Cuyahoga County

CUYAHOGA COUNTY CLIMATE ACTION PLAN

2025-2030

We are addressing climate change and creating a sustainable, healthy, equitable, and resilient Cuyahoga County

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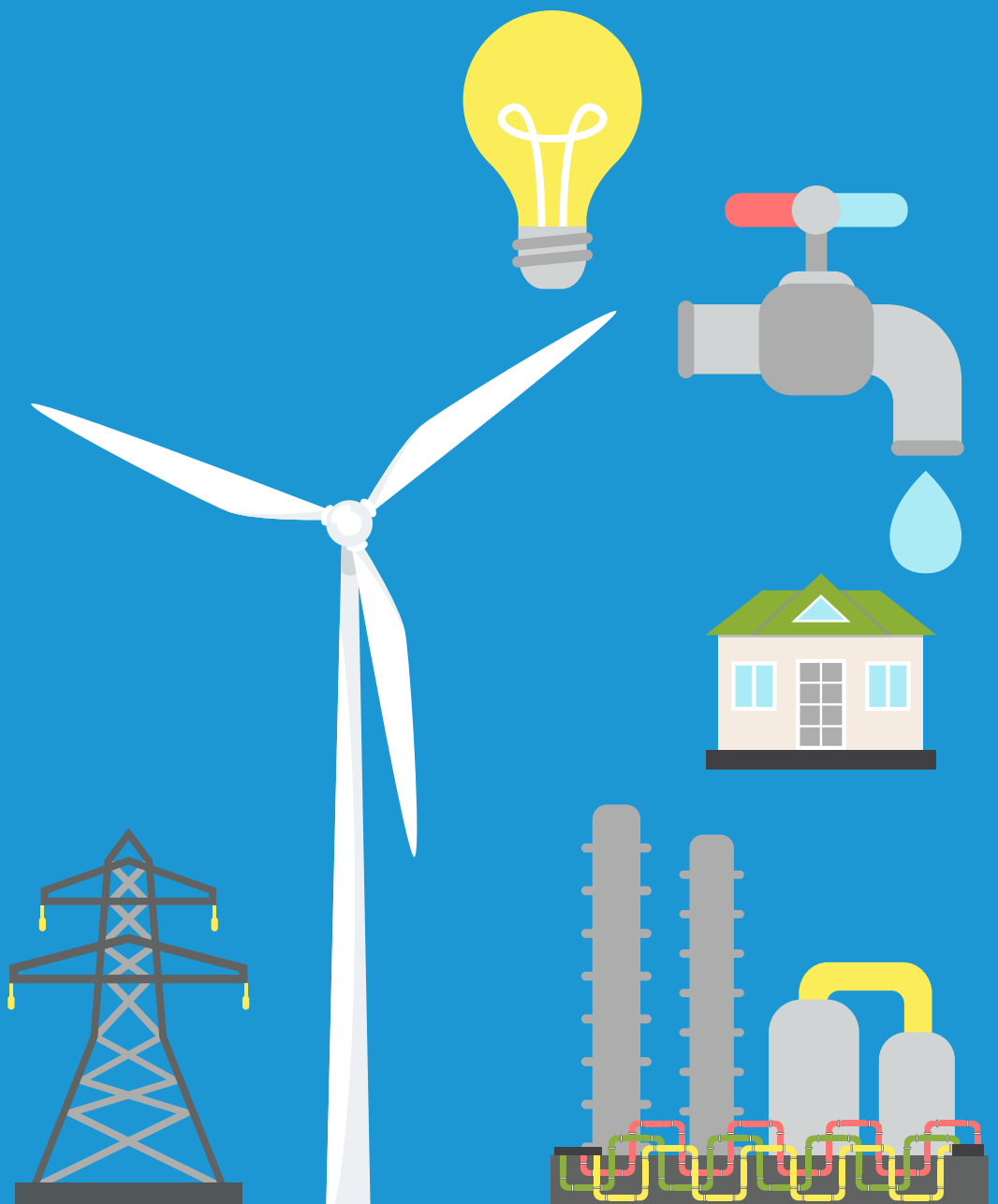

ACKNOWLEDGEMENTS

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NOACA AND THE CITY OF CLEVELAND

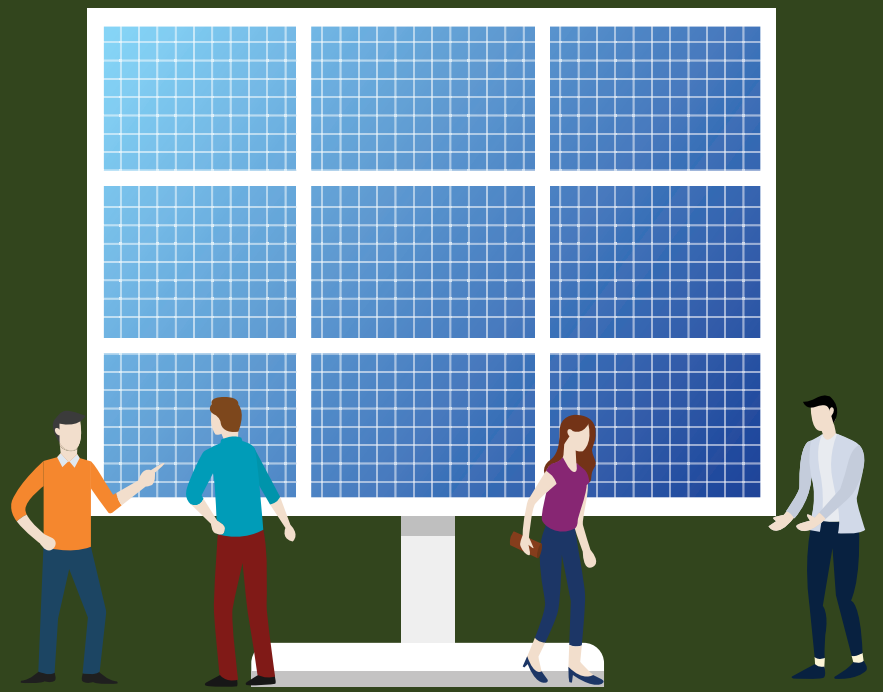
Cuyahoga County received Climate Pollution Reduction Grant Planning Grant dollars from a Northeast Ohio Areawide Coordinating Agency and City of Cleveland sub grant. Those grant funds were used to conduct the Countywide-GHG inventory used in this Climate Action Plan and for technical assistance to jurisdictions in the County on climate action and sustainability.

GREENHOUSE GAS INVENTORY

Brendle Group provided consulting services to update the County-wide Greenhouse Gas Inventory

CONSULTED STAKEHOLDERS

Listed in Appendix A

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Michigan (Anishinaabemowin)
Lake/Lac Michigan

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A JOINT MESSAGE FROM THE COUNTY EXECUTIVE & CHIEF OF SUSTAINABILITY AND CLIMATE

Dear Cuyahoga County residents and stakeholders,

We are pleased to share with you our updated Climate Action Plan. By working together, we can take climate action to improve the health and quality of life for people in Cuyahoga County.

Climate change touches us all where we live, work, and play. In fact, you may have experienced recent climate change events over the past year:

- Smoke and air quality issues stemming from Canadian wildfires
- Tornadoes, strong storms resulting in prolonged power outages and property damage
- And nearly every month last year was warmer than the average

Cuyahoga County is acting on these issues, and with your help, we have a plan to do more to address the causes of climate change and to become a more resilient community that can withstand the shocks of a changing climate.

Building upon our focus of renewable energy development, restoring the urban tree canopy, reducing plastic pollution, and creating a freshwater economy, the targets and goals of the Climate Action Plan will help to advance our other priorities like Healthy Cuyahoga, Affordable Housing, Public Safety and Justice, and Jobs and Infrastructure.

We invite you to collaborate with us on solving these challenges and positioning our region for the future.

Chris Ronayne,
County Executive

Jenita McGowan
Deputy Chief of Staff for Climate and Sustainability

A MESSAGE FROM COUNTY COUNCIL

Welcome to Cuyahoga County's updated Climate Action Plan. As we face the growing challenges posed by climate change, local governments must take bold, proactive steps to reduce greenhouse gas emissions and build resilience for future generations.

The proactive strategy of using a climate action plan can help us mitigate and adapt to rapid environmental changes, many of which are regionally and locally specific. Action plans help businesses, and the public become more aware of how their activities are connected to the collaborative effort to address climate change.

Cuyahoga County, with its diverse urban, suburban, and rural landscapes, is uniquely positioned to make a significant impact on the broader fight against climate change. However, our region is already experiencing the consequences of a warming planet, including extreme weather events, flooding, heat waves, and shifting water levels. These impacts threaten public health, local economies, infrastructure, and the environment. Without a clear, coordinated plan, the risks will only become more devastating.

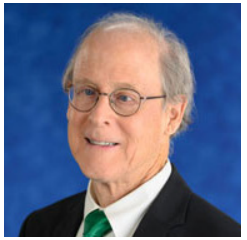
Through adaptation strategies, we can build more resilient infrastructure, protect vulnerable populations, and ensure that our local economy is prepared for the changes ahead. Taking action now can reduce future costs associated with climate-related disasters and disruptions.

Furthermore, Cuyahoga County's leadership on climate action can send a strong message to other municipalities, organizations, and individuals throughout the state and beyond. We can inspire collective action, fostering collaboration between local governments, businesses, and residents to create a more sustainable and equitable future.

We look forward to the work and hope you will join us in the fight against climate change.

Sunny M. Simon

Sunny M. Simon
Cuyahoga County Council, District 11



Dale A. Miller

Dale A. Miller, President
Cuyahoga County Council, District 2

EXECUTIVE SUMMARY

Taking Action on Climate Change Matters

Cuyahoga County is experiencing climate change now

Greenhouse gases shape the Earth's climate. Burning fossil fuels and other human activities are causing the planet to warm. Scientists understand the climate system through observations and modeling.

Here in Cuyahoga County and throughout the Great Lakes region, we are experiencing more

- high heat days
- more precipitation
- more extreme weather events

Climate change can make communities less healthy

In Cuyahoga County, average warmer temperatures and changes in precipitation impact air quality, heat stress, water quality, and introduce new diseases to our community.

Acting now can help to reduce future costs for society and the environment

The cost of responding to climate change by governments, residents, and businesses in Ohio is estimated to be up to $9 billion a year by 2050, but acting now to reduce greenhouse gas emissions and prepare for climate change can help reduce future costs.

We are responding with hope and urgency

A livable and sustainable future for all is possible with rapid, just, and transformational climate action. There is still time to address climate change. Cuyahoga County has an important role to play in this transformation. We can help our residents, visitors, and businesses transition to a low-carbon, environmentally healthy, and just way of life so we can thrive now and into the future.

Climate Targets

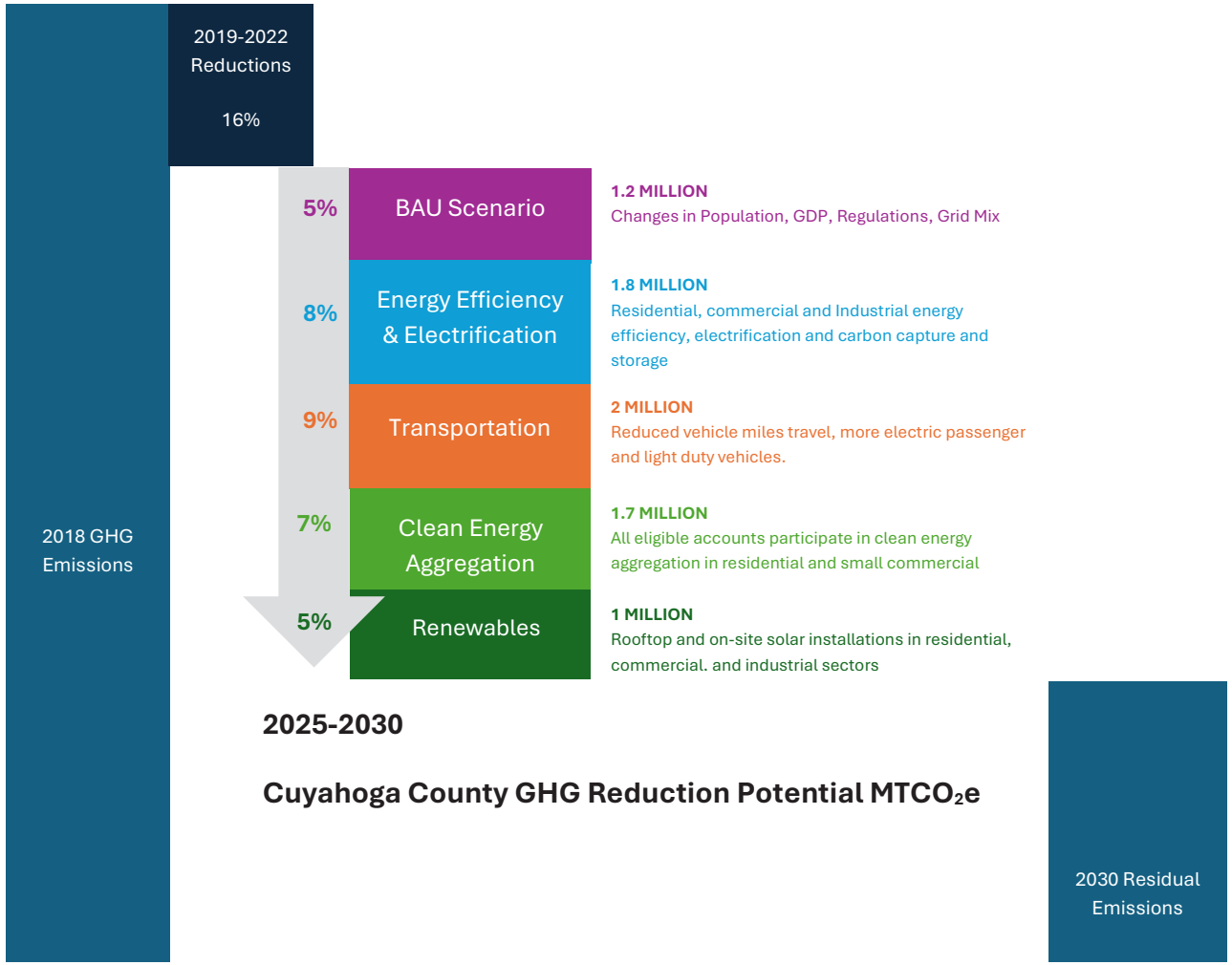
Cuyahoga County has a science-based greenhouse gas reduction target. Our near-term goal is **63%** reduction in greenhouse gas emissions by 2030 from a 2018 baseline. **Our long-term goal is net zero emissions by 2050.**

NET ZERO EMISSIONS

Reducing emissions as much as possible and then using methods such as carbon capture and sequestration to neutralize residual emissions.

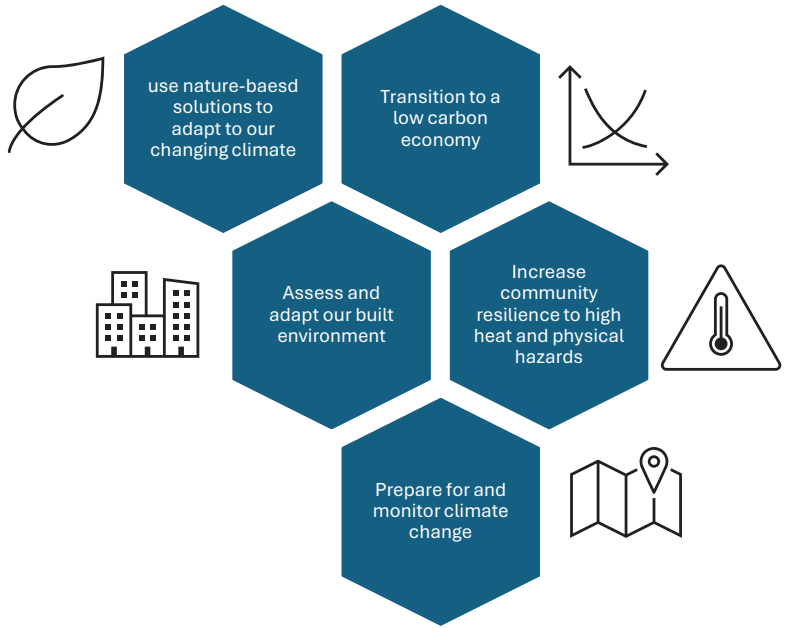
Priority Climate Actions

We can reduce the volume of greenhouse gas emissions to the atmosphere by using less fossil fuel-based energy, using more sources of renewable energy, electrification of vehicles and systems, recycling, composting, and capturing methane and other biogenic emissions.



Adaptation and Resilience

This plan also contains actions to increase the County's climate adaptation and resilience. These strategies work to prepare humans and infrastructure for the impacts of climate change we are already experiencing and to prepare for future impacts.



A Timeline of Climate Action

2015
Cuyahoga County establishes a Department of Sustainability

2017
Cuyahoga County joins Global Covenant of Mayors for Climate & Energy

2019
Cuyahoga County's 1st Climate Action Plan

2022
County achieves 16% reduction in GHG emissions since 2018

CLIMATE CHANGE IN OUR COMMUNITY

Climate Change and its Importance

Greenhouse gases shape the Earth's climate. Burning fossil fuels and other human activities are causing the planet to warm.[3]

Our planet's average temperature is warming at an unusually rapid rate compared to the rate of change over the past 2,000 years, which is causing climate change. Climate change is caused by emissions of greenhouse gases (GHGs) from human activities, mainly from burning fossil fuels (such as coal, oil, and natural gas) for transportation and energy. Greenhouse gases released by human activities include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and fluorinated gases. The greenhouse effect is a naturally occurring phenomenon that keeps the Earth warm and habitable. Additional greenhouse gases from burning fossil fuels are warming the planet at an unusually rapid rate causing harm to people and the environment.

Climate changes cause harmful impacts on people and the ecosystems that support us, with worsening effects on our health, safety, security, and prosperity. While some future climate changes are unavoidable, such as ice sheet loss and permanent flooding of coastal areas, some impacts can be limited by large and rapid cuts in global greenhouse gas emissions.

Focus on urgent action to cut emissions and to expand adaptation in this decade is key to minimizing impacts on people and ecosystems.

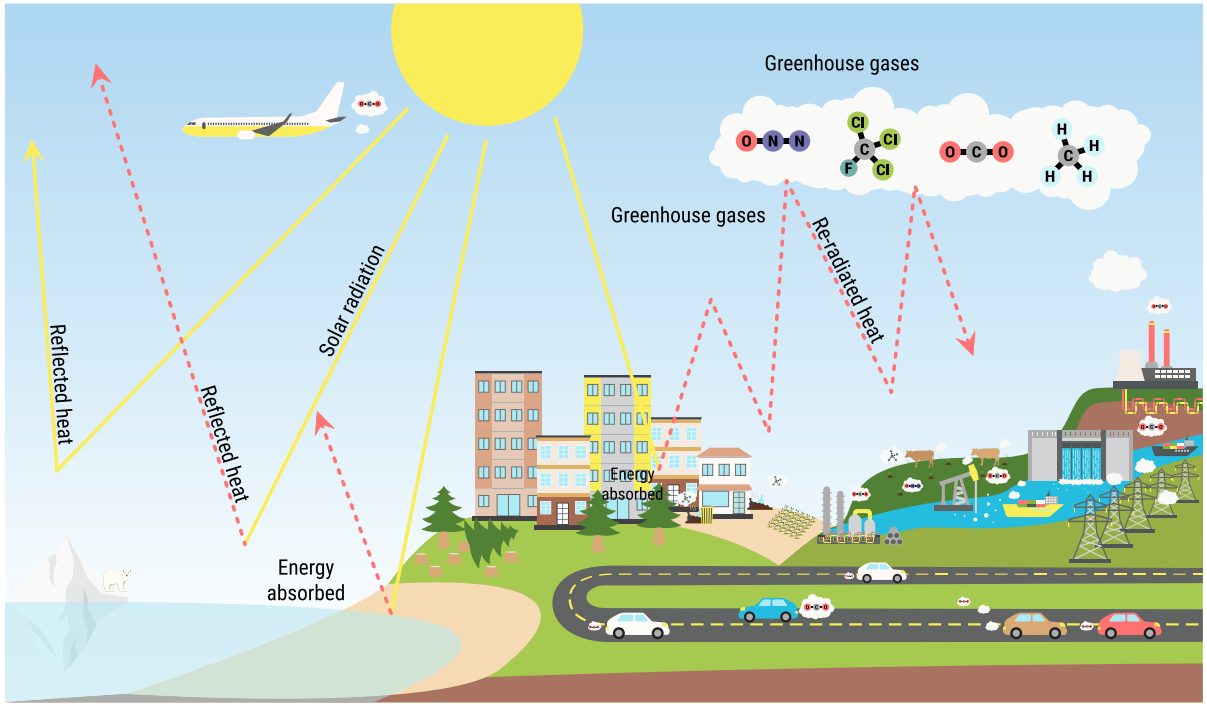


Figure 1 Diagram of the Greenhouse Effect

Alt text: Diagram illustrating how greenhouse gases trap heat in the Earth's atmosphere.

How We Know

Scientists understand the climate system through observations and modeling.

Climate is not the same thing as weather. Weather is the minute-by-minute condition of the atmosphere (such as temperature and precipitation) on a local scale. Climate is the long-term average weather conditions of an area. The term climate change refers to significant and persistent change in an area's average climate conditions or their extremes. Climate scientists understand the world's systems through observations and modeling.

To learn about how climate has changed in the distant past, scientists use natural records, such as tree rings, ice cores, and sedimentary layers. Indigenous knowledge and historical observations such as personal journals also document past climate change. Climate models have been constructed using observational data and physical laws. These models can project a range of potential future climate conditions that result from different assumptions about the future, such as the amount of greenhouse gas. Models that include both human and natural systems examine how climate impacts cascade across sectors and scales and, in turn, how human systems and choices influence climate.

Impacts of Climate Change

Globally, rapid warming and other large-scale climate changes threaten human and ecological systems.

