources.”¹⁵ Emissions associated with waste material management come from the transportation used in collection and disposal of waste. There are embedded emissions as decomposition of organic materials in municipal waste occurs in the landfill. There are also emissions embedded in materials that are discarded, especially plastics.

Over the thirty-year planning horizon for waste material management, to reach net zero emissions will require a strategy for diverting waste material from landfill disposal as much as possible. Forest Hills is among the PA communities where curbside recycling is included in the waste management service. Approximately tons per year of plastic, glass and cardboard are recycled each year through the municipal waste service. What is not recycled goes to landfill. For a detailed discussion of the waste recycling process in western PA, see the Regional Recycling report conducted for the Congress of Neighboring Communities in 2019.¹⁶ The components of the waste stream fall into several categories, each requiring a different emission reduction approach. According to a study¹⁷ produced for the state Department of Environmental Protection, the 10 most common materials in Pennsylvania residential waste are:

- food waste – 12.2%
- non-recyclable paper – 10.1%
- corrugated cardboard – 5.3%
- newspaper – 5.2%
- yard waste – 1%
- mixed paper – 4.8%
- film plastic – 4.7%
- C&D (construction and demolition) – 4.5%
- textiles – 4.4%
- unpainted wood – 3.6%

Approaching the waste emissions reduction problem over the next 30 years offers important opportunities for circular materials management, especially for reclaiming material that can be re-purposed for renewed use, or materials that can be composted for soil amendments, or through anaerobic digestion to produce non-fossil- based methane to power fuel cells or other advanced

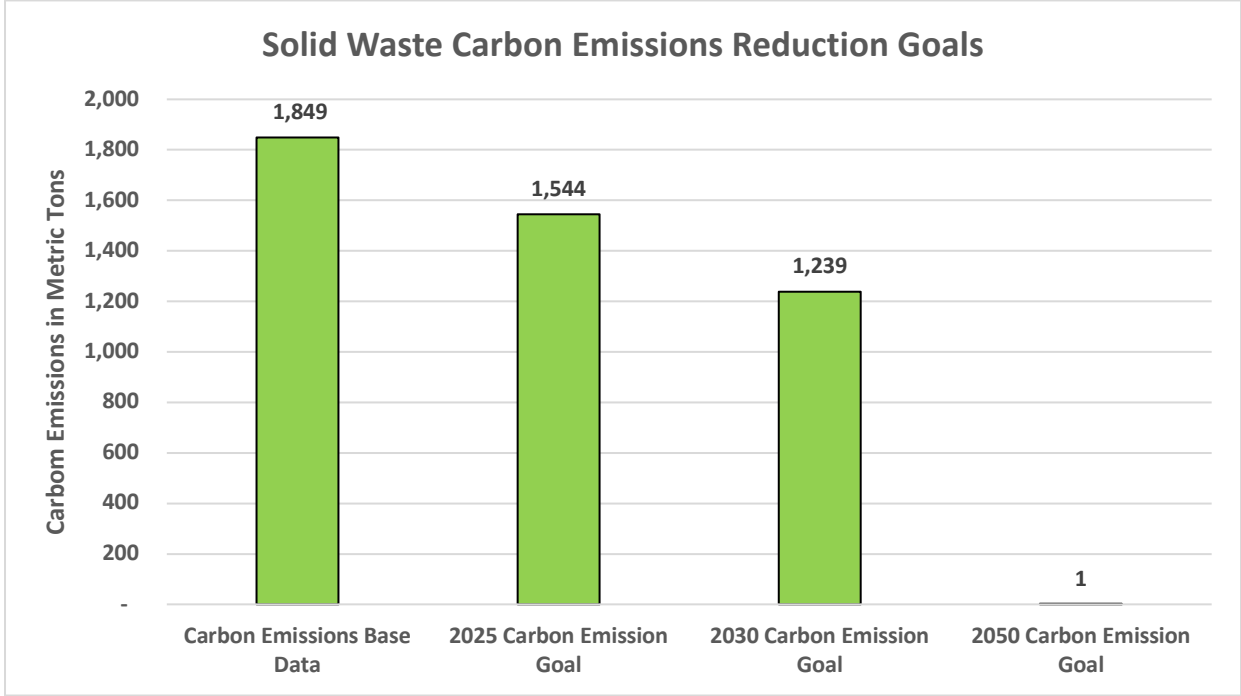
¹⁵ (<https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail>)

¹⁶ CONNECT Recycling Report- (obtain pdf citation)

¹⁷ <http://pawasteindustries.org/waste-industry/waste-facts/>

technologies. The first six items listed above could contribute to anaerobic digestion processes, for example.

Figure 3.4.1. Solid Waste GHG Reduction Goals by Metric Tons



3.4.1. Short-term Waste Materials Actions to 2025

Short-term waste emissions reduction actions are shown in Table 3.4.1. The short-term actions focus on enhanced information and clarity about recycling. As the current contract for Forest Hills waste management is pending renewal in 2022, opportunities emerge for better levels of material recovery for re-use.

Pending legislation at both state and federal levels for bottle deposit requirements will have an enormous effect on materials recovery. Forest Hills also participates in regional initiatives to reduce the use of single-use plastics. Actions through CONNECT and the Turtle Creek Council of Governments will expand the effectiveness of efforts to establish markets for recovered materials. The growing interest of citizens in home gardening also is driving interest in a Forest Hills community composting project. There is a limited composting program by the Forest Hills Public Works Department around seasonal leaf collection and mulch distribution.

Table 3.4.1 Waste Material Management Short-term Actions to be implemented by 2025

Action Categories	Potential Actions to reduce Emissions by 305 CO ₂ MTe

Community Awareness	Research Roadmap to zero waste
	Improve education around waste diversion efforts and options
	Education on products that are good for the environment
	Support a statewide bottle bill
Individual Change (\$)	Use reusable bags
	Use reusable Water bottles
	Use bees wax instead of plastics
	Recapturing & Use Glass
	Using reclaimed water
	Promote composting

Short-term Waste Reduction Policy Recommendations:

1. Establish a regional collaboration to enhance recovery and re-use of recyclable materials such as plastic, glass and paper.
2. Develop robust public education materials to assist citizens in waste reduction- Refuse-Reduce- Re-use and Recycle for all categories of waste.
3. Establish more efficient separation of recyclable materials.
4. Support state and federal action on bottle deposit legislation to enhance recovery and reuse of materials.
5. Establish local composting for food waste and compostable material in the municipal waste stream. This program could also re-distribute compost for local gardening and use in community gardens.

3.4.2 Mid-term Waste Emissions Reduction Actions to 2030

Table 12 sets out mid-term options for waste emissions reduction. Understanding the source and disposition options for elements of the waste stream will help in identifying effective diversion. In particular, developing re-usable or biodegradable options to replace plastic waste will have a significant effect on reducing the emissions from the community as a whole. Although the policy direction for such actions will need to occur at higher levels of government, it is important for local actions to drive in the direction of developing markets for circular materials management, rather than for accumulating waste products.

Table 3.4.2. Waste Material Management Mid-term Actions to be implemented by 2030

Action Categories	Potential Actions to reduce Emissions by a total of 610 CO2 MTe
Community Structure Reform	Implement the Roadmap to Zero Waste
	Clear identified areas for trash- recycling-compost
	Modernize waste collection systems
Community Culture Reform (\$\$)	Decrease organic materials in landfills
	Increase composting efforts
	Increase collection of yard waste
	Increase ‘hard to recycle’ events and drop off locations
	Enforce existing waste and recycling policies Eliminate single-use plastics that cannot be composted or recycled.

Waste Material Mid-term Policy Recommendations

1. Establish local ordinances for waste material diversion from landfill through recycling, composting or re-use.
2. Establish opportunities for regional collaboration on developing markets for recycled and re-purposed materials, including recovery of rare metals from electronics.
3. Reduce the number of trucks and trips through neighborhoods for waste collection as waste stream diminishes.
4. Establish central locations for collection and re-distribution of segmented parts of the waste steam (for example as is done for cardboard and glass.)

