SUSTAINABLE CLEVELAND 2019

CLEVELAND CLIMATE ACTION PLAN

BUILDING THRIVING AND HEALTHY NEIGHBORHOODS

2013

CONTENTS

**See pages 26 - 27 for a summary of all climate actions!*

"This implementation plan is a major step in an informed and coordinated effort to ensure a healthy, economically resilient, and secure community that is the vision of the Sustainable Cleveland 2019 initiative."

- Mayor Frank G. Jackson

ACKNOWLEDGEMENTS

The Mayor's Office of Sustainability would like to thank City staff and Green Team members, the Sustainable Cleveland 2019 Stewardship Council, and the following members of the Climate Action Advisory Committee who participated in the planning process.

FIGURES & TABLES

MAYOR JACKSON'S LETTER

CITY OF CLEVELAND
Mayor Frank G. Jackson

Dear Friends,

The global increase in greenhouse gas emissions has created social, economic, budgetary, health, ecological and security impacts for cities across the country, prompting local governments to plan differently for the future. In 2006, I signed the U.S. Mayor's Climate Protection Agreement, indicating that the City of Cleveland takes climate change seriously.

Taking action around climate change—reducing greenhouse gas emissions while at the same time planning for adaptation and resilience—integrates many of the sustainability initiatives we are working on in municipal government and as a community. The Cleveland Climate Action Plan is designed to build off of the Sustainable Cleveland 2019 Action and Resources Guide and the annual sustainability summits.

I would like to thank the 50-member advisory committee, the Sustainable Cleveland Stewardship Council, and dozens of community members and working group members from business, government, nonprofit, and institutional sectors for co-creating an actionable response to climate change that is built upon collaborative problem solving.

This plan is about much more than climate change. It provides opportunities for Clevelanders now, and into the future. There are 33 actions in this plan that strengthen our economy, clean our environment, and improve the health and wellness of Clevelanders. Whether it's planting trees, building green, creating healthier transportation options, or reducing waste and recycling, we can increase the livability of our neighborhoods and enhance the quality of life for all Clevelanders. By working together, we will:

- Educate Clevelanders to make smart, sustainable choices at home, at work, and in their community
- Create healthier, more comfortable living and working environments
- Reduce costs for homes, businesses, schools, and government
- Create jobs by strengthening our economy
- Improve air quality, water quality, and public health

We can achieve this plan. It requires a commitment not only from government but also from civic leaders, individuals, businesses, institutions, and neighborhoods throughout the City of Cleveland. While this plan centers on the City of Cleveland, it requires a broader community effort. We look forward to collaborating with communities across Northeast Ohio to enable the regional prosperity we all seek.

While access to fresh water and a temperate climate make Cleveland better positioned for increased heat and a changing climate compared to many cities, there is much we can do to improve the city's resilience. By focusing on the strategies that reduce greenhouse gas emissions while at the same time creating conditions for a sustainable economy, a healthy community and a Cleveland resilient and adaptable to changes in climate, we are building a thriving green city on a blue lake.

Sincerely,

Mayor Frank G. Jackson

INTRODUCTION

Someday, our children, and our children's children, will look at us in the eye and they'll ask us, did we do all that we could when we had the chance to deal with this problem and leave them a cleaner, safer, more stable world?

– President Barack Obama's Climate Speech, June 25, 2013

CLIMATE CHANGE IN A NUTSHELL

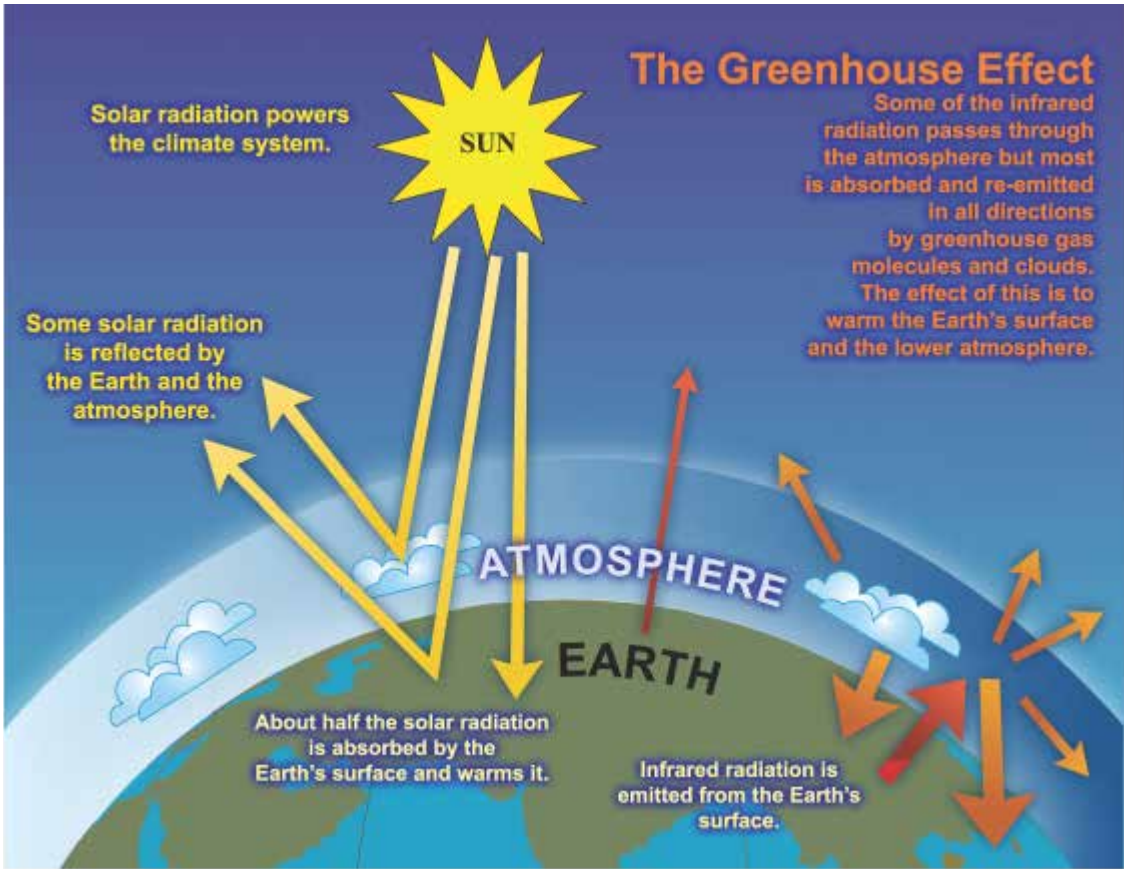
Taking action around climate change is a key component of the Sustainable Cleveland 2019 initiative. We can reduce greenhouse gas emissions, make our neighborhoods more resilient against the impacts of climate change, and grow the economy by integrating sustainability into the City of Cleveland's municipal operations, our residents' lives, and the priorities of our corporate and institutional partners.

SCIENCE OF CLIMATE CHANGE

Over the past century, human activities have released large amounts of carbon dioxide and other greenhouse gases (GHGs) into the Earth's atmosphere. Most of these GHGs have come from the burning of fossil fuels - such as oil, coal, and natural gas - to produce energy for heating and lighting our homes, running our vehicles, and keeping businesses and factories operating. Deforestation, industrial processes, and some agricultural practices also emit GHGs into the atmosphere.

GHGs act like insulation around Earth, trapping heat and energy in the atmosphere and causing the Earth to warm. This phenomenon is called the greenhouse effect. It is natural and necessary to support life on Earth. The excessive buildup of GHGs, however, is changing the Earth's climate, resulting in largely negative consequences on human, environmental, and economic health.

Figure 1: Model of the natural greenhouse gas effect
(Source: IPCC[1])



Global warming refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of GHGs in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change.

Climate change refers to any significant change in the measures of climate lasting for an extended period of time - including major changes in temperature, precipitation, or wind patterns - among other effects - that occur over several decades or longer.

Figure 2 below illustrates how the Earth's surface temperature (red line) is linked to carbon dioxide levels (blue line), indicating that as CO_2 levels increase, so does the Earth's surface temperature. The global atmospheric concentration of CO_2 increased from a pre-industrial value of about 280 parts per million (ppm) to 379 ppm in 2005[ii] and surpassed 400 ppm in 2013. This trend is evident in the right side of the graph.

According to the Intergovernmental Panel on Climate Change (IPCC), an international body of climate scientists, the period from 1995 to 2006 ranked among the 12 warmest years on record (since 1850). Since that time additional record warm years have occurred, including 2012, which was the warmest year on record in Cleveland. Sea levels have also been rising, and the observed annual coverage of the Earth's surface in snow and sea ice have shrunk[iii]. This warming trend in the Midwest is illustrated in Figure 3 below. Projected changes in summer average temperature and rainfall for Illinois and Michigan (shown in the figure) indicate that summers in these states will feel progressively more like summers currently experienced by states to their southwest under both higher (red) and lower (yellow) future emissions scenarios. In other words, parts of the Midwest are projected to feel like Texas by the end of this century unless we act.

Figure 2: Historic Carbon Dioxide and Temperature Fluctuations ***(Source: IPCC)***