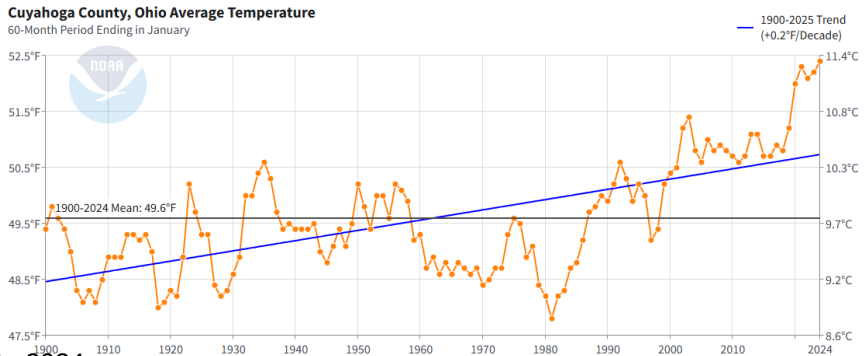
Greenhouse gas pollution in our atmosphere is increasing the occurrences of heavy rainfall, flooding, drought, ice melts, and catastrophic storms throughout the world. These weather events have serious consequences for human health, the natural environment, and our infrastructure.

LOCAL CHANGES IN CLIMATE

Here in Cuyahoga County and throughout the Great Lakes region, we are experiencing more high heat days, more precipitation and more extreme weather events.

Temperature

2024 was the hottest year on record in Cuyahoga County since 1895 with average temperatures 9°F above normal. Over the past 100 years in Cuyahoga County, temperatures have increased by about 2°F.[4]



Alt text: Line graph showing average temperature in Cuyahoga County from 1900 to 2024.

Figure 2 Cuyahoga County, Ohio Average Temperature 1900-2024

Precipitation

In Cuyahoga County, from 1925 to 2024 (100 years), the total change in precipitation was an approximate increase of 12 inches based on data from the Cleveland National Weather Service ThreadEx station.[5]

PRECIPITATION IN CUYAHOGA COUNTY

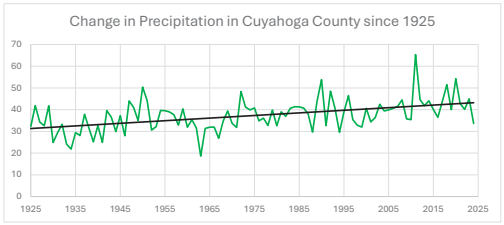


Figure 3 Cuyahoga County Precipitation 1925-2024[6]

Extreme Weather

Higher heat means more convective weather (more moisture in the air) which typically means more frequent intense storm events. Severe storms are increasing in frequency more than other climate-related natural disasters in Ohio and Cuyahoga County. The 1980–2024 annual average is 2.3 events; the annual average for the most recent 5 years (2020–2024) is 7.2 events (CPI-adjusted).[7]

OHIO BILLION-DOLLAR STORMS BY YEAR 1980-2024

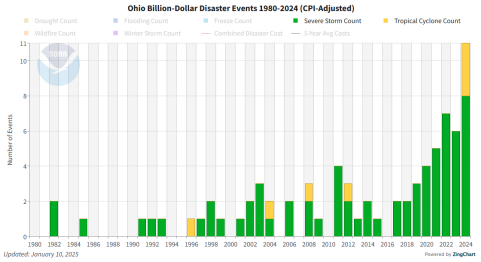


Figure 4 Billion-Dollar Storm Disasters in Ohio

According to the National Climate Assessment, top regional hazards forecasted for Cuyahoga County between 2035-2064 include:

- Extreme temperatures on the hottest days of the year are projected to increase on average between 3-4 degrees F,[8] and the number of days with temperatures above 90 degrees to increase between 12 to 17 days based on future climate scenarios.[9]
- In Cuyahoga County, there are 3 additional days per year with more than 1 inch precipitation compared to 1981.[10]
- 5-10 fewer dry spells (consecutive days without precipitation) are projected per year.[11]

Alt text: Bar chart showing billion-dollar storm disasters in Ohio from 1980 to 2024.

Climate Change and Lake Erie

Cuyahoga County has a unique climatology driven by our location along Lake Erie, our northern border. Lake Erie is the smallest Great Lake by volume and the shallowest of the Great Lakes. Lake Erie's water levels are highly variable, and are affected by changes in precipitation, runoff, evaporation, and ice cover. Climate scientists are forecasting greater variability with periods of both high and low water levels likely to occur in the future, with an overall increase in variability depending on whether evaporation from high heat or increase in precipitation are dominant.

Climate Change and Algal Blooms (GLISA and NOAA)

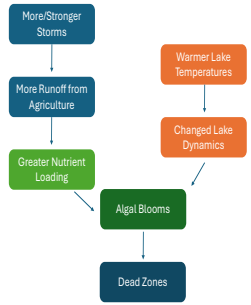


Figure 5 Climate Change and Algal Blooms (GLISA and NOAA)

Lake levels impact many important economic and community assets including boating and recreation, shipping and navigation, property, fisheries, and wetlands.

Higher temperatures mean less ice cover on Lake Erie resulting in increasing lake-effect snowfall as a warmer atmosphere will be able to hold increasing amounts of moisture. Areas in southern lake-effect zones may see lake-effect snow replaced by lake-effect rain, as warming winter temperatures will result in an atmosphere that is less suitable for the formation of snow.

The Great Lakes have warmed faster than nearby air temperatures, leading to longer warm seasons and prolonged stratification—when the upper levels of water are warmer and the cooler, denser water sinks to the bottom. The stratification forms hypoxic "dead zones" that result when algal blooms sink, decompose, and reduce dissolved oxygen concentrations. A greater risk of algal blooms may increase the incidence of hypoxia (low oxygen levels) and fish kills.

More total and intense precipitation is increasing runoff and combined sewer discharge, leading to greater nutrient loads in the lakes. Locally, this is being mitigated by the Northeast Ohio Regional Sewer District's Project Clean Lake storage tunnels and other efforts to reduce non-point source pollution.

Climate Change and Community Health

Climate change can make communities less healthy. In Cuyahoga County, average warmer temperatures and greater precipitation impact air quality, heat stress, water quality, and disease vectors.

Air quality

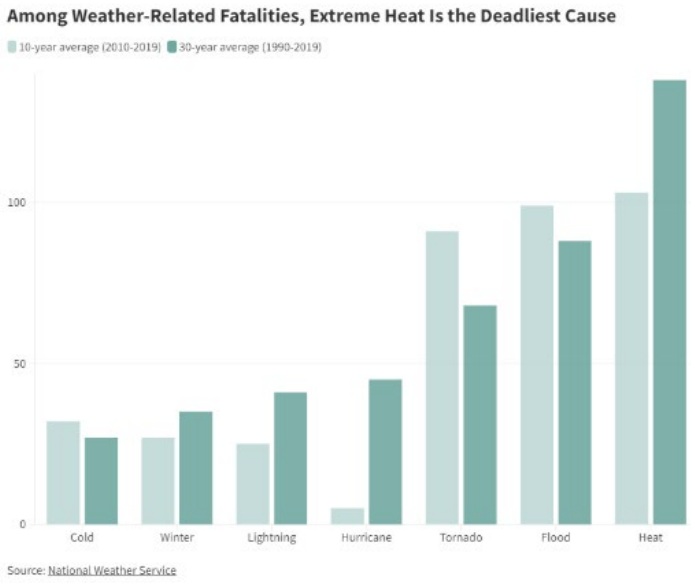
More frequent high heat days and changes in precipitation caused by climate change reduce air quality by exacerbating both ground level ozone and particulate matter pollution. Exposure to these pollutants can lead to or worsen health problems, such as respiratory and heart diseases.

Warmer weather, made more frequent or intense by climate change, can cause ground-level ozone to accumulate. Ground level ozone is a gas that comes from burning fossil fuels in vehicles and from other sources and is the primary component of smog. The EPA has concluded it is highly dangerous to our health and known to cause lung and heart problems. Cuyahoga County has high rates of asthma which can be triggered by high levels of ozone pollution. In Ohio, 1 in 9 adults and 1 in 7 children have asthma. Cleveland has been identified as an asthma capital, meaning it is among the 20 cities with the worst outcomes for asthma prevalence, emergency department visits due to asthma, and asthma-related fatalities. [12]

Rising temperatures are also expected to elevate levels of particulate matter in the air. Ohio is among the states that have the highest level of fine particulate matter, with particles that are 2.5 [illegible] (2019).

High Heat

Our region is one of the top 15 areas in the U.S. for homes with no air conditioning. More than 9% of households or 81,600 homes in our Metropolitan Statistical Area (MSA) lack air conditioning. [13] Seniors, young children, and people with chronic health conditions are at higher risk for health-related illness and fatalities, with heat being the deadliest cause



Alt text: Chart showing weather-related deaths in Ohio.

Figure 6 Weather Related Deaths in Ohio

Water Quality

Increases in precipitation and in extreme weather events can lead to more instances of flooding and of stormwater runoff. In areas with combined sewers, sewer overflows can release untreated wastewater into Lake Erie. Increased stormwater also creates runoff that washes pollutants from the ground and roadways into waterways. Higher heat can increase harmful algal blooms which can also impact water quality of Lake Erie, our source of drinking water.

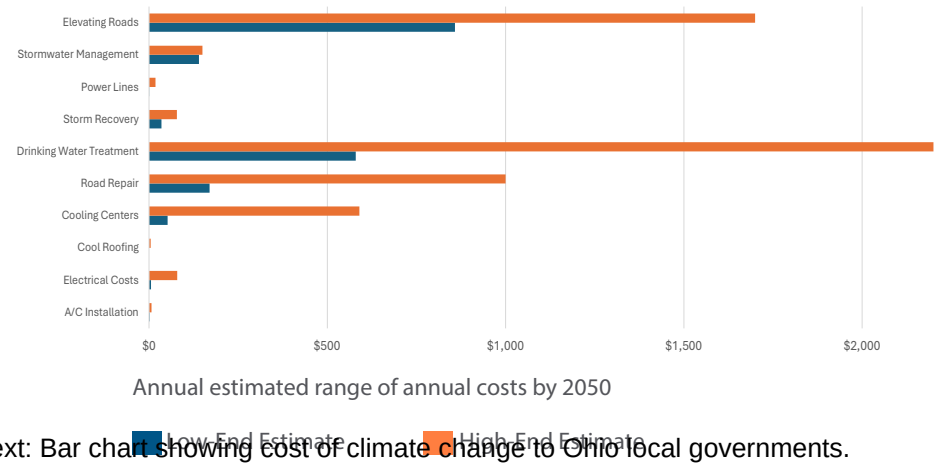
Disease

Hotter and wetter weather makes the Midwest a more favorable region for insects that carry diseases not typically found in Cuyahoga County. Studies predict that by the end of the century our climate will be favorable for insects that carry dengue fever and malaria.[15] There is a documented increase in Lyme disease carried by deer ticks in the Midwest due to tick population increases in milder winters.[16]

Climate Change and The Economy

The cost of responding to climate change is borne by governments, residents, and businesses. The Ohio Environmental Council estimates that by 2050, the total cost to Ohio's local governments will increase between $2-9 billion each year to adapt to the challenges of a changing climate. These costs are related to drinking water treatment, road construction, cooling centers, stormwater management, electrical costs, storm recovery, and other expenses.[17]

Total costs of climate change for local governments in Ohio by 2050



Alt text: Bar chart showing cost of climate change to Ohio local governments.

Figure 7 Cost of Climate Change to Ohio Local Governments, Ohio Environmental Council

The blue economy—economic activity associated with coastal regions-- is important in Cuyahoga County, and climate-related changes to water levels are predicted to impact shipping in Lake Erie. Every lost inch of water depth reduces cargo capacity between 50 and 270 tons and increases costs by $10,000-30,000 per transit, making shipping less efficient. At the same time, less ice cover may extend the shipping season in the Great Lakes. [18]

Cuyahoga County does have a potential competitive advantage for business site location decisions, because it is less exposed to certain climate-related impacts such as rising sea levels, drought, and wildfires. Maintaining Lake Erie and limiting GHGs will help the region keep this competitive advantage.

Learn More

The Colors of Climate Change is a data storytelling project that is an interactive way to learn more about climate change in Ohio: **Colors of Climate Change - Midstory.** **https://www.midstory.org/colors-of-climate-change/**

Climate Equity and Climate Justice

Climate Justice is Possible if Climate Actions are Equitable

Addressing equity is a critical component of effective climate action. Climate change impacts groups of people differently because of existing vulnerabilities, historical patterns of inequity, socioeconomic disparities, and systemic environmental injustices. Those more at risk include children, socially vulnerable people, indigenous populations, older adults, those with chronic medical conditions, those with disabilities, outdoor and emergency response workers, and pregnant/postpartum people. These groups disproportionately suffer from climate-related hazards, are less prepared to respond to extreme weather, and experience unequal access to clean air and affordable energy. Climate equity and justice strategies help ensure that all groups share in the benefits of climate mitigation and adaptation efforts.

What is Climate Equity and Justice?

Climate Equity – alleviates the unequal burdens of climate change, ensures the just distribution of climate protection efforts and meaningful involvement of all groups; centers on equality of outcomes not equality of opportunity

Climate Justice – recognizes disproportionate impacts of climate change and seeks to address the root causes of climate inequity with a focus on human rights and social inequality; long-term equity initiatives with a focus on the system as a whole[1]

ABOUT THIS PLAN

Plan Boundaries

This Climate Action Plan has a 5-year time horizon. The plan is focused on the geography of Cuyahoga County, but some of the actions depend on other organizations and levels of government, such as state and federal policies and programs. The actions prioritized in this plan are activities the Cuyahoga County government can lead, partner on, support, fund, and/or influence based on our structure and resources.

Climate Action Levers

The plan is organized around two primary kinds of climate action levers: mitigation and adaptation. Some climate actions have both adaptation and mitigation benefits, such as tree planting and preservation and energy conservation.

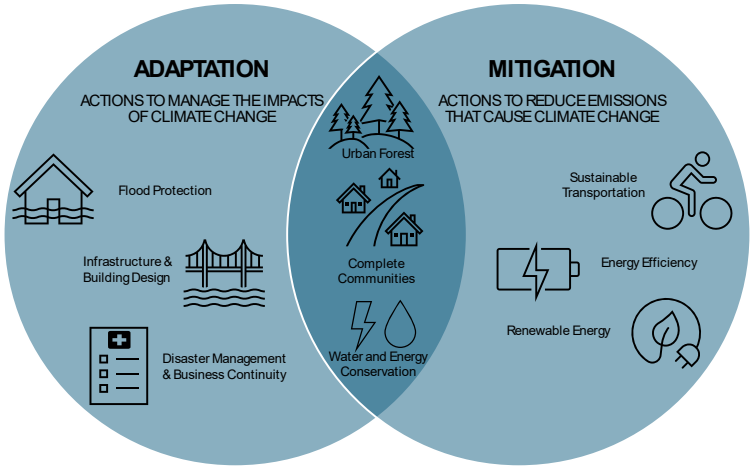


Figure 8 Climate Adaptation and Mitigation Actions

Alt text: Diagram showing climate adaptation and mitigation actions.

Mitigation - strategies that work to reduce the volume of emissions going into the atmosphere, and thus, reduce the magnitude of climate change

Adaptation and Resilience - strategies that work to prepare humans and infrastructure for the impacts of climate change we are already experiencing and will continue to experience

MITIGATION

Reducing emissions of greenhouse gases from human activities to net zero by 2050 can help limit global warming and climate change impacts.

The mitigation section of this plan is organized by the following sectors based on their unique GHG emissions profile within the county and the policy and technology advances that support various climate mitigation actions within these sectors:

- Residential
- Commercial
- Industrial
- Transportation
- Water and Wastewater
- Solid Waste

ADAPTATION & RESILIENCE

Communities are vulnerable to the degree they are exposed to climate risks, their sensitivity to those risks when exposed to climate hazards, and their ability to adapt or cope with those impacts.

The adaptation section of this plan is organized based on the types of climate risks and potential opportunities Cuyahoga County must address to ensure climate resilience.

These potential risks and opportunities include:

- The transition to a low carbon economy
- Physical climate risks
    - Acute extreme weather-related risks
    - Chronic climatological risks
- Climate migration

Data-Driven Decision Making

Cuyahoga County currently uses its climate vulnerability assessment and equity zones analysis to inform sustainability planning efforts and to make the distribution of climate-related initiatives more equitable. Examples include the Healthy Urban Tree Canopy program and low-income residential solar program.

EQUITY IN ADDRESSING CLIMATE CHANGE

Forty-three percent of Cuyahoga County residents live in a low-income disadvantaged community (LIDAC). These approximately 530,000 people have higher rates of social vulnerability (73%) and risk of adverse impacts from natural hazards (91%) compared to the US average.

In 2022, the Cuyahoga County Planning Commission launched its **Equity Zone Map**,[19] which is being used by County agencies to prioritize road, building, and development projects in designated areas suffering from historic disinvestment. Zones were determined based on five indicators: redlining maps, residential property values, life expectancy, poverty, and Improvement Target Areas. The County relies on this map to prioritize funding for tree planting projects, to identify scooter and bike share parking locations, and to identify participating school districts in its Solar for Schools program.

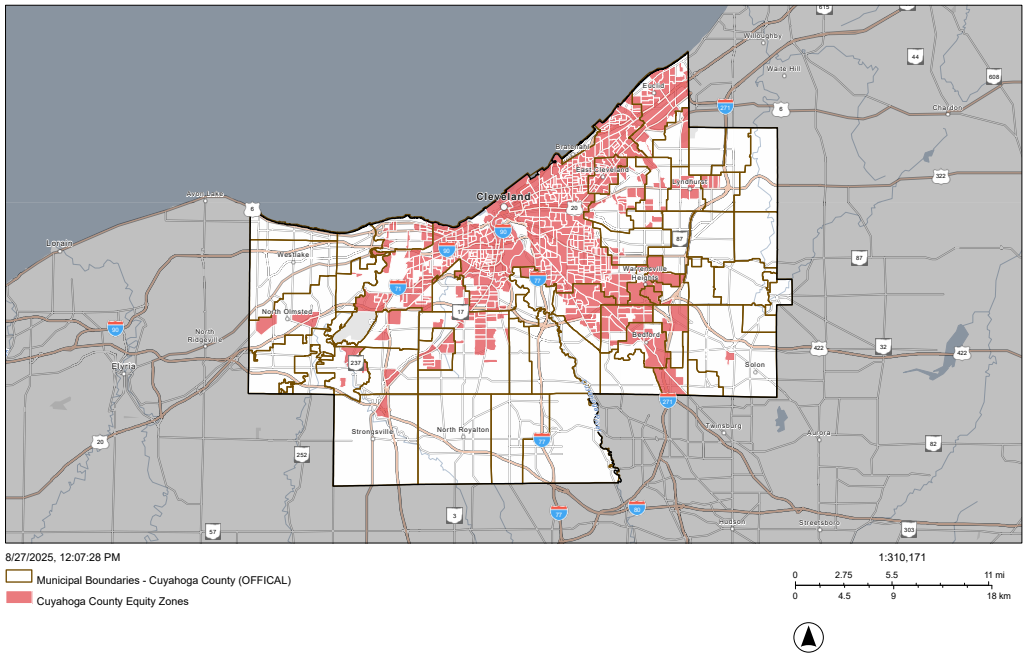


Figure 9 Equity Zones in Cuyahoga County

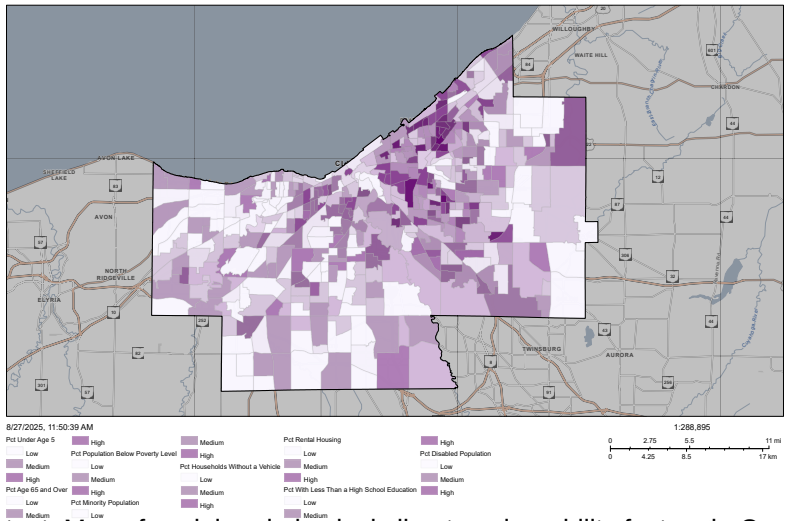
Alt text: Map of equity zones in Cuyahoga County.

CLIMATE VULNERABILITY ASSESSMENT

The **climate vulnerability assessment** [20] combines 5 physical and 8 social factors to identify areas in the county where populations are most vulnerable to the impacts of climate change. The climate vulnerability assessment informs county and local stakeholders of communities that are at greatest risk to the impacts of climate change. This vital information aids in the allocation of funding and the placement of initiatives and programming to help combat climate induced disparities.

Social Factors Impacting Vulnerability:

- Population Under Age 5
- Population Aged 65 and Over
- Population Below Poverty
- Minority Population
- Households Without a Vehicle
- Rental Housing
- Populations Lacking High School Diploma
- Persons with Disability



Alt text: Map of social and physical climate vulnerability factors in Cuyahoga County.