3.4.3. Long-term Waste Material Management Actions to 2050

The long-term goal of eliminating greenhouse gas emissions from waste will be driven by market allocation of value for recovered materials compared to developing material from virgin materials. Reducing the system of collecting waste materials through use of renewable electricity-powered waste recovery vehicles will contribute to the reduced emissions profile. Identifying processes for designing goods for re-use rather than disposal will contribute to materials waste reduction and will also generate business opportunities.

Table 3.4.3. Material Management Long-term Actions to be implemented by 2050

Action Categories	Potential Actions to reduce Emissions by a total of 1,849 CO2 MTe
Community Long-term Policy enacted	Utilize anaerobic digestion technology to divert compostable materials from landfill
	Circular Economy & Resource System policies established to develop markets for re-purposed and reused materials
Large Scale Community Investment (\$\$\$)	Distribute recycle bins to all residents
	Increased recycling rate
	Establish market value for reclaimed and reused material

Long-term Waste Material Management Policy Recommendations:

1. Incorporate life cycle costs of raw materials to increase value of reusing materials such as glass and plastic.
2. Establish procurement standards for municipal purchasing that require recycled or reused materials to help support circular materials systems.
3. Support state and federal legislation requiring re-use and recapture of raw materials.
4. Support legislation requiring replacement of key components in electronic equipment rather than discarding the entire object for updating.

3.5. Water & Wastewater Management Actions and Milestones

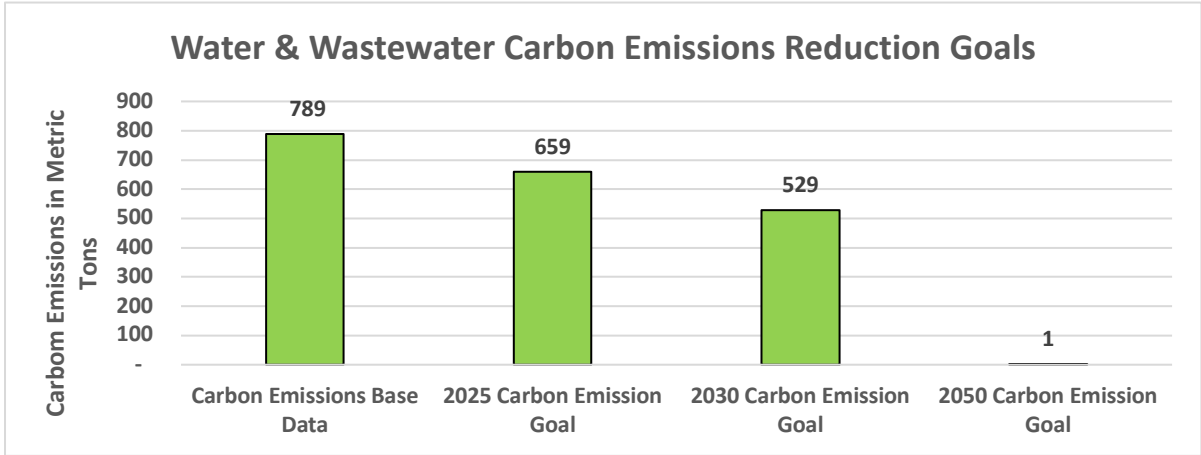
Greenhouse gas emissions related to water and wastewater management come from the purification of water, pumping and distributing water through pipes throughout the region. The emissions reduction for such activities rest on the Wilkesburg-Penn Joint Water Authority for water supplies and on ALCOSAN for wastewater and sewage treatment planning. The Borough of Forest Hills participates in regional collaborations to engage with both of these entities for long term strategic planning to maintain adequate and safe water supplies and responsible sewage and wastewater management.

During the thirty-year planning period, water supply assurance may face significant challenges if prolonged drought conditions affect river flows in Western Pennsylvania. Water conservation measures will assume an increasing importance as adaptation to changing conditions. The carbon emissions from water distribution and wastewater management will shift to non-fossil

based electrified operations. In addition, in the long-term scenarios, it may be possible for wastewater treatment through anaerobic means can generate non-fossil methane (natural gas) to augment energy resources.

To the extent that these emissions are driven by the volume of water used, reducing waste of water is an important contribution for citizens to make. Reaching zero emissions of greenhouse gas emissions in this sector does not imply reducing the amount of water used to zero. Rather this sector will convert operations from direct fossil fuel consuming operations to electric powered operations. As a long-term objective, converting sewage treatment from aerobic to anaerobic digestion processes can enable the production of non-fossil methane that can be used to power fuel cells without combustion. This would require considerable infrastructure conversion but in the thirty to fifty-year horizon, such transformation may be cost effective.

Figure 3.5.1 Water and Wastewater Management GHG Reduction Goals by Metric Tons



3.5.1. Short-term Water and Wastewater Actions to 2025

Short term actions to reduce emissions for water and wastewater management include measures that reduce waste of water through efficient use. Table 3.5.1 summarizes action recommendations for short term water and wastewater emissions reduction.

Table 3.5.1 Water and Wastewater Management Short-term Actions to 2025

Action Categories	Potential Actions to reduce emissions by 130 CO ₂ MTe
Homeowner or Property owners Modifications (\$)	Low Flow showerheads and faucets
	Avoid taking long showers
	Do not leave the water running
	water efficient sprinklers and rain barrels

	Plant native plants
	Separately meter your irrigation (Commercial Buildings)
	Using reclaimed water for irrigation and non-potable water uses Avoid putting toxic and hazardous materials into the waste water stream
Community Awareness and Support Local Policy	Collect monthly potable water use data by sector by zip code
	Plant and maintain mature trees
	Use low-flow clothes washers and dishwashers

Short-term Water and Wastewater Policy recommendations:

1. Implement the measures for the MS4 Consent Decree for water and wastewater management.
2. Provide public information about the value of maintaining native trees, plants and using rain barrels to absorb storm water.
3. Establish zoning ordinances that promote bioswales and water diversion for storm sewers.
4. Provide public information about avoiding materials that can accumulate in the water by disposing of household cleaning materials and other potential contaminants down the waste drains.

3.5.2 Mid-Term Water and Wastewater Actions to 2030

In the next decade, measures to enhance green infrastructure will increase in importance. Adopting permeable surfaces and bioswales to help capture storm surges will help to protect from damage and mitigate extreme climate effects. Converting household water-using functions to low-flow water use and increasing energy efficiency of water-using appliances will also conserve water. Contingency measures to assure adequate water supply in case of long term droughts will also be more important.

Table 3.5.2 Water and Wastewater Management Mid-term Actions by 2030

Action Categories	Potential Actions to reduce Emissions by a total of 260 CO2 MTe
Homeowner or Property owner Modifications (\$\$)	Retrofit Toilets, showers and faucets
	Upgrade water heaters to energy efficient models

	Energy and water efficient appliances ie. Washer and dishwasher
--	---

Mid-term Water and Wastewater Emission Reduction Policies:

1. Promote use of efficient appliances for water use in dishwashers and clothes washers.
2. Establish building requirements for dual flow toilets and low-flow shower heads.
3. Support regional collaboration in adopting green infrastructure for water treatment and storm water management by watershed area rather than by municipal boundaries.
4. Adopt Borough ordinances to enhance stormwater management including maintaining mature trees and bioswales along paved surfaces.

3.5.3. Long-term Water and Wastewater Actions to 2050

In the long term, it will be important to protect the availability of safe fresh water for people. As drought conditions are likely to worsen over the planning period to 2050, it will be critical to manage water wisely. Waste reduction and water conservation require collaboration on a regional basis around preserving watershed health. This includes maintenance of the mature tree canopy as well as supporting bioswales and plantings to stabilize hillsides and absorb stormwater along paved surfaces.