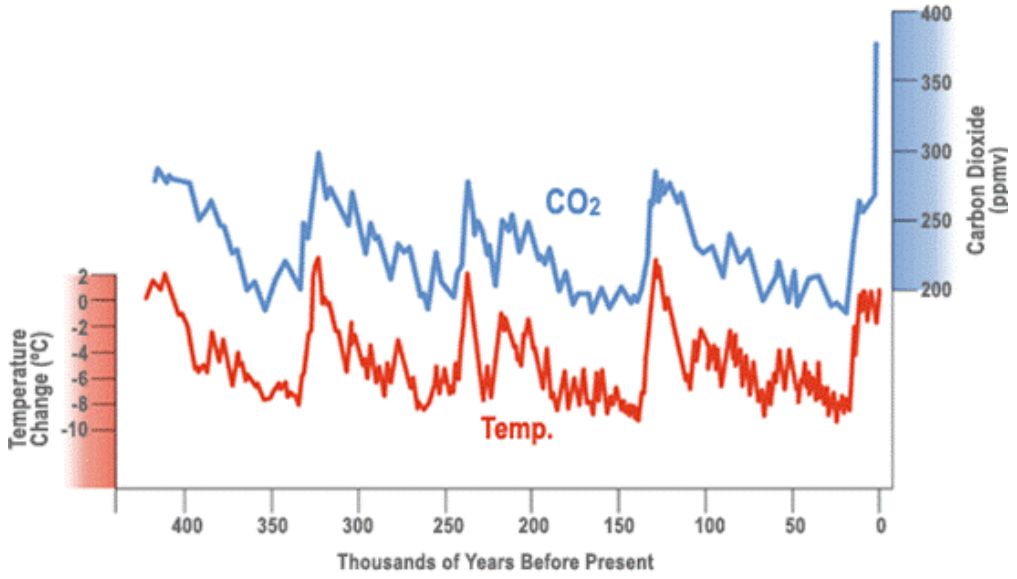
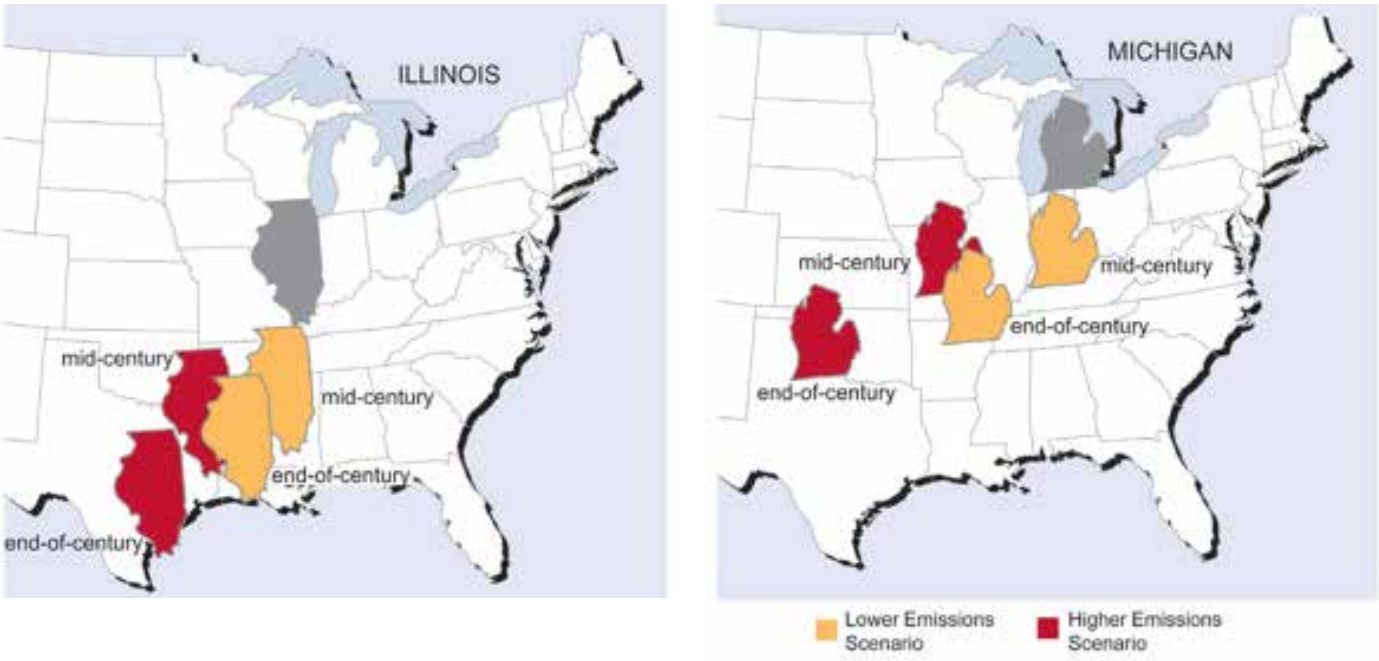
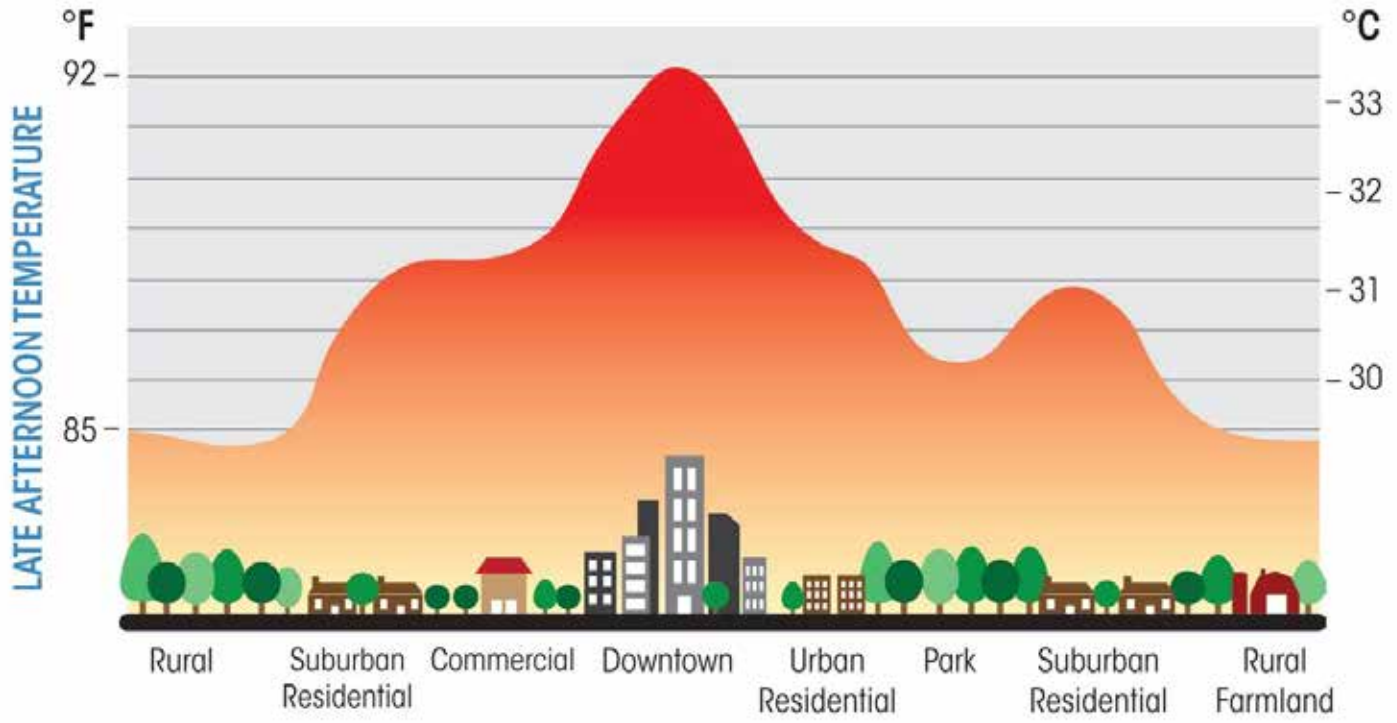


Figure 3: Migrating Temperatures ***(Source: Union of Concerned Scientists[iv])***



In Cleveland, one key impact of climate change are worsened heat islands, characterized by urban air and surface temperatures that are higher than nearby rural areas (see Figure 4 below). Many urban areas have air temperatures up to 10°F (5.6°C) warmer than surrounding areas with open land and vegetation. Heat islands form as dense built-up areas replace natural land cover with pavement, buildings, and other infrastructure. As an example, see the photo below of a parking lot in downtown Cleveland's Warehouse District. Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution, heat-related illness and mortality.

Figure 4: Urban Heat Island Profile[v] ***(Source: Clean Air Partnership)***



Pavement and buildings contribute to the urban heat island effect, while trees help reduce it (Warehouse District) ***(Photo: David Beach)***

Doan Brook combined sewer overflow event (*Photo: David Beach)*

Lake Erie shoreline erosion (*Photo: David Beach)*

WHY CLIMATE ACTION MATTERS IN CLEVELAND

According to the U.S. Environmental Protection Agency, annual temperatures in the Midwest, including Northeast Ohio, have increased over the last several decades. Heat waves are becoming more frequent and cold periods are becoming rarer. Snow and ice are arriving later in the fall and are starting to melt earlier in the spring. Heavy downpours now occur twice as frequently as they did a century ago. These trends are likely to continue under future climate change: average summer temperatures are projected to increase by 3°F over the next few decades and could increase by over 10°F by the end of this century[iv].

Unless we act, climate change is likely to have wide-ranging impacts on people and the environment in Northeast Ohio. Generally, these impacts would exacerbate existing management challenges by putting additional stress on vulnerable populations, infrastructure and ecosystems.

Anticipated impacts on **public health** include:

- More heat-related stress, particularly among the elderly, the poor, and other vulnerable populations; Fewer extreme cold-related health risks
- Greater risk of vector-borne illnesses (e.g., West Nile)
- Reduced summer air quality in urban areas due to increases in ground-level ozone and fine particulates

Climate change will also place additional stress on **water resources**, a key lifeblood in Cleveland and Northeast Ohio. Impacts include:

- Warmer water temperature in lakes and rivers causing increased evaporation
- Decreasing Great Lakes water levels, including Lake Erie, the shallowest of the lakes
- Increased competition for water
- Stress on wetlands
- Increased water-based transportation costs; Declines in ice cover will continue to lengthen the commercial navigation season.
- Reduced hydropower generation
- Increased heavy precipitation events and combined sewer overflow, increasing flooding risk
- Earlier spring snowmelt and peak runoff, increasing flooding risk

Additional climate impacts to **biodiversity and ecosystems** in Northeast Ohio include:

- Shift in the distribution and range of species, including trees such as sugar maples and hemlocks moving northward
- Loss of species not able to adapt to changes, and facing increased competition from invasive species
- Decline in beach health and more harmful blooms of algae
- Longer growing seasons over the next few decades will increase yields of some crops, but benefits will be offset by occurrence of extreme events such as heat waves, droughts, and floods.

Finally, climate change is likely to upset **economic activities** in the Great Lakes. For instance, in a warmer climate, evaporation from the lakes is projected to increase, which could cause water levels to drop by one to two feet by the end of the century. Although such a drop in water levels could benefit public beach access, it could adversely affect coastal ecosystems. Lower water levels would also make some key shipping channels too shallow for fully loaded ships, requiring more dredging. On the other hand, warmer temperatures may have a positive impact on shipping, as ice-free seasons lengthen. The net impact of these changes, however, is likely to impose costs on the Midwest through increased shipping, maintenance, and repair costs, as well as lost recreation and tourism.

THE BUSINESS CASE FOR ACTION

Many institutions, regional organizations, and companies in Northeast Ohio are already embarking on efforts to reduce their GHG emissions associated with energy use, transportation, solid waste and other areas. While reducing GHG emissions is a driving force for many of these efforts, there are many other benefits to individuals, organizations, and Cleveland's neighborhoods. In fact, **even if climate change was not a factor, taking the actions laid out in this plan would still make sense** from an economic, environmental, and equity perspective. The fact of climate change simply adds urgency to acting now.

Dozens of cities have begun to see firsthand that the implementation of climate mitigation strategies, such as improving building energy efficiency and public transit, have a positive impact on local and regional economies. As one example, between 2005 and 2011, Fort Collins, CO, implemented a number of programs and policies identified in its Climate Action Plan. While population increased 13%, the City reduced its GHG emissions by 11% and simultaneously grew its economy by 4% while being recognized nationally for its livability and business-friendly climate.

The goals and actions contained in this plan seek to reduce Cleveland's dependence on non-renewable fossil fuels, prioritize sustainable uses of land and water, reduce waste, and support neighborhood progress. If implemented, these actions will not only reduce Cleveland's GHG emissions, but also enhance its economic vitality, resilience, and viability as a healthy, livable city.

KEY BENEFITS OF TAKING CLIMATE ACTION

- Local job creation and economic development
- Reduced utility and operational costs for homes, businesses, and government
- Improved risk management and resilience to the impacts of climate change
- Healthier, more comfortable homes
- Improved air quality, public health, and quality of life
- Improved water quality in Lake Erie and other habitats
- A more educated and empowered population with the tools to take action at home, at work, and in their community

CLIMATE ACTION AND ECONOMIC DEVELOPMENT

Cities across the country are experiencing the economic benefits of taking climate action, especially as a result of investing in energy efficiency and advanced and renewable energy. Cleveland has the potential to achieve similar or better results as other cities because of the opportunities to improve building efficiency and to transition from coal to more sustainable sources of energy.

Cleveland residents and businesses spend approximately $1.7 billion/year, or 1.6% of the region's Gross Domestic Product, on utilities and transportation costs. These costs lead to 60% of the community's greenhouse gas emissions. Money spent on electric, gas, and water utility bills, or paid at the gas pump, could spur the economic growth of the region. For example, the actions outlined in this plan for Energy Efficiency & Green Building alone would save residents and businesses an estimated $170 million/year by 2030 (or $20 million/year in net savings) – effectively cutting their utility and gas bills while at the same time investing in the creation of a more sustainable economy.

There are three major job-generating components in this plan: 1) demand related to annual household and business utility cost savings; 2) demand related to the construction of infrastructure; and 3) demand related to the plan's ongoing actions.

The energy savings is significant, but the economic case is even greater when considering the multiplier effect from households and businesses having more money to spend elsewhere. For households, additional money translates into greater expenditure on retail goods and services, as well as potentially greater rates of investment and saving, all of which generate demand for jobs in the existing economy. To put that into perspective, the GDP multiplier for household spending in Cleveland is 0.65, meaning that for every additional $1 a household spends, local GDP increases by $0.65. For businesses, annual cost savings mean lower operational costs and potentially greater profitability, which can support local workforce expansion, promote hiring, and potentially support increased employee earnings. All of this means that the ripple effects of household and business cost savings are regionalized; i.e. the benefits are felt throughout the local economy in terms of more jobs and greater earnings in all sectors.