Figure 10 Composite of Social Climate Vulnerability Factors in Cuyahoga County

Physical Factors Impacting Vulnerability:

- Heat Island Effect
- Floodplain
- Older Residential Buildings
- Impervious Cover
- Lack of Tree Canopy

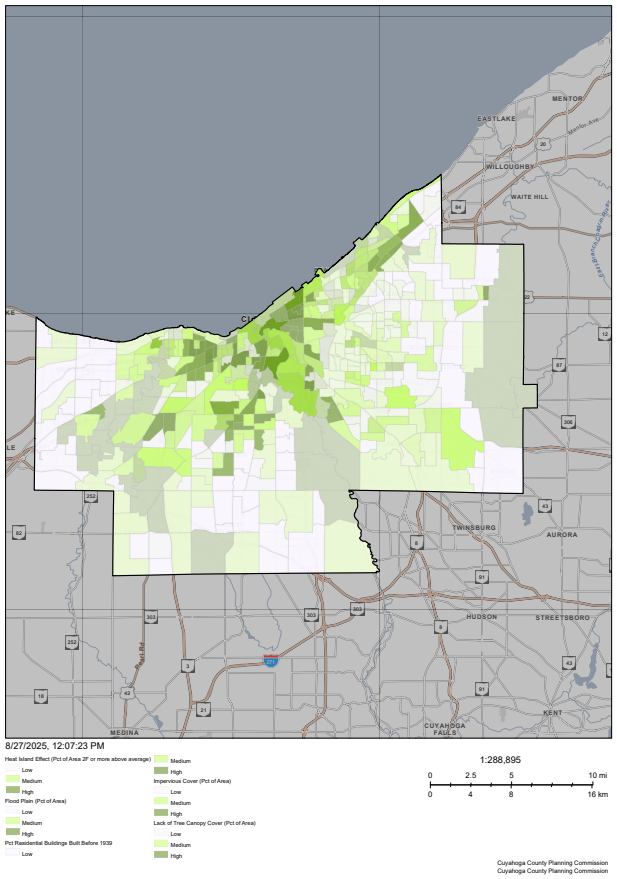


Figure 11 Composite of Physical Climate Vulnerability Factors in Cuyahoga County

How Climate Action Advances Other County Priorities

Climate and Energy initiatives are a priority for Cuyahoga County. The actions in this plan primarily focus on reducing greenhouse gas emissions and helping our communities adapt and be resilient to climate change. These actions have many co-benefits that advance other priority action areas that align with the vision for Cuyahoga County including:

Healthy Cuyahoga: Fostering a community where health, wellness, and safety take center stage, creating a thriving environment for all

Jobs and Infrastructure: A diverse and resilient economic landscape in Cuyahoga County that benefits residents, businesses, and the overall prosperity of our community

Public Safety and Justice: A secure and equitable community, prioritizing public safety initiatives that ensure the well-being and justice of all residents

Operational Excellence: An efficient, transparent, and effective County government for the people, where County operations are streamlined, responsive, and continually improving for the benefit of residents

Affordability: A more inclusive and accessible community for all Cuyahoga County residents

Prioritization of Climate Actions

This Climate Action Plan is intended to focus on priority climate actions that are impactful and feasible to implement using the following rubric

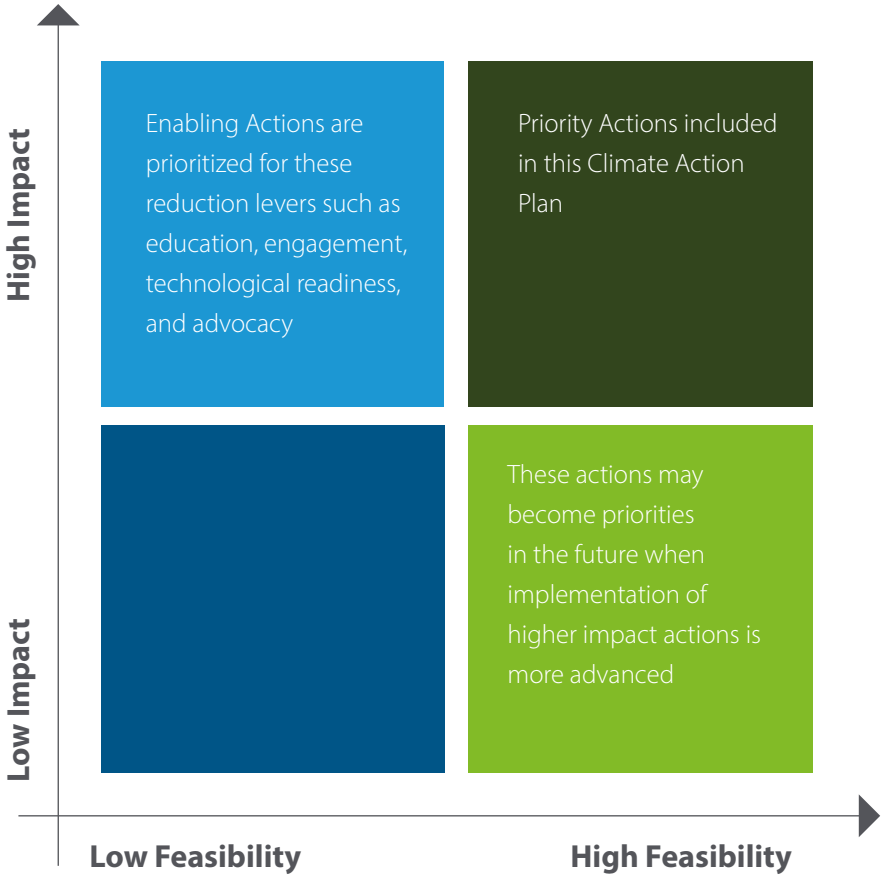


Figure 12 Climate Action Prioritization Matrix

	HIGH IMPACT	HIGH FEASIBILITY
MITIGATION	Potential to reduce greenhouse gas emissions	Supported by federal, state, or local policy and programs High interest and potential for local action including inclusion in other local plans Grant funds or financing are widely available High technological and market readiness Implementation partners identified
ADAPTATION	Potential to increase resilience of vulnerable population or areas High potential to reduce climate risk and increase opportunities for communities or business Improves other County priorities	

Table 1 Climate Action Impact and Feasibility Rubric

Stakeholder Engagment

The Cuyahoga County Department of Sustainability conducted stakeholder engagement activities to inform the Climate Action Plan and to create opportunities for dialogue and shared learning focused on climate change.

ASPEN INSTITUTE & CUYAHOGA COUNTY CLIMATE ROUNDATBLE

Cuyahoga County hosted a Climate Roundtable in July 2024 to highlight climate realities and solutions in Northeast Ohio. The discussion was focused on identifying partnerships for climate action in Cuyahoga County and hosted in partnership with the Aspen Institute. A pre-selected group of participants, identified by Aspen Institute and Cuyahoga County, discussed the resources and knowledge available to local governments to adapt to the effects of a changing climate and invest in their vision. Participants were selected to represent a range of sectors and perspectives. The agenda of the roundtable was built around existing priorities in the local climate action context. The dialogue added value and was designed to inform this Climate Action Plan.

The County used the roundtable as a learning opportunity around effective engagement to generate and sustain climate action in Cuyahoga County. This facilitated open dialogue was analyzed with a survey before and after the event which focused on connections and collaborations amongst participants. Responses showed the event created new connections amongst 76% of attendees surveyed and strengthened connections across the nonprofit, education, government, and business sectors. The results demonstrate that this style of dialogue is a critical enabling climate action moving forward. Key learnings from the roundtable are incorporated into this plan.

Did any fellow participants meaningfully shape or change your perspectives or approaches to the topics discussed during the roundtable? What was it about your interactions that helped shift your perspectives or approach?

33%

They took the time to explain themselves and help me understand the rationale for their perspectives and approaches.

67%

I better understand the core commitments, concerns, and realities that shape others' perspectives and approaches.

COMMUNITY COLLABORATION SURVEY

In 2024, all jurisdictions within Cuyahoga County were asked to complete a Regional Collaboration Survey which included questions specific to climate action and sustainability. Forty-two out of 57 communities completed the survey and ranked the following climate action areas as highest priorities in the County:

- Tree Planting and Maintenance
- Energy Efficiency in Municipal Operations
- Sustainable Municipal Procurement

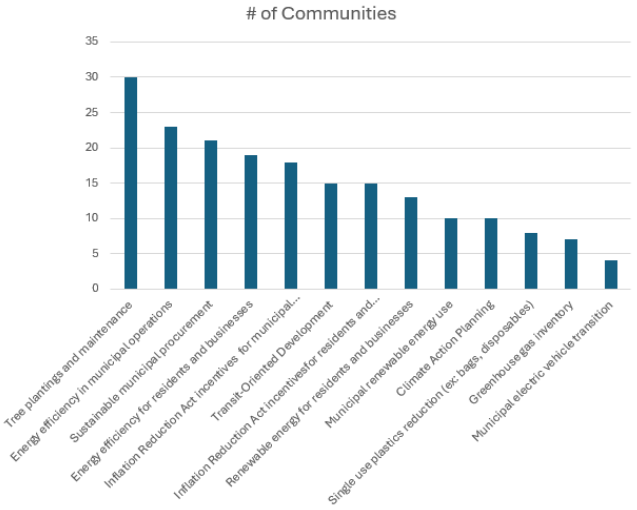


Figure 13 Numbers of Jurisdictions Indicating these Topics are Important to Their Community

Jurisdictions also indicated they were open to collaborating with the County on these topics (ranked by the number of communities willing to partner).

- Uptake on Clean Energy Tax Credits and rebates for residents and businesses
- Renewable energy and energy efficiency for residents and businesses
- Single-use plastics reduction
- Electric Vehicle transition
- Greenhouse gas inventory

MUNICIPAL CLIMATE COLLABORATION

Based on the results of the Community Collaboration Survey and building off the Climate Roundtable Discussion, the Department of Sustainability is providing technical assistance to jurisdictions within Cuyahoga County.

All jurisdictions received a greenhouse gas inventory for scope 1 and 2 emissions within their city boundaries. They were provided with data, key insights, and an executive summary, along with some priority climate action areas based on their unique climate footprint.

Additionally, the Department of Sustainability is providing climate action technical assistance around climate action strategies funded by the Northeast Ohio Areawide Coordinating Agency's (NOACA) U.S. EPA's Climate Pollution Reduction Grant (CPRG) Planning Grant to select jurisdictions. The purpose is to pilot a program where a signature climate action of the County is to support communities within the County that want to take climate action.

The next phase is to share key learnings and use this to launch periodic sessions where communities can come together to share information and best practices. Working collaboratively with the Mayors and Managers Association of Cuyahoga County and the First Suburbs Consortium is a key engagement strategy of the Department of Sustainability.

Figure 14 Cuyahoga County Sustainability Staff Engages Community on the Pedestrian Level of the Veterans Memorial Bridge

COMMITMENT TO COMMUNITY

Community engagement is an important part of the Department of Sustainability Strategy, with outreach on sustainability and climate-related topics being a priority throughout the year. The Department of Sustainability hosts monthly webinars and participates in several tabling, speaking, and volunteer events throughout the year. The County values those conversations with residents, businesses, and other stakeholders in our region.

CUYAHOGA COUNTY GREENHOUSE GAS EMISSIONS

Cuyahoga County periodically conducts a county-wide greenhouse gas inventory. The latest full-year data available at the time of publication is 2022. Cuyahoga County's greenhouse gas emissions (GHGs) are primarily generated by the residential, commmercial, industrial, and transportation sectors. Solid waste, water and wastewater utilities, and fugitive emissions comprise a smaller portion of emissions as well. The sources of emissions are generated by electricity consumption, natural gas combustion, fuel from transport emissions, and industrial process emissions.

2022 Cuyahoga County GHG Emissions by Sector

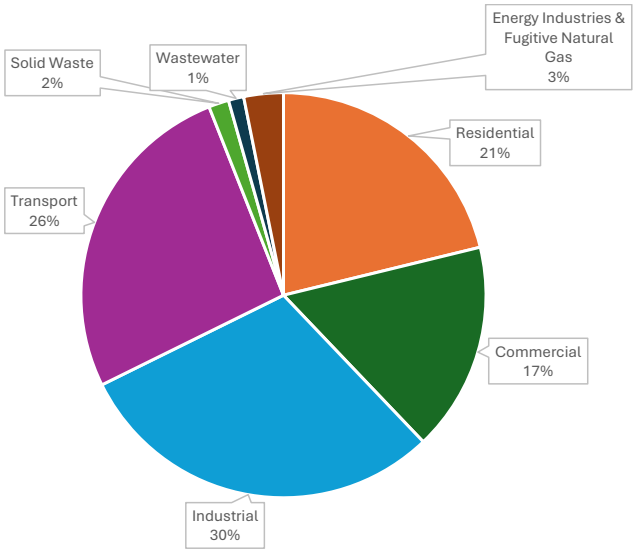


Figure 15 Pie Chart 2022 Cuyahoga County GHG Emissions by Sector

2022 Cuyahoga County GHG Emissions by Source

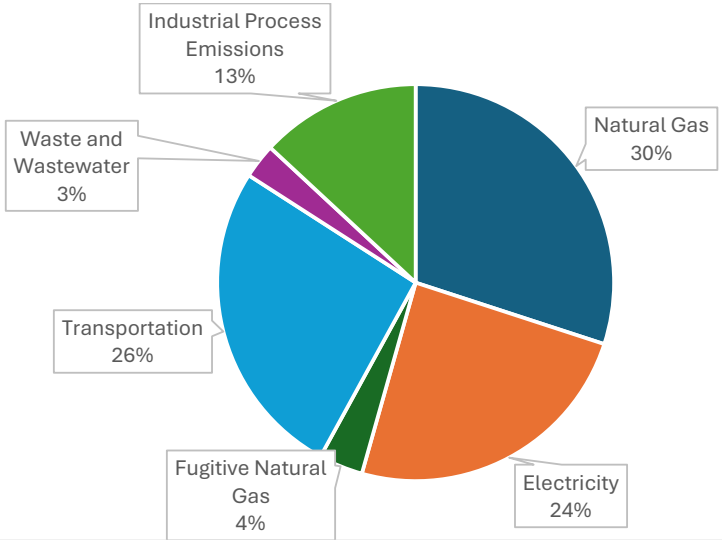


Figure 16 Pie Chart 2022 Cuyahoga County GHG Emissions by Source

The full County Greenhouse Gas inventory, individual municipal inventories, and more information on the methodology can be found at **https://cuyahogacounty.gov/sustainability/plans-data**

CLIMATE TARGETS

Targets by cities and regions are science-based if they are **in line with the goals of the Paris Agreement** and the Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5 C, [21]which are based on the best available data and evidence. The Science-Based Targets Initiative (SBTi) protocol defines targets that are **equitable and consider historic greenhouse gas emissions** and respect socio-economic development. They must be complete and include the major sources of Scope 1 (on-site fuel combustion and fugitive emissions) and Scope 2 (purchased electricity) GHGs. These are referred to as science-based targets (SBT).

There are three SBTi approved methodologies for public sector SBTs. Cuyahoga County used the WWF One Planet City Challenge methodology, which is supported by CDP (formerly Carbon Disclosure Project), an important global standard for transparent environmental reporting. [22]

SCIENCE-BASED

"Aligned with Earth's limits and societal sustainability"
The scope and ambition of the target is aligned with the scientific limits that define a safe space for humanity and a just future for nature and people.

TARGETS

"Measurable, actionable, and time-bound objectives"
Target-setters must be able to measure a baseline, take action and track progress.

In June 2024, Cuyahoga County pledged to be "all in" by joining the America Is All In initiative. Being part of America Is All In represents a **commitment to drive the transformational climate action that science demands, using direct action and advocacy** to meet the United States' goals under the Paris Climate Agreement. Cuyahoga County's science-based GHG reduction target is a 63% reduction in absolute emissions from our 2018 baseline by the year 2030 and net zero emissions by 2050.

Cuyahoga County 2030 Reduction Target

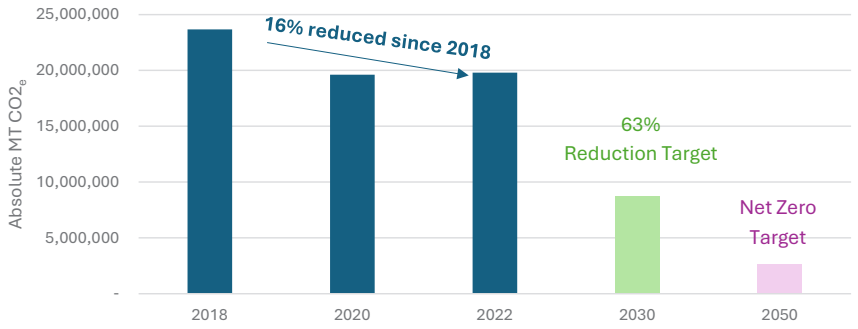


Figure 17 Bar Chart of Historic GHG Emissions and GHG Reduction Targets

The business-as-usual (BAU) forecast for Cuyahoga County indicates a reduction of GHGs of approximately 1,220,000 MTCO2e (the common unit used to measure greenhouse gas emissions) or 6% reduced from the 2022 emissions by 2030, and an additional 7% from 2030 to 2050. This forecast is not inclusive of the climate actions described in the mitigation section of this plan. Details of the assumptions and methodology of the BAU forecast are in Appendix C.

Business-As-Usual Emissions Forecast

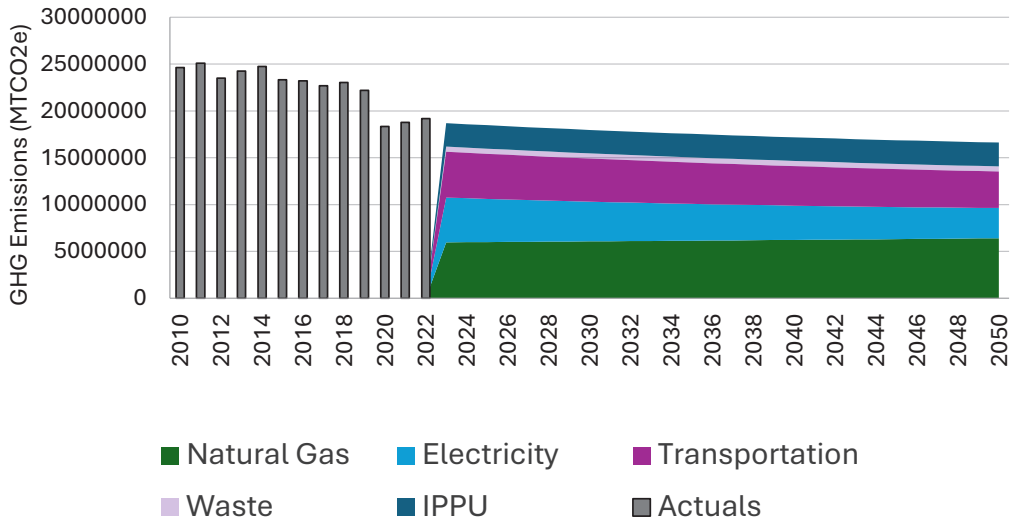


Figure 18 Business As Usual GHG Forecast

CLIMATE MITIGATION

Climate mitigation strategies reduce the volume of emissions going into the atmosphere, lessening the magnitude of climate change. From 2018-2022, emissions in Cuyahoga County declined by 16%. This reduction was driven by increases in energy efficiency resulting in lower natural gas and electricity consumption in the residential, commercial, and industrial sectors. The County has increased on-site renewable energy consumption, and the regional electricity transmission grid has reduced its emissions intensity by 17% compared to 2018. [23] All sources of GHG emissions are reduced except for solid waste and fugitive natural gas sources, which are trending slightly upward.

GHG Emissions Change 2018-2022

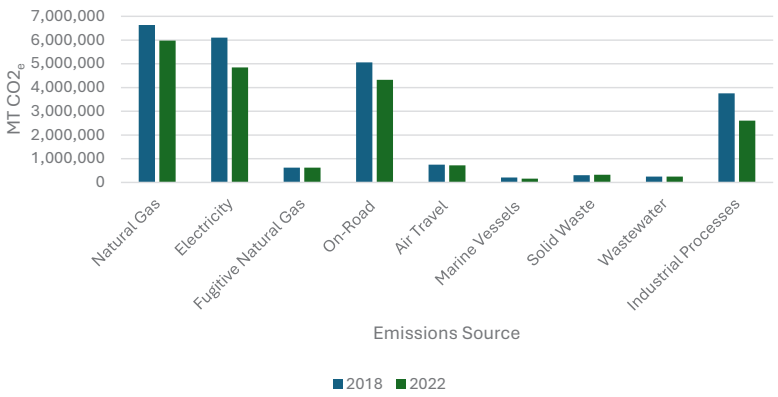


Figure 19 Change in MTCO2e by Source 2018 to 2022

Planned climate mitigation actions between 2025-2030 would result in approximately 50% reduction in GHGs in the County. These actions are ambitious and will require funding, policies, and multi-sector partnerships.

The enabling actions listed in the mitigation section of this plan could help to ensure the 63% target is met, by advancing the regional greening of the grid and creating a policy environment to accelerate the climate mitigation levers.

GHG Mitigation Estimated Impact By Sector

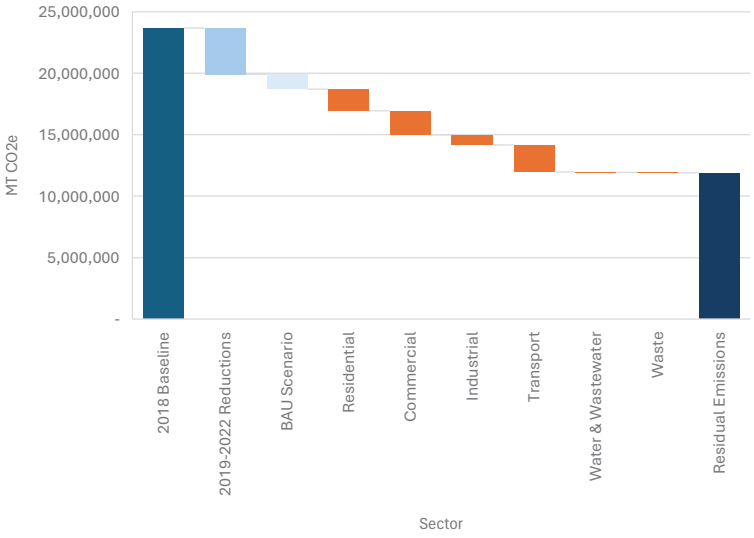


Figure 20 Estimated GHG Reduction Potential by Sector 2025-2030

REDUCING RESIDENTIAL GHG EMISSIONS

Emissions from residential properties comprised 22% of GHGs generated in Cuyahoga County in 2022. These emissions have declined by nearly 8% since the 2018 baseline.

