The Borough of Etna
Climate Action Plan

Local Actions and Policies to Reduce Etna's Greenhouse Gas Emissions

Credits and Acknowledgments

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- Alexis Boytim, Etna Community Organization

Community Stakeholders

- Megan Tunon, Councilwoman
- Judith Koch, Water Champion, ECO
- Dana Gavin, Energy Champion, ECO
- Tim Rodman, Chief of Police
- Greg Porter, Fire Chief

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1. Executive Summary

With seasonal variations and extreme weather events becoming more intense and frequent, climate change threatens the health, safety, and overall well-being of communities across the globe. The Borough of Etna recognizes a growing need to address its own contribution to climate change, as well as adapt to the impacts that will occur and be exacerbated, absent local greenhouse gas reduction. Etna's Climate Action Plan includes an inventory of the Borough's greenhouse gas ("GHG") emissions from community-wide activities, establishes an emissions reduction target, and outlines feasible actions to achieve that target. In addition, the Plan identifies ways in which GHG reduction actions can further the Borough's ability to adapt to climate change impacts. While this plan is not focused on adaptation, it ensures that GHG measures are not counteractive to Etna's future resilience and can serve as a catalyst for developing a robust strategy towards that end. This Plan is supplemental to and integrated with Etna's EcoDistrict Plan; sharing goals, potential community actions, and a vision for an improved community.

Vision Statements and Objectives

"We believe that everyone in Etna deserves the opportunity to thrive and live a life to their fullest potential. As a step toward achieving this goal, it is our mission to make Etna a more vibrant place to live, work, and play by 1) supporting projects and programs that integrate equity, sustainability, and resiliency into the fabric of our community, and 2) engaging, empowering, and activating Etna's community members to take ownership over their futures."

-Etna EcoDistrict Plan, Etna Community Organization

The following Objectives are enumerated below to maintain a high integrity in the effort of identifying, organizing, and implementing projects of civil and commercial importance for the revitalization of the Borough of Etna.

1. Make Etna Borough a leader in clean and local energy that comes from the sun or other innovative renewable technologies.

2. Transform our buildings into high-performing places to live, work, learn, and play.

3. Ensure the benefits of climate action are equitably distributed and empower historically underserved populations to participate in the process of transitioning to a carbon-free community

4. Transform Etna Borough into a community where people walk, bike, take mass transit, or carpool for most trips in a safe, accessible, and affordable transportation network.

5. Aggressively transition toward a clean, carbon-free transportation system that improves health and livability for the Etna Borough community.

6. Understand potential climate-related risks and mitigate these risks while preparing our community for chronic and extreme weather events.

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The Climate Action Plan offers a robust set of objectives and actions that will address the climate hazard vulnerabilities and aim for a 15% reduction in GHG emissions by 2025, a 25% reduction by 2030, and a 65% reduction by 2050. Each action and objective was created and reviewed by a group of stakeholders who considered technology limitations, funding constraints, public support, feasibility of implementation, environmental justice considerations, and other barriers. The Borough of Etna established the following timeline and targets to maintain a vibrant, healthy, and safe community for future generations, while improving the quality of life for those who live here today:

This plan is a mixture of ICLEI reduction strategies and Etna Borough's EcoDistrict Plan, which is the guiding document for this Climate Action Plan. This is not an exhaustive list of what Etna's EcoDistrict Plan offers. For more information please contact the Etna Community Organization.

ETNA'S CLIMATE ACTION PLAN

INCENTIVIZE SOLAR

Actions in this Plan help maximize renewable energy production from solar panels, significantly reducing emissions from fossil fuel grid electricity in the residential, commercial, and industrial sectors.

GOAL 1

OBJECTIVES CB-1 & RB-1

INCREASE ENERGY EFFICIENCY

Actions in this Plan provide residents, businesses, and local government with cost saving options for energy efficiency improvements, reducing the Borough's total energy consumption.

GOAL 2

OBJECTIVES CB-3, CB-4, RB-3, RB-4

INVEST IN RENEWABLE CREDITS

To help reach our goals, Etna can purchase Renewable Energy Certificates and Carbon Credits to offset portions of the Borough's fossil fuel-based electricity consumption and claim environmental benefits.

GOAL 1

OBJECTIVES CB-2 & RB-2

IMPROVE BIKE/PEDESTRIAN INFRASTRUCTURE

Etna will continue to build bike, pedestrian, and electric vehicle infrastructure to promote connectivity and increase shares of alternative transportation in the community.

GOAL 3

OBJECTIVES TR-1 & TR-2

REDUCE WASTE

The Borough will implement new recycling and composting efforts to provide residents with new opportunities to properly recycle, compost yard waste, and encourage reuse.

OBJECTIVE WR-1

PROTECT THE BOROUGH

Actions in this Plan can address landslide and flooding risk to residents, promote green space, and significantly bolster the resilience of the Borough for the future.

OBJECTIVES LU-1 & LU-2

COMMUNITY TIMELINE AND GOALS

15% Reduction in Emissions By:
2025 (Years 1-5)

❖ Solarize municipal-owned & nonprofit-owned buildings, including the Borough Building and the Community Library.

❖ Source energy for commercial and residential use from other carbon neutral power options

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❖ Begin implementation of a comprehensive community energy efficiency and education program(s) to increase adoption of energy efficiency

❖ Continue the LED streetlight retrofit program

❖ Complete and expand current community trail and bike infrastructures

❖ Educate the community about climate risks and the floodplain

❖ Measure progress toward 2030 goals by tracking community energy use, energy sources, and transportation data

25% Reduction in Emissions By:
2030 (Years 1-10)

Goal 1: Divert 15% of grid electricity supplying power to both commercial and residential buildings with zero-carbon generation sources

❖ Increase annual solar production across commercial, residential, and industrial sectors to 1,320 mWh of electricity by 2030

❖ Source electricity for residential, commercial, and industrial use from other carbon neutral power options

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Goal 2: Reduce community wide energy consumption by 50% through a comprehensive energy efficiency program(s)

❖ Increase commercial electricity and natural gas use efficiencies by 20% and 25%; Switch 20% of commercial natural gas end uses to electric

❖ Increase Residential Electricity and natural gas use efficiencies by 20% and 30%; Switch 15% of residential natural gas end uses to electric

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Goal 3: Decrease Vehicle Miles Traveled by carbon-intensive transportation options in the community

❖ Increase the percentage of residents who get to work by means other than driving to 10% walking and transit, and 5% biking and telecommuting

❖ Increase electric vehicle use in the community to above 1%

2. Introduction

With overwhelming evidence within the past decade, climate change has become the greatest environmental challenge of the 21st century. Its effects pose a serious threat not just to the Borough of Etna's natural resources, but also to our jobs and our health. Scientists expect that with the current trends in fossil fuel use, Americans may see more intense heat waves, droughts, rainstorms, floods, wildfires, and landslides in the future. These impacts can affect the economy, stress our natural resources and worsen inequities facing many Americans.

These impacts are caused by the accumulation of greenhouse gas (GHG) such as carbon dioxide (CO_2) and methane (CH_4) in the atmosphere, primarily resulting from burning fossil fuels and land use changes. Although the natural greenhouse effect is needed to keep the earth warm, a human enhanced greenhouse effect with the rapid accumulation of GHG in the atmosphere leads to too much heat and radiation being trapped. Carbon emissions from human activities have continued to rise in recent decades, reaching the highest rates in human history between 2000 and 2010 (Intergovernmental Panel on Climate Change (IPCC), 2014). About half of all carbon dioxide emitted between 1750 and 2010 occurred in the last 40 years alone.

The energy, industry, and transportation sectors have dominated this rise in emissions; and in Pennsylvania, the sectors responsible for the most GHG emissions are industrial at 31%, electricity production at 30%, and transportation at 23% (Pennsylvania Department of Environmental Protection (PA DEP), 2019). With the current trajectory of population growth, urbanization, and reliance on personal vehicles, emissions will only continue to rise. As a result, temperatures have increased by more than 1.8°F since the early 20th century and are expected to increase by an additional 5.4°F by 2050. Similarly, annual precipitation in Pennsylvania has increased by approximately 10% since the early 20th century and is expected to increase by another 8% by 2050, with a 14% increase during the winter season (Shortle et al. 2015). Given the impacts of climate change on humanity, acting quickly to reduce our carbon footprint is critical to avoid the worst of its effects.

Despite this challenge, climate change also presents huge opportunities for creating a healthier, safer, and more equitable world. In addition to national and state efforts to make systemic changes that will reduce global emissions, local governments will play a powerful role in addressing climate change. The design of American communities—how we use our land, how we design our buildings, how we get around—greatly impacts the amount of energy we use and the volume of GHG emissions we produce at both the state and federal level.

Action is required at all levels, but local governments have a unique role to play in building low-carbon communities. The Borough of Etna has an unparalleled opportunity to make changes in ways that create jobs and benefit all residents. It is critical that communities like Etna demonstrate that it is possible to dramatically reduce GHG emissions while creating more vibrant and prosperous places to live and do business.

Statewide Climate Action

In 2008, the Pennsylvania Climate Change Act was passed, 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, and the most recent Climate Action Plan, as well as greenhouse gas inventory, were released in 2019. These documents offer information and guidance for local climate action planning in the Commonwealth. The Climate Impacts Assessment provides a scientific basis for potential statewide impacts of global climate change, which can be used alongside available local data to inform community adaptation efforts. The PA Climate Action Plan summarizes statewide greenhouse gas emissions, sets an emissions reduction target, and describes potential mitigation and adaptation actions for residents and businesses, as well as local and state government. The reduction targets are 26% by 2025 and 80% by 2050 from 2005 levels, consistent with an executive order signed by Governor Wolf in 2019 (PA DEP, 2019).

Purpose and Scope of the Climate Action Plan

With this Plan and in support of its EcoDistrict Plan, Etna is joining an increasing number of local governments committed to addressing climate change at the local. Along with an inaugural cohort of 19 other jurisdictions in the Commonwealth of Pennsylvania, Etna began the climate action planning process in 2019. Staff from each jurisdiction as well as undergraduate and graduate interns were trained by ICLEI USA on each component of the climate action planning process, working together to develop individual and comprehensive climate action plans tailored to the needs of each community. ICLEI's technical guidance was enabled via a grant from US Department of Energy State Energy Program through the PA Department of Environmental Protection.

Etna recognizes the risk that climate change poses to its residents and businesses, and is acting now to reduce the GHG emissions of both its government operations and the community at-large through the innovative programs laid out in this Climate Action Plan and Etna's EcoDistrict Plan. Furthermore, it is recognized that the Borough needs to address existing climate risks such as flooding, permanent inundation, and landslides and adapt its systems and infrastructure to new conditions. This Climate Action Plan takes advantage of common

sense approaches and cutting-edge policies that our local government is uniquely positioned to implement – actions that can reduce energy use and waste, create local jobs, improve air quality, preserve our local landscape and history, reduce risk to people and property, and benefit the Borough for years to come.

Purpose

By creating a clear course of action for achieving climate and sustainability goals, this Climate Action Plan drives and coordinates local efforts toward a 15%, 25%, and 65% reduction in GHG emissions, compared to 2016 levels, by 2025, 2030, and 2050, respectively.

The Climate Action Plan ("Plan") is a framework for the development and implementation of actions that reduce Etna's GHG emissions. The Plan provides guiding objectives and actions to realize Etna's GHG reduction goals.

In addition to addressing mitigation concerns, the Plan considers the vulnerability of Etna to hazards that are, and will continue to be, exacerbated by climate change. The plan prioritizes GHG reduction measures that support climate adaptation and does not propose any actions that are maladaptive to foreseen climate change impacts.