Beyond the economic benefits of reinvesting energy cost savings, perhaps the most compelling economic case for the plan comes from the numbers and types of jobs the strategies in this plan will generate. Cross-referencing the strategies in this plan with the United Nations Environment Programme's (UNEP) Green Jobs Definition and Classification System[vii], the investment that would result from implementing this plan would go largely to wages in high-growth job sectors as well existing businesses throughout Cleveland's economy. Many employment sectors comprise the green job industry, such as green building and construction trades, manufacturing, including cleantech equipment manufacturers and their suppliers, energy, transportation, and civil engineers, and other professional/technical trades like environmental policy experts and planners, among others. In Cleveland, where manufacturing and professional/technical trades account for nearly 25% of the GDP, an investment such as this is really a reinvestment in the long-term stability of the City's existing economic infrastructure. For example, whereas the average GDP multiplier for the all manufacturing industries in Cleveland is approximately 0.83, the multipliers for industries likely to benefit most from the strategies of this plan range from 0.88 to 0.96, meaning that the reinvestment in local GDP is nearly one-for-one (GDP multipliers rarely exceed 1.00.). Similarly, the job multipliers for industries related to implementation of this plan are also above-average. For every additional $1 million spent in the Cleveland economy (any sector), demand for an average of 7.3 local jobs is generated, but for each $1 million spent in industries related to plan implementation, demand for an average of 9.2 local jobs is generated.

In Cleveland, where manufacturing and professional/technical trades account for nearly 25% of the GDP, an investment such as this is really a reinvestment in the long-term stability of the City's existing economic infrastructure.

NorTech, a regional nonprofit technology-based economic development organization serving 21 counties in Northeast Ohio, developed an Advanced Energy Cluster roadmap to identify high growth sectors within the advanced energy economy in Northeast Ohio. Since June 2010, NorTech's advanced energy cluster member companies have grown by 602 jobs. Member growth is an indication of growth in the entire advanced energy cluster in Northeast Ohio.

Nortech has predicted market opportunity and job growth impact for four clusters of the advanced energy economy: Waste and Biomass, Smart Grid, Fuel Cell, and Energy Efficiency. Many of the actions in this plan rely on sectors of those clusters, including thermal depolymerization, anaerobic digestion, smart meter software and communications, energy management systems, solid state lighting, non-fiberglass insulation, and building efficiency systems.

Advanced Energy Cluster	Market Opportunity	Potential Job Impact by 2020
Waste and Biomass	$7 Billion	1,820 Jobs
Smart Grid	$7 Billion	1,040 Jobs
Fuel Cell	$900 Million	1,650 Jobs
Energy Efficiency	$17.3 Billion	2,700 Jobs

Additional economic benefit could be achieved through employee growth across the hundreds of businesses and organizations already involved in Sustainable Cleveland 2019. Implementing this plan could also attract new sustainable companies to the region, while accelerating the commercialization of research from Cleveland's top institutions into new start-ups, especially in the clean energy and clean water sectors.

Many climate plans throughout the U.S. touch on these economic benefits in qualitative terms. Because of the quantitative tools used to analyze and design the recommended strategies within this plan, the economic perspective is a key component of this plan, helping to shape the pathway for reducing per capita emissions while growing a sustainable economy.

Allen Theater Renovations (*Photo: Tony Brown, The Plain Dealer*)

CARBON REDUCTION IN A STEEL TOWN

More than 35 percent of the City of Cleveland's greenhouse gas emissions come from industrial processes – primarily the production of steel for customers in the United States and around the globe. According to the American Iron and Steel Institute, the American steel industry, overall, has steadily reduced its environmental footprint and improved its energy intensity per ton of steel (a near 30 percent reduction) in the past several decades through investments in new technologies and innovation on the shopfloor. Still, steel production is, by its very nature, a carbon intensive process.

The City of Cleveland's goal is to reduce greenhouse gas emissions 16 percent by 2020, and this plan recognizes an equally important goal of increasing the efficiencies of industry. Our city's manufacturers, including our largest steel producer, have been important participants in our Climate Action planning process, creating a vision for a sustainable manufacturing town.

ArcelorMittal's Cleveland facility is the largest industrial manufacturer in Cleveland and is one of the largest integrated steelmaking facilities in the United States, employing more than 1,800 people and generating thousands more jobs linked to the steel industry. Located along the Cuyahoga River in downtown's Industrial Valley, ArcelorMittal Cleveland is recognized as one of the most productive integrated steel facilities in the world with one ton of steel produced for slightly more than one

Electric Arc Furnace (*Photo: ArcelorMittal)*

worker hour. The plant operates two blast furnaces that feed two steelmaking facilities, a hot mill, cold mill and hot dip galvanizing line, serving the automotive, appliance, service center, construction and converter markets.

ArcelorMittal is focused on the importance of industrial energy efficiency in today's global economy, taking advantage of declining natural gas prices and rising demand for renewable energy, fuel efficiency and energy efficiency. ArcelorMittal USA remains the first and only steel company to be named an Energy Star® partner for energy management. The company has received this award for six consecutive years, and the Cleveland facility has contributed significantly to this recognition.

ArcelorMittal's Cleveland plant has already made significant operational improvements that protect and preserve natural resources, reduce emissions and increase energy efficiency, including:

The steel industry in North America has been recycling steel scrap for more than 150 years. The steel industry needs scrap to produce new steel, which ensures that all steel products contain anywhere from 25 percent up to 100 percent recycled content.

- Since February 2010, ArcelorMittal Cleveland has captured additional energy from recycled blast furnace gas and produces up to 30 megawatts of electricity an hour, resulting in less electricity being taken from the power grid. This is enough to power 30,000 homes, or the equivalent of the electric power generated by 30 large wind turbines. ArcelorMittal Cleveland projects greater efficiency in the coming years with up to a 10 percent increase in internal power generation forecasted at the site.

- The facility also reduced natural gas consumption at two of its boilers, reducing CO2 emissions by approximately 3,600 tons per year – the same amount of CO2 generated by using 370,000 gallons of gasoline.

- Twenty locomotives in the ArcelorMittal Cleveland Works Railway fleet have been equipped with special hot start anti-idling technology, saving about 88,000 gallons of diesel fuel a year.

- ArcelorMittal Cleveland and its predecessor companies have invested more than $1 billion related to improving water treatment systems and assisting with the restoration of the Cuyahoga River for more than 40 years. The facility operates eight wastewater treatment plants that meet or exceed U.S. EPA's Best Available Technology (BAT) standards. The company partners with several organizations working to protect and restore the health and habitat of the Cuyahoga River and Lake Erie basin and, in 2009, was recognized by the Cuyahoga River Community Planning Organization for its stewardship of the river.

- On average, ArcelorMittal Cleveland recycles more than 600,000 tons of steel scrap each year.

- In 2012, an office recycling program was launched at the Cleveland administrative offices. Employees participated in recycling more than 100 tons of paper, glass, plastic and aluminum in the program's first year.

As a global company, ArcelorMittal has a global goal to reduce greenhouse gas emissions by eight percent. As the company strives for greater efficiency in its processes, ArcelorMittal is also innovating sustainable solutions in its products. As our nation's energy infrastructure evolves, demand for steel for wind, solar and other energy applications will likely increase. And through innovative collaborations with customers, ArcelorMittal is developing new steel products that are cost-effective, lightweight, high quality and environmentally-friendly.

Here in Cleveland, ArcelorMittal is fast becoming a leading producer of advanced high-strength steels uniquely designed to help automotive manufacturers meet aggressive new fuel-efficiency standards while not compromising vehicle safety. The eco-friendly cars of the future will be made with some of the lightest, strongest coated steels ever made, produced in Cleveland, Ohio.

THE ROLE OF CITIES

Cities are at the front lines of climate change, and Cleveland is no exception. Climate change is a global phenomenon and half of humanity now lives in cities. That number is expected to rise to 70 percent by 2050 (Population Reference Bureau). Cities are in a unique position to provide good quality of life with relatively low levels of greenhouse gas (GHG) emissions per person. An increasingly urbanized world has the potential to play a central role in reducing global emissions.

Cities also have a key role to play in adaptation: protecting people from floods, storms, heat waves, and other impacts of climate change. Hurricane Sandy is a prime example, along with the Chicago heat wave of 1995 that killed more than 750 people.

It is particularly important for cities to make decisions today that will decrease future emissions, while also anticipating and encouraging population and economic growth. Cities can do this by promoting density, public transportation ridership, walkability, bikability, waste disposal, efficient energy use, and an economy creating green products and services.

Therefore, cities have a responsibility to address climate change in a proactive manner. Cities must:

- Provide leadership on the urgency for action;
- Set an example by reducing carbon emissions from municipal operations;
- Create incentives and policies that encourage residents and businesses to reduce carbon emissions;
- Promote the development of beautiful buildings, streets, and neighborhoods that use less energy and natural resources; and
- Practice preparedness by adapting infrastructure, public health programs, and other essential services to meet the risks of a changing climate.

It is "good government" to be proactive. Cities that plan well in the face of change are likely to be more livable, resilient, innovative, and more competitive places in the long run.

SUSTAINABLE CLEVELAND 2019

TOGETHER, WE'RE BUILDING A THRIVING GREEN CITY ON A BLUE LAKE

Sustainable Cleveland 2019 is a 10-year initiative that engages the region to build economic, social and environmental well-being for all (www.SustainableCleveland.org). In autumn 2009, the City of Cleveland hosted the first Sustainable Cleveland 2019 Summit and announced an ambitious plan to transform Cleveland into a Green City on a Blue Lake in just ten years. Sustainable Cleveland is about taking actions now to prepare for a successful future. The regional economy can be strong and resilient, with investment opportunities in growth sectors, job creation, and smart use of natural resources and human capital. Cleveland has the natural resources, the people and the ideas to be successful in this transformation. Sustainable Cleveland has gained support and grown in scope, breadth and numbers since it launched in 2009. There are hundreds of businesses and organizations now engaged. Working groups and more than 200 volunteers have worked on a wide variety of initiatives.