ADVANCING COUNTY PRIORITIES

Affordability
Healthy Cuyahoga

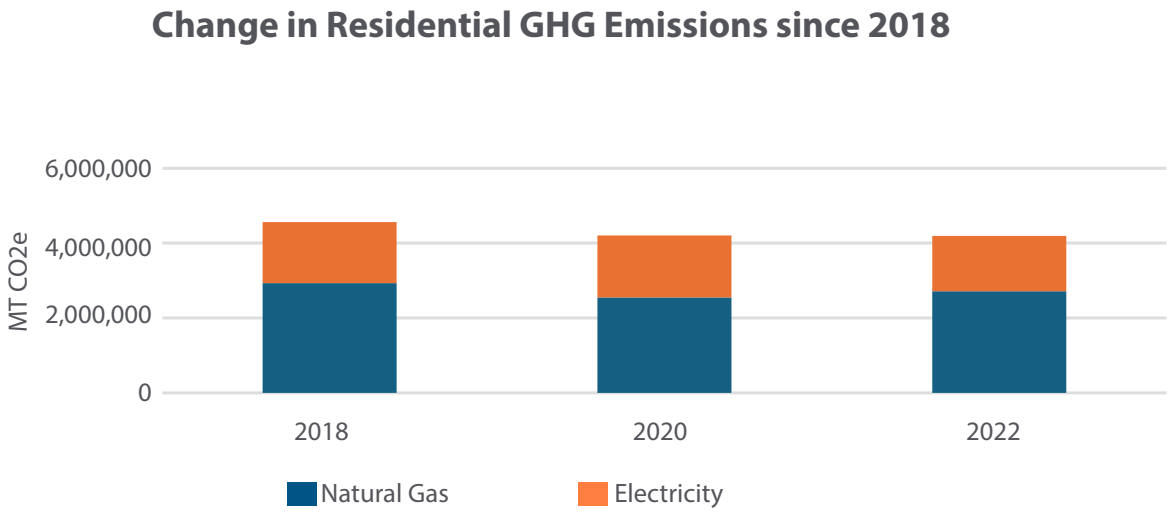


Figure 21 Change in Residential GHG Emissions 2018, 2020, 2022

BACKGROUND AND ANALYSIS

The age of residential buildings in the County is an indicator of higher GHGs due to potential energy inefficiencies, reliance on fossil fuel-based heating systems, and lack of insulation common in older housing stock. The median vintage of residential buildings in Cuyahoga County is 1952. [24] Housing stock aligns with development patterns over time and is older in the City of Cleveland and inner-ring suburbs and newer in the outer-ring suburbs.

LOCATION	MEDIAN YEAR BUILT
Cuyahoga County	1952
City of Cleveland	1923
Inner-Ring	1950
Outer-Ring	1968

Table 2 Residential Housing Stock Median Year Built

The U.S. EPA and the Department of Energy (DOE) recommend an insulation level of R10 or above in Ohio. More than half of Ohio homes are uninsulated, and an additional 15% have insufficient insulation per the recommendation of U.S. EPA. [25]

According to the National Renewable Energy Lab Residential Building Stock Analysis, single-family detached homes built between 1940-1979 can reduce emissions by upgrading enclosures and systems. A basic enclosure upgrade includes upgrading attic insulation to modern building codes, reducing air leakage by 30%, sealing ducts, and adding R-10 insulation.

Basic Enclosure Upgrade with Heat Pump, Water Heater, and High Efficiency Heat Pump with Electric Back Up [26]

Year Built	Electric Bill Savings (%)	Electric Emissions Reduction (%)	Nat. Gas Bill Savings (%)	Nat. Gas Emissions Reduction (%)
<1940			30%	63%
1940-1979	56-57%	60-61%	25%	58%
1980 or after	47%	50%	17%	48%

Table 3 Residential Retrofit Energy Bill and GHG Emissions Savings

In Cuyahoga County, natural gas use comprises 65% of residential emissions, with the remaining 35% from electricity consumption. The decline since the baseline can be, in part, attributed to a cleaner electricity grid and residents using Ohio's Energy Choice policy to contract for electricity powered by renewable energy—either through the Public Utility Commission of Ohio's (PUCO) Apples to Apples website or through energy aggregation programs.

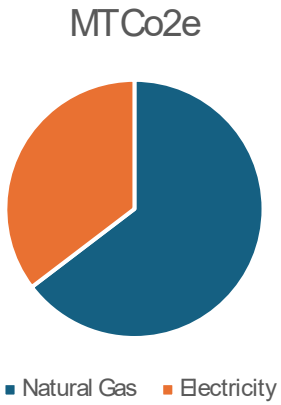


Figure 22 2022 Residential Stationary Emissions Breakdown

As housing stock is modernized and older homes are retrofitted and upgraded with more efficient and electric equipment, these emissions should continue to lessen over time. This trend could be accelerated by connecting residents with programs, incentives, rebates, and tax credit programs. Because natural gas is a dominant source of residential energy consumption, electrifying heat and appliances and using renewable electricity to power those systems will be critical to reducing GHGs over time. Converting household appliances such as boilers, gas-powered dryers, and stoves to heat pumps, electric dryers, and electric or induction ranges are solutions that are currently being incentivized by IRA tax credits and rebate programs.

In addition to energy efficiency and electrification retrofits, residents can increase their consumption of renewable electricity through installation of rooftop solar, by purchasing renewable electricity from a utility, or as part of a clean energy aggregation program. Communities that choose to do clean energy aggregation on behalf of residents see their GHGs decline by 25-30%, according to Power a Clean Future Ohio (PCFO). PCFO's Community Choice Aggregation Toolkit is a helpful resource for communities looking to offer this program.

Home Energy Efficiency and Electrification

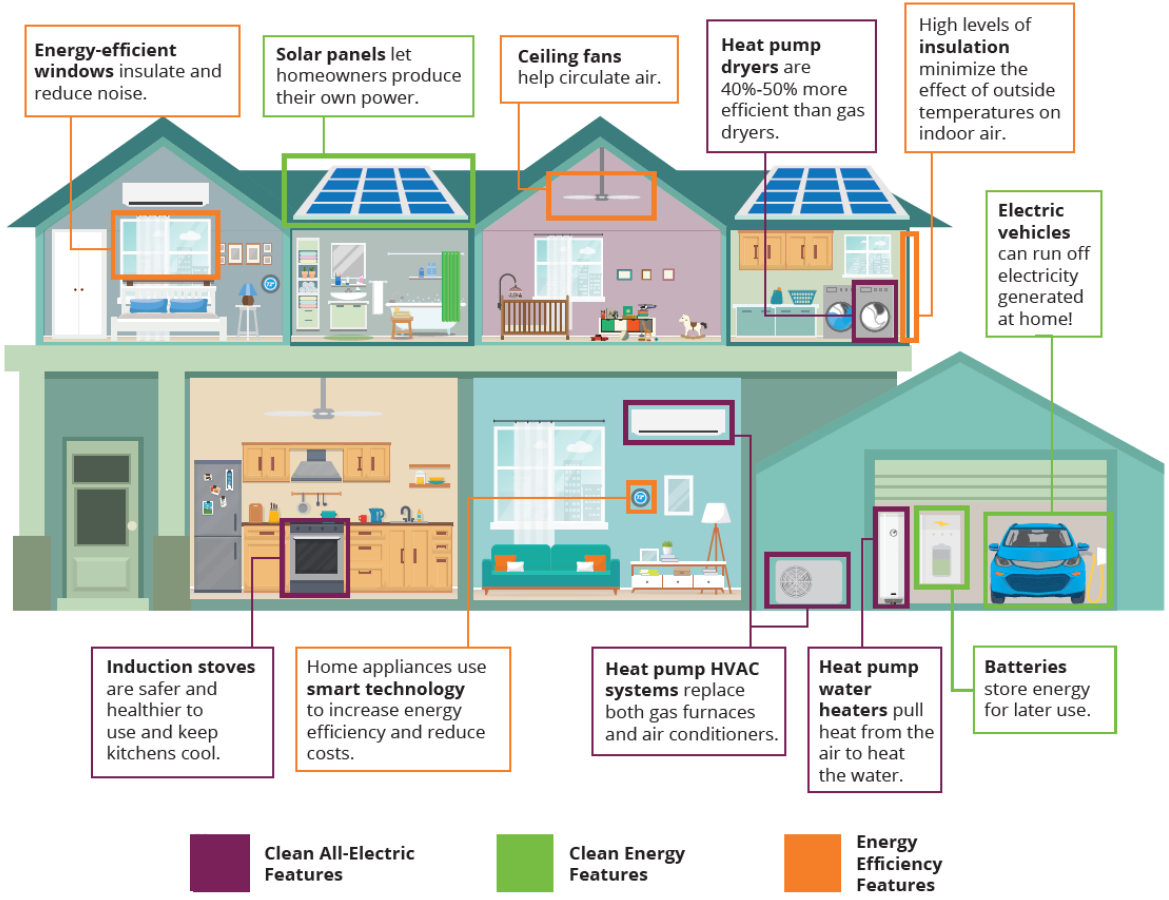


Figure 23 Examples of All-Electric Appliances and Energy Efficiency Upgrades for a Whole Home Electrification Project, Courtesy of Edison International

RESIDENTIAL MITIGATION ACTIONS

M1
Residential Energy Efficiency and Electrification
Estimated GHG Reduction Opportunity:
354,000 $MTCO_2e$

Description

Implementing upgrades to residential energy systems and appliances to consume less energy.
Improving residential building envelopes through weatherization to reduce the need for heating and air conditioning-related energy consumption.
Converting systems and appliances that burn fossil fuel to electrified versions.

Role of Cuyahoga County

Cuyahoga County will work with jurisdictions and nonprofits to help residents learn about and use energy efficiency and electrification-related federal, state, and local programs. County Department of Housing and Community Development will subsidize interest rates for residential efficiency efforts through its residential linked deposit lending program.

Partners and Programs

Clean Energy Tax Credits, Ohio Department of Development Energy Efficiency Rebate Program, Home Weatherization Assistance Programs, Rewiring America, Cuyahoga County Mayors and Managers Association, First Suburbs Consortium, Black Environmental Leaders.

M2
Residential Rooftop Solar
Estimated GHG Reduction Opportunity:
281,000 $MTCO_2e$

Description

Installing on-site solar on residential rooftops (single and multi-family) for families of all income levels to provide behind-the-meter renewable energy to households.

Role of Cuyahoga County

Continue to implement Cuyahoga Green Energy Residential Solar Co-op and launch the Solar for All program for low and moderate -income households within the County.

Partners and Programs

Industrial Heartland Coalition and Growth Opportunity Partners, Ohio Air Quality Development Authority, including the Solar for All statewide program.

M3
Residential Clean Energy Aggregation
Estimated GHG Reduction Opportunity:
1,121,400 $MTCO_2e$

Description

Supporting residential energy aggregation programs that source credible, cost-effective renewable electricity with contracts that meet or stay below the price to compare through the length of the procurement. Communities that participate in these programs also may access energy efficiency grant funds through their aggregators.

Role of Cuyahoga County

Engaging with jurisdictions to educate and inform them about clean energy aggregation programs.
Encourage membership in Power a Clean Future Ohio.

Partners and Programs

Jurisdictions, SOPEC, NOPEC, other Councils of Governments (COGs), PUCO Apples to Apples energy choice platform, and Power a Clean Future Ohio.

Enabling Actions

Community Solar

Ohio law restricts virtual net metering of renewable energy projects by investor-owned utilities which prevents the development of community solar projects. The County will advocate and partner with coalitions to advance virtual net metering and community solar legislation. Potential partners: Ohio Environmental Coalition, Citizen's Utility Board, Power a Clean Future Ohio.

Build to Green Standards

New residential buildings should be built to green standards such as LEED, National Green Building Standard, or Enterprise Green Communities. Existing buildings can be renovated to green building and energy standards such as Energy Star. Cuyahoga County will incentivize and/or require green building through its community development and economic development grants and loans. The County will share best practices such as voluntary sustainable building codes with communities. Potential Partners: Cleveland 2030 District, Ohio Chapter of the U.S. Green Building Council.

Cuyahoga Land Bank Circle East Development

The mission of the Cuyahoga Land Bank is to strategically acquire properties, return them to productive use, reduce blight, increase property values, support community goals, and improve the quality of life for County residents. The Circle East District is a partnership between the cities of East Cleveland and Cleveland and the Cuyahoga Land Bank to revitalize the 30-acre residential and commercial areas along Euclid Avenue at the eastern gateway to University Circle along the RTA Red Line and the Health Line. This large-scale transit-oriented development focuses on sustainability as a core principle. It involves the construction of over 200 new highly energy efficient homes (with rooftop solar and EV chargers included), construction of a new 1-acre community greenway with a walking and biking path, new underground infrastructure, repair of the existing homes, wider sidewalks, and new LED streetlights. The project has already received a 4-star rating from the National Green Building Standard (NGBS) for its planning phase and expects to achieve the same for its implementation phases. Cuyahoga County has supported this project in a number of ways:

- In 2010, the County contributed Neighborhood Stabilization Program Funds to build the Circle East apartment building on Euclid Avenue.
- In 2022, the County contributed $950,000 of Community Development Supplemental Grant (CDSG) funds towards the $4 million renovation of a 25,000 sq. ft. commercial building on Euclid which will soon house a new life sciences company that will bring 100 jobs to the Circle East District.
- In 2023, the Cuyahoga County Department of Housing and Community Development contributed $250,000 toward the construction of five new single- family homes in Circle East. The groundbreaking for the homes took place in February 2025.
- in 2025, Cuyahoga County Council awarded the project $100,000 to support safety patrols in the area, and the project received $50,000 of CDSG funds toward enhanced streetscape on Euclid Avenue.

Figure 24 Circle East Rendering

Switch: Residential Solar Co-op

Cuyahoga County started the Solar Co-op in 2018 to make solar energy more affordable and accessible for residents by partnering with Solar United Neighbors (SUN), a national nonprofit, to organize the co-op and represent the needs and interests of individuals and businesses that want to go solar. Community members can join the co-op to receive free information about solar. Through the program, bids are solicited and installers chosen on behalf of the co-op participants.

Cuyahoga County hopes to see at least 1,000 low to moderate-income households receive solar installations over the next five years. Joining the co-op does not oblige members to buy solar panels. Those who choose to buy solar panels can do so at a reduced cost. Members typically receive a 15 - 20% reduction on the installation of solar panels. Members can find additional savings utilizing the Federal Solar Tax Credit that was made available through the Inflation Reduction Act before its phase-out in December 2025. Over the last 10 co-op sessions, there have been a total of 256 installations, 1.68 MW installed capacity, $5 million in investment, and an estimated 33 jobs created.

Residential Solar Installations

418

Renewable Energy

2.3 MW

Residential Solar Installations

$5 Million

Figure 25 Cuyahoga County Residential Solar Co-op Installation

REDUCING INDUSTRIAL GHG EMISSIONS

Emissions from industry comprise 30% of Greenhouse Gas Emissions generated in Cuyahoga County in 2022. These emissions have declined by nearly 27% since the 2018 baseline

ADVANCING COUNTY PRIORITIES

Jobs and Infrastructure

Industrial GHG Emissions Change Since 2018

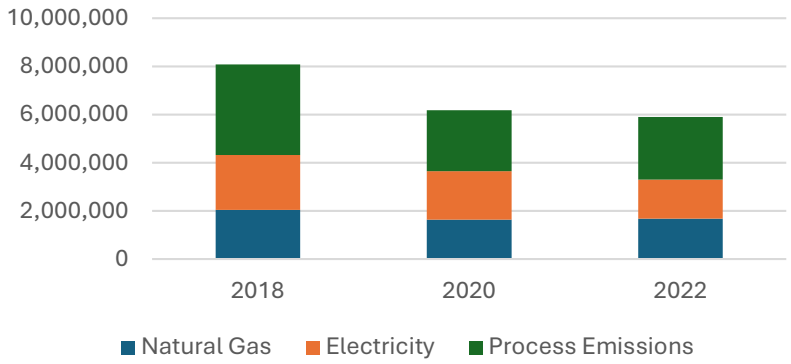


Figure 26 Industrial GHG Emissions 2018-2022

BACKGROUND AND ANALYSIS

Known historically as an industrial powerhouse, Cuyahoga County's manufacturing sector includes food processing, advanced manufacturing, polymers and materials, and metal production and fabrication among other businesses. In 2023 nearly 13% of the County's workforce was employed in a goods producing enterprise. [27]

While industrial emissions declined significantly since the 2018 baseline, only a portion of the reduction may be permanent given that in 2022 production may have been lower in the post-pandemic period. To retain the 27% reduction, growth in production must be decoupled from greenhouse gas emissions. 44% of Industrial GHGs are from industrial process emissions such as the carbon produced during the chemical processes of steel and cement manufacturing. The remaining emissions are split evenly between electricity and natural gas consumption.

Industrial GHG Emissions by Source

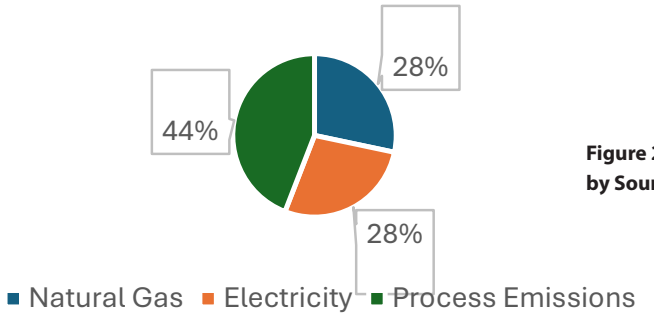


Figure 27 2022 Industrial Emissions by Source

MODERNIZING IS DECARBONIZING.

As industry invests in process and equipment upgrades, the increased efficiency will decarbonize operations in general. The most carbon intensive industries will need to invest in changes to how products are made to decarbonize them. Intensive fossil-fuel based heating processes will need to electrify and use renewable electricity or use alternative fuels such as green hydrogen or biofuels. In Cuyahoga County, steel manufacturing represents 13% of our total GHG emissions and 97% of total 2022 industrial process emissions. The maturity, cost, and incentivization of new technologies will be critical to implementing solutions for this industry.

Decarbonizing steel manufacturing is critical for global competitiveness as regulation, such as the European Union's Carbon Border Adjustment Mechanism, takes effect requiring lowering the carbon footprint of materials to avoid trade taxes.

Locally, steel has historically been produced using blast furnaces to create pig iron and then basic oxygen furnaces to produce steel. Both processes emit carbon as part of the metallurgical transformation.

Recent improvements in local steelmaking include investments in energy efficiency and the use of hot briquetted iron (HBI). HBI is created by reducing the iron ore with natural gas —a less carbon intensive process than using pig iron created using coke. In blast furnaces HBI replaces coke and iron ore, while in electric arc furnaces it replaces scrap metal to produce a higher-grade steel.

Using carbon capture and storage and alternative furnace technologies can improve efficiency and reduce carbon in this sector. Combining these technologies with renewable fuels, such as renewable biofuels or green hydrogen, will further reduce GHG emissions.

Industrious Labs' recent report, Cleveland Needs Clean Steel, analyzed pathways to decarbonize steel locally and concluded that direct reduced iron paired with electric arc furnace steelmaking fueled by green hydrogen could reduce greenhouse gas emissions from steelmaking by 95%. [29]

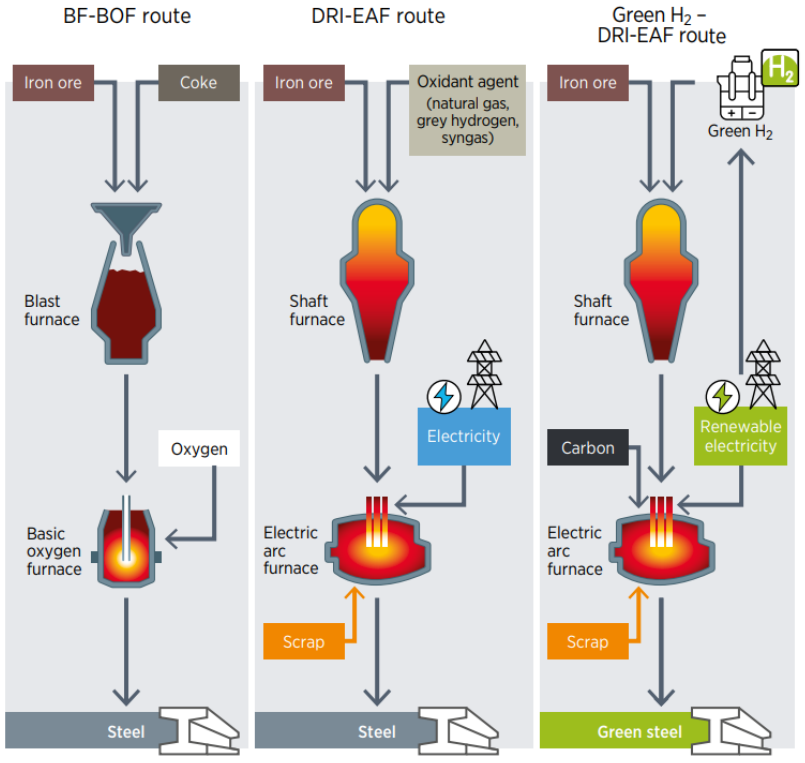


Figure 28 International Renewable Energy Agency Main Steel Production pathways

INDUSTRIAL MITIGATION ACTIONS

M4
Reduce Industrial Process Emissions, Industrial Energy Efficiency, Electrification and Alternative Fuels Estimated GHG Reduction Opportunity:
970,000 MTCO2e

Description

Using new and more efficient technology reduces energy consumption. More efficient practices such as waste heat capture, compressed air system maintenance, and energy management practices such as ISO 50001 reduce electricity, natural gas, and other fuel use. Shifting from fossil-fuel based processes and equipment to electrified processes can utilize renewable electricity. Switching from fossil fuels such as propane, diesel, butane, etc. in manufacturing to alternative sources such as biofuels or landfill methane.

Role of Cuyahoga County

Promote the use of new technology and partner to garner resources and technical assistance for small industrial businesses. Cuyahoga County Department of Development makes loans for industrial upgrades.

Partners and Programs

MAGNET, U.S. Department of Energy, U.S. EPA's Better Plants Challenge, Clean Energy Tax credits, ACEEE, Renewable Thermal Collaborative.