It will be important to monitor the emergence of trends in water supply and place priority on safe, efficient drinking water for people in homes, schools and businesses. Aggressive attention to preventing water pollution, especially to groundwater and watershed recharge areas, will increase in importance over the next decades. Fresh water is critical for life, for growing food, and for maintaining a healthy ecosystem. Preserving our water supply by eliminating contaminants that accumulate is also a critical action that people can take at all levels.

Table 13.5.3. Water and Wastewater Management Long-term Actions by 2050

Action Categories	Potential Actions to reduce Emissions by 789 CO2 MTe
Implementation of Long-Term Policy	Implement a stormwater fee to improve green infrastructure and prevent stormwater from entering the combined sewer
	Pass local graywater and rainwater use legislation to facilitate irrigation/toilet flushing with graywater and rainwater
Large Scale Community Investment	Construction of Rain Gardens for better filtration of stormwater runoff
	Maintain tree protection and replacement policies

Establishing the infrastructure for green infrastructure for water, stormwater and wastewater management will be important for the long -term scenario in this sector. Shifting the electricity supply to 100% renewable supplies can occur quickly. Shifting wastewater management to anaerobic treatment methods can provide non-fossil methane that can be applied both to the treatment process and to use as a fuel supply for fuel cells or other uses.

Long term Water and Wastewater Policy Recommendations:

1. Plant a new tree for every tree removed or damaged by storms to retain stormwater runoff volumes and prevent landslides.
2. Promote regional collaboration for watershed protection and water conservation measures to preserve safe and adequate water supplies over time.
3. Support water conservation measures based on re-use and preservation of water for irrigation and graywater uses for non-potable water requirements.

APPENDICES

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Appendix A. Topics and Dates of Environmental Advisory Council Outreach Meetings

The Forest Hills Environmental Advisory sponsored or organized the following public information meetings:

January 14, 2019- Presentation of the Green Building Alliance 2030 District – at Forest Hills Borough

January 26, 2019 Presentation on “Rethinking Plastics” presentation of Patricia DeMarco with discussion of waste and recycling options by Waste Management and Pennsylvania Resources Council. In Forest Hills Borough building

April 27, 2019- Forest Hills Earth Day Community Clean-up; workshop on waste and trash; Centennial Tree Ceremony. At Westinghouse Lodge

August 20, 2019. An Environment Town Hall- Guests- Rep Summer E. Lee and Senator Jay Costa sponsored by the Forest Hills Environmental Advisory Council

October 12, 2019- Environment Vision for the Centenary- presented by EAC Chair Chris West

November 21, 2019. Bike, Hike, Ride Workshop on non-motorized transportation in Forest Hills. At Forest Hills Borough Building

Appendix B. Residential Survey Results

B. Residential Survey Results Appendix

In the development of the Climate Action plan, the Borough of Forest Hills sought to include input from community residents. In order to achieve this feat, a twenty-two-question survey was sent by email with a link to the survey. The survey’s goal was to gain perspective on what the community had already achieved regarding sustainable methods, what they would consider for future actions, and what they viewed as important for future development. Additionally, the survey questions were separated by categories including: Demographics, Energy, Transportation, and Preferences. As seen below, the questions, question options, responses and answer percentage to each response are shown here

Questions	Responses	Percentage
DEMOGRAPHICS		
Including yourself how many people live in your household?		
1	106	30.7%
2	156	45.2%
3	46	13.3%
4	27	7.8%
5 or more	10	2.9%
How long have you lived in Forest Hills?		
1 - 5 years	83	24.1%
6 -10 years	37	10.7%
11 - 20 years	63	18.3%
21 - 30 years	60	17.4%
30 or more years	102	29.6%
Please indicate your current housing situation.		
I own a house	323	93.6%
I rent a house	10	2.9%
I own an apartment or condo	9	2.6%
I rent an apartment or condo	3	0.9%
ENERGY		
What is your primary source of heating?		
Gas	329	95.4%
Electric	12	3.5%
Oil		0.0%
Propane		0.0%

Wood		0.0%
Hybrid Heat Pump Air Conditioning		0.0%
Geothermal Heating and Cooling	1	0.3%
Other	3	0.9%
Is your home air conditioned?		
Yes	290	84.1%
No	55	15.9%
Please describe the type of air conditioning.		
Whole house central air	274	94.5%
Room window air conditioner	6	2.1%
Portable air conditioner	1	0.3%
Ductless mini split	7	2.4%
Hybrid (heat pump) air conditioner	1	0.3%
Geothermal Heating and Cooling	1	0.3%
How important do you think it is for Forest Hills to address climate change?		
Very Important	196	56.8%
Important	94	27.2%
No opinion	15	4.3%
Not important	15	4.3%
Not an issue of concern	25	7.2%
Have you tried to conserve energy in your daily life?		
Yes	332	96.2%
No	13	3.8%
What measures have you taken to conserve energy in your home?		
Air dry dishes instead of using dishwasher's drying cycle.	147	6.4%
Use timers and motion detectors to turn off lights.	139	6.0%
Lower the thermostat on water heater to 120F.	160	7.0%
Wash only full loads of dishes and clothes.	277	12.0%
Check furnace, heat pump, and AC filters once a month and replace them regularly.	158	6.9%
Get heating system checked up once a year to make sure that system is operating efficiently and safely.	191	8.3%
Caulk and weather-strip around drafty doors and windows.	178	7.7%
Free energy audits from utility company.	43	1.9%

Use spray foam insulation outside home on openings and gaps around pipes, chimneys, lights, windows and basement brick and cement work.	69	3.0%
Use a programmable thermostat which automatically adjusts the temperature during the day or at night.	162	7.0%
Replace incandescent light bulbs with new, light emitting diode bulbs (LEDs).	271	11.8%
Use products and appliances that have ENERGY STAR label.	238	10.3%
Turn off computer and monitor when not in use.	225	9.8%
Other	44	1.9%
Do you think you have enough information to make your home energy efficient?		
Yes	248	71.9%
No	97	28.1%
What are the barriers preventing you from make energy conservation improvements?		
My up-front out-of-pocket costs	65	38.0%
I don't know how much money I would save on my power bill.	28	16.4%
I don't have enough information to decide.	63	36.8%
I don't think what I do will make a difference.	10	5.8%
Other	5	2.9%
Have you converted your light bulbs to LED?		
Yes, all light bulbs	127	36.8%
Some light bulbs	204	59.1%
No	14	4.1%
Have you selected a renewable energy provider for your electricity?		
I did not select to use any forms of renewable energy	204	59.1%
I selected a 100% renewable provider	85	24.6%
I opted not to use any renewable energy options	56	16.2%
Have you installed solar on your house?		
Yes	9	2.6%
No	314	91.0%
Not Applicable	22	6.4%

Would you consider Solar installation on your house?		
Yes	155	49.4%
No	70	22.3%
My roof and property are not suitable (size, shade, orientation)	89	28.3%
How important do you feel that using clean energy and renewable sources, such as Solar, is to you?		
Very Important	168	48.7%
Slightly Important	98	28.4%
Neutral	55	15.9%
Low Importance	10	2.9%
Not important	14	4.1%
TRANSPORTATION		
Do you own any vehicles?		
Yes	340	98.6%
No	5	1.4%
Select the types of vehicles owned by your household.		
Car	252	53.8%
Hybrid Car	28	6.0%
Electric Car	8	1.7%
SUV	118	25.2%
Hybrid SUV	4	0.9%
Electric SUV		0.0%
Truck	44	9.4%
Hybrid Truck		0.0%
Recreational Vehicle	2	0.4%
Motorcycle	12	2.6%
Boat	6	1.3%
How many vehicles are used by your household?		
1	136	40.0%
2	152	44.7%
3	40	11.8%
4	8	2.4%
5 or more	4	1.2%

What types of fuel do your vehicles use?		
Gasoline	336	94.6%
Electric	15	4.2%
Diesel	4	1.1%
Prior to the pandemic, and considering all vehicles in your household, how many miles were driven per week?		
25 mile or less	98	28.8%
26 - 75 miles	134	39.4%
76 - 150 miles	72	21.2%
151 miles or more	36	10.6%
Do you commute to work?		
Yes	164	47.5%
No, I work from home	64	18.6%
I do not work (retired, unemployed, etc.)	117	33.9%
How far do you commute to work?		
5 miles or less	52	31.7%
6 - 25 miles	100	61.0%
26 - 75 miles	10	6.1%
76 - 150 miles	2	1.2%
151 miles or more	0	0.0%
How far are you willing to walk to receive your daily/weekly needs? (e.g. Groceries, haircut etc.)		
1 mile	154	44.6%
2 miles	64	18.6%
3 - 4 miles	21	6.1%
5 or more miles	9	2.6%
Unable or not willing to walk	97	28.1%
Do you walk for recreation?		
Yes	286	82.9%
No	59	17.1%
Do you walk in Forest Hills and local Parks?		
Yes	255	89.2%
No	31	10.8%
Do you walk for recreation in other areas outside of Forest Hills?		