Scope

This Plan covers objectives and actions for reducing GHG emissions resulting from local government and community-wide activities within the Borough. It addresses the major sources of emissions in Etna and sets forth objectives and actions in the following five sectors that can be implemented by local government and community members together to reduce greenhouse gas emissions:

- Commercial/Municipal/Industrial Buildings
- Residential Buildings
- Transportation
- Waste/Composting/&Recycling
- Land Use & Resilience

The Plan creates a framework to document, coordinate, measure, and adapt efforts moving forward.

Planning Process

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

Figure 1: Five Milestones for Climate Mitigation

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

Milestone 1: Section 3 summarizes the emissions inventory and forecast

Milestone 2: Section 4 sets reduction targets

Milestone 3: Sections 5-12 outline objectives and actions

Section 13 also describes the initial steps of milestones 4 and 5, monitoring and implementation.

Planning Team and Stakeholders

- Mary Ellen, Etna Borough Manager –
- Alexis Boytim, Director, Etna Community Organization (ECO) –
- Judith Koch, Water Champion, ECO –
- Dana Gavin, Energy Champion, ECO –
- Tim Rodman, Chief of Police –
- Greg Porter, Fire Chief –
- Megan Tunon, Councilwoman –

Social Equity

Climate equity was a core component of the planning process and will continue to be through implementation. Climate equity ensures the just distribution of the benefits of climate protection efforts and alleviates unequal burdens created by climate change. Implementation of this concept requires intentional policies and projects that simultaneously address the effects of and the systems that perpetuate both climate change and inequity. Under the status quo, however, not everyone is given the opportunity to participate and benefit.

Communities of color and low-income populations have historically been under-served by programs and investments and under-represented in decision-making, including for the development and implementation of climate policy. These exclusionary processes maintain or exacerbate disparities in public health; food, energy, and housing security; air and water quality; economic prosperity, and overall quality of life. These inequities primarily stem from ongoing institutional racial bias and historical discriminatory practices that have resulted in the inequitable distribution of resources and limited access to opportunities.

Climate change is likely to amplify the impacts of these existing inequities. Residents of frontline communities which often include lower income neighborhoods, communities of color, immigrants, unhoused, outdoor workers, the very young, and the elderly will disproportionately bear the burdens of climate change impacts. In addition, the many economic and health benefits of carbon reduction investments are not shared equitably across the city, especially among people of color and low-income communities.

Etna's Community-Driven Planning Process

To ensure an equitable climate action plan, the Borough utilized a community-driven process around both the Etna EcoDistrict Plan and this Climate Action Plan, described in the following sections. Prior to the Borough of Etna's efforts to create this Climate Action Plan, extensive community engagement and planning around environmental sustainability, community resilience, and social equity occurred through the Etna EcoDistrict.

The Etna EcoDistrict

The Etna EcoDistrict was initiated by the Borough of Etna in 2017 through a partnership with Millvale and Sharpsburg as part of the Triboro Ecodistrict. The Etna EcoDistrict initiative thereafter became a community-driven movement to advance sustainability, equity, and resilience in the Borough to improve quality of life and create a more vibrant and healthy future for all. The group of volunteers at the core of this movement became the Etna Community Organization (ECO).

Leading up to the creation of a 10-year community plan, ECO, alongside the Borough of Etna, invested two full years in community education and outreach to ensure that the final Etna EcoDistrict Plan was fully reflective of the community's own visions and priorities for Etna's future. The year 2018 was dedicated to the Etna EcoDistrict Education Series. On a monthly basis, ECO hosted community meetings where an independent planning consultant (evolveEA) facilitated educational presentations, activities, and conversations around six core quality of life issues that the Etna EcoDistrict focuses planning on: water, mobility, air quality, energy, food, and social equity. These six areas were chosen by the Triboro Ecodistrict for their direct relevance to the lived experiences of the community members across Millvale, Etna, and Sharpsburg at a granular level. Feedback was collected from community members at each meeting on both the specific issues within each quality of life issue that community members are most concerned about, and the goals and visions for Etna's future related to each quality of life issue. The feedback was collected and processed further at smaller-scale "Champions" meetings where community members particularly passionate about each quality of life issue gathered through an open-call invitation. The Community Champions then worked to develop visions statements for each quality of life issue that defined future planning of the Etna EcoDistrict. These are as follows:

Water Vision: Etna is a resilient community that protects its people and waterways through creative water interventions.

Mobility Vision: Etna is a connected community where people of all ages have safe, reliable, and affordable mobility options.

Air Vision: Etna is a healthy community with empowered advocates that take a balanced approach to air quality.

Energy Vision: Etna is an innovative community that takes collective action to provide smart energy solutions.

Food Vision: Etna is a food-secure community with opportunities to grow, buy, share, and eat food locally.

Equity Vision: Etna is an inclusive community that embraces diversity and activates everyone to share our future together.

The year 2019 was dedicated to defining goals, actions, and measurable indicators on a 10-year timeline to actualize these visions. Through monthly community meetings and workshops, feedback was collected on specific projects and programs, as well as places, that the Etna community was most interested in advancing. Additionally, feedback was collected on the community's priorities of these projects, programs, and places, and how they should fall on Etna's 10-year timeline. All community feedback collected throughout

the Etna EcoDistrict process ultimately informed the Etna EcoDistrict Plan, published at the close of Etna's 2-year community engagement and planning period.

While the Etna EcoDistrict Plan focuses specifically on the six quality of life issues (water, mobility, air quality, energy, food, and social equity), the overarching imperatives of social equity, community resilience, and environmental stewardship were woven into the community planning process. Climate protection was an important part of the conversation, and community meetings were held to better understand the relationship between the six quality of life issues impact on climate, carbon emissions, social equity and environmental justice, and resilience related especially to the anticipated increasing frequency in severe weather events due to climate change. As a requirement to achieving EcoDistrict Certification, Etna set the preliminary goal to achieve carbon neutrality by the year 2050. Since this planning process, the Borough has collected rigorous baseline data and conducted a greenhouse gas inventory to develop this Climate Action Plan and better understand the ability to achieve carbon neutrality. The Etna EcoDistrict Plan will adjust its goal to a 65% reduction by 2050, which is rooted in this data, and will further reevaluate as the Plan progresses. Etna EcoDistrict Plan actions, suggested and prioritized by community members through the engagement process, offer pathways to reduce carbon emissions and are further emphasized in this Climate Action Plan.

Borough of Etna CAP Engagement

To provide more specific and recent engagement on the Climate Action Plan, the Borough of Etna also issued a community-wide survey through their social media outlets to collect input on community needs, climate risks, and potential reduction strategies. Additional engagement through community-wide distribution of this document will provide an opportunity to collect final input on the reduction strategies suggested in Etna's draft Climate Action Plan. The results and implications of these engagement activities will be described throughout each relevant section.

3. Co-Benefits of Climate Action

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

1. Improving Public Health

Climate change mitigation activities, particularly those related to transportation, help to clean the air by reducing vehicle emissions which results in improved public health. Mitigation activities engender a greater degree of choice for Etna's residents. More transit options combined with transit-oriented development practices make for a more vibrant, livable community with shorter commute times and more opportunities for active transport. This creates more connected and resilient neighborhoods.

2. Saving Money and Reducing Risk

In addition to addressing climate change, measures taken to reduce greenhouse gas emissions have other important benefits. The most obvious of these is the potential for significant cost savings. In 2016, Etna spent nearly $60,000 on energy to power municipal buildings and fuel its vehicle fleet. Many of the measures in this plan pay for themselves quickly by reducing direct costs for fuel or energy and indirect costs, such as maintenance. For instance, a "right-sized" vehicle fleet is less expensive to purchase and fuel, while also being less costly to maintain. Encouraging energy efficiency, public transit use, building improvements, and other measures will also result in lower energy and water bills for residents and businesses.

Acting now will also save on costs related to climate change, especially in the long term. These costs include infrastructure damage due to extreme storms; the need for pest control; and industry losses, particularly for businesses that depend on environmental conditions, such as water recreation. A key strategic side benefit of climate change mitigation activities is enhanced energy security through reduction in total demand. As a whole, this will put less strain on the energy system as the Borough transitions to clean renewable energy. Similarly, demand shifts can help with improving water and food security as well.

Many of the actions identified here to mitigate GHG emissions will also help Etna's elected officials, businesses, and residents to adapt to a changing climate. For example, extreme and prolonged heat waves can put considerable strain on the reliability of energy delivery in peak periods, possibly leading to service disruption during times when cooling is most needed. By increasing efficiency across the municipality, such service

disruptions are less likely, and the Borough will be able to better cope with those situations. Similarly, improving climate resiliency can secure food and water sources and prevent damage and service disruptions to these systems from flooding.

3. Creating Jobs

Renewable energy is a growing sector. The U.S. Department of Energy reports that sustainable tourism, green construction, and urban agriculture can provide job opportunities that did not previously exist. These climate protection measures can spur business and job growth during the design, manufacture, and installation of energy efficient technologies, which present an opportunity to reinvest in the local economy and generate green jobs within Etna.

4. Fostering Social Equity

Social equity and justice are major considerations for addressing climate change and were established as core values behind this plan. Equity occurs when all individuals have access to the opportunities necessary to satisfy their essential needs, advance their well-being and achieve their full potential. Environmental justice ensures fair treatment and meaningful involvement in the development of laws, policies and regulations, and the identification of issues impacting vulnerable communities. As discussed in Section 1, Etna's community-driven planning process generated solutions that will both address climate change and ensure a better quality of life for low-income residents and people of color.

4. Etna's GHG Emissions

Since the early 1990s, U.S. cities have developed community-wide and local government greenhouse gas (GHG) inventories based on accounting protocols created by ICLEI. Known as the "U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions" and the "Local Government Operations Protocol", these standards created a credible and defensible methodology which accelerated the number of inventories created and provides consistency within and across U.S. communities. In 2014, ICLEI partnered with the World Resources Institute and C40 Climate Leadership Group to create the "Global Protocol for Community Scale GHG Emissions", a tool that allows communities around the world to compare their emissions footprint. For its GHG Inventory and Climate Action Plan, Etna has utilized the U.S. Community Protocol and IPCC's 4th assessment for consistency with these standards.

Through the completion of a local emissions study, or "greenhouse gas inventory," the Borough has determined emissions levels for the community as a whole, appearing in this report as "CO_2e" or "carbon dioxide equivalent" emissions. Community-wide CO_2e emissions represent the sum total of emissions produced within The Borough's limits as well as emissions resulting from electricity use within the jurisdiction, even if this electricity is generated elsewhere. In this way, the community-wide figures represent all emissions for which the community is responsible.

Measuring Etna's GHG Emissions

The following figure breaks down community-wide emissions in Etna Borough. Note that emissions from the Etna Borough's operations are embedded within the community-wide totals. For example, emissions from government buildings are included in the "Commercial" sector and emissions from Etna Borough fleet vehicles are included in the "Transportation" figure above. Government operations are therefore a subset of total community emissions.