M5
Industrial Renewable Electricity Estimated GHG Reduction Opportunity:
364,000 MTCO2e

Description

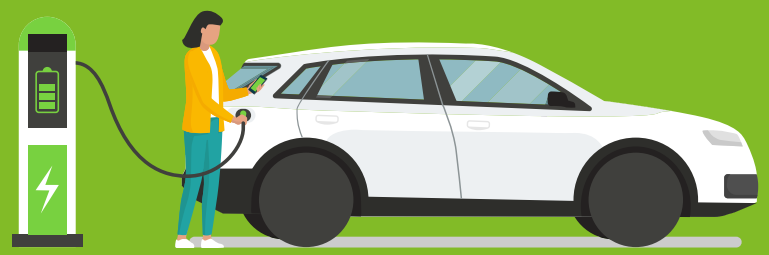
Deploying on-site and off-site use of renewable electricity including Power Purchase Agreements (PPAs) and procurement of Renewable Energy Credits (RECs) through green energy contracts.

Role of Cuyahoga County

Cuyahoga Green Energy will implement brownfield solar and microgrid projects for industry.

Partners and Programs

Power Up Local, Fund for our Economic Future, Cleveland Public Power.



Enabling Actions

Green and Blue Hydrogen

The development of alternative energy systems such as Green and Blue Hydrogen, biodigesters, and campus and district geothermal systems. Host updates on in-region solutions as they develop. Potential Partners: GCP, MAGNET, Appalachian Hydrogen Hub, Midwest Hydrogen Hub, CSU Energy Policy Center.

Carbon Capture and Utilization

Commercialization of carbon capture technologies is a critical component of industrial decarbonization. Several national and regional pilot projects are underway which should help improve market readiness and reduce implementation costs in this sector.

Cuyahoga Green Energy Solar Microgrids

In 2021, Cuyahoga County created a new energy utility, Cuyahoga Green Energy (CGE), to help transform Northeast Ohio's energy grid to be cleaner, more resilient, more secure, and more cost effective for its residents, industries, and commercial businesses. CGE aims to be an innovative and affordable electric utility employing state-of-the-art grid-edge technologies. The County has plans to develop six microgrid districts with at least 50 MW of renewable energy to serve industrial and community loads by 2030.

In collaboration with the City of Euclid, CGE is working to deploy its first microgrid along the East 222nd Street industrial corridor. This multi-customer transmission connected microgrid will bring resilient, local, renewable energy to commercial industrial businesses. Microgrid resources will be shared between off-takers and will include distributed solar and battery back-up systems.

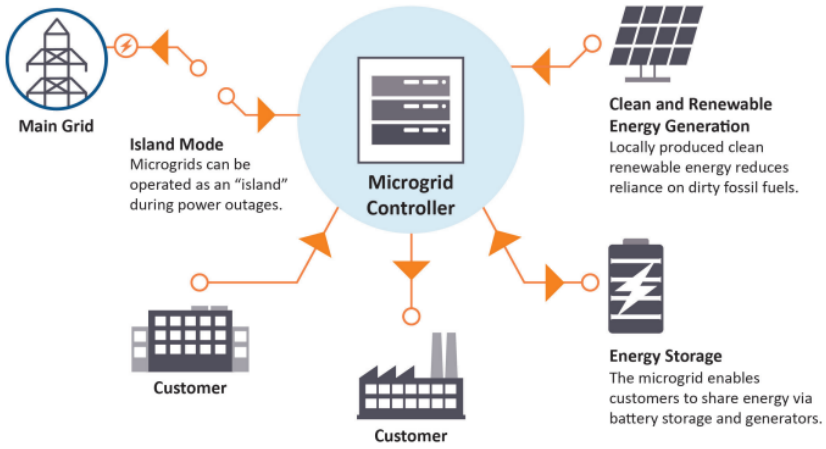


Figure 29 Components of a Microgrid

Cleveland-Cliffs

Cleveland-Cliffs is a leading North America-based steel producer with focus on value-added sheet products, particularly for the automotive industry. Along with its headquarters in downtown Cleveland, one of the company's largest steel mills is also located in Cleveland. The average Scope 1 and 2 GHG emissions intensity of Cleveland-Cliffs integrated mills, which includes the Cleveland Works steel mill, is 27% lower than the global GHG average.

Energy Efficiency

Cleveland-Cliffs is a member of the Department of Energy's Better Plants program and has a goal to reduce the company-wide energy intensity by 10% over ten years. In 2024 energy efficiency projects across the company are anticipated to save 160 million kWh of energy, which under U.S. EPA guidance is equivalent to over 15,500 homes. The Cleveland Works mill is investigating energy efficiency projects focused on water consumption, steam use, and compressed air systems. At Cleveland Works one of the key energy efficiency initiatives has included the consumption of hot briquetted iron (HBI) produced at the direct reduction plant in Toledo, Ohio. HBI is produced from iron ore, and when used in the blast furnaces improves energy efficiency and lower scope 1 GHG emissions.

On-Site Energy Recovery for Combined Heat and Power Generation

As part of the ironmaking process, by-product gases are generated that can be recovered to provide energy to the Cleveland Works steel mill. Rather than being flared, the gas is used to generate needed steam for the mill and electricity generation. The mill recently installed and commenced operation of a new electricity generator, increasing Cleveland Works' generation by approximately 50 MW. This improves the energy efficiency of the mill by reducing purchased electricity and lowering scope 2 emissions. In 2025, most of the mill's electricity needs are anticipated to be met with on-site power generation.

Steel for Sustainable Society

The Cleveland Works mill produces modern grades of steel that contribute to a more sustainable society, including advanced high strength steels (AHSS). AHSS grades contribute to vehicle lightweighting for the automotive sector improving energy efficiency of internal combustion, hybrid, and electric vehicles. This in turn reduces the emissions footprint of the vehicles.

REDUCING COMMERCIAL GHG EMISSIONS

Emissions from the commercial sector comprise 17% of Greenhouse Gas Emissions generated in Cuyahoga County in 2022. These emissions have decreased 14% since the 2018 baseline

ADVANCING COUNTY PRIORITIES

Jobs and Infrastructure

Industrial GHG Emissions Change Since 2018

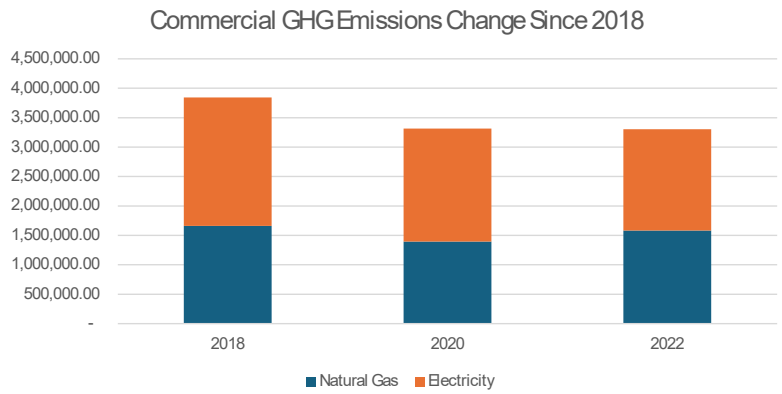


Figure 30 Commercial Sector Emissions Change from Baseline

BACKGROUND AND ANALYSIS

Greenhouse gas emissions from commercial buildings are nearly evenly split between electricity and natural gas sources. The commercial sector has reduced emissions by increasing energy efficiency, procuring renewable electricity, and implementing on-site renewables. A small decline in emissions can be attributed to changes in building use during and after the COVID 19 pandemic, however research has indicated that the base energy use in commercial buildings does not fluctuate as significantly as transportation emissions and water consumption.

Sources of Commercial GHG Emissions

Figure 31 2022 Commercial Emissions by Source

COMMERCIAL MITIGATION ACTIONS

M6
Commercial Energy Efficiency and Electrification
Estimated GHG Reduction Opportunity:
983,700 MTCO2e

Description

Implementing commercial energy efficiency using federal, state, and local programs such as Clean Energy Tax Credits and financing through the Greenhouse Gas Reduction Fund. Converting systems and appliances that burn fossil fuel to electric versions.

Role of Cuyahoga County

Cuyahoga County will work with jurisdictions and nonprofits to promote commercial sector education and uptake on energy efficiency-related federal, state, and local programs. The County will conduct energy audits at County-owned buildings and implement energy efficiency improvements. The County will promote NOPEC and GCP energy audit programs. The County will adjust its lending policies to prioritize County development loans to support commercial sustainability.

Partners and Programs

Ohio Department of Development Advanced Energy Fund, Clean Energy Tax Credits, Greater Cleveland Partnership (energy audits), Property Assessed Clean Energy (PACE) financing, Cleveland Thermal.

M7
Renewable Electricity
GHG Reduction Opportunity:
426.300 MTCO2e

Description

Installing on-site and off-site use of renewable electricity including PPAs and procurement of RECs through green energy contracts.

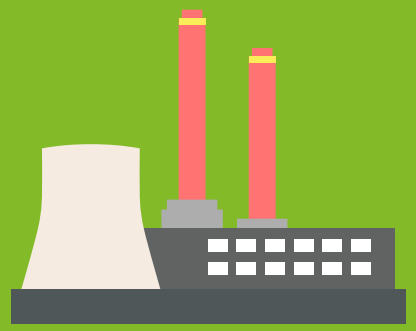
Role of Cuyahoga County

Cuyahoga Green Energy will continue to implement the Commercial Solar Co-Op, Solar Microgrids, Solar for Schools.

The County will implement distributed energy and smart grid solutions and procure green energy contracts at County facilities.

Partners and Programs

CPP, First Energy, Solar developers, Equity investors.



COMMERCIAL MITIGATION ACTIONS

M8
Commercial Clean Energy Aggregation
Estimated GHG Reduction Opportunity:
536,200 MTCO2e

Description

Supporting commercial small business energy aggregation programs that source credible, cost-effective, renewable electricity with contracts that meet or stay below the price to compare through the length of the procurement.

Role of Cuyahoga County

The County will engage with jurisdictions to educate and inform them about clean energy aggregation programs.

Partners and Programs

Jurisdictions, SOPEC, NOPEC, Councils of Governments (COGs), Power a Clean Future Ohio.

Enabling Actions

Incentivize Green Building and Net Zero Buildings

New commercial buildings should be built to green standards such as LEED or the GSA's 2024 P100 standard. Existing buildings should work to reduce energy use intensity. Participating in efforts such as the Cleveland 2030 District or the Better Buildings Challenge can help provide insights, tools, and resources. Support jurisdictions in incentivizing and/or requiring green building standards in economic development activities. Support energy disclosure and benchmarking programs. Create a green building policy for County government buildings. Potential Partners: U.S. Green Building Council and the Cleveland 2030 District.

District Energy Systems

District energy systems include geothermal and district scale steam and hot water technologies. Promoting and educating contractors and building owners about district energy systems can accelerate the adoption of these lower carbon solutions. Employing district heating, cooling, and geothermal systems in County buildings where feasible. Conducting an analysis of the geothermal potential in Cuyahoga County to define the potential demand and decarbonization.

Solar for Schools

In 2024, Cuyahoga County launched a new program to provide financial support to four Northeast Ohio school districts for solar installation. The Solar for Schools program aims to reduce electricity costs and regional GHGs while increasing equitable access to clean, local, renewable energy and providing educational opportunities for K-12 students.

The Solar for Schools program is made possible through a partnership between the County utility, Cuyahoga Green Energy, and the community financial institution, Growth Opportunity Partners (Growth Opps). The County will subaward Energy Efficiency & Conservation Block Grant funds in the amount of $95,000 to school districts to offset the costs of solar installations.

The Growth Opportunity Partners forgivable loan program will further alleviate the financial burden for the districts through forgivable loans of $50,000 per district. The school districts will own the solar systems and, as nonprofit entities, are now eligible to take advantage of the solar investment tax credits established through the IRA's Elective Pay Option.

The school districts participating in the first phase of the program include East Cleveland City School District, Maple Heights City School District, Euclid City School District, and Cuyahoga Heights City School District.

Figure 32 Congresswoman Shontel Brown with County and Maple Heights officials Celebrating the Federal Award in Support of Solar for Schools at Maple Heights High School

Cleveland 2030 District

Cuyahoga County is a member of the Cleveland 2030 District, one of 24 Districts across North America that have begun a movement based on Architecture 2030's Challenge for Planning. The challenge calls for existing commercial buildings to reduce energy use, water use, and transportation emissions by at least 50% from prescribed baselines by the year 2030 and for new construction to achieve zero emissions.

The Cleveland 2030 District is a voluntary movement, engaging over 75 million square feet of property in the Cleveland area and more than 50 professional partners and 30 community stakeholders in both the public and private sectors. The organization's approach includes education sessions to keep current with green building trends and emerging technologies. It relies on utility data to measure progress and provide property members with building performance reports that highlight potential for improvement. Through 2023, participating buildings reduced energy use by 28%, water use by 35%, and transportation emissions by 40%. The greatest strength of the 2030 District is connecting property managers, professionals, and other stakeholders who share the same values, working together to collectively achieve our region's goals to reduce emissions and the use of energy and water resources.

REDUCING TRANSPORTATION GHG EMISSIONS

Emissions from the transportation sector comprised 26% of Greenhouse Gas Emissions generated in Cuyahoga County in 2022. These emissions have declined by 13% since the 2018 baseline, but they have been on an upward trend with an 11% increase 2020-2022 as vehicle miles driven has increased after the pandemic. Most emissions come from on-road travel, with air travel comprising the second largest category.

ADVANCING COUNTY PRIORITIES

Transportation MT CO2e

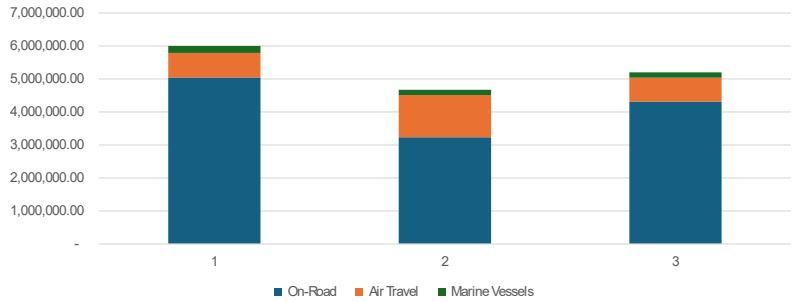


Figure 33 Transportation GHG Emissions 2018-2022

MT CO2e

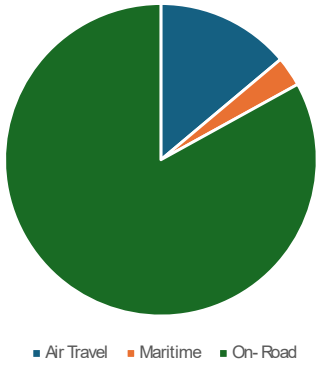


Figure 34 Sources of Transportation GHG Emissions

BACKGROUND AND ANALYSIS

Reducing emissions from transportation is multi-faceted and involves modernizing fleets and personal vehicles, updating land-use patterns and access to transit, improving electric charging options, and decarbonizing port and airport operations.

Alternative Fueled Vehicles

According to DriveOhio's Alternative Fuel Vehicle Registration Dashboard, there are 12,757 registered electric vehicles (EVs) in Cuyahoga County as of January 2024. From 2019 to 2024, EV registrations in the County more than doubled. Of the total number of vehicle registrations in Cuyahoga County, 2% are alternative fuel vehicles (electric vehicles, plug-in hybrid (PHEV), or compressed natural gas). To support EV and PHEV adoption, particularly for drivers without at-home charging, Cuyahoga County needs more public LEVEL 2 and DC fast charging ports. Cuyahoga County has 165 EV charging stations with 427 ports. According to the U.S. Department of Energy's Alternative Fuels Data Center EVI-Pro Lite Tool, our area needs at least 436 Level 2 charging ports and 178 DCFC ports to support current ownership and to increase adoption rates to the national average. In Cuyahoga County, commercial alternative fueled trucks are primarily light duty battery electric and compressed natural gas vehicles.

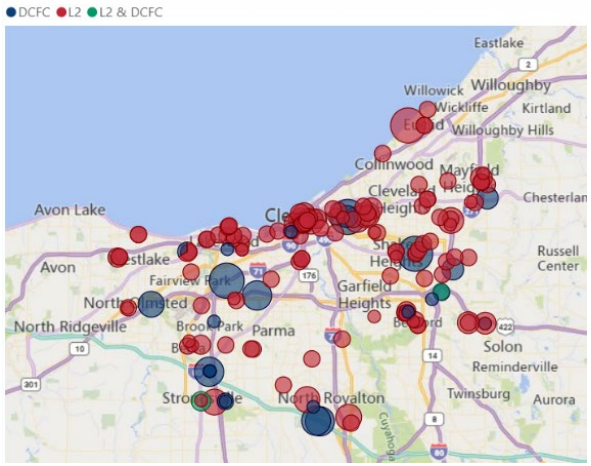


Figure 35 Drive Ohio Dashboard EV Charging Locations in Cuyahoga County

Alternative Fuel Type	Other	Light Duty	Medium Duty	Heavy Duty	Total
BEV	6	522	6	0	534
CNG	1	55	95	17	168
PHEV	2	4	0	0	6
Total	9	581	101	17	708

Table 4 Drive Ohio Dashboard Table of Commercial Alternative Fuel Trucks in Cuyahoga County

Driving Alone

Driving Alone: In Cuyahoga County, 75.6% of commuters drive alone to work, which is above the national average. The emissions from on-road vehicles are a function of four main variables: travel mode choice, fuel efficiency, vehicle fuel type, and total vehicle miles traveled (VMT). Most on-road vehicles in Ohio have internal combustion engines although the number of alternative fuel vehicles has begun to slowly increase.

Public Transit

Public transit is another vital source of transportation throughout our community. The Greater Cleveland Regional Transit Authority (GCRTA) is the largest transit agency in Ohio. Ridership declined in 2020 due to the COVID pandemic but has started to rebound. In 2024, ridership increased by 9% from 2022 and passenger trips totaled 24.9 million - an increase from 2021 levels, rebounding to 80% of pre-pandemic levels. [32]

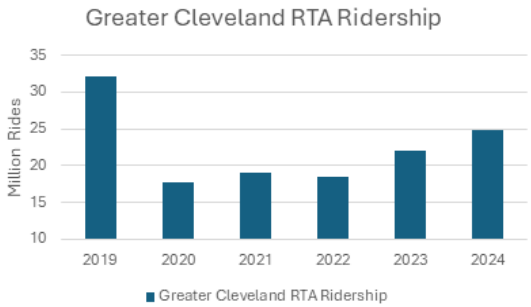


Figure 36 GCRTA Ridership 2019-2024

Maritime and Airports

Decarbonizing maritime and airports requires a combination of energy efficient operations including electrification of equipment, fleet, and craft and using alternative fuels. The Port of Cleveland's Net-Zero Electrification Plan aims to electrify ocean vessels, cargo equipment, harbor craft, and trucks and rail while deploying on-site rooftop solar generation with battery storage over the next ten years.

Sustainable Aviation fuel (SAF) is made from renewable biomass and waste resources and can replace fossil-based jet fuel, reducing the greenhouse gas emissions associated with air travel. SAF can be made from many types of feedstocks including mill waste, wastewater treatment sludge, and dedicated energy crops.

Because transporting SAF from where it is produced to airports across the country will erode the GHG reducing benefits and increase the costs, the industry has created a "book and claim" market for SAF.
The SAF is delivered via local jet fuel supply chains to airports close to the SAF production facility, thereby replacing an equivalent amount of fossil jet fuel. The environmental attributes are decoupled from SAF, preventing the airline that makes use of the fuel from laying claim to the allocation. The environmental attributes are sold and allocated to companies or people via a claim certificate.

Long-haul logistics, cargo handlers, and marine vessels are challenging to decarbonize, with battery electric solutions leading the sector and zero-emission hydrogen Fuel Cell Electric Vehicles (FCEVs) as one of the most promising climate solutions. FCEV's use an electric motor instead of an internal combustion engine to power the vehicle, however FCEV's produce their own power rather than plugging into an electric grid to recharge the battery. The conversion of hydrogen to electricity produces no pollutants. If hydrogen is produced within the region with new sources of renewable energy, it can be a low-carbon logistics solution.

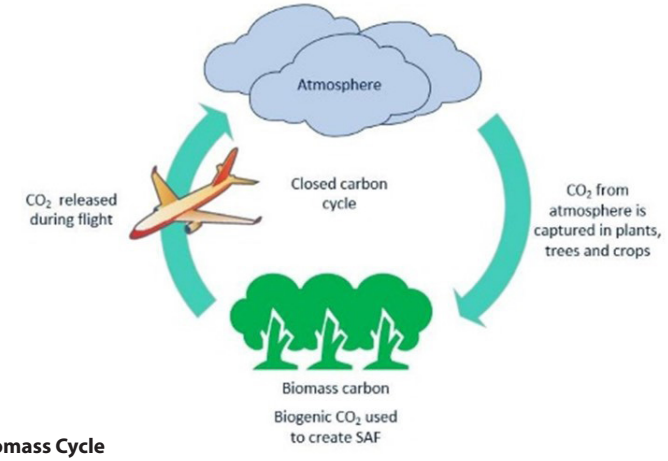


Figure 38 SAF Biomass Cycle

Figure 37 Hydrogen Fuel Cell Applications

TRANSPORTATION MITIGATION ACTIONS

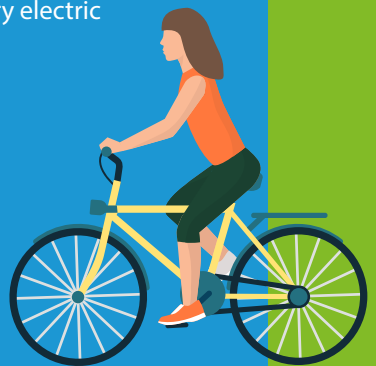
M9
Reduce Vehicle Miles Traveled and Transition to Electric Vehicles and Electric Transportation Infrastructure

Estimated GHG Reduction Opportunity: 2,204,100 MTCO2e

Description

Use transportation investments to advance local and Countywide goals for multimodal connectivity, road safety, public health, enhanced livability, and economic growth. Mitigation levers include:

- Shifting from driving alone in car to carpooling, transit, and active transportation such as biking and walking.
- Transitioning from internal combustion engines to battery electric and plug-in hybrid passenger vehicles and short and medium haul logistics.
- Upgrade propane and diesel fuel powered industrial trucks (forklifts, tractors, loaders, etc.), cranes, and equipment to battery electric replacements.