Yes	203	71.0%
No	83	29.0%
Do you consider Pedestrian amenities adequate in Forest Hills?		
Yes	173	50.1%
No	172	49.9%
How often do you use any mode of public transportation?		
Daily	8	2.3%
1 - 2 times per week	18	5.2%
3 - 4 times per week	5	1.4%
5 times per week	9	2.6%
Do not use public transportation	305	88.4%
If Public transportation were more easily available after the pandemic would you use it more often?		
Yes	133	38.6%
No	212	61.4%
How would you use public transportation if were more easily available?		
Commuting to work	66	31.9%
Doing errands (shopping, medical visits, etc.)	69	33.3%
Recreation destinations	72	34.8%
PREFERENCES		
What is the preferred method you would like us to use in order to keep you informed on the Climate Action Plan?		
Mail	109	14.3%
Email	171	22.4%
Text Messages	22	2.9%
Tree City Times	223	29.2%
Website	118	15.5%
Instagram	8	1.0%
Facebook	52	6.8%
Twitter	8	1.0%
Community Meetings	52	6.8%

Due to CoVid-19, we are unable to hold in-person meetings to discuss our Climate Action Plan. Do you have any concerns or issues that you would like to discuss, share, or suggest being included within the Climate Action Plan?		
Yes	63	18.3%
No	282	81.7%
Would you participate in a Virtual Meeting on the Climate Action Plan?		
Yes	162	47.0%
No	183	53.0%
Would you participate in a more in-depth Telephone Survey about the Climate Action Plan?		
Yes	125	36.2%
No	220	63.8%

Appendix C. Business Survey Results

Due to the COVID-19 restrictions, focus group meetings with business community was not possible. Few of the business contacts have e-mail addresses available for conducting a survey. Therefore, The Borough of Forest Hills initiated outreach to the businesses from the Tax Collection List first by way of direct-mailed cards. When little response was returned, we sent out a five-page, 20 question survey to the business community with stamped return address envelopes. Approximately one third of businesses returned the survey as undeliverable or reported that they are out of business. This is an alarming and significant area of concern that needs to be addressed separately from the Climate Action Plan.

Of the responses received, highlights of the feedback are as follows:

When asked:

How Important do you think it is for Forest Hills to address climate change?

62% of surveys indicated “No Opinion or No Importance” while 38% indicated “Importance” to this question.

What kind of fuel do your vehicle(s) use?

78% of vehicles placed in business use Conventional Gas while 8% are a hybrid or use diesel.

Have you selected a renewable energy provider for your building electricity?

92% indicated they do not have a renewable energy provider for their building.

See the spreadsheet of business survey recorded responses below.

Survey Responses Tallied				Written Comment
We are concerned about how your business may be affected by COVID-19:				
Business is Unaffected by COVID		2		* 17% (no selection n.s.)
Business is 10% reduced		1		*Owner only working offsite.
Business is 25% reduced		6		
Business is reduced 50% or more		2		
Business is closed		2		
Employees retained or working offsite				
Employees have reduced hours				
Laid off some employees temporarily				
Laid off some employees permanently				
Do you have any suggestions about how Forest Hills Borough could be helpful to your business in this time?				
Furnish off street parking- either free or for pay				
Let us know when road construction is being done, parking had been difficult. Let us get the streets cleaner with more street sweeping.				
Let more snow be removed. Seriously, don't think PHB can do anything at this time.				
Remove the business is most likely to close to some degree as kids + residents stay at home. Looking forward to the economy getting better obviously creating more traffic for all businesses.				
1. How important do you think it is for Forest Hills to address climate change?				
Very Important		3		
Important		2		
No Opinion		1		
Not Important		1		
Not an issue of concern		4		
2. How many years has your business been present in Forest Hills?				
1-5 years		1		
6-10 years		1		
11-20 years		3		* [Ma] Building has space for retail and service businesses. 4 units in total- built in 1950.
21-30 years		3		
30+ years		3		
3. How many employees does your business employ full time?				
1		2		* [Ma] Building Varies- usually 1 per unit.
2		3		* None (no selection- n.s.)
3-4 employees		3		
5+		3		
4. What is the heating source in your building?				
Gas		2		
Electric		6		*? We rent
Wood		0		
Other:		0		
5. Is your building air conditioned?				
Yes		13		*? We rent
No		0		
(If Yes check which apply)				
Is it a whole building system?		8		* 3 Systems (1) for each floor
Room Conditioners?		2		* [Ma] Building Central. 1st floor. Separate. 3rd floor.
Other:		3		* 1 air conditioner per unit.
6. Have you converted your lights to LED?				
Yes, All Lights		2		
Some Lights		5		
Not at all		6		* Scheduled as water project
7. Have you selected a renewable energy provider for your building electricity?				
I do not use any forms of renewable energy to my knowledge		12		
I opted to use the renewable energy option that my electric company offers		0		
I selected a 100% renewable energy provider in Pennsylvania		0		* We rent (no selection)
8. Have you installed solar on your building?				
Yes		0		* We rent (no selection)
No		11		* Maybe... I'd have to look into it - (n.s.)
If No, would you consider solar installation on your building?				
No		1		* I don't own building/ am a renter (n.s.)
Yes		1		* N/A (n.s.)
Yes, if financial assistance is available		5		* Don't own building (no selection)
		0		* [Ma] Building] At no cost to me!
9. How many vehicles are used by your business?				
1		5		* zero (n.s.)
2		4		* [Ma] Building] Usually 1/unit
3-4 vehicles		1		* None (no selection)
5+		2		* 0 for the store, 5+ for our whole company
10. Check the kind of vehicles that your business uses for operation:				
Sedan		4		* An automobile (no selection)
SUV		5		* N/A (n.s.)
Truck		1		
Other (Boat, RV, etc.)		1		
11. What kind of fuel do your vehicle(s) use?				
Electric		0		
Hybrid		1		
Diesel		1		
Conventional Gas		10		
12. How many miles do you/your employees drive per week?				
25 mi or less		2		
26-75 mi		6		* Store employees only to and from work (n.s.)
76-150 mi		1		* 0 (no selection)
151+ mi		2		* 12 mile weekly commute (n.s.)
13. Do you consider Pedestrian amenities adequate in Forest Hills business sectors?				
Yes		10		* It lacks maintenance in certain areas.
No (if no skip down)		2		* Not enough time to cross the street and speed limit is fast- speed bumps may be help.
14. Do you feel that public transportation is regularly accessible to your business?				
Yes		1		
No		1		* regularly>>>No
15. If public transportation were more readily available, do you think your business would be more prosperous?				
Yes		4		* Most of our customers are from walking or cars stopping.
No		6		* Need off street parking!
		0		* No it is fine- (n.s.)
16. What is the preferred method would you like us to use in order to keep informed? Select all that apply.				
Mail		5		
Email		9		
Text Messages		0		
Facebook		1		
Instagram		1		
Community Meetings		1		
17. Due to COVID-19, we are unable to hold in-person meetings to discuss our Climate Action Plan. Do you have any concerns or issues that you would like to discuss, share, or suggest being included within the Climate Action Plan?				
NA				
There are many concerns, lack of electric generation like CA. Rolling blackouts, lack of charging stations, lack of space for charging stations, loss of fuel tax revenue to the Fed and state. National security concerns. If an electric grid is attacked or hacked, + as a petroleum marketer... lost revenue.				
Would you like to participate in a virtual meeting? (Please provide an email address)				
Yes		3		
No		10		
Would you participate in a more in-depth Telephone survey?				
Yes		3		
No		10		
19. Are you interested in having a free energy efficiency audit of your building?				
Yes		4		* Not owner (n.s.)
No		7		
20. Would you be interested in having more information?				
Yes		4		
No		6		