Community CO2e Emissions Summary

<1% 3% 9% 37% 17% 34%

Legend:
- Water & Wastewater
- Process & Fugitive Emissions
- Solid Waste
- Industrial Energy
- Commercial Energy
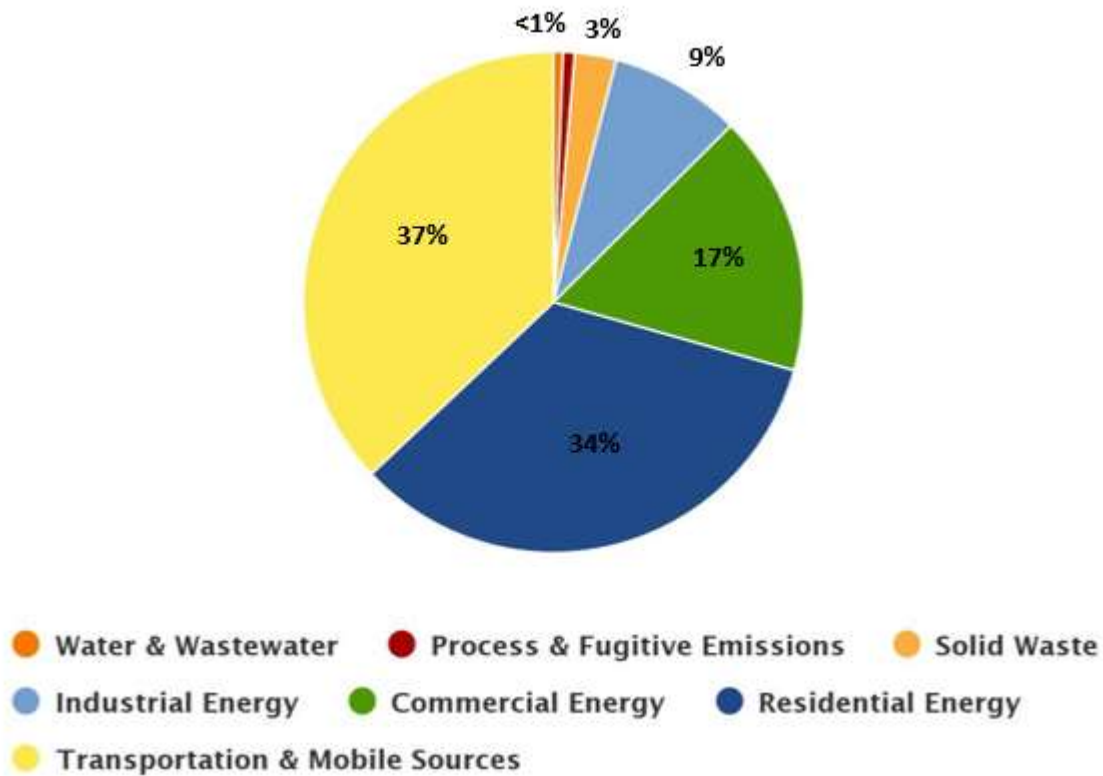- Residential Energy
- Transportation & Mobile Sources

Figure 2: Etna's Community-Wide GHG Emissions

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

Forecasting Etna Borough GHG Emissions

Etna has also completed an emissions forecast based on projections of current data and expected future trends, shown in Figure 3. This emissions forecast is the "Original" forecast (also known as a "Business As Usual" forecast), a scenario estimating future emissions levels if no further local action (i.e. projects within this Climate Action Plan) were to take place. The forecast indicates that, if we do not take action, overall GHG emissions will show almost no change, but GHG emissions per capita will increase. According to Census data for Allegheny County, Etna is experiencing slight population decline. Etna's population is project to increase again by 2035 and exceed base year population by 2040.

Projected Growth in GHG Emissions

Figure 3 shows the projected growth in GHG emissions in Etna Borough from 2016 to 2030. For complete information regarding the emissions inventory and forecast, including methodology and supporting data, please reference Appendix I.
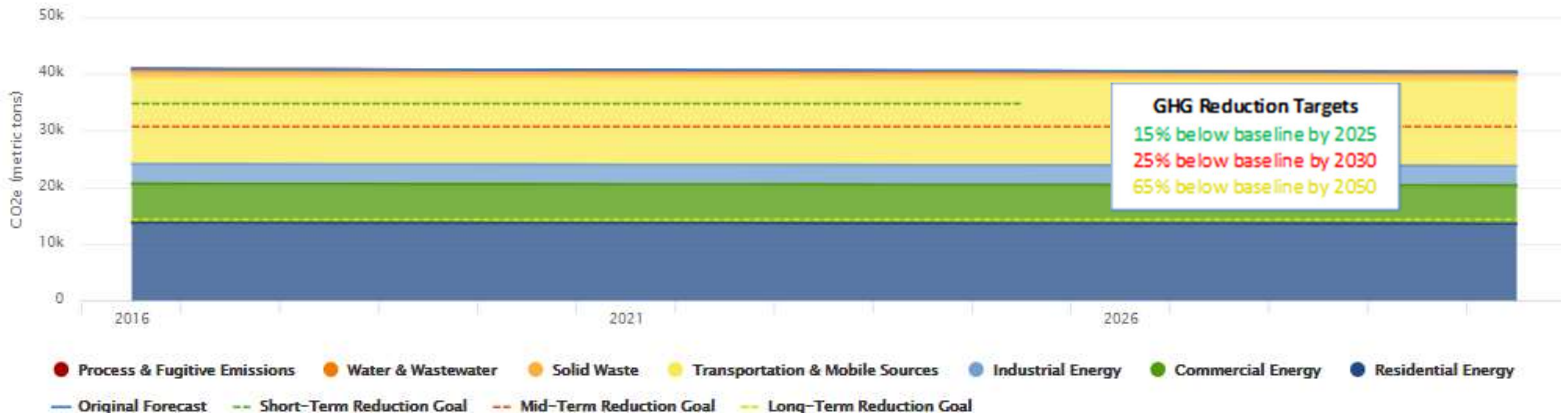
Figure 3: Projected Change in GHG Emissions from 2016 to 2030

Etna Borough's GHG Reduction Target

Etna Borough has set targets to reduce its emissions to 15% below 2016 levels by 2025, 25% percent below 2016 levels by 2030, and eventually 65% percent below 2016 levels by 2050. Figure 4 compares the reduction target with the business-as-usual forecast. Etna's reduction targets are consistent with the statewide targets by 2050 from 2005 levels, as they exceed their local percentage of the total emissions reductions needed in order to achieve that target.

The combination of measures that Etna has already implemented, are currently planned, and are presented through this Climate Action Plan are designed to achieve the 2025, 2030, and 2050 targets. Reductions in each target year rely on the best information currently available pertaining to population forecasts, future changes to building codes, and vehicle fuel efficiency standards.

The Etna Borough Climate Action Plan

The Etna Climate Action Plan is the community's roadmap to improve quality of life for all Etna residents. The Plan includes projects, programs, and places that integrate social equity, community resilience, and environmental stewardship into the fabric of the community, while contributing to the achievement of Etna's EcoDistrict vision statements.

The summary table below identifies the targeted sectors within the Etna Climate Action Plan, the number of actions within each sector, and the contribution of each sector toward the GHG reduction goal. Each sector has a dedicated section within this document where objectives and specific actions (both new and those already employed) are described. In total, this Climate Action Plan identifies 48 potential actions feasible for implementation by the Borough of Etna to reduce its GHG emissions and adapt to the expected effects of climate change. Over half of these actions are consistent and supportive of goals explicitly described in Etna's EcoDistrict Plan. Not all actions must be implemented to achieve the set reduction targets, however, those shaded and those pertaining to the first four categories of the Climate Action Plan on page 6 should be considered most essential to achieving the Borough's overall goals.

Etna Borough Climate Action Plan Summary Table – Sectors

Sector	Description	Number of Potential Actions	Anticipated MTCO2e Reduction by 2030	Percentage of Total Reduction at 2030
Commercial & Industrial Buildings	Policies and programs to reduce commercial, municipal, and industrial sector energy use and emissions.	14	~2300	~24%
Residential Buildings	Policies and programs to reduce residential sector energy use and emissions.	14	~2700	~26%
Transportation	Projects and programs to reduce on-road vehicle miles traveled and promote electric or low emission travel options.	10	~5000	~50%
Waste, Composting, & Recycling	Projects to provide residents with more recycling and composting options and reduce the amount of emissions producing solid waste sent to landfills	4	N/A	N/A
Land Use	Policies and programs to reduce emissions from urban land use, protect natural resources, and bolster resilience	6	N/A	N/A

*MTCO2e (Metric tons of CO_2 equivalent)

While local government cannot, and arguably should not, address climate change unilaterally, elected officials can adopt policies and practices to dramatically reduce greenhouse gas emissions from a range of sources and help prepare Etna for the anticipated impacts of climate change. In addition, Etna can assist residents and businesses in their endeavors to reduce emissions through programs explained in this Plan. By working together, the Borough's leadership can work together with residents and businesses to reap the benefits of healthier air, lower costs for utilities and services, improved transportation and accessibility, and a more vibrant local economy.

Etna Climate Action Plan Impact on Emissions

The figure below depicts GHG emissions, forecasted growth in emissions, and target emissions from 2016 to 2030. As described in detail in subsequent sections, this Plan provides a comprehensive assortment of potential actions that can be taken by Etna to reduce emissions. If actions are chosen that achieve this Plan's objectives, the figure below depicts the expected reductions in GHG emissions.
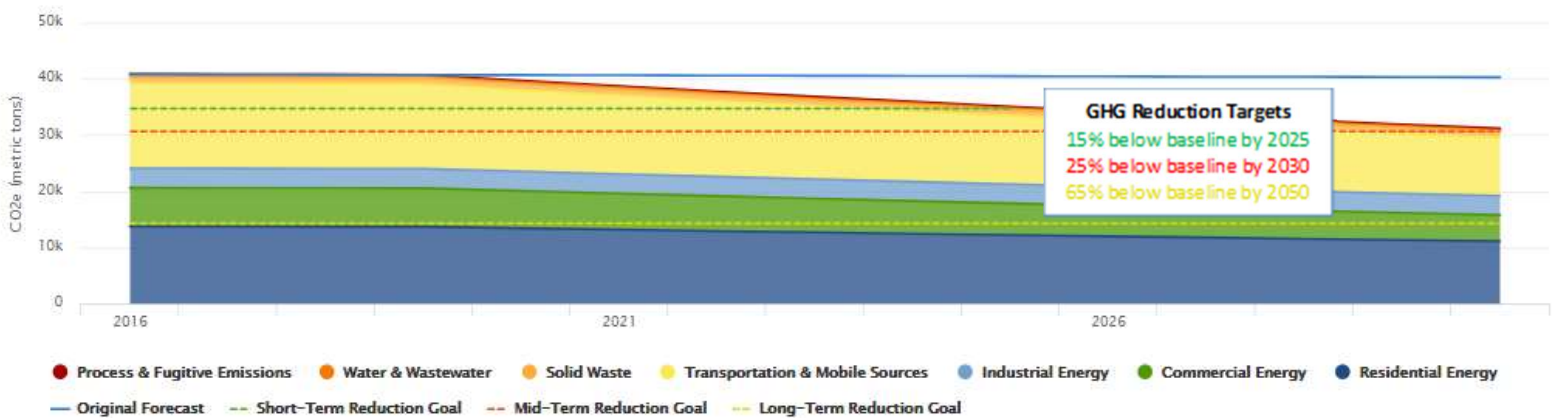
Figure 5: GHG Reductions with Etna Climate Action Plan

The colored areas represent the projected emissions levels and effects of the above short-term reduction measures for each sector if the Climate Action Plan is implemented as described, successfully reaching both the total 15% and 25% reduction goals of Etna by 2025 and 2030.

5. Taking Action

In the following sections, a series of measurable objectives with supporting actions are explored for each emissions sector. An "Objective" is a goal, end result, or target, and an "Action" is a means of realizing that objective. These objectives are based on ClearPath modeling for what is reasonable and necessary to achieve an overall reduction of 25% by 2030. Each sector draws on the actions of the local government, residents, and businesses, although some areas may be largely reliant on one or the other. In addition to achieving their respective "objective", each of these potential "actions" can help to fulfill Etna's "Overarching Goals" as listed in the executive summary.

Emissions Reduction Potential

Calculating expected emissions reductions for each objective and action requires making assumptions about degree of implementation, technology, and individual behavioral changes several years into the future. The uncertainty associated with these assumptions makes it difficult to assign exact reduction totals to each objective or action. To address this uncertainty and provide a simple but useful reference for reduction potential, a series of symbols and percentage ranges has been devised to represent the emission reductions associated with each objective. Similarly, the most

Symbol	GHG Reduction
🌿	[Small Impact Range]
🌿🌿	[Moderate Impact Range]
🌿🌿🌿	[Significant Impact Range]

important actions to implement are shaded to emphasize their necessity in reaching Etna's reduction goals.