Role of Cuyahoga County

- Support the implementation of the Cuyahoga Greenways Plan and prioritize Complete & Green Streets projects in County operations.
- Engage in and support smart transportation planning in alignment with NOACA's Transportation Improvement Program and long-range transportation plan.
- Encourage employers to subsidize public transit and adopt modern, remote work policies.
- Lead by example as a model employer (public transit, bike friendliness, remote work, Gohio Commute) with sound policy and employee engagement.
- Support last mile connections that reduce automobile dependence.
- Support the EV Transition by installing public charging infrastructure in County facilities, converting County vehicle fleet to electric vehicles where feasible, and partnering to build a network of publicly accessible EV charging infrastructure.
- Support local transportation agencies', including GCRTA, The Port of Cleveland, and airports, electrification shift.

Partners and Programs

GCRTA, Bike Cleveland, NOACA, Gohio Commute, Cuyahoga County Planning Commission, Clean Fuels Ohio, Power a Clean Future Ohio, The Electrification Coalition. Port of Cleveland, Cleveland Department of Port Control, and Cuyahoga County Airport.

TRANSPORTATION MITIGATION ACTIONS

Enabling Actions

Transit-Oriented Development (TOD)

Advance transit-oriented development (TOD) throughout the County by adjusting economic development lending policies to prioritize funding for eligible mixed use and business growth projects that include public transportation hubs and pedestrian-friendly projects. Promote Cuyahoga County Planning Commission's Model TOD Zoning, interagency coordination, and municipal engagement.

Alternative Fuels

Educate about and promote the use of alternative fuels in transportation, including sustainable aviation fuel and biodiesel and hydrogen fuel cells. Promote SAF book and claim programs for airline scope 1 GHG reduction and procurement for business travel scope 3 reductions. Promote and support the inclusion of hydrogen fuel cell powered long haul/heavy duty transport and marine propulsion.

Passenger Rail Advocacy

Advocate for the State of Ohio joining the Midwest Interstate Passenger Rail Compact. Support alignment of advocacy efforts of All Aboard Ohio with the Ohio Rail Development Corporation . Potential Partners: All Aboard Ohio, Midwest Interstate Passenger Rail Commission (MIRPC), Ohio Rail Development Commission (ORDC), and NOACA.

Pitt Ohio Cleveland Terminal

Figure 39 PITT OHIO's LEED Gold Cleveland Terminal in Parma

PITT OHIO is a supply chain and trucking logistics company that operates in the Mid-Atlantic and the Midwest United States. Their Cleveland Terminal, located in Parma, Ohio, demonstrates best practices in transportation logistics, including achieving LEED Gold certification for its facilities. The 111,000-square-foot building includes a terminal, mechanic shop, office, and warehouse.

Renewable Energy Microgrid

The Cleveland Terminal includes eight 60' Windstax Energy wind turbines and 1,500 rooftop solar panels to store 1mWh in the facility's renewable energy-powered microgrid. The system generates 540,000 kWh of electricity annually to be stored and consumed on-site with the excess sent to the local utility grid. The site also features a geothermal energy system which reduces the consumption of electricity and natural gas.

Electrification

PITT OHIO's Cleveland terminal is equipped with electric forklifts which emit zero carbon and create a healthier work environment for employees. PITT OHIO operates Class 6 & 7 battery electric vehicles resulting in reduced maintenance costs and positive driver experience.

Efficiency

PITT OHIO is decoupling its growth from carbon emissions by using best practices in shifting and reduced idling. They are using their diverse fleet profile to improve average miles per gallon by 4.3%, while miles driven has increased by approximately 2%.

Carbon Reporting

The company passes sustainability expertise on to their customers, providing carbon footprint reporting to customers who use their services. This is an innovative service for a company providing Less-than-Truckload (LTL) logistics.

Cuyahoga Greenways

Cuyahoga Greenways is a blueprint for linking neighborhoods, parks, Lake Erie, the Cuyahoga River, and public transit through a comprehensive countywide network of trails that are safe and welcoming for people of all ages and abilities. This system of existing and future trails and bikeways aims to expand opportunities for commuting, recreation, and exercise. It was envisioned through a countywide planning process with a dedicated group of key stakeholders known as the Cuyahoga Greenway Partners. The result is presented in the **Cuyahoga Greenways Plan** developed by the Cuyahoga County Planning Commission.

Cuyahoga County embraces the vision for a connected, multimodal transportation system that expands mobility options available to residents and visitors. In 2024, Cuyahoga County's Departments of Public Works and Transportation & Mobility initiated a multimodal pilot in consultation with the Cuyahoga County Planning Commission.

The $200,000 pilot includes feasibility studies for two gaps in the County's multimodal transportation network:

1. **Bradley & Crocker Roads in Bay Village and Westlake**
2. **South Green Road in University Heights, Beachwood, and Shaker Heights**

The studies are evaluating options and will identify the best alternatives for multimodal enhancements (including bicycle, pedestrian, transit, and road safety) in consultation with municipalities. The studies will include feasible concepts with cost estimates that can be incorporated into future roadway projects.

Figure 40 County Planning Commission Staff Member Elaine Price During the County Greenways Tour

Figure 41 Participants in Cuyahoga Greenways Tour Included South Euclid Mayor Kirsten Holzheimer Gail and County Council Representative Sunny Simon

REDUCING WATER AND WASTEWATER EMISSIONS

Emissions from water and wastewater utilities in Cuyahoga County come from:

- Electricity to pump, filter, aerate, and treat water and wastewater
- Natural gas and other fuels used for heating processes
- Biogenic emissions released by natural organisms, such as bacteria in wastewater and denitrification
- Combustion of biosolids

ADVANCING COUNTY PRIORITIES

Affordability

Jobs and Infrastructure

Healthy Cuyahoga

Water and Wastewater Change in GHG Emissions since 2018

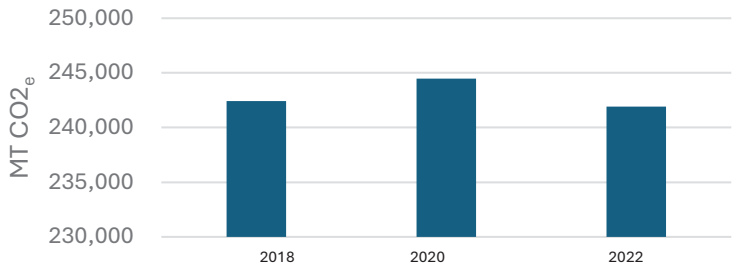


Figure 42 Water and Wastewater GHG Emissions 2018-2022

BACKGROUND AND ANALYSIS

Reductions in the water and wastewater utility sector can be made by improving operational efficiencies including upgrading equipment, reducing system leaks, and innovative practices such as methane capture. The Northeast Ohio Regional Sewer District (NEORSD) serves much of Cuyahoga County as a wastewater and stormwater utility. Since 2021, NEORSD has reduced electricity consumption by 19%, which represents about 24,000 MWh of reduced electricity or about 11,600 MTCO2e. The District has a goal to reduce GHGs by 30% by 2030.

The City of Lakewood's wastewater treatment plant recently overhauled their biodigester to reclaim energy through dual fired boilers and a combined heat and power (CHP) system, effectively reducing energy use for heating by about 90%.

WATER AND WASTEWATER MITIGATION ACTIONS

M10
Process Efficiency and Leak Reductions
Estimated GHG Reduction Opportunity:
33,000 MTCO2e

Description

Improving the efficiency of operations such as upgrades of pumps and motors, including using Variable Frequency Drives. Reducing system leaks and capturing waste heat for power generation.

Role of Cuyahoga County

Cuyahoga County Department of Public Works will continue to provide jurisdictions with sewer maintenance and maintain efficient pump stations.

Partners and Programs

Water and wastewater utilities in Cuyahoga County, Cleveland Division of Water, and U.S. Department of Energy Better Plants Challenge.

M11
Renewable Electricity
Estimated GHG Reduction Opportunity:
4,800 MTCO2e

Description

Implementing on-site renewable energy and procured renewable electricity contracts.

Role of Cuyahoga County

Promote solar co-ops to water and wastewater utilities in the County.

Partners and Programs

Cuyahoga Green Energy Municipal Solar Co-op.

REDUCING SOLID WASTE EMISSIONS

Emissions from solid waste comprised 1.5% of Greenhouse Gas Emissions generated in Cuyahoga County in 2022. These emissions have increased 4% since the 2018 baseline due to an increase in total tons of waste landfilled in 2022, compared to 2018. 98% of solid waste emissions come from landfills that produce greenhouse gases as waste breaks down organically in the landfill. There is a small amount of incineration in Cuyahoga County.

ADVANCING COUNTY PRIORITIES

Change in Solid Waste GHG Emissions Since 2018

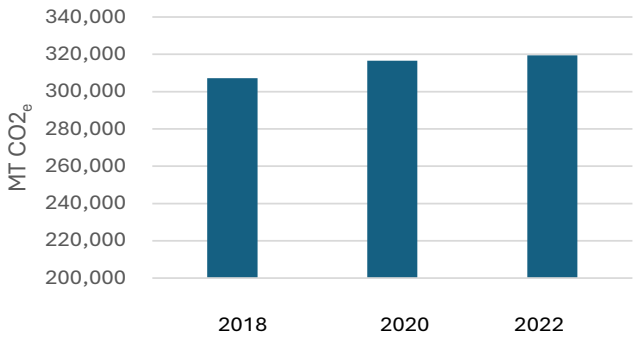


Figure 43 Solid Waste GHG Emissions 2018-2024

BACKGROUND AND ANALYSIS

Emissions from solid waste come from landfilled waste that breaks down and releases methane, combustion or incineration of solid waste, and the biogenic emissions related to composting. While composting organic matter releases greenhouse gases, the process reduces the fugitive landfill methane emissions and improves the carbon sequestration ability of soils.

The State of Ohio's recycling mandates include recycling 25% of our residential and commercial waste, with a goal to reduce industrial waste volume going to landfill. Currently, Cuyahoga County exceeds Ohio's recycling goals by recycling approximately 27% of residential and commercial waste. The State of Ohio Solid Waste Plan requires the Cuyahoga County Solid Waste District to offer programming to assist industries with reducing their reliance on landfills.

Solid Waste Sources of GHG Generation

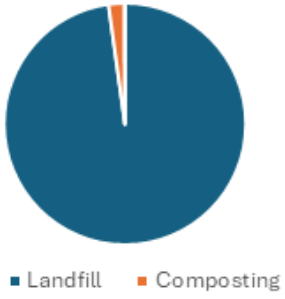


Figure 44 Sources of Solid Waste GHG Emissions

SOLID WASTE MITIGATION ACTIONS

M12
Diverting Waste from Landfill through Recycling and Composting
Estimated GHG Reduction Opportunity:
26,370 MTCO2e

Description

Reducing and recycling solid waste generated by the residential, commercial, and industrial sectors. Composting is the natural process of recycling organic matter such as leaves and food waste.

Role of Cuyahoga County

The County will work to:

- Improve recycling and waste reduction at County facilities
- Educate employees and the public about waste reduction strategies
- Promote and provide technical assistance on sustainable procurement policies to jurisdictions in Cuyahoga County
- Integrate sustainability into the County's updated Purchasing Policy for County Operations
- Promote and provide technical assistance on sustainable procurement policies to jurisdictions in Cuyahoga County
- Amplify best practices of jurisdictions offering residential composting programs and implement composting for key County facilities
- Partner with the Cuyahoga County Solid Waste District to amplify their industrial and business programming

Partners and Programs

Cuyahoga County Solid Waste District and Ohio Materials Marketplace

Enabling Action

Circularity

Circularity refers to a system where materials never become waste products but are reused and repurposed continually. Educating small businesses on circularity opportunities can help turn waste into potential sources of revenue.

MAKING LOW CARBON FOOD CHOICES

The impact of our food choices is critical to both community health and the health of the planet. Food is a powerful way for individuals, households, and businesses to reduce GHGs and pollution. While the emissions reductions from consumer choices won't always directly impact the emissions within Cuyahoga County, they can affect our carbon footprint on both the local and the global scale.

ADVANCING COUNTY PRIORITIES

Here are some ways to reduce the carbon emissions associated with food choices:

Eat more plant-based foods: Animal agriculture is responsible for about 18% of all GHGs globally - more than the emissions from all the fuel burned by all of the world's transport vehicles - including cars, trucks, trains, boats, and airplanes. Meat products have larger carbon footprints per calorie than vegetables and grains because of livestock methane emissions and the energy it takes to grow the plant-based animal feed. In fact, it takes approximately 11 times the amount of fossil fuels to produce one calorie of meat protein versus one calorie of plant-based protein. Choosing plant-based foods, even just one day a week (Meatless Monday, for example) can make a big difference over time. Eating one vegetarian meal each week, for 52 weeks, could reduce an individual's carbon emissions by the equivalent of driving 1,160 miles.

Replacing a serving of beef with chicken or fish, which have fewer intensive energy requirements to produce, is also a great way to cut your carbon by more than half.

Choose more sustainably farmed and grown foods: If beef is on the menu, grass-fed is the more environmentally friendly alternative versus conventionally raised beef, because of reduced nutrient run-off and energy consumption used in its production. Whether households opt for meat, dairy, or plant-based foods, choosing organic requires one third to one half less energy to produce than conventional food.

Buy more local: 11 percent of food's carbon footprint in the U.S. is from transportation which means buying local can further reduce food's carbon footprint. Locally, there are dozens of farmers markets, Community Supported Agriculture, and grocers who stock local produce, meat, and dairy to make choosing local more convenient. Eating primarily locally sourced food for one year could save the greenhouse gas equivalent of driving 1,000 miles.

Pay attention to the packaging and waste generated from food purchase: Choosing food with no packaging or recyclable packaging cuts down on its environmental footprint. Composting food waste and employing strategies to reduce food waste will also help.

Residential Compost Programs

Municipalities in Cuyahoga County are beginning to offer residential drop-off food composting programs. The Cities of Beachwood, Cleveland, Lakewood, Orange Village, Shaker Heights and University Heights are offering programs for residents to compost food scraps. Composting organic food waste helps reduce emissions and creates nutrient-rich compost, which can be used to enrich soil in community gardens, parks, and other green spaces.

Cleveland Food Scrap Drop-Off Composting: Cleveland residents can sign up for the Food Scrap Drop-Off Composting Program, which is funded through a federal grant from the U.S. Department of Agriculture (USDA). Residents can enroll for $12 per month to bring food scrap composting materials to any established drop-off location with Rust Belt Riders. Additionally, to ensure income does not limit participation, the City will offer 250 free memberships for SNAP-eligible households.

Shaker Heights Community Supported Composting: Shaker residents can sign up for the Community Supported Composting Program offered by Rust Belt Riders, which composts all household food scraps and BPI Certified products. Lomond residents are eligible for free drop-off composting from Rust Belt Riders via a year-long pilot program funded by a grant from the Cuyahoga County Solid Waste District.

Figure 45 Food Scraps in a Bucket for Composting

Sustainable Stores Program

The Sustainable Stores Program was created by Cuyahoga County and partners in early 2023 to support retailers' efforts to eliminate plastic checkout bags. The program included an interactive online map for consumers and a grant for retail store owners, libraries, and food pantries. 38 retailers, library branches, and food pantries have been awarded grants totaling $98,052. Collectively, these organizations are eliminating more than 11,000 plastic checkout bags from the County each week. That's 572,000 bags avoided each year.

Grants were used by the recipients to purchase reusable bags, educate customers, and create incentive programs to encourage customers to "BYOBags." The grantees are from 11 different municipalities, including 14 Cleveland neighborhoods. Just under half of the awarded retailers are located in Equity Zones. The **Sustainable Stores Map** is a tool for shoppers to locate retailers large and small who are taking the important step to eliminate plastic checkout bags.

The County, in partnership with the Solid Waste District, has distributed 50,000 BYOBags-branded reusable bags throughout the County since 2020. An additional 20,000 reusable bags will be distributed in 2025, largely through partnerships with food pantries and community-based organizations.

Figure 46 Reusable Bag Distributed through Cuyahoga County's Bring Your Own Bag (BYOB) Initiative

SUMMARY IMPACT OF MITIGATION ACTIONS

GHG Mitigation Estimated Impact By Action

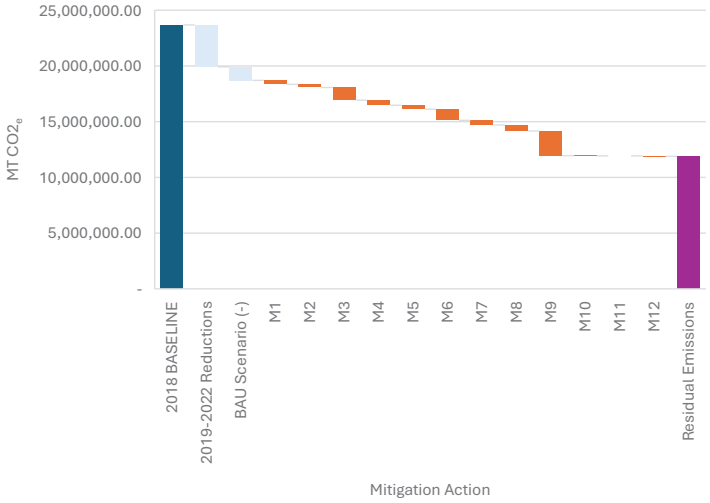


Figure 47 Estimated GHG Emissions Reduction from Mitigation Actions

MITIGATION	ACTION	ESTIMATED GHG IMPACT MTCO2E
M1	Residential Energy Efficiency and Electrification	354,000
M2	Residential Rooftop Solar	281,000
M3	Residential Clean Energy Aggregation	1,121,400
M4	Industrial Energy Efficiency, Electrification	465,000
M5	Industrial Solar Energy	364,000
M6	Commercial Energy Efficiency and Electrification	983,700
M7	Commercial Rooftop Solar	426,300
M8	Commercial Clean Energy Aggregation	536,200
M9	Reduced VMT, Vehicle & Transportation Infrastructure Electrification	2,204,100
M10	Water and Wastewater Energy Efficiency	33,000
M11	Water and Wastewater Renewable Energy	4,800
M12	Increased Recycling and Composting	26,370
TOTAL ESTIMATED POTENTIAL REDUCTIONS		**6,799,000**

Table 5 Estimated GHG Emissions Reduction from Mitigation Actions by 2030

CLIMATE ADAPTATION AND RESILIENCE

CLIMATE-RELATED RISKS AND OPPORTUNITIES

Adapting to climate change means assessing a variety of risks and opportunities and taking actions to reduce risk exposure and act on new opportunities to ensure public health, community well-being, and a thriving economy. [39]

Climate Change Adaptation

Climate Change Adaptation

Adjusting human and natural systems to the actual or expected impacts of climate change.

- Adapting to short-term weather fluctuations and longer-term changes over decades.
- Adjustments in behaviors, practices, skill sets, natural processes, and knowledge.

Climate Resilience

Strengthening the resilience of a system to withstand climate -related shocks or stressors is where Climate Adaptation and Resilience intersect.

Resilience

The ability of a human or natural system to withstand the impacts of external shocks and cope with or rebound from them.

The capacity of a system to face multiple shocks and stressors - socioeconomic, market-related, climate-related - and withstand them.

TRANSITION TO A LOW CARBON ECONOMY

As governments and key actors in the marketplace make ambitious climate targets, including net zero commitments, the business sector must adapt to a world that is transitioning to a low carbon economy. The market risks and opportunities include changing customer expectations and government requirements for lower carbon products and services, including carbon taxes, fees, and penalties, and incentives for lower carbon business models.

Businesses that have a long-term plan to stay competitive over time will adapt better to a world that is responding to climate change through adaptation and mitigation activities.

A business climate transition plan includes: [40]

- **Greenhouse gas inventory and emissions reduction targets**
- **Decarbonization strategies for operations, products, and services**
- **Value chain engagement to reduce upstream and downstream impacts**
- **An analysis of climate-related risks and opportunities, including physical risks and market transition risks**
- **Financial planning related to mitigating climate-related risks and taking advantage of climate-related opportunities**
- **A governance structure to support accountability**
- **A transparent reporting process**

A critical component to a low-carbon economy future is the required workforce. In 2024, the Cleveland Foundation, Cuyahoga County Workforce Funders Group (via the Fund for Our Economic Future), The George Gund Foundation, and the City of Cleveland commissioned the Greater Cleveland Climate Sector Workforce Landscape Analysis to better understand the green transition in northeast Ohio. The study identified gaps and is designed to inform investments, strategies, and actions to advance inclusion goals related to the green transition.

According to the study, good, green, and attainable jobs are growing 50% faster than the rest of the labor market but only represent 14% of all jobs in Greater Cleveland.

- **Green:** Related and/or contributing to climate concerns, including decarbonization and energy efficiency
- **Good:** Family-sustaining wages
- **Attainable:** Accessed with less than a 4-year degree

Three recommendations of the study are:

1. Invest in mechanisms for cross-sector information sharing.
2. Workforce development funders and intermediaries should support efforts that drive demand generation in good, green, attainable jobs in collaboration/alignment with local economic development efforts.
3. Invest in inclusion efforts for the climate sector overall.

LOW CARBON ECONOMY TRANSITION ACTIONS

A1
Technical Assistance
Area of Impact: Jobs & Infrastructure

Description

Supporting programs for small businesses to respond to low carbon demands from the market and regulations.

Role of Cuyahoga County

Cuyahoga County Department of Sustainability and the Office of Small Business in the County's Department of Development to conduct programs for small businesses on sustainability.

Partners and Programs

GCP, MAGNET, COSE

A2
Enabling infrastructure
Area of Impact: Climate & Energy

Description

Creating infrastructure that supports the transition of businesses to lower carbon business models.

Role of Cuyahoga County

Cuyahoga Green Energy to implement solar and microgrid projects that enable the greening of the grid and grid resilience.