Because of this work, the integration of sustainability and economic development is becoming a model of how to prepare for the future, and cities across the country are now beginning to adopt this approach. New businesses and non-profit organizations have emerged, new programs have been developed,

SUSTAINABLE CLEVELAND KEY MILESTONES

2005

Office of Sustainability Formed

2006

Mayor Jackson signs U.S. Mayor's Climate Protection Agreement

2008

Mayor Jackson signs UN Global Compact

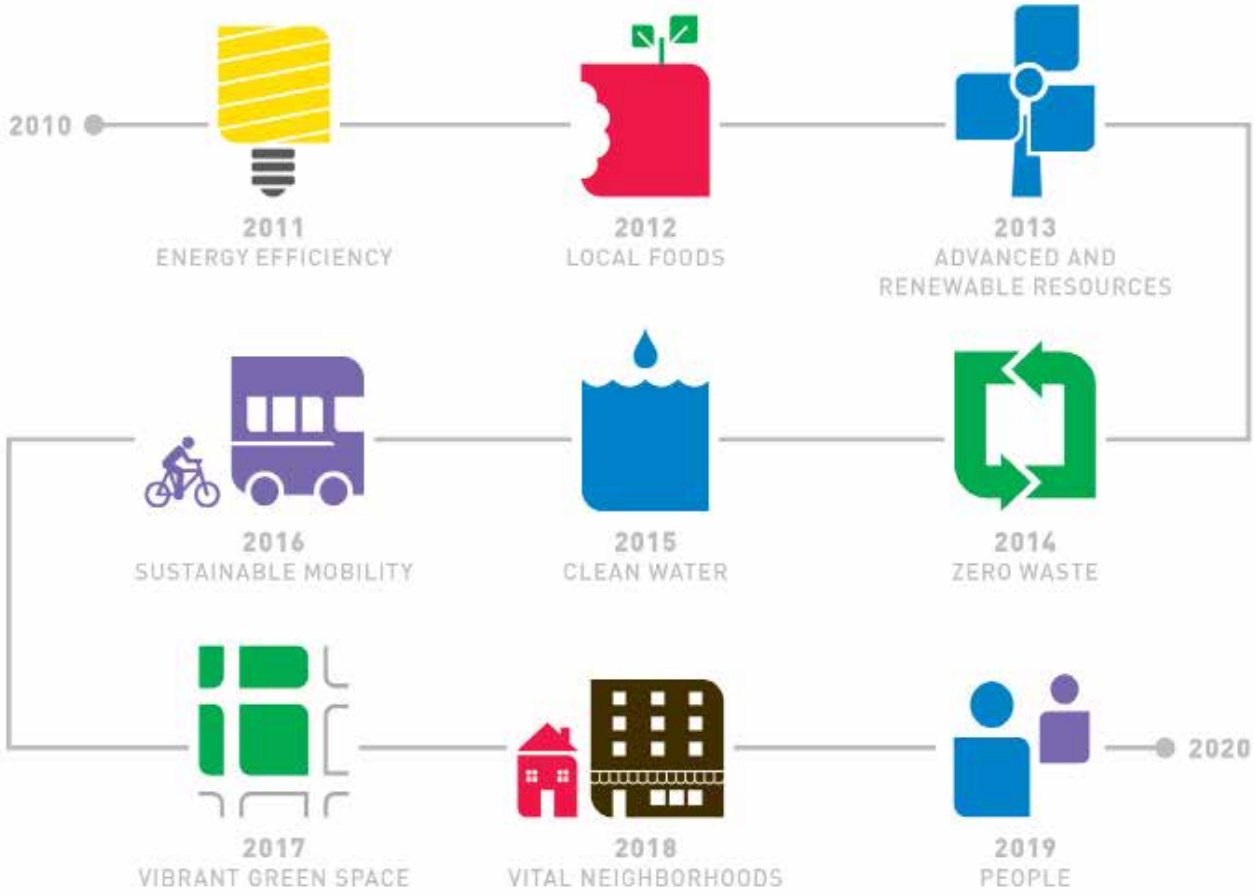
2009

1st Sustainable Cleveland Summit, Sustainability becomes part of Mayor's Office, Chief of Sustainability position created

and new jobs have been created by integrating sustainability into the way Cleveland operates. It is important that the broader community remain focused on this tremendous opportunity to position Cleveland for the future and that the City of Cleveland fully supports efforts to build a sustainable economy.

Every year leading up to 2019, Cleveland focuses on one of the key areas fundamental to a sustainable economy. The Sustainable Cleveland Celebration Years are designed to be accessible to all members of the community - households, neighborhoods, businesses, and institutions can all participate, either in collaboration or independently. One key purpose of the CAP is to integrate each sustainability topic (see Figure 4) into a comprehensive whole, highlighting how they are connected and dependent upon each other. By doing so the City not only developed community consensus regarding actions for each topic, but also found opportunity to celebrate successes to date. While some actions are new, most build upon policies, programs, and projects that community leaders have been working on for years.

Figure 5: Sustainable Cleveland Celebration Years



2010

Sustainable Cleveland 2019 Action and Resources Guide Developed, More than 20 Working Groups established

2011

Celebration Years Concept Announced, Celebration Year Logos shared with the community

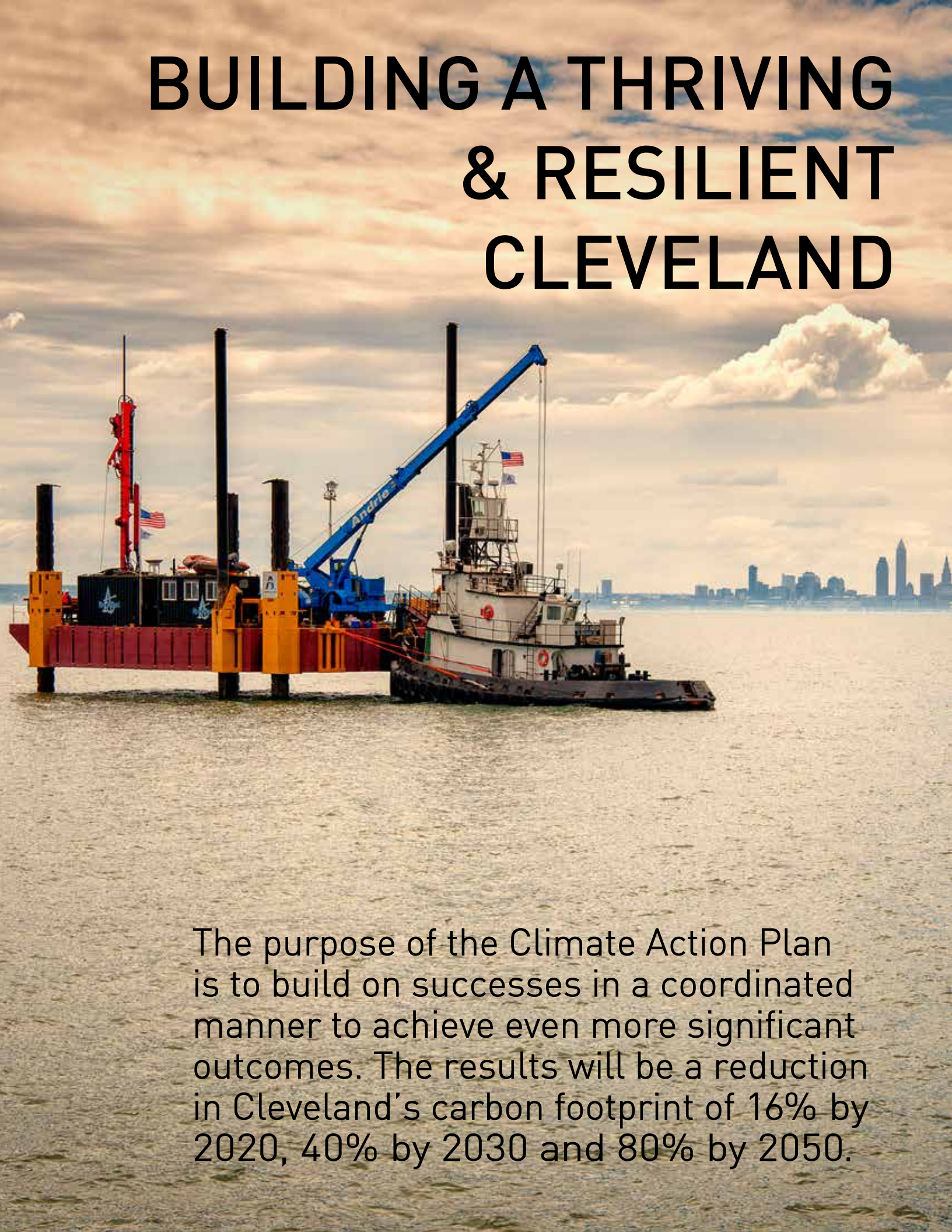
2012

Sustainable Cleveland Center Opens, SustainableCleveland.org and Indicator dashboard launched

2013

Municipal and Community Climate Action Plans, 5th Annual Sustainability Summit, Photo Contest and "I am Sustainable, Cleveland" campaign

BUILDING A THRIVING & RESILIENT CLEVELAND



The purpose of the Climate Action Plan is to build on successes in a coordinated manner to achieve even more significant outcomes. The results will be a reduction in Cleveland's carbon footprint of 16% by 2020, 40% by 2030 and 80% by 2050.

HOW THE PLAN WAS CREATED

In July 2012, the City of Cleveland utilized federal grant money to contract with a team of experts to create an action-oriented approach to sustainability and climate action planning. Working with a core group of stakeholders and building on the Sustainable Cleveland 2019 efforts to date, the team decided to create two separate, but interrelated plans:

1. A Sustainable Cleveland Municipal Action Plan (SC-MAP) for the City's internal operations; and

2. A community-wide Cleveland Climate Action Plan (CAP) for the City proper (this document)

Both action plans include near-term objectives and actions that largely build upon current initiatives and achievements.

SUSTAINABLE CLEVELAND MUNICIPAL ACTION PLAN

Development first began on the SC-MAP, a sustainability plan for Cleveland's municipal operations. Cities across the country, including the City of Cleveland, have embraced sustainability as a tool to enhance the viability of their organizations and communities, benefit from increased efficiencies and reduced operating costs, enhance social services, drive innovation, and preserve valuable environmental resources. The SC-MAP establishes an organizational philosophy toward sustainability through proven policy, goals, actions, and performance metrics. While it is primarily intended to lay out specific actions for City staff, the SC-MAP also provides context for the public to understand the City's approach to sustainability in its operations, and track the results.

The City is already practicing sustainability in many areas. The purpose of the SC-MAP is to accelerate progress in a more coordinated manner and help the City achieve even more significant outcomes. Key to this process was development of a City Green Team in May 2012, consisting of representatives from across City government serving to integrate sustainability into City operations.

The overall goal is to reduce GHG emissions from Cleveland's municipal operations below 2010 levels 10% by 2016, 20% by 2020, and 45% by 2030. The SC-MAP, also completed in 2013, includes 25 actions and targeted goals, broken into the following focus areas:

- Design, Construction and Maintenance
- Energy
- Transportation
- Water
- Materials Management and Procurement

For more information on the Sustainable Cleveland Municipal Action Plan, visit the City of Cleveland's website at **www.city.cleveland.oh.us/sustainability**.

COMMUNITY-WIDE CLEVELAND CLIMATE ACTION PLAN

In October 2012, the Office of Sustainability convened a 50-member Climate Action Advisory Committee (CAAC) with representatives of leading Cleveland organizations from the commercial, industrial, educational, government, and non-profit sectors to inform and create the Climate Action Plan. The project team convened meetings and workshops with CAAC committee members and other key stakeholders to develop and vet the objectives, actions, and goals of the Plan and discuss GHG Inventory findings. The project team also:

- Conducted surveys of Cleveland residents, CAAC members, and other key stakeholders to obtain input on the Plan;

- Held a Public Outreach Meeting to present information about the Plan and obtain feedback, followed by a one-month public comment period; and

- Obtained GHG Inventory data from local utilities, the City of Cleveland, Cleveland-Cuyahoga County Port Authority, Cuyahoga County, the Northeast Ohio Area Coordinating Agency (NOACA), the Northeast Ohio Regional Sewer District (NEORSD), the U.S. and Ohio Environmental Protection Agency offices, and other sources.

CLEVELAND'S CARBON FOOTPRINT

One of the first steps in developing the Cleveland CAP was to create a baseline GHG inventory (or carbon footprint) to understand the sources of emissions. This involved the definition of a physical boundary for the inventory as well as identifying emissions sources to include based on data availability and climate impact.

Cleveland's city limits were selected as the boundary for the Cleveland community GHG inventory. To varying degrees, all activities that occur within this boundary can be influenced by the City via policies, incentive programs, and educational campaigns (Figure 6, Next Page). The inventory, therefore, seeks to quantify the GHG emissions of all activities within this boundary area.