Coordination with Etna EcoDistrict Plan

As mentioned in the Planning Process section, the Etna EcoDistrict Plan is a community-driven movement to advance sustainability, equity, and resilience in the Borough to improve quality of life and create a more vibrant and healthy future for all. This ongoing effort is strongly supportive of and integrated with Etna's Climate Action Plan, sharing many of the same goals and community actions. As such, potential actions within this Plan are marked with the symbol ETNA ECODISTRICT if they are supportive of actions and goals explicitly found within the EcoDistrict Plan.

Evaluating Co-Benefits

In addition to measuring the GHG reduction potential, each objective and action is also evaluated for other benefits such as public health, equity and justice, jobs and prosperity, and environmental conservation. The symbols below will indicate which co-benefits a measure will generate.

Symbol	Co-Benefit
	Supports jobs, cost savings, and economic prosperity
	Advances social equity
	Fosters resource security
	Improves public health and local environmental quality

New and Existing Actions

This Climate Action Plan includes a combination of existing policies and programs as well as new ideas based on best practices from around the country. Whether an action is new or existing is noted in the action heading.

Consistency with Statewide Climate Action Plan

The Commonwealth of Pennsylvania's 2018 Climate Action Plan includes many actions that are meant to be implemented by local governments as well as on the state-level. This Climate Action Plan incorporates as many of those actions as possible and appropriate. The tables in the following sections will indicate whether an action is adapted from the statewide plan.

Climate Adaptation

Some of the proposed actions reduce risk to climate hazards as well as greenhouse gas emissions, which is explicitly identified in the "Reduces Climate Risks" column. This Plan does not propose any actions that would foreseeably increase the community's risk to climate hazards, but some actions are more directly supportive of climate adaptation than others. The "Climate Adaptation" section describes climate hazards and related actions in more detail.

6. Commercial Buildings

Energy consumed in commercial buildings and industrial energy together account for 26% of Etna's total GHG emissions. Emissions associated with commercial business alone represents 17% of total emissions. Improving the efficiency of our commercial building stock and reducing the energy intensity of the local industrial sector will contribute significantly to achieving Etna's greenhouse gas reduction target. This section focuses on opportunities to retrofit existing commercial and industrial buildings and to ensure that future activities in these sectors are compatible with our community's climate protection goals. Among these actions, residents have indicated that incentivizing solar panel installation by businesses and improving the energy efficiency of Borough-owned buildings are high priority actions for commercial sector climate planning in Etna.

The following tables contain overarching goals, objectives, and potential actions to achieve 2030 targets

Overarching Goal	Objective	Co-Benefits	Reduction Potential
Goal 1: Divert 15% of grid electricity supplying power to both commercial and residential buildings with zero-carbon generation sources	**CB 1 –** Increase annual solar production in the commercial sector to help achieve 1,320 mWh of electricity across all sectors by 2030		
	CB 2 - Source electricity for commercial and industrial use from other carbon neutral power options		
Goal 2: Reduce community wide energy consumption by 50% through a comprehensive energy efficiency program(s)	**CB 3 –** Increase commercial electricity and natural gas use effciencies/intensities by 20% and 25%, respectively		
	CB 4 – Switch 20% of existing commercial natural gas end uses to electricity		

Goal 1: Divert 15% of grid electricity supplying power to both commercial and residential buildings with zero-carbon generation sources

	Objective CB 1 – Increase annual solar production in the commercial sector to help achieve 1,320 MWh of electricity across all sectors by 2030						
Action Number	**Potential Action**	**New (N) or Existing (E)**	**Statewide CAP Action**	**Reduces Climate Risk**	**Co-Benefits**	**Lead Actor**	**Metric**
CB-1A ETNA ECODISTRICT	Create a pathway for Etna residents and businesses to participate in a solar co-op by partnering with surrounding communities and ECO	N	N	N	🌍🌲🐷	-	-
CB-1B ETNA ECODISTRICT	Determine feasible rooftops that can host solar panels via formation of a work group with ECO and solar coop partners. Respect historical buildings and community equity.	N	N	N	🌍🍎🌲🐷	-	-
CB-1C ETNA ECODISTRICT	Install solar panels onto commercial business rooftops.	N	Y	Y	🍎🌲🐷	-	-
CB-1D ETNA ECODISTRICT	Solarize municipal-owned and non-profit-owned buildings, including the Borough Building and the Community Library	N	N	Y	🌲	-	-
CB-1E ETNA ECODISTRICT	Incentivize large parking lot owners to install solar arrays with electric vehicle charging stations and electric vehicle car rentals	N	N	Y	🌲	-	-
CB-1F	Encourage broad implementation of recent commercial PACE legislation to fund energy projects	N	Y	N	🌲🐷	-	-

	Objective CB 2 – Source electricity for commercial and industrial use from other carbon neutral power options						
Action Number	Potential Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
CB-2A	Execute a renewable power purchase agreement (REC's, offsets, etc.) for a percentage of total electricity demand of local government buildings. Work with WPEC for collective bargaining power	N	Y	N		-	-
CB-2B	Execute a renewable power purchase agreement with Rye hydroelectric Lock and Dam power plant.	N	N	N		-	-

Goal 2: Reduce community wide energy consumption by 50% through a comprehensive energy efficiency program(s)

	Objective CB 3 – Increase commercial electricity and natural gas use efficiencies/intensities by 20% and 25%, respectively						
	Objective CB 4 – Switch 20% of existing commercial natural gas end uses to electricity						
Action Number	Potential Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
CB-3/4A ETNA ECODISTRICT	Work with Triboro Energy Baseline Project to collect actual energy consumption data for Etna	E	N	N		-	-

ID	Description				Co-Benefits		
	to establish a more accurate energy baseline						
CB-3/4B	Establish a strategic energy inventory and management plan for public facilities to identify patterns in energy use and savings opportunities	N	Y	Y	🌲🐷	-	-
CB-3/4C ETNA ECODISTRICT	Partner with organizations such as Conservation Consultants Inc. and Rebuilding Together to establish an energy efficiency program that provides assistance and training to businesses to receive free or reduced cost energy audits and retrofits.	N	Y	N	🌍🍎🌲🐷	-	-
CB-3/4D	Educate consumers on the benefits of occupant performance, retro commissioning, and low energy usage improvements in building system technologies	N	Y	N	🌍🌲🐷	-	-
CB-3/4E	Consider ENERGYSTAR certification, Leadership in Energy and Environmental Design (LEED) Gold, Net Zero Buildings, Zero Energy Codes, Passive House standards, and climate resilience design guidelines as a higher performance basis of design for new construction and major renovation projects in public buildings	N	Y	Y	🌲🐷	-	-
CB-3/4F	Continue Borough Streetlight LED replacement program	E	N	N	🌍	-	-

7. Residential Buildings

Energy consumed in residential buildings accounts for 34% of Etna Borough's total energy GHG emissions. Improving the efficiency of our residential building stock will contribute significantly to achieving Etna Borough's greenhouse gas reduction target, while saving residents money on utility bills and reducing the need for new infrastructure. This section focuses on opportunities to retrofit existing residential buildings, increase the quality of new construction, and to ensure that future activities in these sectors are compatible with our community's climate protection goals. Among these actions, residents have indicated that incentivizing solar panel installation by homeowners, encouraging energy efficiency improvements in home electric/lighting/heating/insulation/cooling systems, and offering indoor air quality improvements such as affordable indoor air filters for residents are the highest priority actions for residential sector climate planning in Etna.

The following tables contain overarching goals, objectives, and potential actions to achieve 2030 targets

Overarching Goal	Objective	Co-Benefits	Reduction Potential
Goal 1: Divert 15% of grid electricity supplying power to commercial and residential buildings with zero-carbon generation sources	**RB 1 –** Increase annual solar production in the residential sector to help achieve 1,320 mWh of electricity across all sectors by 2030		
	RB 2 - Source electricity for residential use from other carbon neutral power options		
Goal 2: Reduce community wide energy consumption by 50% through a comprehensive energy efficiency program(s)	**RB 3 –** Increase residential electricity and natural gas use effciencies/intensities by 20% and 30%, respectively		
	RB 4 – Switch 15% of existing residential natural gas end uses to electricity		

Goal 1: Divert 15% of grid electricity supplying power to both commercial and residential buildings with zero-carbon generation sources

Objective RB 1 – Increase annual solar production in the residential sector to help achieve 1,320 MWh of electricity across all sectors by 2030

Action Number		Potential Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
RB-1A	ETNA ECODISTRICT	Create a pathway for Etna residents and businesses to participate in a solar co-op by partnering with surrounding communities and ECO	N	Y	N	🌍🌲🐷	-	-
RB-1B		Start a campaign encouraging the residential adoption of solar panels	N	Y	N	🌍	-	-
RB-1C	ETNA ECODISTRICT	Assist residents in determining feasibility of rooftop solar on their homes via formation of a community work group with ECO.	N	N	N	🌍🐷	-	-
RB-1D		Establish a renewable energy commitment program encouraging residents to install solar panels or purchase green energy. Work with PA Municipal League to negotiate cheaper purchase options for residents	N	N	N	🌍🌲🐷	-	-
RB-1E	ETNA ECODISTRICT	Install solar panels onto residential rooftops.	N	Y	Y	🌍🌲	-	-
RB-1F	ETNA ECODISTRICT	Continue multi-municipal teen solar fellowship to foster community engagement	E	N	N	🌍	-	-

Objective RB 2 – Source electricity for residential use from other carbon neutral power options 🍃🍃

Action Number	Potential Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
RB-2A	Work with PA Municipal League to negotiate cheaper green purchase options (REC's, offsets, etc.) for residents	N	Y	N	🌍🌲💰	-	-
RB-2B	Execute a renewable power purchase agreement with Rye hydroelectric Lock and Dam power plant for residential energy	N	N	N	🌍🌲	-	-

Goal 2: Reduce community wide energy consumption by 50% through a comprehensive energy efficiency program(s)

Objective RB 3 – Increase residential electricity and natural gas use efficiencies/intensities by 20% and 30%, respectively 🍃🍃🍃

Objective RB 4 – Switch 15% of existing residential natural gas end uses to electricity 🍃🍃🍃

Action Number	Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
RB-3/4A ETNA ECODISTRICT	Work with Triboro Energy Baseline Project to collect actual energy consumption data for Etna to establish a more accurate	E	N	N	🌍💰	-	-

	breakdown of energy use for the residential sector						
RB-3/4B	Develop a program to provide efficient end use retrofits such as low flow showerheads and toilets to low income families	N	Y	Y	🌍🌲	-	-
RB-3/4C ETNA ECODISTRICT	Partner with organizations such as Conservation Consultants Inc. and Rebuilding Together to establish an energy efficiency program that provides assistance to residents to receive free or reduced cost energy audits and retrofits.	N	Y	N	🌍🍎🌲🐷	-	-
RB-3/4D	Work with Energy Champions and ECO to hold additional monthly, annual, etc. energy use challenges to engage the community	E	Y	N	🌲	-	-
RB-3/4E	Secure funding with Triboro EcoDistrict to greatly increase number of homes weatherized through local and national weatherization programs	E	Y	Y	🌍🌲🍎🐷	-	-
RB-3/4F	Increase access to affordable, efficient energy options for low-income residents.	N	Y	Y	🌍🍎	-	-

8. Transportation

Besides emitting greenhouse gases, transportation fossil fuels also produce a host of criteria air pollutants when combusted, reducing local air quality and affecting the health of residents. Transportation accounts for 37% of Etna's total GHG emissions. This section focuses on programs and policies to reduce emissions from transportation and includes design-oriented approaches as well as expansion of alternate modes such as walking, biking, and public transportation to and from the most common destinations in Etna. Etna residents indicated that the highest priority actions for climate planning in the transportation sector should include the expansion of bicycle/pedestrian infrastructure like bike racks, crosswalks, ramps, and repair stations to help increase feasibility of carbon free transportation methods.