Partners and Programs

COMPASS, GO Sustainable Energy, Fund for Our Economic Future, Team NEO, Power Up Local.

A3
Workforce Readiness
Area of Impact: Jobs & Infrastructure

Description

Investing in workforce readiness for green jobs and climate jobs.

Role of Cuyahoga County

County will:

- Support the recommendations and actions of the Greater Cleveland Climate Sector Workforce Landscape Analysis.
- Align recruitment and training work of the public sector workforce system with skills needed for in demand jobs identified by the Analysis.
- Help drive demand by supporting education around incentives and programs related to modernization, electrification, and renewable energy.
- Implement Fresh Water Institute Climate Ready Workforce Internships and conduct the CGE renewable energy apprenticeship program.

Partners and Programs

The Cleveland Foundation, Fund for Our Economic Future, IBEW, Manufacturing Works, Greater Cleveland Works, the Workforce Funders Group.

Renewable Energy Apprenticeship Program

Cuyahoga Green Energy received $129 million in Climate Pollution Reduction Grant funding to implement community-driven solutions that tackle the climate crisis, reduce air pollution, advance environmental justice, and accelerate America's clean energy transition, in partnership with the cities of Cleveland and Painesville. Manufacturing Works, a workforce development organization, will receive $2 million in funding to develop a renewable energy-related pre-apprenticeship program. Working with project partners, Manufacturing Works will offer multiple on-ramps for industry certifications, academic credits, and micro-credentials for high school and college students, underemployed, and existing employees in construction, renewable energy, and manufacturing and will conduct grassroots outreach to increase awareness about available jobs and training for critical occupations affiliated with this project.

Figure 48 Partners Celebrate the Announcement of the CPRG Grant

Fresh Water Institute

In 2024, Cuyahoga County launched the Fresh Water Institute (FWI), a catalyst and a convener to strengthen our region's culture of freshwater stewardship. The Fresh Water Institute builds upon a foundation of youth education and community science, defining, supporting, and connecting stakeholders to current and future workforce opportunities in the water economy and advocating for freshwater stewardship and access.

A goal of the FWI is to support the development of a climate ready workforce for the water economy. The Institute is working collaboratively to connect students to waterfront and water economy learning opportunities, while exposing youth and families to community science opportunities through the Fresh Water Fellowship program. In partnership with Teaching Place and See You at the Top (SYATT), this 2-year, after-school learning experience provides high school sophomores and juniors with a foundation of historical, ecological, and career information about our freshwater resources and opportunities to connect with the Cuyahoga River and Lake Erie.

The Fresh Water Institute is partnering with and funding AquaMissions to provide water safety and swimming competency as a foundation for building our freshwater culture. This program provides free swim lessons for students in the County. Many youths and adults in Cuyahoga County have never visited the Cuyahoga River or Lake Erie, and swim lessons are a fundamental step in better connecting our residents with our bodies of fresh water.

The Fresh Water Institute is partnering with the Student Conservation Association to create young adult internship opportunities to connect them to good jobs in the freshwater economy. We plan to provide at least 12, 12-week internship opportunities over the next three years.

Figure 49 2024 Fresh Water Institute Fellowship Session

COMMUNITY RESILIENCE

The resilience of residents to physical climate risks is a critical component of a community's ability to withstand and bounce back from climate-related stresses and shocks.

ADVANCING COUNTY PRIORITIES

- Healthy Cuyahoga
- Public Safety and Justice

Physical climate risks have acute and chronic exposures. Acute climate risks include high heat events, flooding, and extreme precipitation, which are all expected to increase in the medium and long-term in Cuyahoga County. Increases in the frequency and/or intensity of these events can cause second order impacts that compound them, including power and communication outages, economic hardships, and disruptions of needed systems and services, such as power, transportation, healthcare, jobs, and schools. Chronic climate risks include slower moving impacts such as erosion, changing disease vectors, and impacts to ecosystems and biodiversity, such as invasive species.

Resilience is the ability of people and their communities to anticipate, accommodate, and positively adapt to or thrive amidst changing climate conditions and hazard events. The most successful disaster response is to invest in preparedness of individuals, community-based organizations, and neighborhoods before a disruption. Resilience Hubs are emerging as a critical place-based strategy to create adaptive and resilient communities, especially in marginalized neighborhoods.

RESILIENCE ACTIONS

A4
Resilience Hubs
Area of Impact: Healthy Cuyahoga

Description

Developing community-serving facilities augmented to support residents, coordinate communication, distribute resources, and reduce carbon pollution while enhancing quality of life.

Role of Cuyahoga County

- Support jurisdictions in the planning, design, and implementation of Resilience Hubs
- CGE partnering on cooperative solar and microgrids
- Support Greater Cleveland Foodbank expansion of its resource center model.

Partners and Programs

USDN, Resilience Hub Collaborative, First Suburbs Consortium

A5
High Heat Infrastructure
Area of Impact: Public Safety, Healthy Cuyahoga

Description

Installing and preserving built and natural infrastructure that reduces urban heat island effect.

Role of Cuyahoga County

Educate jurisdictions on energy saving trees, cool roofs, reflective pavements.

Partners and Programs

Cleveland Tree Coalition, Trust for Public Land, Western Reserve Land Conservancy.

RESILIENCE ACTIONS

A6
High Heat Programs
Area of Impact: Healthy Cuyahoga

Description

Conducting programs and services to aid vulnerable populations in preparing for high-heat events and during high-heat events.

Role of Cuyahoga County

- Partner on air quality monitoring
- Promote rebate programs for air conditioning/heat pumps
- Communication about community cooling centers.

Partners and Programs

Office of Emergency Management, 211 and 311, Cuyahoga County Housing and Community Development, Cuyahoga County Health and Human Services, GCRTA.

A7
Emergency Preparedness
Area of Impact: Public Safety & Justice Services

Description

Taking steps to ensure community members are safe before, during, and after an emergency or natural disaster.

Role of Cuyahoga County

- Integrate climate change into the 2028-2033 County All Hazards Mitigation Plan
- Support Federation of American Scientists Federal Policy Agenda for Tackling Extreme Heat
- Encourage municipalities to participate in the National Flood Insurance Program enabling reduced flood insurance rates for residents.

Partners and Programs

Mayors and Managers Association, Office of Emergency Management.

Resilience Hubs

What is a Resilience Hub?

Resilience Hubs are community-serving facilities augmented to support residents, coordinate communication, distribute resources, and reduce carbon pollution while enhancing quality of life. Hubs provide an opportunity to effectively work at the nexus of community resilience, emergency management, climate change mitigation, and social equity while providing opportunities for communities to become more self-determining, socially connected, and successful before, during, and after disruptions.

Who creates them?

Resilience Hubs are created by local government and other partners but led and managed by community members, community-based organizations, and/or faith-based groups. Resilience Hubs are intended shift power to neighborhoods and residents, provide opportunities to address root causes of disproportionate exposure and sensitivity to climate impacts, and enhance communities' capacity to adapt.

How do they work?

Resilience Hubs are flexible both in their application and design. Sites are as diverse as the communities they serve. Hubs typically require enhancements and upgrades that improve their capacity to provide service in all three operating conditions (everyday, disruption, and recovery).

5 Foundations

1. **Services and programs to build relationships and promote preparedness**
2. **Ability to communicate within and outside of service area especially during disaster and recovery situations.**
3. **Building and landscapes to strengthen property to withstand physical climate impacts**
4. **Ensuring reliable back up power to HVAC systems and other essential systems during hazard events and ensuring sustainability in all three modes**
5. **Operations including personnel and processes in place to operate in all three modes.**

Greater Cleveland Foodbank Community Resource Center

The Greater Cleveland Foodbank has created a new best practice model of addressing food insecurity and other social needs with their new one-stop resource center. The Community Resource Center opened in 2023 in the Collinwood neighborhood of Cleveland. Cuyahoga County provided $5 million of American Rescue Plan Act (ARPA) funds to the project. The Foodbank purchased a Lorain Avenue building from Cuyahoga County to house the west side community resource center.

The resource center includes a healthy choice food market with extended hours and collaboration with non-profits addressing some of the root causes of food insecurity. The center is a friendly and welcoming place that offers childcare, coffee, a chance to catch up with friends and neighbors, cooking classes, and other ways for residents to connect. Partners include:

- **MetroHealth**
- **Shoes and Clothes for Kids**
- **Legal Aid Society of Cleveland**
- **Diaper Bank of Greater Cleveland**
- **Digital C**
- **College Now of Greater Cleveland**
- **Cuyahoga Community College**
- **Ohio Means Jobs**
- **CHN Housing Partners**
- **Benjamin Rose Institute on Aging**
- **Towards Employment**
- **United Way of Greater Cleveland**
- **MAGNET**
- **Family Connections**
- **Cuyahoga County Dept. of Health and Human Services**

Figure 50 Family Connections' Playroom at the Greater Cleveland Foodbank

NATURE-BASED SOLUTIONS

Nature-based solutions involve working with nature to address societal challenges, while supporting human well-being and biodiversity locally. Natural solutions can absorb carbon from the atmosphere, reduce pollution, reduce heat, and absorb stormwater.

ADVANCING COUNTY PRIORITIES

NATURE-BASED SOLUTIONS ACTIONS

A8
Plant and Maintain More Trees
Area of Impact: Healthy Cuyahoga

Description

Maintaining and growing the County's tree canopy, and trees in general, to cool communities and help manage stormwater-related climate risks.

Role of Cuyahoga County

- Continue to fund tree planning, planting, and maintenance activities
- Pilot mini forest plantings to accelerate canopy growth
- Create institutional partnerships with large low canopy landowners.

Partners and Programs

Cleveland Tree Coalition, Holden Forests and Gardens, Cuyahoga County Soil and Water Conservation District, Cuyahoga County Planning Commission, Ohio Department of Natural Resources.

NATURE-BASED SOLUTIONS ACTIONS

A9
Stormwater Management
Area of Impact: Public Safety, Healthy Cuyahoga, Affordability

Description

Constructing nature-based solutions for stormwater management including wetland restoration, green infrastructure such as rain gardens and bioswales, and greenspace preservation.

Role of Cuyahoga County

- The County's Fresh Water Institute (FWI) will promote and advocate for green infrastructure and encourage developments that retain impervious surface
- Continued support of wetland and watershed restoration
- FWI to support watershed best management practices.

Partners and Programs

Cuyahoga County Soil and Water Conservation District, Cleveland Metroparks, Chagrin River Watershed Partners, NEORSD.

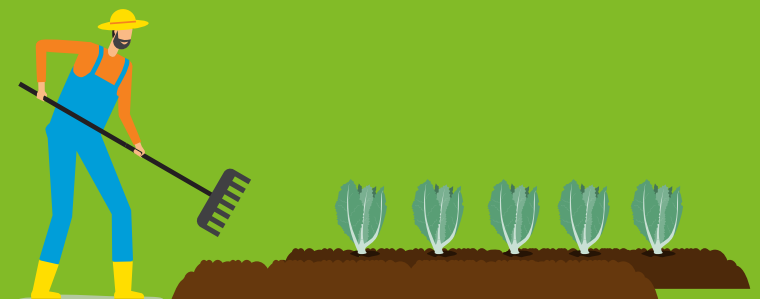
Enabling Actions

Soil Remediation

Soil remediation refers to the strategy of managing soil to reduce plant stress, improve productivity, and increase carbon storage in soils. It also improves water quality and reduces stormwater runoff. Biochar production is a technique through which carbon from certain biomass is transformed into stable carbon that can be captured in the soil. The County will explore the potential of integrating soil remediation into tree planting projects and support the creation of biochar pilots and commercialization to use wood waste to sequester carbon.

Brownfield and Vacant Land Reuse

The County will engage County Landbank and others around using brownfields and vacant land for nature-based climate solutions, returning brownfields and vacant properties into productive use including incorporation of strategic greenspace.



Healthy Urban Tree Canopy

The Healthy Urban Tree Canopy Grant (HUTC) is an initiative of Cuyahoga County to promote a healthy tree canopy in our County with grant funds for tree planting and maintenance projects. Since 2019, the County committed $1 million annually to fund the restoration of tree canopy through tree planting and maintenance activities. Although the program took hiatus in 2020 due to the Covid Pandemic, to date, nearly 13,000 trees have been planted and more than 1,000 have been maintained through HUTC. In 2024, the County funded an additional $1 million in tree canopy projects resulting in approximately 1,500 additional trees planted. The HUTC program has also funded 30 community tree plans, the maintenance of nearly 3,000 trees, and removal of 579 dead or hazardous trees. These activities will, over time, help to preserve and improve our County's trees which provide shade to cool neighborhoods and help to absorb stormwater. The carbon sequestration benefit of these tree planting activities is an average of 350 tons of carbon a year for 50 years.

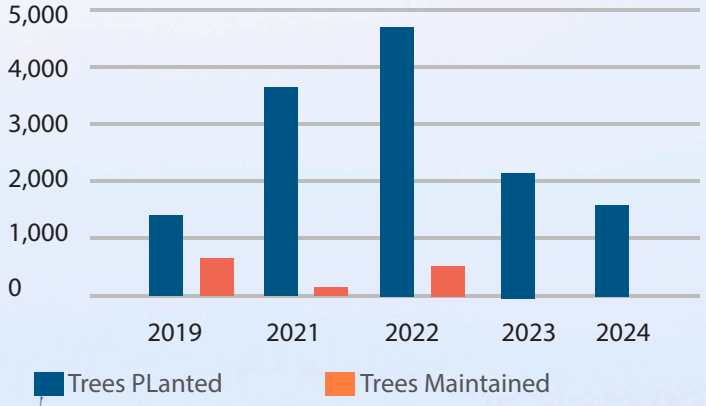


Figure 52 HUTC Trees Planted and Maintained 2019-2024

Trees plantings funded 2019-2024

14,500

Tons of carbon sequestered over 50 years

17,500

Grants awarded for community planting, maintenance, and planning

115

Figure 51 HUTC Tree Planting

THE BUILT ENVIRONMENT

The built environment includes structures and systems that provide places for people to live, work, and play. It includes buildings, roads, bridges, parks, streets, and systems that provide transportation, water, power, and other utilities and services.

Many of the adaptation, resilience, and nature-based solutions in this report will help to protect the built environment. Additionally, improved land-use planning and increased emergency preparedness are critical. More knowledge on which assets and infrastructure in the built environment are at increased risk exposure is an important step in emergency preparedness.

Important considerations include:

- **Aging, damaged, and stressed infrastructure which is more vulnerable to extreme weather**
- **Risk exposure of infrastructure that impacts the production of goods and services, including systems vulnerable to climate change like power, water and transport systems, that can disrupt supply chains, access to health care, and communications.**

ADVANCING COUNTY PRIORITIES

Jobs and Infrastructure

Public Safety and Justice

CLIMATE RESILIENCE ACTIONS

A10
Climate Resilience Assessment
Area of Impact: Public Safety

Description

Assessing County assets and infrastructure for climate resilience including roads, bridges, pump stations, buildings and critical infrastructure, and services.

Role of Cuyahoga County

Convene partners to fund and conduct the assessment.

Partners and Programs

Cuyahoga County Public Works, Cuyahoga County Emergency Management, jurisdictions within the County, external experts.

A11
Adapt the Built Environment
Area of Impact: Public Safety, Healthy Cuyahoga

Description

Hardening, updating, and adapting critical infrastructure and systems as a response to increased climate risk exposure.

Role of Cuyahoga County

- Respond to the results of the resilience assessment
- Support the implementation of NEORSD's Project Clean Lake
- Improve electricity grid resilience
- Promote the adoption of riparian setback ordinances

Partners and Programs

NEORSD, Cuyahoga County Soil and Water Conservation District, Cuyahoga County Emergency Management, ODOT.

CLIMATE MIGRATION

Climate migration occurs when people leave their homes due to acute extreme weather events, chronic climate change, or other climate challenges. Climate migrants can move between any scale of geography: local, intrastate, interstate, intra-national, and international.

Climate migration is often viewed as a future problem, but climate change is already driving migration. In 2023, seven million people were displaced by weather-related hazards globally, mostly from floods, storms, and droughts. In the Americas, more than two million people were displaced by natural disasters that same year.

With the predicted increase in the number of climate migrants, areas will have to prepare for both climate-induced in-migration and out-migration. Areas may need to reevaluate land use and zoning practices, increase their affordable housing stock, take political action to ensure the legal protection for climate migrants, and make their own communities more resilient to climate hazards.

Climate migration patterns in the U.S. are widely uncertain, but early studies predict that Northeast Ohio will be one of the country's hotspots for in-migration. [43]

In 2022, the Lincoln Institute of Land Policy published a working paper, Exploratory Scenario Planning for Climate In-Migration. This guide presented recommendations for Counties to plan for a variety of migration scenarios and can be consulted periodically to monitor the likelihood of those scenarios over time.

ADVANCING COUNTY PRIORITIES

Healthy Cuyahoga

Public Safety and Justice

Climate Receiver Counties

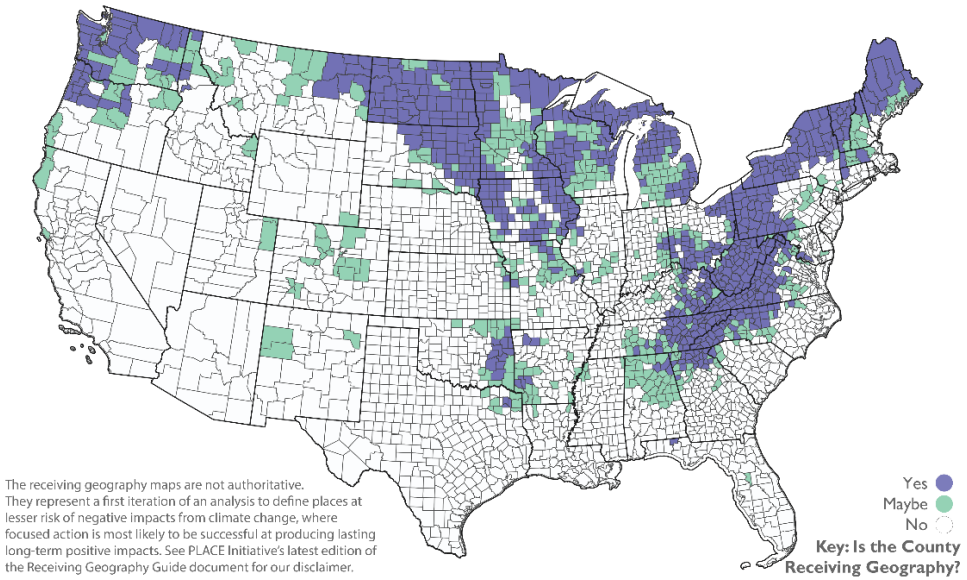


Figure 53 Climate Migration Receiver Counties[45]

CLIMATE MIGRATION ACTIONS

A12
Climate Migration Scenario Planning
Area of Impact: Healthy Cuyahoga, Affordability

Description

Strategic planning to make flexible long-term plans related to climate migration, potential outcomes, and responses.

Role of Cuyahoga County

Conduct periodic climate migration scenario planning and indicators for tracking and monitoring over time.

Partners and Programs

Cuyahoga County Planning Commission, Lincoln Institute of Land Policy.

A13
Climate Migration Indicators
Area of Impact: Healthy Cuyahoga, Affordability

Description

Creating climate migration indicators to monitor scenarios over time.

Role of Cuyahoga County

Engage partners in identifying indicators and creating a policy playbook to respond to respective climate population growth scenarios.

Partners and Programs

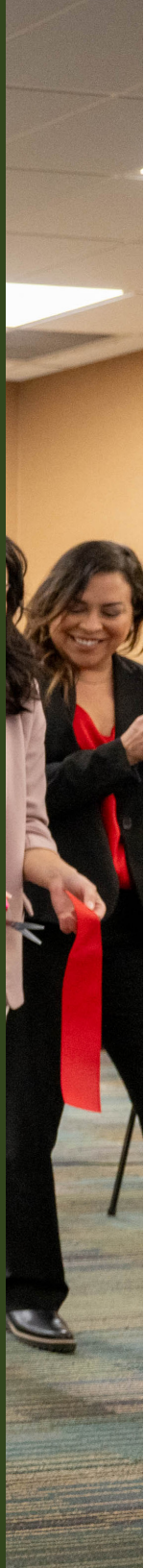
Cuyahoga County Planning Commission, Lincoln Institute of Land Policy.

Figure 54 2024 Opening of the Cuyahoga County Welcome Center

Cuyahoga County Welcome Center

The Cuyahoga County Welcome Center is a multi-service center serving residents who are immigrants, refugees, and/or have limited English proficiency. Within the Welcome Center, the County partners with outside service agencies to work with individuals and families, identify their specific needs, and connect them to available resources.

The Cuyahoga County Welcome Center provides a centralized access point to provide consistent and streamlined human and social services in Cuyahoga County, including language services, public benefits, education, jobs and workforce support, housing, legal, and other resources necessary to acclimate to our community. Combined, these services help newcomers and those with limited English proficiency build resilience and become better connected to the community, which is an important aspect of climate resilience.



FUNDING CLIMATE ACTION

Achieving the ambitious goals in this plan will require all sectors in Cuyahoga County to leverage the funding and resources available. Investing in climate actions now will help to avoid higher economic and societal costs in the future.

In addition to federal, state and philanthropic grants for mitigation and adaptation activities, communities will need to leverage other tools and sources of funds to meet the challenge of climate change. An "all of the above" resourcing strategy is required. Organizations will need to layer financing, grants, rebates, tax credits, and public private partnerships to achieve the plan's goals.