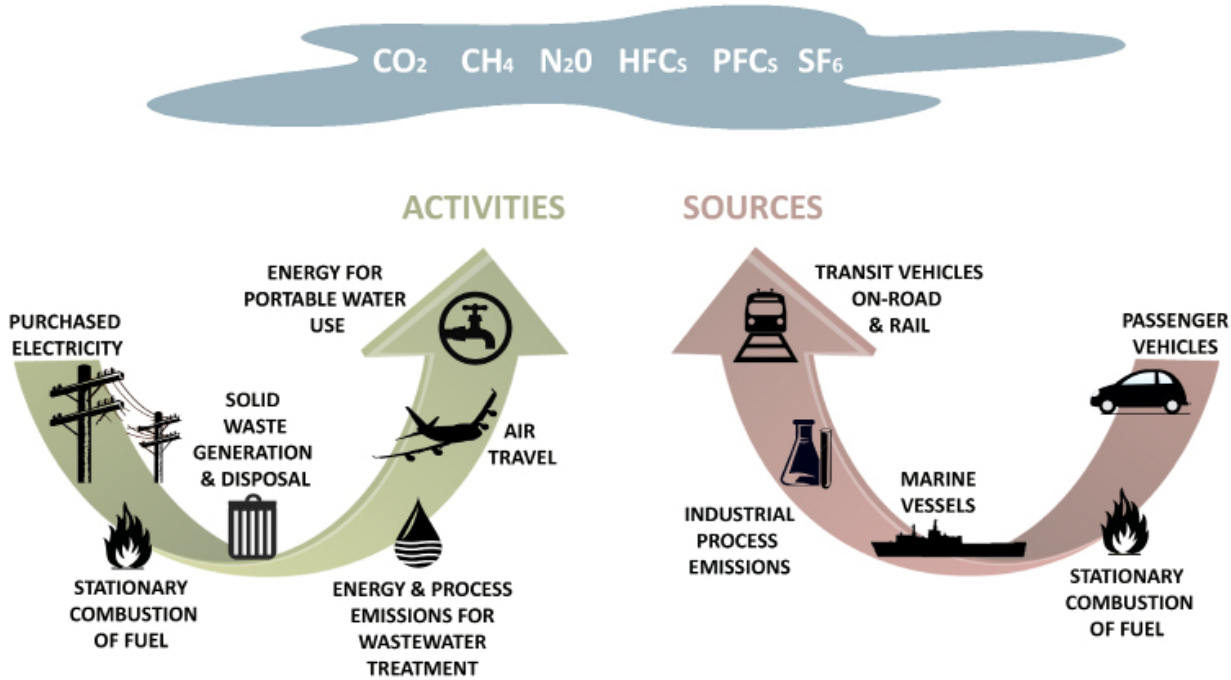
There are two general categories of emissions for the City's inventory:

- **Sources:** Any physical processes inside the jurisdictional boundary of the City that release GHG emissions into the atmosphere.
- **Activities:** The use of energy, materials, and/or services by the community that result in the creation of GHG emissions, directly or indirectly.

The GHG inventory revealed that in 2010 emissions in the City totaled almost 13 million metric tons of carbon dioxide equivalent ($MTCO_2e$). Electricity and natural gas consumption in buildings contribute over 50% of total emissions followed by industrial emissions (36%), such as burning fuels on-site for manufacturing.

Figure 6: City of Cleveland Limits *(Source: Teaching Cleveland[v])*

Figure 7: GHG Inventory Categories [vi]



The total annual emissions of almost 13 $MTCO_2e$ is equivalent to the entire population of Cleveland commuting from Cincinnati every day for the year. Conversely, covering an area the size of Lake Erie and Lake Ontario with trees would absorb this same amount of CO_2e. Figures 8 and 9 present the breakout of total emissions by sector and source, respectively. In Figure 8, note that Industrial Facilities (25%) includes electricity and natural gas consumption related emissions for the industrial sector, while Industrial Emissions (36%) includes specific industrial process emissions and large emitters' stationary combustion sources as reported to the EPA.

Figure 8: GHG Emissions by Sector

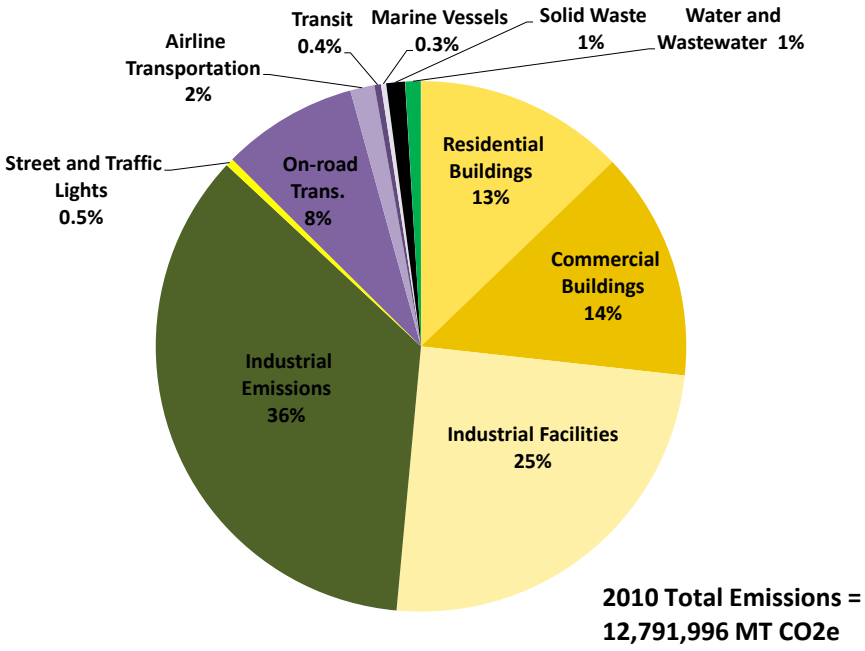
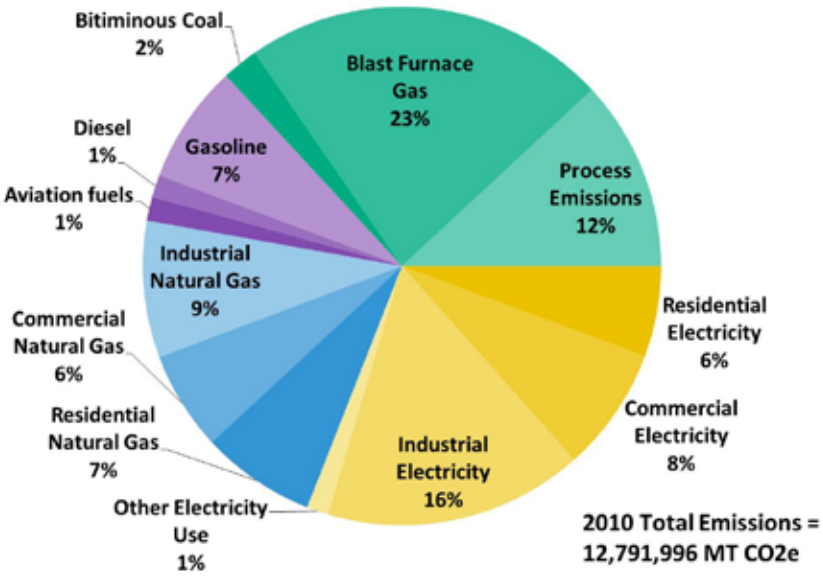


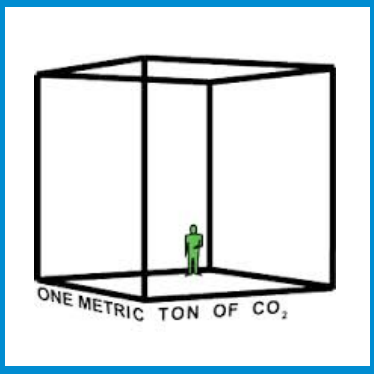
Figure 9: GHG Emissions by Fuel Source



WHAT IS A $MTCO_2e$?

There are six main greenhouse gases that contribute to climate change, and each one has a different level of impact. For example, the emission of 1 ton of methane (CH_4) has a global warming potential (GWP) 21 times larger than that of the emission of 1 ton of carbon dioxide (CO_2). To avoid confusion between emissions of the different types of gases, all emissions are converted to the common unit of **CO_2e**, or **carbon dioxide equivalent.**

If a cube was built to represent one metric ton of CO_2, it would measure 27 feet across by 27 feet deep by 27 feet high. One metric ton equals 2,204 pounds.



Some equivalencies for 1 metric ton of carbon dioxide equivalent (CO_2e) include:

- Driving 2,000 miles in a car that averages 23 miles per gallon (e.g., 4 round trips between Cleveland and Cincinnati, 250 miles each way).
- Flying 3,700 miles by commercial airline (e.g., one round-trip from Cleveland to Las Vegas).

By comparison, the seven-county Northeast Ohio region generated 64 million MTCO2e in 2005 as determined in a baseline inventory conducted by the GreenCityBlueLake Institute. As in the City, buildings contributed the largest share of emissions in the region. However gasoline and diesel used for transportation played a larger role, likely the result of differences in land uses that cause more driving in suburban areas. If industrial process emissions are removed from the Cleveland inventory (because this emission source was not included in the regional inventory), Cleveland contributes around 13% to the region's total emissions.

FUTURE PROJECTIONS

After the baseline GHG emissions inventory was prepared, a business-as-usual (BAU) forecast was calculated to estimate what emissions would likely be in the future if no action were taken. There are a number of different factors that can impact future emissions in the City of Cleveland. Population and economic growth tend to be two of the more significant drivers of BAU emissions projections. Other factors such as projected development patterns in the city and whether those patterns tend towards infill development or a more sprawling development pattern can impact activities such as driving habits, and therefore impact future GHG emissions.

Due to the high level of uncertainty associated with this type of forecasting exercise, a flat line BAU forecast was assumed for now. However, this assumption of no growth or decline in emissions can be adjusted in the future to account for changing conditions.

THE PLAN'S FRAMEWORK

The Cleveland Climate Action Plan (CAP) framework consists of Focus Areas, Objectives, Goals, Actions, and Next Steps. Each of these components is described below.

Focus Areas: Focus Areas are used to organize the CAP actions into themes in a consistent manner. Specifically, these Focus Areas include:

Energy Efficiency and Green Building

Advanced & Renewable Energy

Sustainable Mobility

Waste Reduction & Resource Conservation

Sustainable Land Use & Clean Water

Community Engagement & Public Health

Objectives: The objectives summarize what the Cleveland community plans to achieve, and are used as a means to organize the various Actions.

Goals: The Goals embody the desired outcomes that the Cleveland community intends to achieve for each Focus Area. Where applicable, Goals include numeric targets and time frames for achieving these targets. In other instances, goals are more qualitative but still articulate a desired future end state.

Actions: Actions consist of specific strategies that will be implemented to meet the Goals. It is at this level where potential costs and benefits, both in financial and resource efficiency terms, are quantified to help scale and prioritize possible actions. For any given Goal there are generally several supporting Actions. It is indicated which sectors (Home, Work, Community) are served by each Action.

Next Steps: Specific task to complete by 2016 in order to achieve significant progress on each Action

MITIGATION VS. ADAPTATION

Mitigation: Reducing GHG emissions and lessening impacts from additional warming of the atmosphere.

Adaptation: Preparing for the impacts of an already-changing climate.

While Cleveland must take steps to reduce GHG emissions and lessen impacts from additional warming of the atmosphere ***(Mitigation)***, it can also prepare for the impacts of an already-changing climate ***(Adaptation)***. These adjustments can be protective (i.e., guarding against negative impacts of climate change), or opportunistic (i.e., taking advantage of any beneficial effects of climate change). In some cases, adaptation and mitigation strategies are closely related and intertwined (see Figure 10). For example, planting trees and green roofs reduce emissions by taking carbon out of the atmosphere, but they also help protect people on extreme heat days by cooling the air, thereby reducing the urban heat island effect.

Many governments and communities across the U.S. and around the world have already begun plans to adapt to a changed climate. They recognize that this will be a permanent part of planning resilient communities. Many GHGs remain in the atmosphere for 100 years or more, so those already emitted into the atmosphere will continue to warm the Earth for a long time even if new emissions were stopped today.

Cleveland can start adapting now to the changes that are already being experienced in Northeast Ohio. This includes measures to protect vulnerable populations, such as the sick and elderly, anticipating needed changes in infrastructure (e.g., stormwater capture),

and constructing buildings to be more efficient – particularly during hotter summers when more energy will be needed for cooling. Examples of adaptation-related actions are provided in the Community Engagement & Public Health focus area.