The following tables contain overarching goals, objectives, and potential actions to achieve 2030 targets

Overarching Goal	Objective	Co-Benefits	Reduction Potential
Goal 3: Decrease Vehicle Miles Traveled by carbon-intensive transportation options such as passenger vehicles	**TR 1 –** Facilitate non-vehicular travel and increase the percentage of residents who get to work by means other than driving to 10% walking and transit, and 5% biking and telecommuting	🌍🍎	🍃🍃🍃
	TR 2 - Increase electric vehicle use in the community to above 5%	🍎	🍃🍃

Goal 3: Decrease Vehicle Miles Traveled by carbon-intensive transportation options such as passenger vehicles

Objective TR 1 – Facilitate non-vehicular travel and increase the percentage of residents who get to work by means other than driving to 10% walking and transit, and 5% biking and telecommuting 🍃🍃🍃

Action Number	Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
TR-1A ETNA ECODISTRICT	Determine safe areas for bike paths and dangerous streets that can benefit from bike lanes.	E	N	N	🌍🍎	-	-
TR-1B ETNA ECODISTRICT	Implement new bike infrastructure, paths, and lanes	E	Y	Y	🌍🍎🐷	-	-
TR-1C ETNA ECODISTRICT	Using information from Green Building Alliance, establish a transportation baseline by creating a survey asking where residents live, work, and how they travel.	N	N	N	🐷	-	-
TR-1D ETNA ECODISTRICT	Prioritize compact and Complete Streets development strategies with PennDOT	N	Y	Y	🌲🐷	-	-
TR-1E ETNA ECODISTRICT	Work with local schools and ECO to create and mark urban walking trails throughout the community	E	N	N	🌍	-	-
TR-1F ETNA ECODISTRICT	Secure funding for/complete new and existing recreation trails, such as the Pine Creek Connector Trail or the Etna Riverfront Trail and Park Project to increase connectivity with Pittsburgh and the GAP	E	N	Y	🌲🍎	-	-

Objective TR 2 – Increase electric vehicle use in the community to above 5% 🍃🍃							
Action Number	Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
TR-2A	Require energy efficient and alternative fuels use in fleet vehicles and equipment.	N	N	N	🍎💰	-	-
TR- 2B	Implement a strategic plan/incentives for increasing electric vehicle use by the community	N	N	N	🍎	-	-
TR-2C ETNA ECODISTRICT	Incentivize large parking lot owners to install solar arrays with electric vehicle charging stations and electric vehicle car rentals	N	N	Y	🌲	-	-
TR-2D	Advocate for regional market-based policies such as fuel efficiency standards that would reduce carbon pollution and fund clean transportation investments	N	Y	N	🍎	-	-

9. Waste, Composting, & Recycling

Etna's solid waste is disposed of, primarily, at Arden Landfill in Washington PA while yard waste is sent to Valley Landfill. Emissions from decaying putrescible material at both disposal locations directly account for 3% of Etna's total GHG emissions and contribute to emissions in the Transportation sector via hauling of waste to and from facilities. Additionally, significant downstream positive environmental impacts and municipal cost savings can be achieved through reuse and recycling of materials. A majority of respondents expressed desire for the creation of a local composting program and voiced support for building up local recycling infrastructure. As such, it is in Etna's long-term interest to reduce waste at its source, expand recycling facilities, reduce food waste, and enable re-use of materials. This section focuses on opportunities to reduce waste, reuse materials, and recycle what cannot be reused.

The following tables contain objectives and potential actions to supplement 2030 emissions targets

Objective	Benefits	Reduction Potential
WR 1 – Reduce solid waste generation by 15% by 2030		

Objective WR 1 – Reduce solid waste generation 15% by 2030 🌱

Action Number	Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
WR-1A	Conduct a public education and outreach campaign to encourage citizens and business to properly handle recyclable materials and reduce personal waste	N	Y	N	🍎🌲🐷	-	-
WR-1B ETNA ECODISTRICT	Explore options for a composting program that reduces yard litter and food waste sent to landfill. Build on relationships with residents to encourage 200 residents to provide composting material for Etna's Community Garden.	N	Y	N	🌍🍎🌲🐷	-	-
WR-1C	Utilize partnerships with other municipalities to renegotiate existing contracts with Etna's waste management company; creating more transparent and standardized arrangements for stakeholders	N	N	N	🌲🐷	-	-
WR-1D	Support the creation of and contribute to a regional recycling data collective to better understand community waste	E	N	N	🍎🌲🐷	-	-

10. Land Use & Resilience

Besides contributing to greenhouse gas emissions through more urban development, non-climate conscious land use practices can increase the Borough's risk from severe weather events exacerbated and made more frequent by a changing climate. Landslides, flooding, and inundation are consistent threats to Etna, with 15% of survey respondents reporting the occurrence of flooding in their home or place of business. Sustainable land use can protect long term infrastructure and natural resources, while strengthening the community through a more accessible, connected, and resilient Borough. Although a comprehensive climate adaptation plan should be considered separately from the climate mitigation strategies highlighted in this Plan and the high-level vulnerability assessment in Section 11, the following section lists potential actions that could align with such an adaptation plan. This section focuses on programs and policies that not only reduce emissions associated with urban land use practices but primarily those that bolster Etna's resilience and reduce the risks associated with an increased frequency of climate-related extreme weather events.

The following tables contain objectives and potential actions to supplement 2030 emissions targets

Objective	Benefits	Reduction Potential
LU 1 – Implement sustainable, accessible, and resilient land use practices in the community	🌍🍎🌲🐖	🍃
LU 2 – Improve climate/weather risk mitigation and response in the community	🌍🍎🌲🐖	🍃

Objective LU 1 – – Implement sustainable, accessible, and resilient land use practices in the community 🌿

Action Number	Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
LU-1A ETNA ECODISTRICT	Continue to preserve and convert vacant lots into green spaces, parks, and trails that enhance natural stormwater and flood management, while allowing people to maintain connectivity to outdoor activities and the community	E	N	Y	🌍🍎🌲🐷	-	-
LU-1B ETNA ECODISTRICT	Increase green space and tree canopy through a streambank planting effort that restores wetland and riparian buffer areas along the Allegheny River and Pike Creek	N	N	Y	🌍🍎🌲	-	-
LU-1C ETNA ECODISTRICT	Along with ECO and EcoDistrict Water Champions, educate the community about water conservation and the floodplain	N	N	N	🌍🌲🍎	-	-

Objective LU 2 – – Improve climate/weather risk mitigation and response in the community 🌿

Action Number	Action	New (N) or Existing (E)	Statewide CAP Action	Reduces Climate Risk	Co-Benefits	Lead Actor	Metric
LU-2A	Expand the scope of the local hazard mitigation plan to factor in expected vulnerabilities explicitly related to climate change	E	N	Y	🌍🍎🌲🐷	-	-
LU-2B	Incorporate PA DEP's Stormwater Best Management Practices into standard operating procedure and the EcoDistrict Plan	N	N	Y	🌍🍎🌲🐷	-	-

| LU-2C | ETNA ECODISTRICT | Improve preparedness for increased frequency of extreme events by creating resilience hubs around the Borough of Etna | N | Y | Y | 🌍🍎🌲 | - | - |

11.Climate Adaptation

This section provides a high-level assessment of potential climate impacts and highlights those greenhouse gas reduction actions that support adaptation for each type of hazard. While the Borough does not currently have the capacity to complete a more robust climate vulnerability assessment and adaptation action, the following analysis was completed to educate the public on local impacts and inform future efforts.

Anticipated Climate Impacts

Over the last 110 years, the Commonwealth of Pennsylvania has experienced a long-term warming of more than 1.8°F, as well as an increasing number of wet months. The warming and wetting trend is expected to continue at an accelerated rate, especially if continues on its current path of greenhouse gas emissions. Under this scenario, Pennsylvania will be about 5.4°F warmer than it was at the end of the 20th century, and the annual precipitation will increase about 8%. While the likelihood of meteorological drought is projected to decrease, months with above-average precipitation will continue to rise. These changes will have a variety of ecological, economic, and social impacts on the Commonwealth, particularly related to agriculture, energy, forests, human health, outdoor recreation, water, wetlands and aquatic ecosystems, and coastal resources (Shortle et al. 2015).

The Borough used the Etna EcoDistrict Plan, Temperate.io, and U.S. Climate Explorer to identify likely changes from today through 2050. The following sections discuss the top climate hazards according to those projections. For more information about the science behind climate change, see Appendix III: Climate Change Science.

Rising Temperatures & Heat

The following graph from U.S. Climate Explorer indicates that average daily temperatures have been increasing and will continue to rise through 2090, impacting agriculture and public health, especially in the most vulnerable populations. A high warming scenario is depicted by the red average temperature trend line, while blue depicts a low warming scenario.
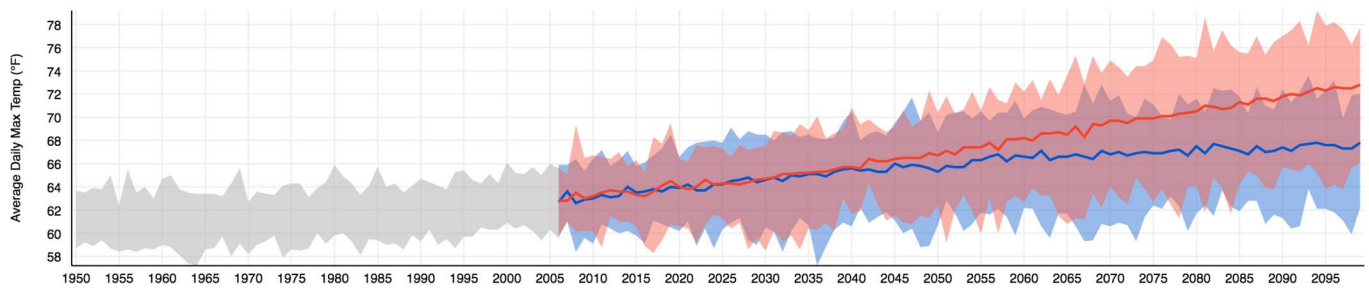
Figure 5: Average Daily Temperature Between 1950-2090

Water

Due to climate change, the Borough of Etna is projected to experience:

- 1 additional intense rainstorm over the current average every 2 years, or about 5 additional intense rainstorms in a given year by 2030.
- An 8% annual mean increase of precipitation by 2050.
- A 14% increase in winter precipitation by 2050.
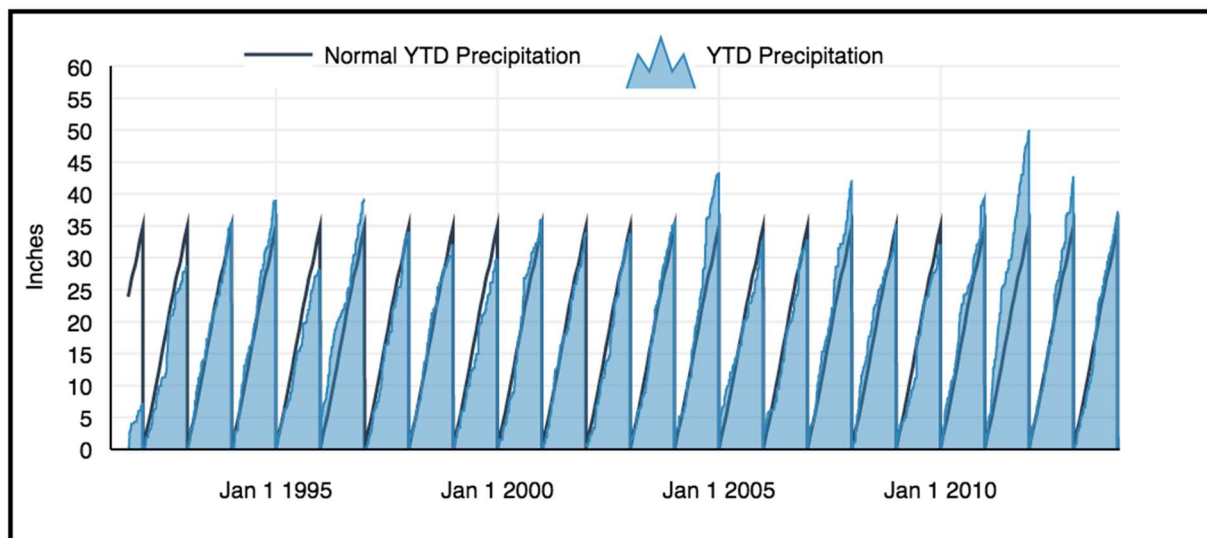
Figure 6: Historical Precipitation

Changes in precipitation patterns as shown above in Figure 6 is likely to cause Etna to experience flash/surface flooding, groundwater flooding, landslides, inundation, rainstorms, and river flooding. Heavy rain events and increased winter precipitation can lead to flooding and combined sewer overflows into Pine Creek and the Allegheny River.