Appendix D. Greenhouse Gas Emissions Methodology and Data

D. Greenhouse Gas Emissions Methodology and Data Appendix

The Forest Hills goal to be completely Carbon Neutral by 2050 means that the community must reduce the total (51,144 metric tons) Greenhouse Gas emissions by 3.3% or 1,704.8 metric tons per year from the Base Year Benchmark set at 2017, the most recent period for which complete data were available. (Some data are from 2016 as the most recent date for information.) These charts include the CO2 Emissions goal per year within each sector, amount of reduction per period, and the total emissions per period.

CO2 by Category	2016 CO2 Emissions	2025 Carbon Emission Goal	2030 Carbon Emission Goal	2050 Carbon Emission Goal
Residential Energy	32,248	26,927	21,606	1
Commercial Energy	11,378	9,501	7,623	1
Transportation and Mobile Sources	4,880	4,075	3,270	1
Solid Waste	1,849	1,544	1,239	1
Water and Wastewater	789	659	529	1
Total Emissions:	51,144	42,705	34,266	1
Reduction Goal Per Year:	3.30%			
Years from 2020	-	5	10	30
Amount of Reduction Per Period	2016 CO2 Emissions	2025 Reduction Needed	2030 Reduction Needed	2050 Reduction Needed
Residential Energy	32,248	5,320.92	10,641.84	31,925.52
Commercial Energy	11,378	1,877.37	3,754.74	11,264.22
Transportation and Mobile Sources	4,880	805.20	1,610.40	4,831.20

Solid Waste	1,849	305.09	610.17	1,830.51
Water and Wastewater	789	130.19	260.37	781.11
Total Reduction		8,438.76	16,877.52	50,632.56
Reduction Goal Per Year:	3.30%			
Years from 2020	-	5	10	30

Appendix E. Greenhouse Gas Consolidated Data Tables for Base year 2017

Detailed Report Solid Waste

Id	Output Record Ids With Co2e	Inventory Record	Calculator	Gpc Scope	GPC Ref Number	Factor Profiles
123239	1. 5697 x 10 ⁶	Kelly Run Sanitation 2017	Waste Generation (2019)	Scope 3	III.1.2	PA Waste Characterization Study- 2016

Water & Wastewater

Id	Output Record Ids With Co2e	Inventory Record	Calculator	Gpc Scope	GPC Ref Number	Factor Profiles
124038	1. 5839 x 10 ⁶	ALCOSAN Wastewater Treatment Energy Use	Emissions from Wastewater Treatment Energy Use	Scope 3	VI.1	RFCW West (RFCW) eGRI D 2016
122525	1. 5597 x 10 ⁶	ALCOSAN Potable Water Supply Emissions	Emissions from the Supply of Potable Water	Scope 3	VI.1	RFCW West (RFCW) eGRI D 2016
122524	1. 5597 x 10 ⁶	ALCOSAN Nitrification /Denitrification	Process N2O Emissions from Wastewater Treatment	Scope 3	III.4.2	PG&E
124039	1. 5839 x 10 ⁶	ALCOSAN Nitrogen Discharge	Process N2O from Effluent Discharge to Rivers and Estuaries	Scope 3	III.4.2	PG&E

Residential Energy

Id	Output Record Ids With Co2e	Inventory Record	Calculator	Gpc Scope	GPC Ref Number	Factor Profiles
129172	1. 6731 x 10 ⁶	2017 Residential Grid Electricity	Emissions from Grid Electricity	Scope 2	I.1.2	RFCW West (RFCW) eGRI D 2016
122500	1. 5592 x 10 ⁶	2016 Residential Natural Gas	Emissions from Stationary Fuel Combustion	Scope 1	I.1.1	

Commercial Energy

Id	Output Record Ids With Co2e	Inventory Record	Calculator	Gpc Scope	GPC Ref Number	Factor Profiles
129173	1. 6731 x 10 ⁶	2017 Commercial Grid Electricity	Emissions from Grid Electricity	Scope 2	I.2.2	RFCW West (RFCW) eGRI D 2016

122502	1. 5593 x 10 ⁶	2016 Commercial Natural Gas	Emissions from Stationary Fuel Combustion	Scope 1	1.2.1	
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Industrial Energy

Id	Output Record Ids With Co2e	Inventory Record	Calculator	Gpc Scope	GPC Ref Number	Factor Profiles
129174	1. 6731 x 10 ⁶	2017 Industrial Grid Electricity	Emissions from Grid Electricity	Scope 2	1.3.2	RFCW West (RFCW) eGRID 2016

Transportation & Mobile Sources

Id	Output Record Ids With Co2e	Inventory Record	Calculator	Gpc Scope	GPC Ref Number	Factor Profiles		
137634	1. 8091 x 10 ⁶	2016 Community VMT - diesel	On Road Transportation	Scope 1	11.1.1	RFCW West (RFCW) eGRID 2016 and 2016 US National Defaults (updated 2020)		
122501	1. 5593 x 10 ⁶	2016 Community VMT - gasoline	On Road Transportation	Scope 1	11.1.1	RFCW West (RFCW) eGRID 2016 and 2016 US National Defaults (updated 2020)		
Global Warming Potential	Category	Activity Source	Notes	Created By	Created At	CO2 (MT)	CH4 (MT)	N2O (MT)
IPCC 2nd Assessment	Solid Waste	Activity		bs 0604@ship.edu	2020 Jan 15 05:37pm		88. 032	
Global Warming Potential	Category	Activity Source	Notes	Created By	Created At	CO2 (MT)	CH4 (MT)	N2O (MT)
IPCC 2nd Assessment	Water & Wastewater	Activity		bs 0604@ship.edu	2020 Jan 29 06:23pm	358. 33	0.031123	0. 0054747
IPCC 2nd Assessment	Water & Wastewater	Activity		bs 0604@ship.edu	2020 Jan 7 08: 24pm	358. 33	0.031123	0. 0054747
IPCC 2nd Assessment	Water & Wastewater	Activity		bs 0604@ship.edu	2020 Jan 7 08: 19pm			0.05115
IPCC 2nd Assessment	Water & Wastewater	Activity		bs 0604@ship.edu	2020 Jan 29 06:26pm			0. 16356
Global Warming Potential	Category	Activity Source	Notes	Created By	Created At	CO2 (MT)	CH4 (MT)	N2O (MT)
IPCC 2nd Assessment	Residential Energy	Activity		bs 0604@ship.edu	2020 Mar 2 05: 45pm	12785	1.1105	0. 19536
IPCC 2nd Assessment	Residential Energy	Source and Activity		bs 0604@ship.edu	2020 Jan 7 05: 55pm	19329	1. 8228	0. 036457
Global Warming Potential	Category	Activity Source	Notes	Created By	Created At	CO2 (MT)	CH4 (MT)	N2O (MT)
IPCC 2nd Assessment	Commercial Energy	Activity		bs 0604@ship.edu	2020 Mar 2 05: 46pm	9154. 7	0. 79514	0. 13989
IPCC 2nd Assessment	Commercial Energy	Source and Activity		bs 0604@ship.edu	2020 Jan 7 06: 08pm	2157. 3	0. 20344	0. 0040689