GOALS AND ACTIONS

The Cleveland Climate Action Plan (CAP) contains an overarching GHG reduction goal of 80% reduction below baseline emissions by 2050, with interim goals of 16% reduction by 2020 and 40% reduction by 2030. These goals are comparable to the City's targets for municipal operations as outlined in the SC-MAP. Goals will be achieved through the implementation of the **33 actions** outlined in the plan. These actions are split into **6 focus areas** all with the aim of reducing Cleveland's climate impact and preparing the City for the changing climate of the future. Goals are designed to be bold yet achievable.

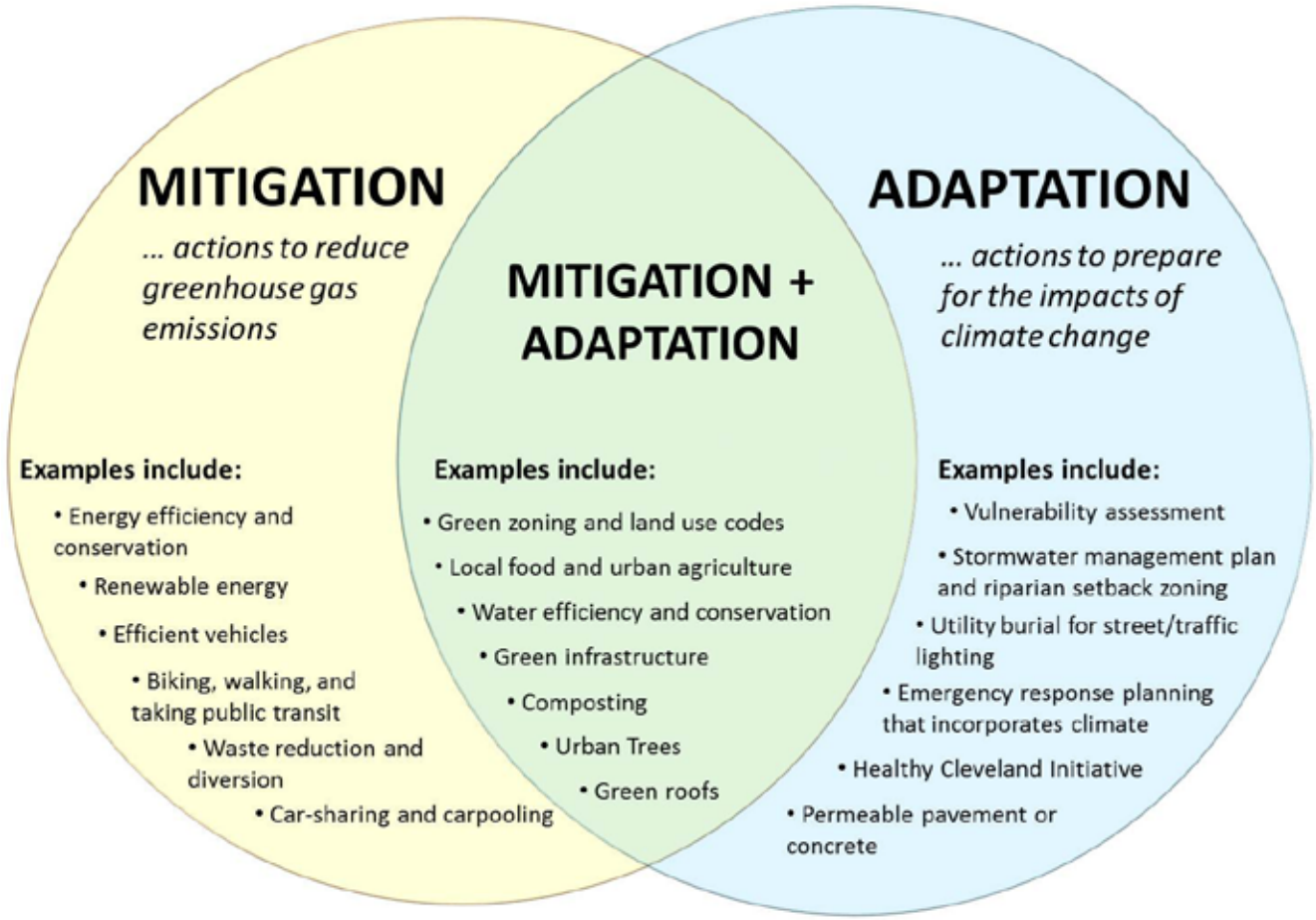
Figure 11 illustrates the contribution of each focus area to meeting the GHG reduction goal. For example, actions in the Energy Efficiency & Green Building focus area contribute 14% of the 40% reduction in GHGs by 2030 we are seeking. Table 1 provides a brief summary of all the actions included in the Climate Action Plan, organized by focus area and including:

- **Sectors**: Indicates the involvement level(s) for each action; At Home, At Work, or In Your Community
- **Climate Change Impact**: Indicates how each action addresses climate change; reduces GHG emissions (mitigation) or preparing for the impacts of an already changing climate (adaptation)
- **2030 Reduction Potential**: The annual GHG reduction by the end of the planning horizon, 2030

In addition to goals based on overall reduction, this Climate Action Plan recognizes the benefit of tracking our city's carbon intensity. For the purposes of this plan, carbon intensity is the amount of CO2e per person and per gross domestic product (GDP). Because decreasing sprawl and increasing urban density is key to improving efficiency and sustainability on a regional and global scale, understanding the effect of increased population and economic growth on total carbon emissions is important. As we increase efficiency and improve community behaviors, we expect the carbon intensity of our businesses and population to improve even if our overall carbon footprint decreases less rapidly due to job and population growth.

More detail on each action provided in the following sections.

Figure 10: Mitigation-Adaptation Connection



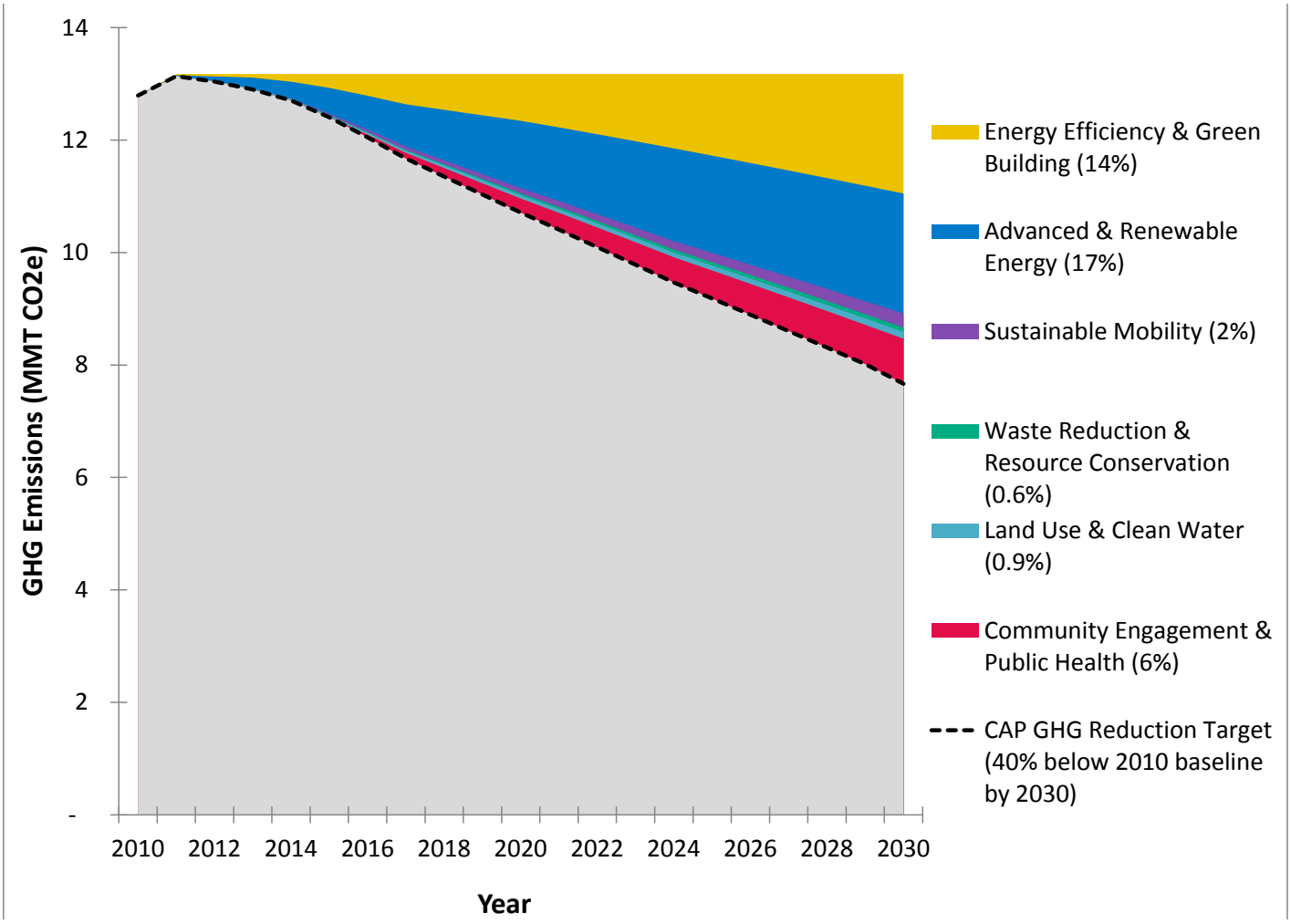
SETTING PRIORITIES

The following factors were considered when identifying the 33 actions contained in this plan:

- Cost-effectiveness
- Quality of life and environmental benefits
- Feasibility (technical, cultural, political, legal)
- Stakeholder support
- Tie to local priorities and current initiatives
- Potential for spurring innovation

Reducing Cleveland's GHG emissions by 40% is equivalent to the energy used by **410,000 homes.**

Figure 11: Reduction Wedge Diagram




WIND POWER FOR Indians
BY CLEVELAND STATE UNIVERSITY

Table 1: Cleveland's Climate Action Plan at a Glance

Focus Area	Objective	Sectors	Climate Change Impact	Action	Annual Reduction Potential by 2030 (MT CO_2e/yr)
ENERGY EFFICIENCY & GREEN BUILDING **Annual Emissions Reduction by 2030 = 2,100,000 MT CO2e (39% of total GHG reduction)**	**Retrofit and renovate existing buildings**		M A	Action 1. Support programs and policies to retrofit residential buildings	430,000 8%
			M	Action 2. Support programs and policies to retrofit commercial and industrial buildings	1,300,000 24%
	Make green building the standard for all new construction		M A	Action 3. Incentivize new construction to exceed existing building codes	1,500 0.03%
	Implement neighborhood-level solutions		M	Action 4. Make utility data easily accessible for residents and businesses	n/a
			M	Action 5. Expand use of smart grid and advanced meter technologies	120,000 2%
			M	Action 6. Expand energy and green building challenges	290,000 5%
			M A	Action 7. Build on existing green school initiatives in the City	n/a
ADVANCED & RENEWABLE ENERGY **Annual Emissions Reduction by 2030 = 2,100,000 MT CO2e (38% of total GHG reduction)**	**Accelerate renewable energy use by Cleveland's residents and small businesses**		M A	Action 8. Increase distributed energy installations	35,000 0.6%
			M	Action 9. Incorporate renewable energy into municipal aggregation	340,000 6%
	Use local projects to help meet or exceed the utility renewable energy standards		M	Action 10. Become national leader in reusing vacant land for renewable energy projects	23,000 0.4%
			M	Action 11. Develop a pilot offshore wind farm	67,000 1%
			M	Action 12. Utilities invest in additional projects to meet renewable energy standards	1,100,000 20%
	Implement advanced energy technologies		M	Action 13. Accelerate conversion of organic waste to energy using anaerobic digestion	52,000 1%
			M	Action 14. Switch to low-carbon fuel sources for district heating and cooling systems	120,000 2%
			M	Action 15. Support Cleveland businesses to reduce industrial process emissions	390,000 7%
SUSTAINABLE MOBILITY **Annual Emissions Reduction by 2030 = 250,000 MT CO2e (5% of total GHG reduction)**	**Reduce congestion and vehicle emissions**		M	Action 16. Develop and promote policies and programs that encourage more efficient vehicles	150,000 3%
			M	Action 17. Encourage anti-idling citywide	8,500 0.2%
			M	Action 18. Expand use of carpooling and car sharing	8,700 0.2%
			M	Action 19. Increase the use of public transit through incentives and system improvements	84,000 2%
	Create Complete and Green Streets		M	Action 20. Make biking and walking easier and safer	2,600 0.05%
			M A	Action 21. Develop a streamlined process to implement complete and green streets policy	n/a