Landslides

Due to increased severity of heavy rain events, Etna is predicted to experience:

- An increase in frequency of landslide events from current levels.

Landslides pose an extreme danger to residents of Etna and cause considerable strain on public safety and resources. High remediation costs, street closures preventing commercial or emergency access, and displacement of families result from landslides caused by changing patterns of precipitation.

Community Concerns

Community engagement events, including the EcoDistrict planning process and Climate Action Plan survey, allowed residents to communicate their concerns regarding the effects of climate change. A majority of survey respondents who live or work in the Borough are "very concerned" about the increasing frequency and severity of stormwater events and poor air quality in our area over the next few decades.

Landslides, flooding, and inundation are shown to be among the most consistent perceived threats to Etna. Fifteen percent of survey respondents reported the occurrence of flooding in their home or place of business, including those who do not live in the designated floodplain. Twenty-five percent report the occurrence of mold. Landslide events, including major ground shifting and failure of retaining walls, are continually reported by residents and are of top concern. EcoDistrict planning showed low-income residents as among the most vulnerable segment of the community, with residents within the floodplain at the highest risks of climate effects.

Adaptive Actions in Etna Climate Action Plan

As described in Section 10, this Plan includes potential actions that bolster Etna's resilience and reduce the risks associated with an increased frequency of climate-related extreme weather events. According to survey respondents, building large-capacity green infrastructure that captures and holds stormwater during rain events both within Etna and uphill in the watershed was among the highest rated climate actions in the Plan.

The following table identifies all specific greenhouse gas reduction actions from the previous sections that have the potential to reduce risk from climate hazards, and which hazards to the community that they address.

Climate Risk	Adaptive Actions
Flooding	CB-3/4E, RB-3/4E, TR-1B, TR-1F LU-1A, LU-1B, LU-2A, LU-2A
Landslides	TR-1D, TR-1F LU-1A, LU-1B, LU-2A, LU-2B
Extreme Temperatures/Utility Outages	CB-1C, CB-1D, CB-1E, CB-3/4B, CB-3/4E RB-1E, RB-3/4B, RB-3/4E, RB-3/4F TR-2C, LU-1B, LU-2A, LU-2C

12.Modeled Objectives/Actions

*See Appendix II for more details on estimated emissions reductions from programs in this Plan

Increased Solar by 2030 – Objective CB 1 & RB 1

Overarching Goal	Objective
Goal 1: Divert 15% of grid electricity supplying power to commercial and residential buildings with zero-carbon generation sources	**CB 1 –** Increase annual solar production in the commercial and industrial sectors to help achieve 1,320 mWh of electricity across all sectors by 2030
	RB 1 – Increase annual solar production in the residential sector to help achieve 1,320 mWh of electricity across all sectors by 2030
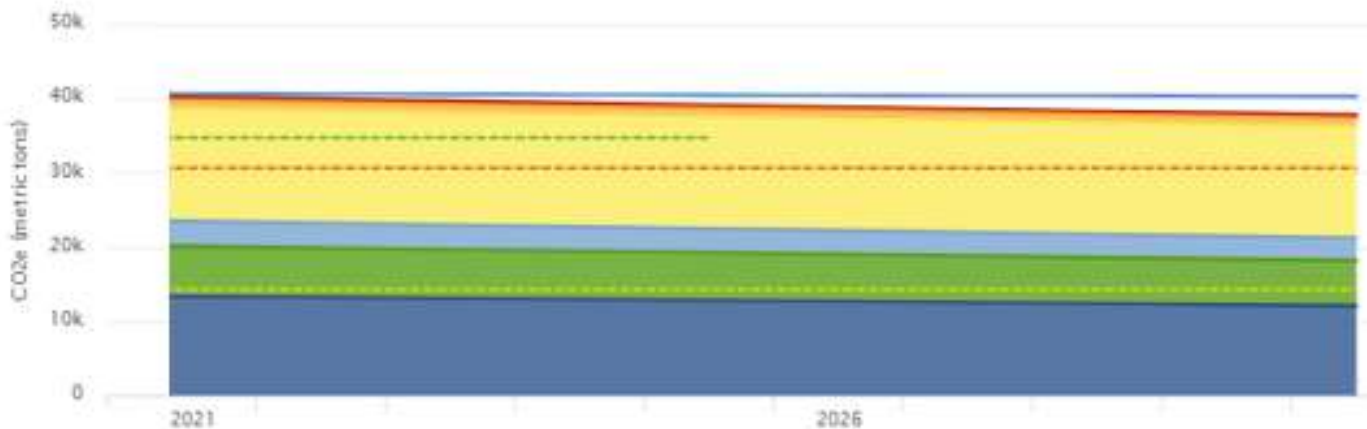
Figure 7: GHG Reductions from Increased Solar to 1,320 MWh by 2030

If implemented as described in Etna's EcoDistrict Plan, an energy goal of 1,320 MWh of annual solar generation by 2030 would, on its own, account for nearly a quarter of all emissions reductions required to reach this Climate Action Plan's target of 25% emissions reduction by 2030.

Reducing Community-Wide Energy Consumption 25% by 2030 - Objective CB/RB 3 & 4

Overarching Goal	Objective
Goal 2: Reduce community wide energy consumption through a comprehensive energy efficiency program(s)	**CB/RB 3 –** Increase commercial & residential electricity and natural gas use effciencies/intensities
	CB/RB 4 – Switch existing commercial & residential natural gas end uses to electricity
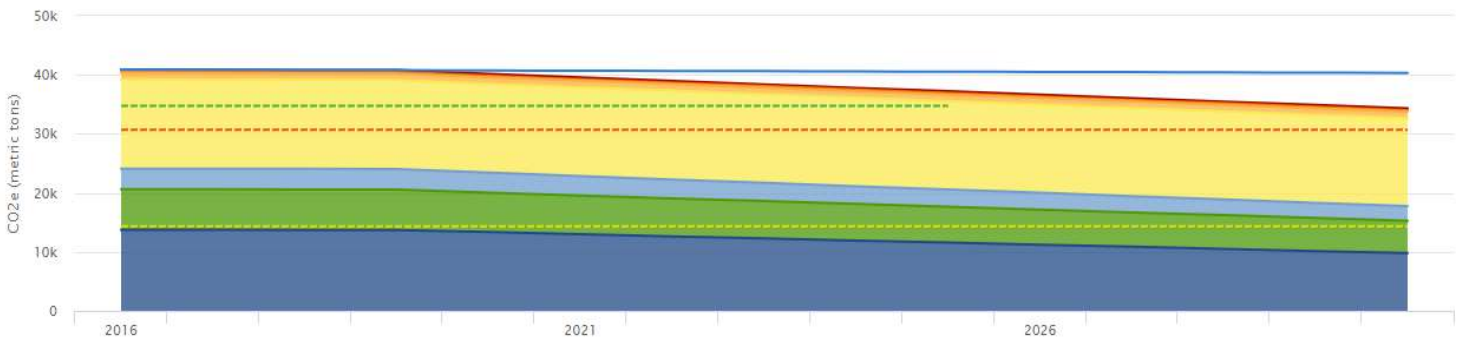
Figure 8: GHG Reductions from 25% Reduced Energy Use Across Community by 2030

Etna's EcoDistrict Plan calls for a 50% reduction in community energy use(compared to a 2003 baseline). According to ClearPath, only a 25% reduction in community energy use by 2030 (compared to a 2016 baseline) would account for nearly 60% of all emissions reductions required to reach this Climate Action Plan's 2025 and 2030 targets. To reduce energy use by 25%, primarily in the commercial and residential sectors, Etna must implement a community-wide energy efficiency effort consisting of actions in this Plan, shown in Figures 9 and 10.
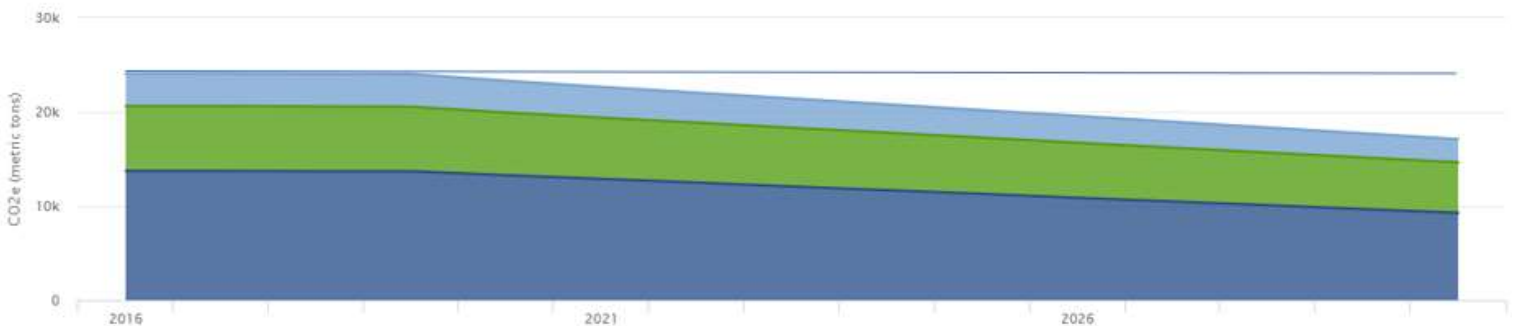
Figure 9: GHG Reductions from a Comprehensive Energy Efficiency Effort by 2030 – Consulting Organizations for Residential and Commercial Energy Audits/Retrofits & Switching Existing Natural Gas End Uses to Electric

Modeled in Figure 9 are major actions such as RB & CB 3/4C, which entail contracting or partnering with organizations to perform energy audits and provide opportunities for switching/retrofitting less efficient end

uses for more efficient models/technologies. Figure 10 models together additional supplementary energy efficiency actions, including RB 3/4D & E as well as CB 3/4F.

Figure 10: GHG Reductions from Supplementary Energy Efficiency Projects – Energy Challenge/LED Streetlight Retrofits/Home Weatherization/Retrocommissioning Local Govt. Buildings by 2030

Note that those actions modeled in Figure 10 account for a minority of potential emissions reductions from reducing energy consumption in the community by 25%. However, these actions comprise large enough emissions reductions and therefore remain important to reaching 2030 goals. See Appendix II for estimated emissions reductions from individual programs included in this model.