Funding Type	Description
Greenhouse Gas Reduction Fund	Capital for clean energy and climate projects that reduce pollution across the country with special focus on ensuring these benefits reach low-income and disadvantaged communities
Capital Investments	Deploying traditional capital expenditures for climate actions
Green Bonds	A fixed-income debt instrument earmarked to raise money for climate and environmental projects
PACE Financing	Property Assessed Clean Energy Financing through property owners' taxes
Tax Credits	Federal Tax Credits to incentivize energy efficiency, electrification, and renewable energy
Tax Credit Bridge Funding	Bridge loans to expand the pool of organizations that can take advantage of tax credit programs
Loan Loss Reserves	Philanthropy or government can set aside funds as an allowance for potential uncollected loans and loan payments to reduce financing risk for climate-related projects
Linked Deposit Programs	Reduced rate financing for climate projects by linking to local or state treasury deposits
Aggregated Procurement	Leveraging group buying power for clean electricity, EVs and EV charging, trees, soil remediation, solar panels, etc
Maintenance and Renovation	Using routine maintenance and renovation activities to modernize and improve efficiency of technology and systems
Levies, Fees, and Taxes	Creating government revenue for climate related programs through local taxes, levies, or fees on services
Private Equity	PE firms collaborate with governments, utilities, and other institutional investors through public-private partnerships and co-investments to leverage additional capital and improve viability of large-scale projects
Internal Revolving Loan Fund	Revolving loan funds utilize a dedicated pool of capital to implement sustainability projects that deliver cost savings. Cost savings are reinvested to replenish the fund. Projects typically focus on renewable energy and energy efficiency
Energy Savings Performance Contracting	Energy Savings Performance Contracts allow property owners to make energy efficiency upgrades at low or no upfront cost in partnership with an Energy Service Company (ESCO) which guarantees energy savings to pay for the project over time
Carbon Fees	A carbon fee assigns a price to greenhouse gas emissions, which cities can collect and use to generate revenue for climate projects. Internal carbon fees: Fees applied to departments or specific activities based on greenhouse gas emissions External carbon fees: Fees applied to energy usage by households and businesses and/or based on greenhouse gas emissions

Table 6 Funding Climate Action by Sector

Ohio Climate Funding Highlights

Toledo's 1% for the Environment

In 2021, Toledo, Ohio's City Council passed a resolution to reduce greenhouse gas emissions by 30% below 2010 levels by 2030. In 2022, the city established an ordinance requiring one percent of its annual capital improvement budget be dedicated to environmental programs identified in its Environmental Protection and Climate Resilience Plan. Using these funds, Toledo launched a new food waste composting program with Keep Toledo/Lucas County Beautiful (KTLCB), Metroparks Toledo, GoZERO, and Toledo City Council members.

Athens Carbon Fee

Athens passed an Athens Carbon Fee of 2/10 of a cent per kWh to residential, small commercial, city, and county electricity customers through the SOPEC Electric Aggregation Program. Funds go toward the Athens Public Solar Fund to implement solar on public buildings and facilities.

EV Purchasing Collaborative

The EV Purchasing Collaborative, run by Sourcewell and the Electrification Coalition, is a one-stop, online procurement portal to support public agencies in accessing competitive bids for EVs and charging infrastructure, innovative financing options, and best practices.

REPORTING PROGRESS

We are committed to being transparent about our efforts to achieve this plan. The Cuyahoga County Department of Sustainability will communicate progress on our activities related to this plan with an **annual update of our Sustainability Dashboard hosted on our web page here: Department of Sustainability**. We will periodically update our Greenhouse Gas Inventory to track progress toward our targets.

The County is a signatory to the Global Covenant of Mayors for Climate and Energy and reports our climate progress annually to CDP. We are working in partnership with many networks and coalitions including the **Cleveland 2030 District, the Urban Sustainability Director's Network, Power a Clean Future Ohio, and the Midwest Climate Collaborative.**

APPENDIX A: CONSULTED STAKEHOLDERS

Climate roundtable participants

- Dylan Beach, Lead Sustainability Strategist, The Goodyear Tire & Rubber Company
- Carly Beck, Environmental Project & Data Analyst, Cuyahoga Land Bank
- Carolyn Berndt, Legislative Director, Sustainability Federal Advocacy, The National League of Cities
- Annette M. Blackwell, Mayor, City of Maple Heights
- Matt Burke, Mayor, City of Garfield Heights
- Sara Continenza, Founder, Executive Director, Food Strong
- Jenice Contreras, President and CEO, Northeast Ohio Hispanic Chamber
- Eric Fiala, Head of Corporate Responsibility, Key Bank
- Kimberly Foreman, CEO, Environmental Health Watch
- Grant Goodrich, Executive Director, Great Lakes Energy Institute, Case Western Reserve University
- Scott Hardy, Extension Educator, Ohio Sea Grant and Stone Laboratory, Ohio State University
- Kirsten Holzheimer-Gail, Mayor, City of Euclid
- Jud Kline, Mayor, City of Orange Village
- Paul Koomar, Mayor, City of Bay Village
- Edward Kraus, Mayor, City of Solon
- Stephen Love, Program Director, Environmental Initiatives, Cleveland Foundation
- Arianna Mack, Healthy Communities Program Manager, Environmental Health Watch
- John Mitterholzer, Program Director, The George Gund Foundation
- Heather Navarro, Director, Midwest Climate Collaborative
- David November, Sustainability Manager & FAMIS Administrator, Cuyahoga Community College
- Sarah O'Keefe, Director of Sustainability and Climate Justice, City of Cleveland
- Divya Sridhar, Manager of Climate Resiliency and Sustainability, Cleveland Neighborhood Progress
- Trish Sylvia, Vice President of Advocacy & Impact, NBC Sports Next
- Angela Yeager, Director of Environmental Justice Semester, Laurel School

APPENDIX A: CONSULTED STAKEHOLDERS

Special thanks to the Aspen Institute

Tommy Loper, Vice President, Enterprise Development
María Ortiz Pérez, Managing Director, Energy and Environment Program
Nadia Phyu, Executive Associate, Energy and Environment Program
Graham Veysey, Executive Director/Executive Producer, Aspen Ideas Festival

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Municipalities Surveyed

- Bratenahl
- Bay Village
- Bedford Heights
- Beachwood
- Bedford
- Berea
- Brecksville
- Brooklyn
- Brook Park
- Chagrin
- Chagrin Falls Township
- Cleveland
- Euclid
- Garfield Heights
- Glenwillow
- Highland Heights
- Highland Hills
- Hunting Valley
- Lakewood
- Lyndhurst
- Maple Heights
- Mayfield Heights
- Mayfield Village
- Middleburg Heights
- Moreland Hills
- Newburgh Heights
- Olmsted Township
- Orange
- Parma
- Parma Heights
- Pepper Pike
- Richmond Heights
- Rocky River
- Shaker Heights
- South Euclid
- Solon
- University Heights
- Westlake

APPENDIX A: CONSULTED STAKEHOLDERS

Consulted Experts

Chris Alvarado, Cuyahoga County Director of Regional Collaboration

Jon-Paul d'Aversa, Principal, Unpredictable City

SeMia Bray, Black Environmental Leaders

Mark Christie, Cuyahoga County Manager of Emergency Management

Cindy Cicigoi, Executive Director, Cleveland 2030 District

Brad Cromes, Cuyahoga County Treasurer

Mike Dever, Cuyahoga County Director of Public Works

Kevin Friis, Planning Manager, Cuyahoga County Office of Emergency Management

Traci Forrester, Executive Vice President, Environmental and Sustainability, Cleveland Cliffs

Paul Herdeg, Cuyahoga County Director of Economic Development

John Hill, Sustainability Director, Cleveland Cliffs

Sara Parks Jackson, Cuyahoga County Director of Housing and Community Development

Dave Jankowski, Chief Marketing and Communications Officer, NOPEC

Alyssa Johnson, Director of Programs and Partnerships, Power a Clean Future Ohio

Vaughn Johnson, Cuyahoga County Deputy Director of Economic Development

Emily Keller, Director of Sustainability, Greater Cleveland Partnership

Tim Kovach, Decarbonization Strategist, City of Cleveland

Marie Fechik-Kirk, Manager of Sustainability and Special Projects, NEORSD

Stephen Love, Program Officer for the Environment, The Cleveland Foundation

Jennifer McMillin, Regional Director, Northeast Ohio, SOPEC

Dale Miller, President, Cuyahoga County Council, District 2 Representative

Annie Pease, Cuyahoga County Senior Transportation Advisor

Paul Porter, Cuyahoga County Director Department of Purchasing

Sunny Simon, Cuyahoga County Council, District 11 Representative

Elena Stachew, Northeast Ohio Strategy Consultant, Power a Clean Future Ohio

Deepa Vedavyas, Director of Resiliency and Sustainability, NOPEC

Nat Ziegler, Director of Community Solutions, Power a Clean Future Ohio

APPENDIX B: GLOSSARY

Adaptation - strategies that work to prepare humans and infrastructure for the impacts of climate change we are already experiencing and will continue to experience.

Carbon Capture and Storage - involves the capture of CO2 emissions from industrial processes, such as steel and cement production, or from the burning of fossil fuels in power generation. This CO2 is then transported from where it was produced, via ship or in a pipeline, and stored deep underground in geological formations.

Carbon Dioxide Equivalent (Co2e) - a measure of the effect of different greenhouse gases (GHGs) on the climate. By converting different emissions to the equivalent amount of carbon dioxide (CO2), their impacts can be compared.

Clean Energy - includes all sources of renewable energy and nuclear energy.

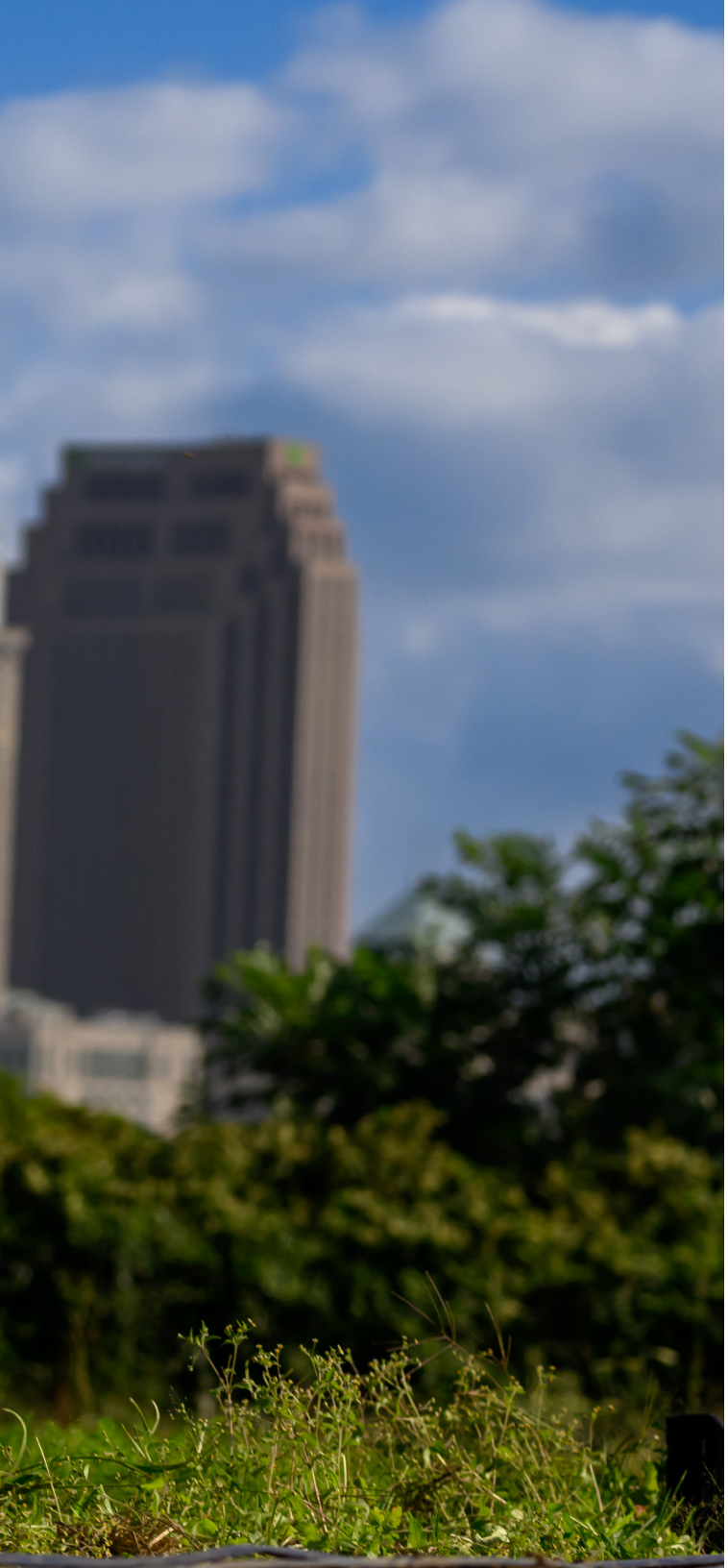
Climate - the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity, and precipitation.

Climate Change - significant and long-lasting change in the climate and weather patterns, especially as associated with global warming.

Climate Equity - alleviates the unequal burdens of climate change, ensures the just distribution of climate protection efforts and meaningful involvement of all groups; centers on equality of outcomes not equality of opportunity.

Climate Justice - recognizes disproportionate impacts of climate change and seeks to address the root causes of climate inequity with a focus on human rights and social inequality; long-term equity initiatives with a focus on the system as a whole.

Climate Migration - occurs when people leave their homes due to extreme weather events or other climate challenges.



APPENDIX B: GLOSSARY

Climate Resilient - capacity to prepare for, respond to, and recover from the impacts of hazardous climactic events while incurring minimal damage to societal wellbeing, the economy, and the environment.

Fossil Fuels - a fuel (such as coal, oil, or natural gas) formed in the earth from plant or animal remains. **Global Warming** - an increase in the earth's atmospheric and oceanic temperatures widely predicted to occur due to an increase in the greenhouse effect resulting largely from pollution.

Green Banks- banks with a mission to combat climate change by investing in low-carbon, climate-resilient infrastructure and other green sectors (including clean energy and waste management) and mobilizing that investment into underserved markets to fill financial gaps.

Greenhouse Gases (GHGs) - any gaseous compounds (such as carbon dioxide or methane) that absorb infrared radiation, trap heat in the atmosphere, and contribute to the greenhouse effect.

Mitigation - strategies that work to reduce the amount of emissions going into the atmosphere, and thus reduce the magnitude of climate change.

Transit Oriented Development (TOD) - compact and mixed-use urban design near transit where people can easily access jobs and services.

Tree Canopy - layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Vehicle Miles Traveled (VMT) - the total annual miles of vehicle travel divided by the total population in a state or in an urbanized area.

Weather - the state of the atmosphere over a short period with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

APPENDIX C: ASSUMPTIONS AND METHODOLOGY

BAU FORECAST ASSUMPTIONS

To understand the likely emissions from the County's geographic boundary if no further climate action was taken, a business-as-usual (BAU) forecast was developed to forecast emissions.

This forecast includes actual emissions reductions from 2018-2022, as well as calculated emissions out to 2050. To complete this analysis, current emissions sources were forecasted based on population and economic factors, as well as external forces that may impact emissions. The emissions sources and forecasting factors used are shown in Table 1.

Emissions Source	Forecasting Factor
Residential Energy Consumption	Population declines 0.07% per year
Employment	Increases by 0.89% per year
Passenger Vehicle Emissions	Decreases by 1.01% per year
GHG Sectors	**Forecasting Factor Applied**
Residential	Population
Commercial	Employment
Industrial	Employment
On-Road Transportation	Passenger Vehicles
Air Travel	Population
Marine Vessels	Employment
Solid Waste	Population
Wastewater	Populations
Industrial Process Emissions	Employment
Energy Provider Assumptions	
Cleveland Public Power	100% renewable electricity by 2050 applied as a linear trendline from 2022-2050
First Energy	100% renewable electricity by 2050 applied as a linear trendline from 2022-2050.

The BAU forecast results in an estimated reduction of 6% of baseline emissions between 2025-2030 and 13% reduction between 2025-2050. The BAU forecast is based on current policy and regulations. Emissions reductions may be accelerated by climate-related incentives, grants, rebates, policies, and regulations between now and 2050.

GREENHOUSE GAS MITIGATION ACTIONS

In addition to the BAU forecast net reduction detailed above, the Cuyahoga County Climate Action Plan includes the following GHG reducing actions and related assumptions and estimates:

- **Residential Energy Efficiency and Electrification -** 5% of residential households conduct energy efficiency and electrification retrofits annually, resulting in an average reduction of natural gas use by about 25% and electricity use by about 50%.
- **Residential Rooftop Solar** - Calculating estimated greenhouse gas reductions for Cuyahoga Green Energy Residential Solar Co-op based on historical sizes and planned programming and Solar for All installations in Cuyahoga County. An annual residential solar CAGR is based on historical averages in Ohio of 24% which is aligned with the State of Ohio's Priority Climate Action Plan methodology.
- **Residential Clean Energy Aggregation** - Based on an analysis provided by PCFO. In 2030, total potential avoided emissions are 952,347.
- **Industrial Energy Efficiency and Electrification** - 5% of industrial buildings are retrofit each year. Each retrofit averages 45% reduction in natural gas and 37% reduction in electricity consumption, which is aligned with the State of Ohio's Priority Climate Action plan median emission savings estimates. The target for large emitter process emissions is a 10% reduction by 2030.
- **Industrial Solar and Microgrids** - Incorporates planned Cuyahoga Green Energy industrial solar microgrids and renewable energy installations contained in the Port of Cleveland's Net Zero Electrification Plan. Includes a solar CAGR based on historical averages in Ohio of 24% over 5 years, which is aligned with the State of Ohio's Priority Climate Action Plan methodology.
- **Commercial Energy Efficiency and Electrification** - 5% of Commercial Buildings are retrofitted each year. Each retrofit averages 45% reduction in natural gas and 37% reduction in electricity consumption, which is aligned with the State of Ohio's Priority Climate Action plan median emission savings estimates.
- **Commercial Solar -** Incorporates planned Cuyahoga Green Energy commercial solar microgrids and includes a solar CAGR based on historical averages in Ohio of 24% over 5 years, which is aligned with the State of Ohio's Priority Climate Action Plan methodology.
- **Commercial Clean Energy Aggregation** - Based on an analysis provided by PCFO. In 2030 total potential avoided emissions are 475,895.
- **Reduce VMT and Electrification** - 15% reduction in passenger VMT, 15% increase in EV adoption, and 5% increase in Short Haul Electric Vehicles.
- **Port and Airport Efficiency and Electrification** - Aligns with Port of Cleveland's electrification and net zero plan in the year 2030.
- **Water and Wastewater Efficiency and Electrification** - Incorporates a 30% reduction in water and wastewater energy-related greenhouse gas emissions.
- **Water and Wastewater Renewable Energy** - Includes on-site renewable energy projects generating 9,900 MWh of renewable energy.
- **Waste Diversion through Recycling and Composting** - 30% of total waste diverted from landfill through recycling (from 25%) and 5% increase in volume of organic waste composted in Cuyahoga County, using EPA Warm Data to calculate MTCO2e reductions.

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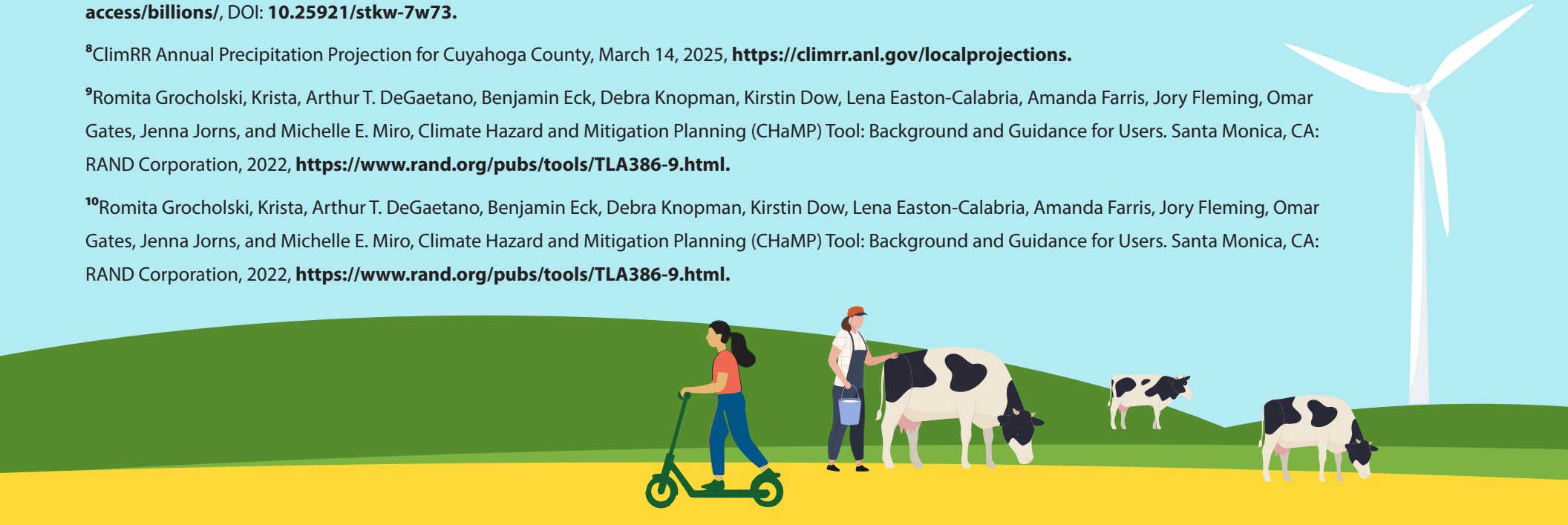

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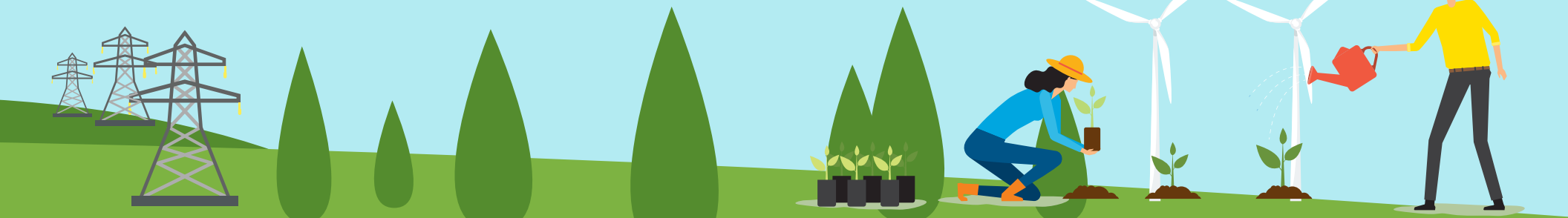

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