Focus Area	Objective	Sectors	Climate Change Impact	Action	Annual Reduction Potential by 2030 (MT CO_2e/yr)
WASTE REDUCTION & RESOURCE CONSERVATION Annual Emissions Reduction by 2030 = 77,000 MT CO2e (1% of total GHG reduction)	**Significantly reduce the amount of waste sent to landfills**		M	Action 22. Implement programs and policies to encourage waste reduction and diversion by residents and businesses	56,000 1.0%
			M	Action 23. Develop a cost-effective approach to deconstructing and recycling demolished buildings	n/a
			M	Action 24. Develop and implement a sustainable integrated waste and energy plan for the City of Cleveland	21,000 0.4%
LAND USE & CLEAN WATER Annual Emissions Reduction by 2030 = 120,000 MT CO2e (2% of total GHG reduction)	**Encourage vibrant downtown and neighborhoods**		M A	Action 25. Green the zoning and land use codes to encourage sustainable development	1,500 0.03%
			M A	Action 26. Prioritize sustainability and rightsizing in City infrastructure upgrades and improvements	n/a
	Restore and regenerate the natural environment		M A	Action 27. Develop and implement an urban tree plan to grow the canopy	110,000 2%
			M A	Action 28. Scale up the local food system	n/a
			M A	Action 29. Implement green infrastructure to capture stormwater on-site	1,900 0.03%
			M A	Action 30. Increase water conservation and efficiency	9,300 0.2%
COMMUNITY ENGAGEMENT & PUBLIC HEALTH Annual Emissions Reduction by 2030 = 800,000 MT CO2e (15% of total GHG reduction)	**Organizations, neighborhoods, and individuals become climate leaders**		M	Action 31. Promote leading local businesses striving to meet energy and carbon reduction goals	800,000 15%
			M A	Action 32. Recognize capacity of neighborhood and community groups to implement climate mitigation and adaptation initiatives	n/a
	Improve public health and resiliency to climate change impacts		A	Action 33. Conduct climate change vulnerability assessment and integrate projected impacts into existing plans	n/a
				Total Estimated Annual Reduction by 2030 (MT CO2e/yr) =	**5,500,000**

KEY

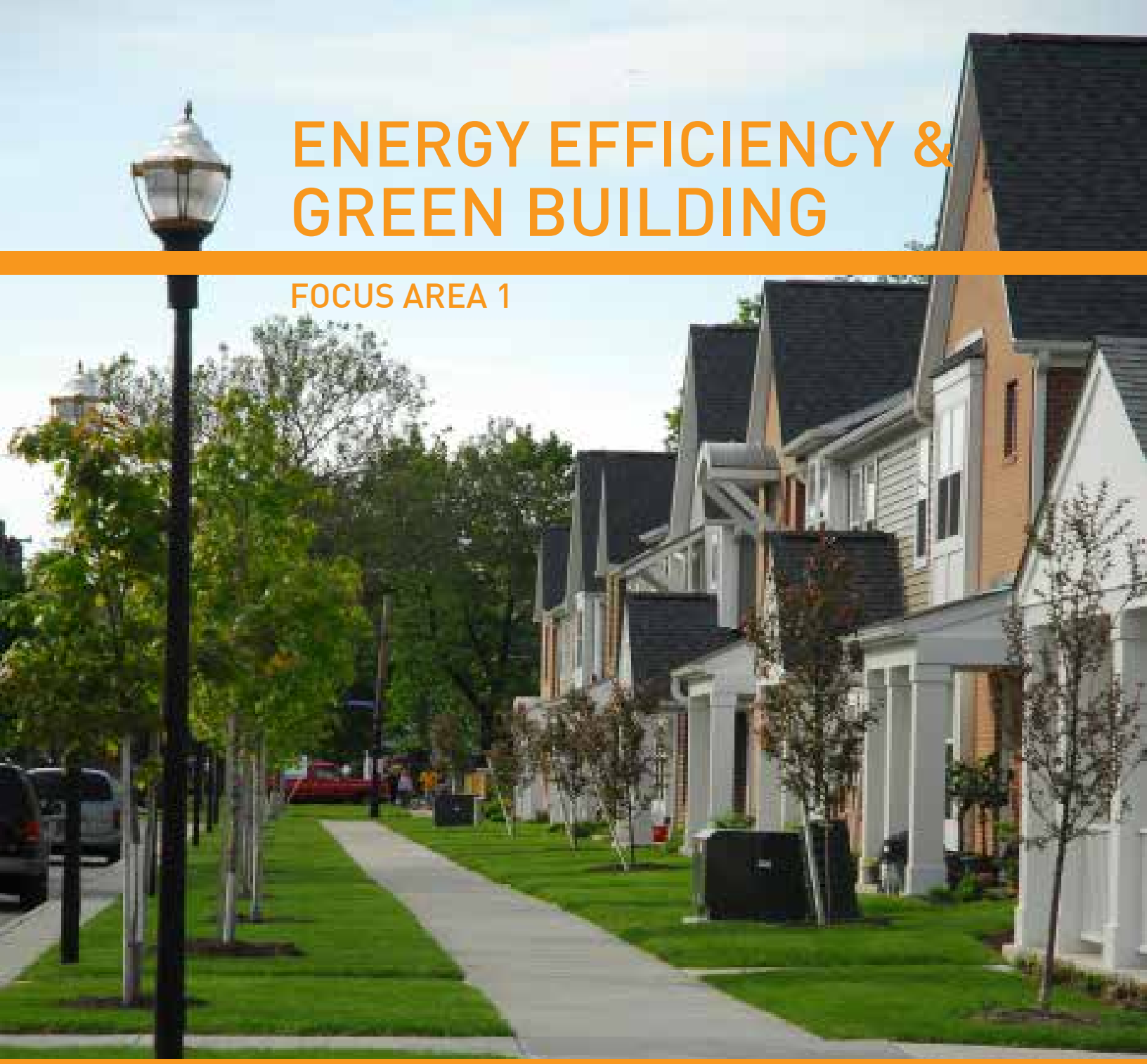
(XX%)	Percent contribution of each action (and total of all actions) to meeting overall GHG reduction goal of 40% reduction below 2010 baseline by 2030
TBD	Analysis/results that will be included in the final CAP but is not yet available
n/a	Actions for which GHG reductions and costs are not be quantified as part of the CAP

Sectors: At Home; At Work; In The Community

Climate Change Impact: M Mitigation; A Adaptation

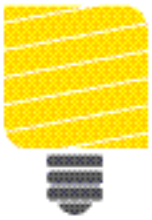
ENERGY EFFICIENCY & GREEN BUILDING

FOCUS AREA 1



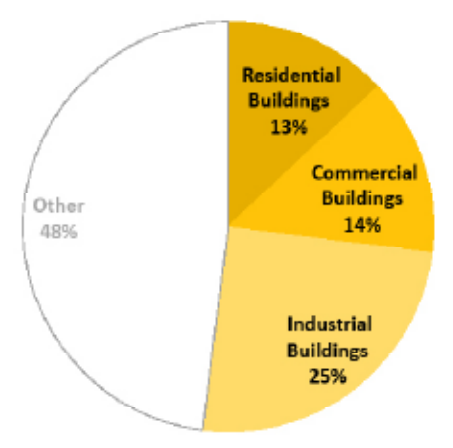
GOALS:

- By 2030, reduce residential and commercial energy and water use 50%, and industrial use by 30%
- Reduce Annual Cleveland GHG Emissions 2.1 million $MTCO_2e$ by 2030
- By 2030, $170 million saved annually by Cleveland households and businesses due to reduced energy use



KEY FACTS:

Energy use in buildings makes up more than **50% of Cleveland's total GHG emissions.**



The energy use intensity of Cleveland's housing stock is **54% higher than National averages** (58% higher than average Midwest stock), while commercial buildings in Cleveland use **36% more energy** than U.S. averages (22% higher than Midwest averages). This is partially due to an older building stock in Cleveland.

THE IMPORTANCE OF ENERGY EFFICIENCY & GREEN BUILDING

Ohioans spend roughly $4,700 per person and 11.5% of our gross state product on energy, according to the Energy Information Administration. These costs strain the budgets of residents, businesses, and government. In addition, Ohio ranks sixth nationally for the total amount of energy we use, and third nationally for the amount of pollution we emit when generating electricity.

Energy efficiency and conservation are often the most cost-effective approaches for reducing emissions and energy costs in buildings. Energy consumed by residential, commercial, and industrial buildings located in the City of Cleveland contributed to more than 50% of the City's greenhouse gas (GHG) emissions in 2010. Existing residential buildings represent 13% of Cleveland's total emissions while commercial and industrial buildings make up another 39% of Cleveland's total emissions.

Significantly reducing energy use in existing buildings through efficiency projects and conservation is a critical mitigation strategy. Efficient housing has lower utility and maintenance costs, reducing energy poverty for low-income residents. Encouraging building design that considers future climate impacts, such as innovative cooling and stormwater management, is an important adaptation strategy.

Energy demand curtailment offers additional cost savings opportunities for building owners. Demand Response is a consumer's ability to reduce electricity consumption at their location when wholesale prices are high or the reliability of the electric grid is threatened. Common examples of demand response include: raising the thermostat temperature so the air conditioner runs less frequently, occasionally slowing down manufacturing production, or shutting off lights - basically any action to reduce load in response to short-term high prices or a signal from the utility grid operator.

PJM Interconnection is a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia, including Ohio. PJM's wholesale electricity markets provide opportunities for end-use customers to realize value for reducing their demand for electricity. In PJM's Energy Market, end-use customers participate in demand response by reducing their electricity use either during an emergency event or when marginal prices are high on the PJM system.

FOCUS AREA 1

ENERGY EFFICIENCY & GREEN BUILDING

OBJECTIVE: RETROFIT AND RENOVATE EXISTING BUILDINGS

Since building energy use makes up more than 50% of the total GHG emissions for the City, making the existing building stock as efficient as possible is a top priority for the CAP.

ACTION 1: SUPPORT PROGRAMS AND POLICIES TO RETROFIT RESIDENTIAL BUILDINGS

2030 Emissions Reduction Potential: **430,000 $MTCO_2e$ = 32,000 Cleveland homes.**

There are great opportunities to significantly improve the energy efficiency of existing homes through improved insulation and air sealing, more efficient heating and cooling equipment, and efficient appliances and electronics. Efficient buildings reduce strain on power distribution systems, are more resilient to increasing utility costs, and are less affected by extreme weather events.

KEY BENEFITS OF ENERGY EFFICIENCY & GREEN BUILDING

- Cost savings
- Less risk from energy price volatility
- Increased property values & rental rates
- Reduction in energy poverty
- Healthier, more comfortable homes
- Local job creation and economic development
- Leadership and recognition
- Education and awareness

CLEVELAND ALREADY HAS SEVERAL EXISTING PROGRAMS TO BUILD ON, INCLUDING:

- Home Weatherization Assistance Program
- Warm & Healthy Homes
- House Warming and Good Cents (Dominion)
- Cleveland Energy$aver Program
- Efficiency Smart Program offered by Cleveland Public Power
- FirstEnergy programs (e.g., appliance turn-in, lighting and HVAC incentives, traffic signal)

ACTION 2: SUPPORT PROGRAMS AND POLICIES TO RETROFIT COMMERCIAL AND INDUSTRIAL BUILDINGS

2030 Emissions Reduction Potential: **1,300,000 $MTCO_2e$ = 97,000 Cleveland homes.**

The energy efficiency of existing commercial and industrial buildings can be improved through insulation, building envelope, and lighting upgrades, more efficient heating and cooling equipment, efficient motors and drives, and efficient processes and equipment. Efficient buildings cost less to operate, adding directly to bottom-line profits and the strength of local businesses.