Purchasing Renewable Energy Credits/Carbon Offsets – Objective CB 2

Overarching Goal	Objective
Goal 1: Divert 15% of grid electricity supplying power to both commercial and residential buildings with zero-carbon generation sources	**CB 2 –** Source electricity for commercial and industrial use from other carbon neutral power options
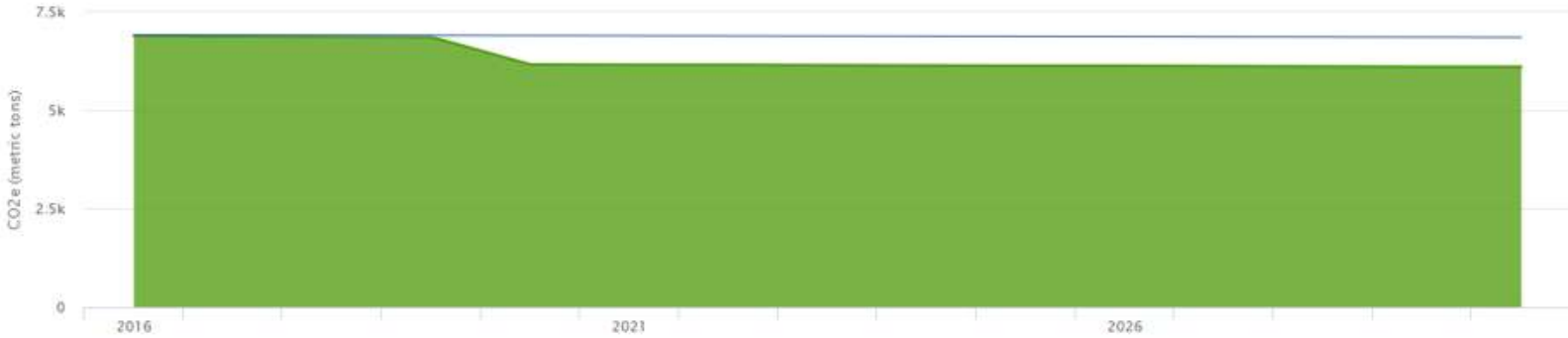
Figure 11: GHG Reductions from Local Government Renewable Energy Credit/Carbon Offset Purchasing to offset 100% of Local Govt. Electricity Use in 2030

If action CB-2A is implemented in the year 2030, purchasing energy credits/carbon offsets equivalent to 100% of Etna's local government electricity consumption would instantly account for over 7% of all emissions reductions required to reach this Climate Action Plan's target of 25% emissions reduction by 2030.   Note that this action should occur annually to secure emissions reductions.

The following is a description of next steps in the process of implementing and monitoring the progress of this Climate Action Plan. The monitoring Plan is subject to change and can include further outreach efforts to stakeholder groups, additional feasibility studies that may need to be taken, identification of funding sources, and identification of key partners that will be required for successful implementation.

Starting in January 2021, the Borough of Etna will engage with community members, businesses, institutions, and other stakeholders through a Climate Action Planning Task Force to prepare for any prerequisite or additional actions needed to begin Plan implementation. These prerequisite actions include:

- Creating citizen advisory groups, such as an Etna Environmental Committee that includes members from the community, the Council, and ECO, to help with programs that require considerable community engagement.

- Gathering bids for contracted services and equipment.

- Making necessary changes to local policies or existing programs, including local government staffing.

- Other steps the community intends to take immediately to kick off programs, and provide ways for citizens to become involved with the Climate Action Plan.

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

The table below describes the components of the monitoring reports. Interval reports are to occur every two years and will only include status updates on the overall action, the mitigation action plan, and the adaptation action plan. The full monitoring report will occur every 5 years and in addition to the components in the action report, will include an updated community and municipal GHG inventory to help the Borough track its GHG emissions reduction progress. With the approval of this Climate Action Plan in 2021, the first monitoring action

report will be due in 2023 and the first full monitoring report with the updated GHG inventories will be due in 2025. Ideally, the most recent GHG inventories should be no more than four years old.

| Monitoring Report Component	Interval Reporting	Full Reporting
Overall Actions: Report any changes to initial actions as well as updated information on human and financial resources	Yes	Yes
GHG Emissions Inventories: Provide updated energy consumption and GHG emissions data for the reporting year using same methodology as 2016 ICLEI process.	No	Yes
Climate Action Measures: Report the implementation status (completed, in progress, on hold) of key actions and update their estimated impacts	Yes	Yes
Residential/Commercial Energy Sources Collect data on percentage of total energy use in the residential/commercial sectors that is sourced from zero carbon generation. 2016 Inventory assumes 0% of total energy use in each sector is from zero carbon generation, and source utility portfolio is 0% renewable.	No	Yes
Residential/Commercial Energy Use Efficiencies/Intensities Use census data of population/household, commercial property data, and energy consumption in each sector to calculate energy efficiencies/intensities and track progress toward 2030 residential/commercial objectives	No	Yes
Transportation Mode Shares Using Census data, record percentages of community transportation modes to track progress toward 2030 transportation objectives	No	Yes

14.Appendix I: Methodology

GHG Inventory
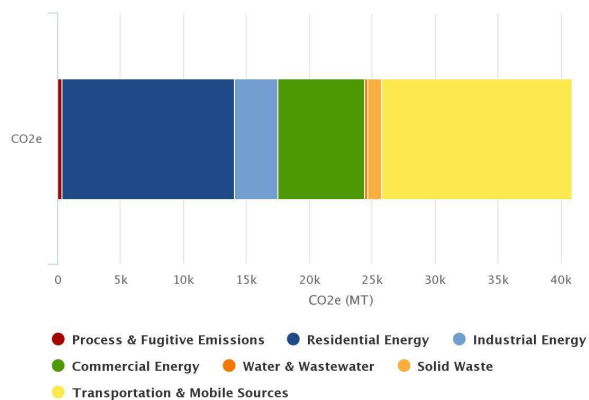
Figure: Etna Detailed GHG Inventory

Sector	Fuel Or Source	Usage	Usage Units	Emissions
Residential Energy	Electricity	11,610,514	kWh	6,549
Residential Energy	Natural Gas	1,352,275	Therms	7,191
Residential Energy Total				13,740
Commercial Energy	Electricity	8,202,938	kWh	4,627
Commercial Energy	Natural Gas	425,433	Therms	2,262
Commercial Energy Total				6,889
Industrial Energy	Electricity	4,378,745	kWh	2,470
Industrial Energy	Natural Gas	189,524	Therms	1,006
Industrial Energy Total				3,476
Transportation & Mobile Sources	Gasoline	30,404,810	VMT	10,724
Transportation & Mobile Sources	Diesel	30,404,810	VMT	4,412
Transportation & Mobile Sources	Other			1
Transportation & Mobile Sources Total				15,137
Solid Waste	Waste Sent to Landfill	211	Tons	5
Solid Waste	Other			1,096
Solid Waste Total				1,101
Water & Wastewater	Wastewater Energy			216
Water & Wastewater	Fugitive Emissions			35
Water & Wastewater Total				251
Process & Fugitive Emissions	Other			305
Process & Fugitive Emissions Total				305

Utility data forms were requested, detailing energy use(both electricity and natural gas), as well as other emissions, attributed to the Borough of Etna. 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 Etna's potable water use and wastewater treatment.
- **Process and Fugitive Emissions** – estimated emissions due to leaks from Etna's natural gas distribution system(estimated using average national leak data).
- **Industrial Energy** – emissions associated with electricity and natural gas use by industries located in Etna.
- **Commercial Energy** – emissions associated with electricity and natural gas use by commercial entities (including municipal operations) located in Etna.
- **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 Etna.
- **Solid Waste** – emissions associated with waste generated and sent to the landfill by the community.

Raw utility data 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. 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 Etna community within ClearPath. Estimated growth and associated emissions was modeled to the year 2030.

Short-Term High-Level Scenario

Data collection included per household emissions, rough estimates of square footage of commercial space in the Borough obtained through the EIA, ArcGIS, and Vehicle Miles Traveled(VMT per capita) from the RTO in order to estimate the effects of reduction measures on community emissions. Such reduction measures within each sector were assigned preliminary "appropriate and feasible" target values that would contribute to the overall emissions reduction goals of the community. Reduction measures were then combined to visualize their effect on forecasted emissions.

*All assumptions used and sources for data collection are noted within Etna's Detailed Report, Etna's Property Data File, and Utility Data Request Forms all provided to the Borough.

**For more information about Etna's 2016 GHG inventory, please contact Etna Community Organization.*

15. Appendix II: Modeled Actions Details

Action/Objective #	Reduction Action	Metric	Emissions Savings (MTCO2e)	% of the total emissions reductions required to reach 2030 goal	Notes
CB-3/4F	LED Streetlight Retrofits	Replace 115 additional sodium streetlamps with LED	34.41	6	
RB-3/4D	Residential Energy Challenge	50 homes participate in an energy challenge per year until 2030	313.72		
CB-3/4B	Retrocommissioning Local Govt. Buildings	Retrocommission one building per year until 2030.	72.65		assuming that Etna's local government buildings average around 7,000 ft^2
RB-3/4E	Low-Income Home Weatherization	Weatherize 25 homes per year until 2030	131.18		
Objective CB/RB 1	Etna EcoDistrict Plan Renewable(Solar) Goal	Increase annual solar energy production to 1320 MWh by 2030	2490	25	assuming total MWhs are split across all three sectors(residential/commercial/industrial) according to their current percentage of the community's 2016 electricity total.
CB-2A	Local Govt. Renewable Energy Credit/Carbon Offset Purchasing	Purchasing renewable energy credits to offset all grid electricity use by local government sector (2016 electricity use)	683	7	assuming local government is 15% of commercial properties in Etna, utility grid electricity is not calculated to include percent renewable energy, credits offset electricity use and do not include natural gas use.
		Purchasing renewable energy credits to offset 50% of grid electricity use by local government sector (2016 electricity use)	341.5	3	
Objective CB & RB-3/4	Etna EcoDistrict Plan Energy Reduction Goal	Reduce total community energy consumption 50% by 2030 compared to 2016 baseline	11884	100+	
		Reduce total community energy consumption 25% by 2030 compared to 2016 baseline	5942	59	assuming "total community energy consumption" includes both electricity and natural gas use from the residential, commercial, and industrial sectors as measured in 2016.

All modeled programs use ICLEI Local Governments for Sustainability ClearPath Emissions calculator tool. Assumptions used in ClearPath calculations are noted, and each model is based on the best available information from the local government, ICLEI, and cited sources.