Global Warming Potential	Category	Activity Source	Notes	Created By	Created At	CO2 (MT)	CH4 (MT)	N2O (MT)
IPCC 2nd Assessment	Industrial Energy	Activity		bs0604@ship.edu	2020 Mar 2 05:47pm	58.868	0.005113	8.9951 x10 ⁻⁴
Global Warming Potential	Category	Activity Source	Notes	Created By	Created At	CO2 (MT)	CH4 (MT)	N2O (MT)
IPCC 2nd Assessment	Transportation & Mobile Sources	Source and Activity	Default vehicle mix and emissions factors from U.S. Community protocol		2020 Apr 14 06:59pm	982.91	0.002893	0.0028112
IPCC 2nd Assessment	Transportation & Mobile Sources	Source and Activity	Default vehicle mix and emissions factors from U.S. Community Protocol	bs0604@ship.edu	2020 Jan 7 06:03pm	3848.1	0.19063	0.14116
CO2e (MT)	Tags	Waste Generated (wet tons)	Mixed MSW Emissions Factor (MT CH4/wet short ton)	Newspaper Emissions Factor (MT CH4/wet short ton)	Office Paper Emissions Factor (MT CH4/wet short ton)	Corrugated Cardboard Emissions Factor (MT CH4/wet short ton)	Magazines/Third Class Mail Emissions Factor (MT CH4/wet short ton)	Food Scraps Emissions Factor (MT CH4/wet short ton)
1848.7		4325.2	0.0648	0.042	0.1556	0.1048	0.0476	0.0648
CO2e (MT)	Tags	Process N2O Population Served	CO2e per Capita (MT)	N2O Emissions Factor (g/person)	Is this a Direct Entry Record?	Nitrification/Denitrification as a step in the treatment process?	Population Served	Industrial Commercial Discharge Multiplier
360.68								
360.68					No			
15.856		6354	0.0024955	7	No	Yes	6354	1.15
50.703							6354	
CO2e (MT)	Tags	Energy Equivalent (MMBtu)	Energy Cost	Biogenic CO2 (MT)	MMBtu per Household	CO2e per Household (MT)	MMBtu per Person	CO2e per Person (MT)
12869					Infinity	Infinity	12.015	1.9986
19379		364568	0	0			57.376	3.0499
CO2e (MT)	Tags	Electricity Energy Equivalent (MMBtu)	MMBtu per 1,000 SQFT Floor Area	CO2e per 1,000 SQFT Floor Area (MT)	MMBTU per Employee	CO2e per Employee (MT)	MMBtu per Establishment	CO2e per Establishment
9214.8		55397	Infinity	Infinity	Infinity	Infinity	Infinity	Infinity
2162.9						Infinity		

CO2e (MT)	Tags	Electricity Energy Equivalent (MMBtu)	CO2 Emissions Factor	CH4 Emissions Factor	N2O Emissions Factor	Is this a Direct Entry Record?	Electricity Used	CO2
59.254		356.22	0.16526	1.4353 x 10 ⁻⁵	2.5252 x 10 ⁻⁶	No	104372	
CO2e (MT)	Tags	On Road VMT	Fossil Fuel Energy Equivalent (MMBtu)	Biofuel Energy (MMBtu)	Bioogenic CO2 (MT)	Biofuel CH4 (MT)	Biofuel N2O (MT)	Emissions per Capita (MT CO2 per Person)
983.85		NaN	13294	0	0	0	0	Infinity
3895.8		NaN	54785	0	0	0	0	Infinity
Grass Emissions Factor (MT CH4/ wet short ton)	Leaves Emissions Factor (MT CH4/ wet short ton)	Branches Emissions Factor (MT CH4/ wet short ton)	Dimensional Lumber Emissions Factor (MT CH4/ wet short ton)	Mixed MSW LFG Capture Rate (%)	Newspaper LFG Capture Rate (%)	Office Paper LFG Capture Rate (%)	Corrugated Containers LFG Capture Rate (%)	Magazines/ Third Class Mail LFG Capture Rate (%)
0.0228	0.026	0.058	0.0068	60	59	58	55	55
Previously Calculated N2O	Wastewater Generation and Treatment Location	Not a tion Keys	Data Quality: Activity Data	Data Quality: Emissions Factor	CO2 lbs/MWh	CO2 kg/MWh	CH4 lbs/GWh	CH4 kg/GWh
					1243.4		108	
					1243.4		108	
	Exported	IE	Medium		444.62		30	
	Exported				444.62		30	
CO2 Emissions Factor	Bioogenic CO2 Emissions Factor	CH4 Emissions Factor	N2O Emissions Factor	Is this a Direct Entry Record?	Fuel Type	Fuel Use	Data Source	CO2
0.16526		1.4353 x 10 ⁻⁵	2.5252 x 10 ⁻⁶	No				
53.02	0	0.005	1 x 10 ⁻⁴	No	Natural Gas	3.6457 x 10 ⁶	Measured usage	
CO2 Emissions Factor	CH4 Emissions Factor	N2O Emissions Factor	Is this a Direct Entry Record?	Electricity Used	CO2	CH4	N2O	Commercial Floor Area (optional)
0.16526	1.4353 x 10 ⁻⁵	2.5252 x 10 ⁻⁶	No	1.6231 x 10 ⁷				
			No					
CH4	N2O	Not a tion Keys	Data Quality: Activity Data	Data Quality: Emissions Factor	CO2 lbs/MWh	CO2 kg/MWh	CH4 lbs/GWh	CH4 kg/GWh
					1243.4		108	
Emissions per Mile (g CO2e per mile)	CO2 Emissions Factor	Bioogenic CO2 Emissions Factor	CH4 Emissions Factor	N2O Emissions Factor	Calculation Method	VMT Location	Travel Type	Type of VMT or Emissions Data

NaN	0.073934	0.073773	2.899 x10 ⁻¹⁰	2.817 x10 ⁻¹⁰	VMT & MPG	In-Boundary		Origin-Destination
NaN	0.07024	0.068414	1.9103 x10 ⁻⁸	1.4145 x10 ⁻⁸	VMT & MPG	In-Boundary	Passenger	Origin-Destination
Food Scraps LFG Capture Rate (%)	Grass LFG Capture Rate (%)	Leaves LFG Capture Rate (%)	Branches LFG Capture Rate (%)	Dimensional Lumber LFG Capture Rate (%)	Oxidation Rate	Waste per Household	Waste per Business	CO2e per Household
53	43	51	53	59	0.1			
N2O lbs/GWh	N2O kg/GWh	N Uptake in Treatment Process (kgN/ kg BOD5)	Fraction N Removed in Nitrification/Denitrification	Daily N Load at Facility with Release to Environment (kg N/ day)	Emissions per Capita (MT)	N2O Emissions Factor (kg N2O/kg N in effluent)	Is This a Direct Entry Record?	Do You have daily N load data from your effluent discharge?
19								
19								
11								
11		0	0	57.044	0.0079797	0.005	No	Yes
CH4	N2O	Number of Households (optional)	Population (optional)	Notation Keys	Data Quality: Activity Data	Data Quality: Emissions Factor	Electricity Energy Equivalent (MMBtu)	Energy Cost (\$)
			6439				77367	0
			6354	NE	Medium			
Commercial Workforce Size (optional)	Number of Commercial Establishments (optional)	Notation Keys	Data Quality: Activity Data	Data Quality: Emissions Factors	CO2 lbs/MWh	CO2 kg/MWh	CH4 lbs/GWh	CH4 kg/GWh
					1243.4		108	
		IE	Medium					
N2O lbs/GWh	N2O kg/GWh							
19								
Type of Freight VMT or Emissions Data	Fuel Type	Is this a T&D Loss Record?	VMT	Per cent Motor cycles	Per cent Passenger Vehicles	Per cent Light Trucks	Per cent Heavy Trucks	Fuel Use
Origin-Destination	Diesel		9.9793 x 10 ⁶		0.3	1.3	5.4	
Origin-Destination	Gasoline		9.9793 x 10 ⁶		60.6	32.4		
CO2e per Business	Is this a previously calculated Value?	Total Waste Generated	Landfill Methane Collection Scenario	Landfill Moisture Content	Waste Type to Calculate Emissions For	CH4 Released (for Previously Calculated records)	Disposal Location	Number of Households

	No	4325.2	Typical	Moderate	All		Outside the Jurisdiction	
Daily N Load	Industrial-Commercial Discharge Multiplier	Is your facility predominantly an Aerobic or Anaerobic system?	Does your facility employ Nitrification/Denitrification?	Wastewater Electric Energy Equivalent (MMBtu)	Gallons per Capita	CO2e per Person (MT)	Electricity Energy (MMBtu)	Natural Gas Energy (MMBtu)
				2168.9	0	0.056764	2168	0.83138
						0.056764	2168	
57.044								
Electricity Used	Building Area (optional)		CO2 lbs/MWh	CO2 kg/MWh	CH4 lbs/GWh	CH4 kg/GWh	N2O lbs/GWh	N2O kg/GWh
2.2668 x 10 ⁷			1243.4		108		19	
N2O lbs/GWh	N2O kg/GWh	Energy Equivalent (MMBtu)	MMBtu per 1000 SQFT Floor Area	MMBtu per Business	CO2e per 1000 SQFT Floor Area (MT)	CO2e per Establishment (MT)	MMBtu per Employee	CO2 Emissions Factor (kg/MMBtu)
19								
		40689	Infinity	Infinity	Infinity	Infinity	Infinity	53.02
T&D Loss Factor	Percent Bi fuel	CO2 On Road Average Emissions Factor	CH4 On Road Average Emissions Factor	N2O On Road Average Emissions Factor	Previously Calculated CO2	Previously Calculated CH4	Previously Calculated N2O	Previously Calculated Biogenic CO2
0	0				0	0	0	0
0	0				0	0	0	0
Number of Businesses	Not a tion Keys	Data Quality: Activity Data	Data Quality: Emissions Factor	Percentage Mixed MSW	Percentage Newspaper	Percentage Office Paper	Percentage Curtailed Carboard	Percentage Magazines / Third Class Mail
					4	18.5	8	3
Electric CO2 Emissions Factor	Natural Gas CO2 Emissions Factor	Electric CH4 Emissions Factor	Natural Gas CH4 Emissions Factor	Electric N2O Emissions Factor	Natural Gas N2O Emissions Factor	Is this a Direct Entry Record	CO2	CH4
0.16526	0.05302	1.4353 x 10 ⁻⁵	5.0 x 10 ⁻⁶	2.5252 x 10 ⁻⁶	1.0 x 10 ⁻⁷	No		
	0.05302		5.0 x 10 ⁻⁶		1.0 x 10 ⁻⁷			
CH4 Emissions Factor (kg/MMBtu)	N2O Emissions Factor (kg/MMBtu)	Fuel Type	Fuel Use	Data Source	Commercial Workforce Size (optional)	Data Quality: Emissions Factor		

0.005		1 x 10 ⁻⁴		Natural Gas		406889		Measured usage			
Bi of ue l CO2 Factor	Bi of ue l CH4 Factor	Bi of ue l N2O Factor	Popul ati on (optional)	Number of Passenger Trips (optional)	Notati on Keys	Data Quality: Activity Data	Data Quality: Emi ssi ons Factor			CO2 lbs/MWh	
										1243.4	
						Medium				1243.4	
Per centage Food Scr aps		Per centage Gr ass			Per cent a ge Leaves		Per cent a ge Br anches		Per centage Di mensi on al Lumber		
12		1			1		4		15		
N2O	Electricity Used	Na t ur a l Gas Used	Tr eatment Locati on	Volume of Water Treated (optional)	Popul ati on Ser ved (optional)	Water Suppl y Ener gy Equi val ent (MMBtu)	Gallons per Capita (gallons / per son)	Natur al Gas Ener gy (MMBtu)			
	635238	0.83138			6354						
	635238	0.83138			6354	2168.9	0	0.83138			
CO2 kg/ MWh	CH4 lbs/GWh	CH4 kg/ GWh	N2O lbs/GWh	N2O kg/ GWh	Gas Passenger Vehicle Fuel Economy (MPG)	Gas Passenger Vehicle g CH4/ mi	Gas Passenger Vehicle g N2O/ mi	Gas Light Truck Fuel Economy (MPG)			
	108		19		23.957	0.0196	0.0119	17.398			
	108		19		23.957	0.0196	0.0119	17.398			
Electricity CO2 Emi ssi ons Factor	Electricity CH4 Emi ssi ons Factor		Electricity N2O Emi ssi ons Factor		Volume of Water Delivered (optional)	Previously Calculated CO2	Previously Calculated CH4				
0.16526	1.4353 x 10 ⁻⁵		2.5252 x 10 ⁻⁶								
Gas Light Truck g CH4/ mi	Gas Light Truck g N2O/ mi	Gas Heavy Truck Fuel Economy (MPG)	Gas Heavy Truck g CH4/ mi	Gas Heavy Truck g N2O/ mi	Gas Transit Bus Fuel Economy (MPG)	Gas Transit Bus g CH4/ mi	Gas Transit Bus g N2O/ mi	Gas Para Transit Bus Fuel Economy (MPG)			
0.0223	0.0214	5.3588	0.1047	0.0726	17.398	0.0223	0.0214	17.398			
0.0223	0.0214	5.3588	0.1047	0.0726	17.398	0.0223	0.0214	17.398			
Gas Para Transit Bus g CH4/ mi	Gas Para Transit Bus g N2O/ mi	Gas Mot or c y c l e Fuel Economy (MPG)	Gas Mot or c y c l e g CH4/ mi	Gas Motor cycl e g N2O/ mi	Electric Vehicle Fuel Economy (MPGe)	Di esel Passenger Vehicle Fuel Economy (MPG)	Di esel Passenger Vehicle g CH4/ mi	Di esel Passenger Vehicle g N2O/ mi			
0.0223	0.0214	23.957	0.0196	0.0119		23.957	5 x 10 ⁻⁴	0.001			
0.0223	0.0214	23.957	0.0196	0.0119		23.957	5 x 10 ⁻⁴	0.001			
Di esel Light Truck Fuel Economy (MPG)	Di esel Light Truck g CH4/ mi	Di esel Light Truck g N2O/ mi	Di esel Heavy Truck Fuel Economy (MPG)	Di esel Heavy Truck g CH4/ mi	Di esel Heavy Truck g N2O/ mi	Di esel Transit Bus Fuel Economy (MPG)	Di esel Transit Bus g CH4/ mi	Di esel Transit Bus g N2O/ mi			
17.398	0.001	0.0015	6.1542	0.0051	0.0048	17.398	0.001	0.0015			
17.398	0.001	0.0015	6.1542	0.0051	0.0048	17.398	0.001	0.0015			

Di esel Par a Transit Bus Fuel Economy (MPG)	Di esel Par a Transit Bus g CH4/ mi	Di esel Par a Transit Bus g N2O/ mi	Di esel Motor cycle Fuel Economy (MPG)	Di esel Motor cycle g CH4/mi	Di esel Motor cycle g N2O/mi
17.398	0.001	0.0015	23.957	5×10^{-4}	0.001
17.398	0.001	0.0015	23.957	5×10^{-4}	0.001

Consolidated data tables as seen here is the information used within ICLEI to identify the CO2 Emissions within Forest Hills by working with the utility companies directly. Due to this partnership and the research of data, it was realized that portions of data within 2017 were insufficient so data from 2016 was included to fill supplement. The factor sets include a consolidated version of the data use, if you would like a detailed report, please refer to the excel sheet.