16. Appendix III: Climate Change Science

The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report affirms that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level" (IPCC, 2014, p. 151). Researchers have made progress in their understanding of how the Earth's climate is changing in space and time through improvements and extensions of numerous datasets and data analyses, broader geographical coverage, better understanding of uncertainties and a wider variety of measurements (IPCC, 2014). These refinements expand upon the findings of previous IPCC Assessments – today, observational evidence from all continents and most oceans shows that "regional changes in temperature have had discernible impacts on physical and biological systems" (IPCC, 2014, p. 151).
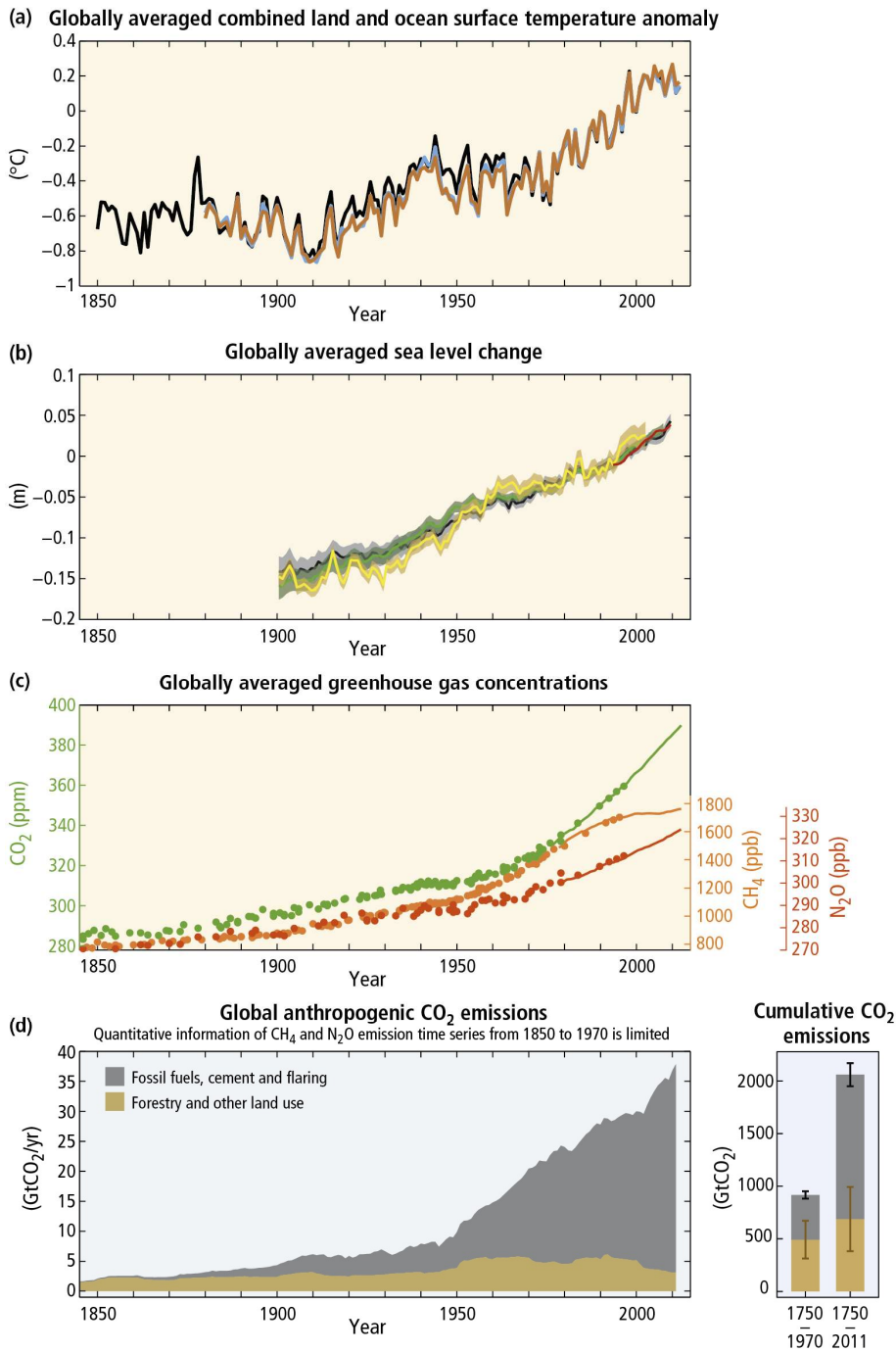
Figure 1. Observations and other indicators of a changing global climate system

The Fifth Assessment also asserts that "it is *extremely likely* that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forces together. Globally, economic and population growth continued to be the most important drivers of increases in CO_2 emissions from fossil fuel combustion. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm

temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions" (IPCC, 2014, p. 151).

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

Temperatures and Extreme Events are Increasing Globally
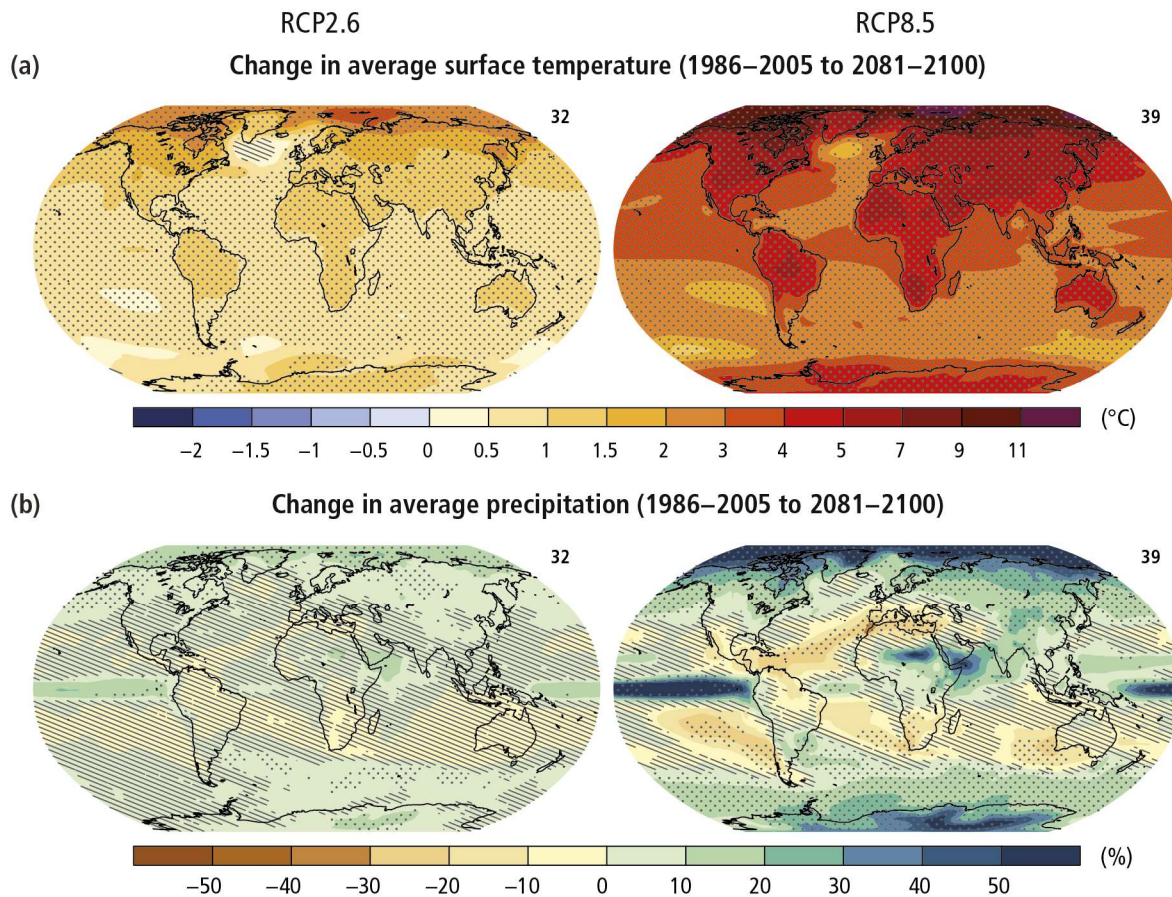

Figure 2 Change in average surface temperature (a) and change in average precipitation (b) based on multi-model mean projections for 2081–2100 relative to 1986–2005 under the RCP2.6 (left) and RCP8.5 (right) scenarios.

Surface temperature is projected to rise over the 21st century under all assessed emission scenarios. It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions (IPCC, 2014).

Climate Risks

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

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

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

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

Greenhouse Gas Emissions Must be Reduced

(a) Risks from climate change...   **(b) ...depend on cumulative CO₂ emissions...**

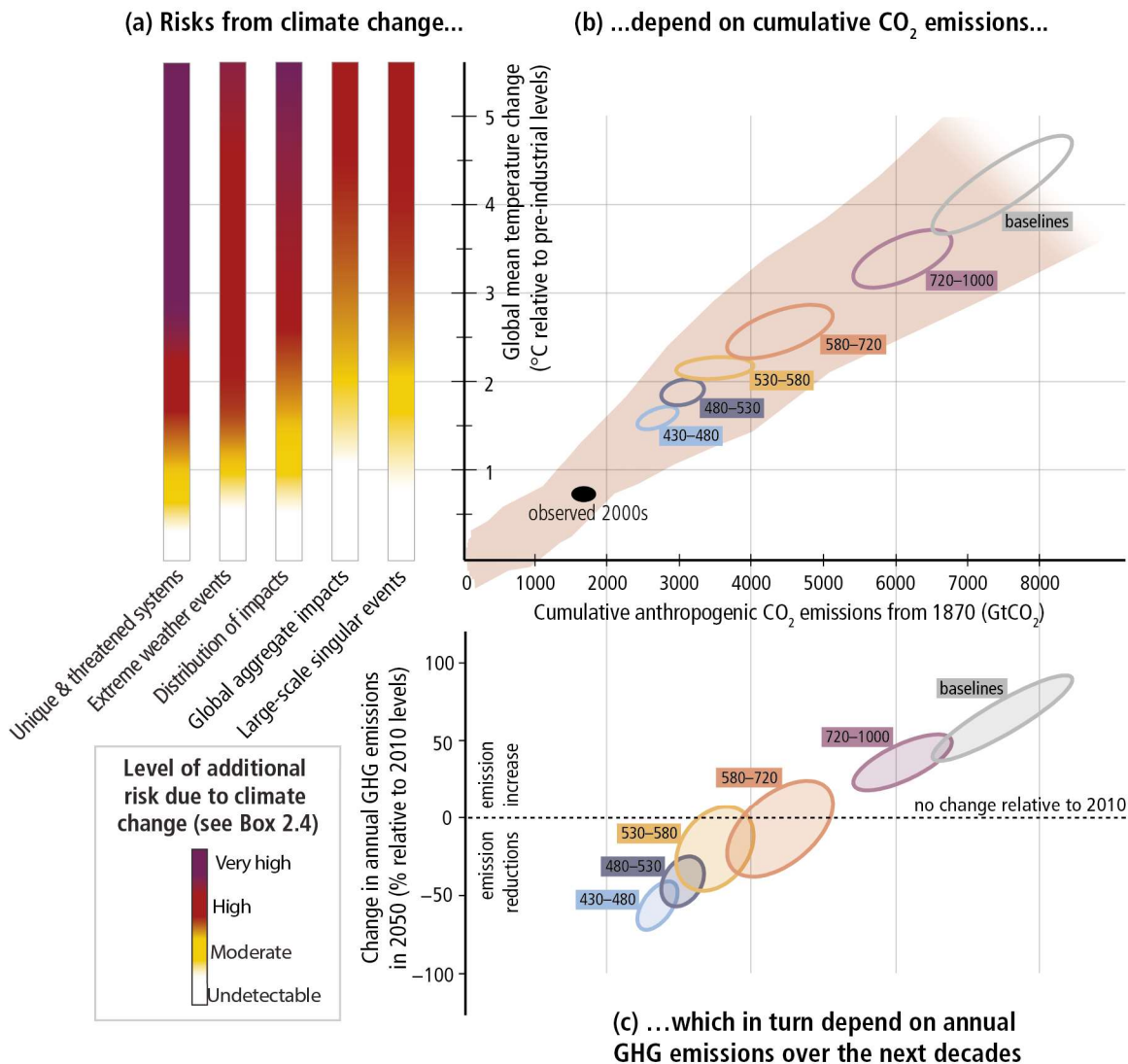**(c) ...which in turn depend on annual GHG emissions over the next decades**

Figure 3. The relationship between risks from climate change, temperature change, cumulative carbon dioxide (CO2) emissions and changes in annual greenhouse gas (GHG) emissions by 2050.

Limiting risks across Reasons For Concern (a) would imply a limit for cumulative emissions of CO2 (b) which would constrain annual GHG emissions over the next few decades (c). Panel A reproduces the five Reasons For Concern. Panel b links temperature changes to cumulative CO2 emissions (in GtCO2) from 1870. They are based on Coupled Model Intercomparison Project Phase 5 simulations (pink plume) and on a simple climate model (median climate response in 2100), for the baselines and five mitigation scenario categories (six ellipses). Panel C shows the relationship between the cumulative CO2 emissions (in GtCO2) of the scenario categories and their associated change in annual GHG emissions by 2050, expressed in percentage change (in

percent GtCO2-eq per year) relative to 2010. The ellipses correspond to the same scenario categories as in Panel B, and are built with a similar method (IPCC, 2014).

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

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

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

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