Factor Sets:

Grid Electricity

Name	
RFCW West (RFCW) eGRID 2016	
Year	2016
CO2 lbs/MWh	1243.439
CO2 kg/MWh	
CH4 lbs/GWh	108
CH4 kg/GWh	
N2O lbs/GWh	19
N2O kg/GWh	
Notes	

Transportation

+ Name	
2016 US National Defaults (updated 2020)	
Year	2016 ▼
Gas Passenger Vehicle Fuel Economy (MPG)	23.95689
Gas Passenger Vehicle g CH4/mi	0.0196
Gas Passenger Vehicle g N2O/mi	0.0119
Gas Light Truck Fuel Economy (MPG)	17.39756
Gas Light Truck g CH4/mi	0.0223
Gas Light Truck g N2O/mi	0.0214
Gas Heavy Truck Fuel Economy (MPG)	5.35883
Gas Heavy Truck g CH4/mi	0.1047
Gas Heavy Truck g N2O/mi	0.0726
Gas Transit Bus Fuel Economy (MPG)	17.39756
Gas Transit Bus g CH4/mi	0.0223
Gas Transit Bus g N2O/mi	0.0214
Gas Para Transit Bus Fuel Economy (MPG)	17.39756
Gas Para Transit Bus g CH4/mi	0.0223
Gas Para Transit Bus g N2O/mi	0.0214
Gas Motorcycle Fuel Economy (MPG)	23.95689

Gas Motorcycle g CH4/mi	0.0196
Gas Motorcycle g N2O/mi	0.0119
Electric Vehicle Fuel Economy (MPGe)	
Diesel Passenger Vehicle Fuel Economy (MPG)	23.95689
Diesel Passenger Vehicle g CH4/mi	0.0005
Diesel Passenger Vehicle g N2O/mi	0.001
Diesel Light Truck Fuel Economy (MPG)	17.39756
Diesel Light Truck g CH4/mi	0.001
Diesel Light Truck g N2O/mi	0.0015
Diesel Heavy Truck Fuel Economy (MPG)	6.154184
Diesel Heavy Truck g CH4/mi	0.0051
Diesel Heavy Truck g N2O/mi	0.0048
Diesel Transit Bus Fuel Economy (MPG)	17.39756
Diesel Transit Bus g CH4/mi	0.001
Diesel Transit Bus g N2O/mi	0.0015
Diesel Para Transit Bus Fuel Economy (MPG)	17.39756
Diesel Para Transit Bus g CH4/mi	0.001
Diesel Para Transit Bus g N2O/mi	0.0015
Diesel Motorcycle Fuel Economy (MPG)	23.95689
Diesel Motorcycle g CH4/mi	0.0005
Diesel Motorcycle g N2O/mi	0.001

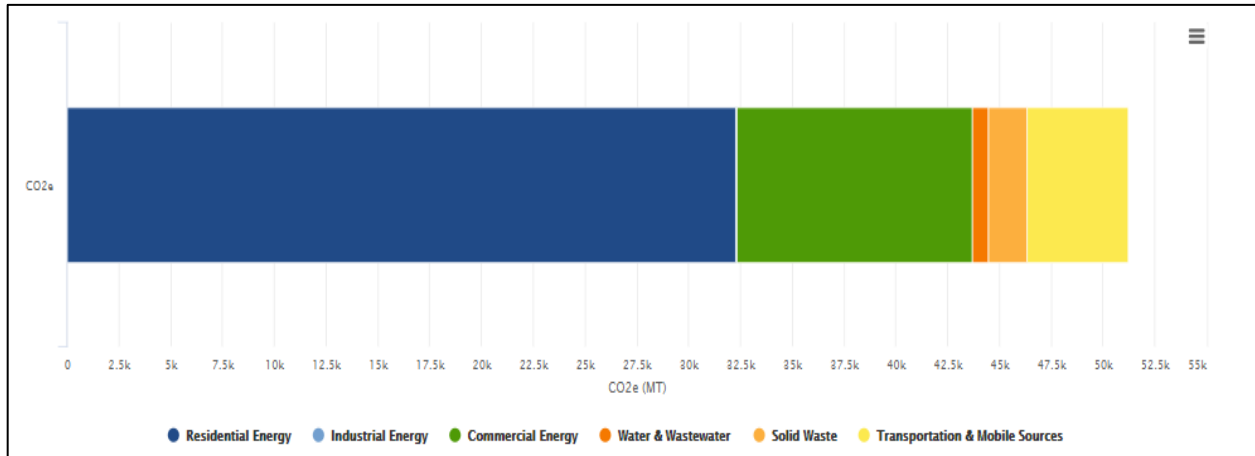
Waste Characterization

* Name	
PA Waste Characterization Study-2016	
Year	2016 ▼
Percentage Mixed MSW	<input type="text"/>
Percentage Newspaper	4
Percentage Office Paper	18.5
Percentage Corrugated Cardboard	8
Percentage Magazines / Third Class Mail	3
Percentage Food Scraps	12
Percentage Grass	1
Percentage Leaves	1
Percentage Branches	4
Percentage Dimensional Lumber	15
Notes	
From 2001 PA DEP Waste Study: http://files.dep.state.pa.us/Waste/Recycling/RecyclingPortal	

* Name	
PA Waste Characterization Study-2017	
Year	2017 ▼
Percentage Mixed MSW	<input type="text"/>
Percentage Newspaper	4
Percentage Office Paper	18.5
Percentage Corrugated Cardboard	8
Percentage Magazines / Third Class Mail	3
Percentage Food Scraps	12
Percentage Grass	1
Percentage Leaves	1
Percentage Branches	4
Percentage Dimensional Lumber	15
Notes	
From 2001 PA DEP Waste Study: http://files.dep.state.pa.us/Waste/Recycling/RecyclingPortal	

Appendix F. ClearPath Forecast Methodology

F. Clear Path Forecast Methodology



Sector	CO2e
Transportation & Mobile Sources	4,879
Solid Waste	1,848
Water & Wastewater	787
Commercial Energy	11,377
Industrial Energy	59
Residential Energy	32,248

Utility data forms were requested, detailing energy use (both electricity and natural gas), as well as other emissions, attributed to the Borough of Forest Hills. Utility data was collected for the year 2016 for the following 6 sectors, with Process and Fugitive Emissions data being supplemented by ICLEI.

- Water and Wastewater – emissions associated with Forest Hills potable water use and wastewater treatment.
- Process and Fugitive Emissions – estimated emissions due to leaks from Forest Hills natural gas distribution system (estimated using average national leak data).
- Industrial Energy – emissions associated with electricity and natural gas use by industries located in Forest Hills.
- Commercial Energy – emissions associated with electricity and natural gas use by commercial entities (including municipal operations) located in Forest Hills.
- Residential Energy - emissions associated with electricity and natural gas use by residents of Etna.
- Transportation & Mobile Sources – emissions from passenger and freight travel through and within the boundaries of Forest Hills.

- Solid Waste – emissions associated with waste generated and sent to the landfill by the community.

Forest Hills Borough Climate Action Plan uses Raw utility data that was supplemented with additional necessary data and converted within ClearPath climate planning software to various useable formats.

Total emissions by sector is calculated, with detailed reports available within the application. Business as Usual Forecast Using reported data from the American Community Survey, census data (including population, number of households, etc.) was recorded for the year 2016 and 2017. This data was supplemented by statewide Pennsylvania population growth estimates published by the U.S. Census Bureau to create a “Allegheny Decline Scenario” for the Forest Hills community within ClearPath. Estimated growth and associated emissions was modeled to the year 2030.

“Mitigating climate change and adapting to its effects are necessary to eradicate extreme poverty, reduce inequality and secure equitable, sustainable economic development. ... Climate change is intrinsically linked to public health, food and water security, migration, peace, and security. It is a moral issue. It is an issue of social justice, human rights, and fundamental ethics. We have a profound responsibility to protect the fragile web of life on this Earth, and to this generation and those that will follow.”

Ban Ki-Moon, Secretary of the United Nations



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