Figure 12: *Architecture 2030 Challenge* - Existing Buildings

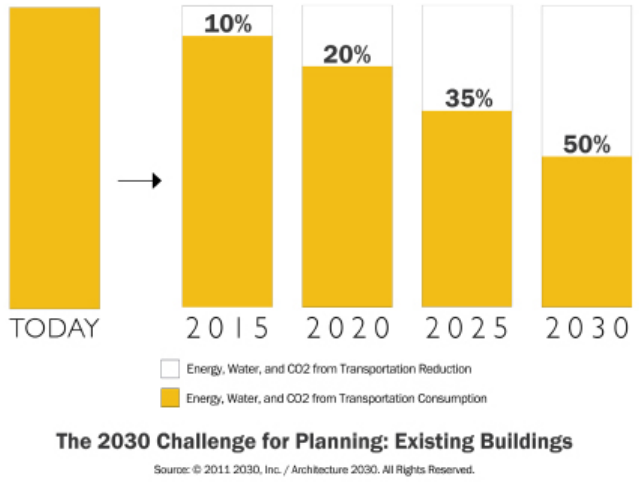


Figure 13: *Architecture 2030 Challenge* - New Buildings & Major Renov.

Stakeholders can build on existing programs and explore others, such as:

- On-bill financing option for businesses
- Lease and PACE financing
- Re-commissioning/tune-up program; audit requirements/services
- Energy benchmarking and disclosure
- Green Leasing

These programs can be expanded, and others, such as point-of-sale retrofit requirements and energy efficient mortgages, would support residents and businesses in improving their properties with the goal of achieving a 50% reduction in energy use in 50% of existing homes and businesses by 2030. As an added benefit, businesses with more efficient buildings will be affected less by changes in economic and climatic conditions. According to a 2008 CoStar study, LEED buildings command rent premiums of $11.33 per square foot higher than conventional buildings and boast 4.1 percent higher occupancy rates.

Many existing initiatives, programs, and leading organizations already focus on commercial and industrial energy efficiency. One example is the Cleveland 2030 District, which is working with property owners/managers, developers and other stakeholders to create high-performance, sustainable building districts throughout Greater Cleveland. Performance targets shown in Figures 12 and 13 are based on the targets of the Architecture 2030 Challenge for Planning, a national effort to improve buildings and meet climate goals. The Cleveland 2030 District downtown footprint includes approximately 75 million square feet of building space and 1,000 structures.

OBJECTIVE: MAKE GREEN BUILDING THE STANDARD FOR ALL NEW CONSTRUCTION

When considering development within Cleveland, it is important to minimize the impact of new construction through the establishment of policies and incentives that encourage energy efficiency and green building.

ACTION 3: INCENTIVIZE NEW CONSTRUCTION TO EXCEED EXISTING BUILDING CODES

2030 Emissions Reduction Potential: **1,500 MTCO$_2$e = 110 Cleveland homes.**

FOCUS AREA 1

ENERGY EFFICIENCY & GREEN BUILDING

In addition to complying with state building codes to ensure that all new construction is meeting a specified energy efficiency standard, the City can also implement incentive programs to encourage green building. The Cleveland Green Building Standard is already required not just of residential projects receiving property tax abatement, but also for all residential development projects receiving direct assistance from the City. This policy has resulted in hundreds of homes meeting the Enterprise Green Communities standard or receiving Leadership in Energy and Environmental Design (LEED) third party certification.

Additional incentives could extend to the commercial sector, such as expedited permitting, updating the requirement for green building at a specified percent efficiency over code as a prerequisite for public financing, and public recognition and promotion.

OBJECTIVE: IMPLEMENT NEIGHBORHOOD-LEVEL SOLUTIONS

Rather than just looking at opportunities on a building-by-building basis, it is also important to consider enabling programs and systems that can be implemented neighborhood-wide or community-wide.

ACTION 4: MAKE UTILITY DATA EASILY ACCESSIBLE FOR RESIDENTS AND BUSINESSES

There is a familiar phrase that you can't manage what you don't measure. Utility data is measured by a utility company, but it is not often accessible in a form that owners, staff, and occupants can easily use to manage their energy use. The Green Button program is a national initiative encouraging utilities to provide easy access to utility data in a standard format that is both consumer- and computer-friendly. Energy and cost savings can then be achieved with timely information on a building's performance and behavior. This action calls for utilities, in collaboration with regional and national stakeholders, to make data transparency a priority.

ACTION 5: EXPAND USE OF SMART GRID AND ADVANCED METER TECHNOLOGIES

2030 Emissions Reduction Potential: **120,000 MTCO$_2$e = 9,000 Cleveland homes.**

Advanced metering infrastructure (AMI) gives consumers and utilities access to real-time electricity usage information that can be used to reduce costs and improve power reliability by managing supply and demand more effectively. AMI also supports the Green Button Initiative (Action 4) and behavior changes by providing better access to utility data. A pilot can be used to demonstrate the capabilities and potential of the smart grid to reduce peak demand, save energy, reduce costs, and increase grid reliability.

In 2012, Cleveland Public Power launched a pilot project which involved the installation of 160 AMI's in areas prone to unauthorized use. These meters allow CPP to respond to customer requests within 3-5 minutes. Furthermore, the cost of the meters pay for themselves in a single service call. First Energy has installed 5,000 smart meters in the Cleveland Electric Illumuniating service area, and plans on expanding to 37,000 more customers.

ACTION 6: EXPAND ENERGY AND GREEN BUILDING CHALLENGES

2030 Emissions Reduction Potential: **290,000 MTCO$_2$e = 22,000 Cleveland homes.**

Building occupants have measureable control over the resources their homes or workplaces use. Building challenges are a call to action to reduce energy consumption in buildings, both commercial and residential, through the combined effects of these individual occupants and operators. Challenges start with educating and engaging occupants about how they use energy and suggesting low to no-cost ways to reduce that use, such as turning off computers and lights, unplugging non-essential equipment, or adjusting thermostats by a degree or two. For residential occupants or even targeted neighborhoods, simply comparing energy consumption with other

residents or neighborhoods on a scale of high to low performance can motivate changes in habit. For commercial buildings, organized efforts over set periods of time with guided activities, such as shut-down days, cold lunch days, 1-degree days (temperature adjustments), etc., can serve as catalysts for competition and long-term behavior change. Challenge participants gain public recognition for their performance and access to best practices through peer-to-peer exchanges. The Northeast Ohio Chapter of the U.S. Green Building Council has already organized successful challenges in downtown, midtown, University Circle neighborhood, and in Independence. Multiple Northeast Ohio organizations have also participated in EPA's National Building competition. These existing challenges provide a foundation for new locations and expanding into sustainability topics such as waste reduction and transportation.

ACTION 7: BUILD ON EXISTING GREEN SCHOOL INITIATIVES

M A

Ohio is a leader in green and LEED-certified schools. The State's Ohio School Facilities Commission (OSFC) has an Energy Conservation Program to support facility improvements and a Green Schools initiative that requires LEED Silver Certification for new schools. The Ohio Department of Education also participates in the Green Ribbon Schools program to recognize achievements in sustainability, energy efficiency, and healthy environments. Schools that follow green school practices tend to cost less money to operate, have a healthier learning environment, and higher performing students and staff.

PNC Smart Home

FOCUS AREA 1

ENERGY EFFICIENCY & GREEN BUILDING

ENERGY EFFICIENCY & GREEN BUILDING NEXT STEPS TO BE COMPLETED BY 2016:

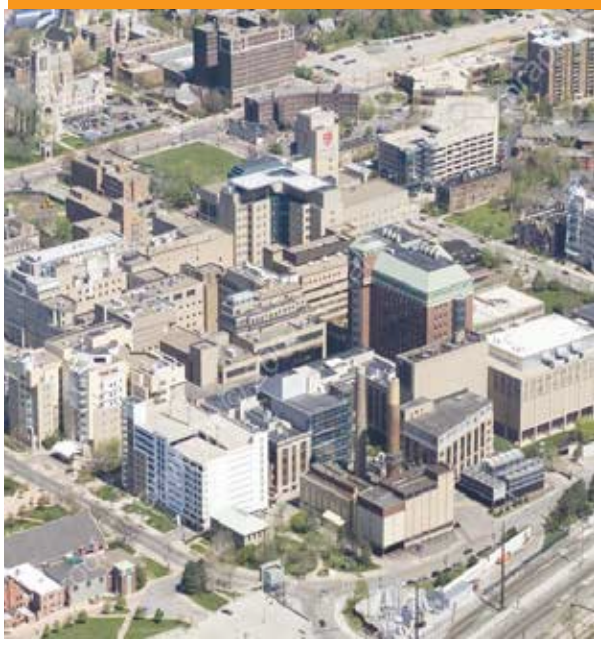
1. Pursue efficient one-touch approach to low-income housing programs by layering healthy homes, lead, and weatherization programs. At the same time, research options for incentivizing low-income residents who do not pay utility bills to practice conservation.(1)
2. Build on the success of deep energy retrofit demonstrations by incorporating deep energy reduction principles in local rehabs and new construction, and continue to foster demonstrations that advance and disseminate advanced knowledge of energy efficiency. (1)
3. Expand on existing programs that have provided energy efficiency education and incentives through local community development organizations, including programs that provide home visits on low cost interventions such as weather-stripping and caulking. (1)
4. Promote education on identifying opportunity points for energy efficiency improvements throughout the life-cycle of the home, for example, when replacing a roof, doing foundation work, or replacing windows. (1)
5. Explore strategies to establish a permanent revolving fund for commercial and residential energy efficiency programs such as the Energy$aver program. (1)
6. Encourage all local utilities to make available the Home Performance with ENERGY STAR® Program to its customers. This program uses a whole-house approach to make any size or style of home more energy efficient, thus lowering energy costs. (1)
7. Review residential and commercial programs to determine which ones have the greatest impact. (1, 2)
8. Engage individuals and organizations involved professionally in energy efficiency in an organizational network that can collaborate in advocating for private, state, and federal funding for energy efficiency and for progressive energy efficiency policies. (1-7)
9. Complete pilot on-bill financing / repayment for commercial customers. If successful, create a program for other potential customers to utilize. (2)
10. Thoroughly explore the possibility of an energy benchmarking and disclosure policy in the City of Cleveland, in tandem with other policies to accelerate improved efficiency. (2)
11. Support the industrial sector's transition to less energy and water intensive practices through the development of collaborative programs, incentives, training, and data collection. (2)
12. Explore strategies for expanding use of green roofs and other sustainable roof technologies, building on the City's municipal policy. (2, 7)
13. Engage all major downtown property owners, managers and developers to become Cleveland 2030 District members, share their utility data and discuss energy efficiency and building retrofit projects. (2)

14. Identify proper incentives to encourage adoption of above-code construction and renovation projects, especially for commercial buildings. (3)
15. Complete automated meter reading (AMR) rollout for water meters. (5)
16. Continue to expand Advanced Metering Infrastructure solutions and develop plan to test in a smart grid pilot. (5)
17. Build on success of building challenge program for the residential and commercial sectors (6):
    a. Work with Northeast Ohio Chapter of the U.S. Green Building Council (NEOGBC) to learn from their existing building challenge program and identify key opportunities.
    b. Work with utilities to identify neighborhoods that could most benefit from this program and develop comparison utility data reporting to encourage competitive reductions.
    c. Expand the forum for public recognition for high performing buildings, organizations, and neighborhoods
18. Coordinate with Cleveland Metropolitan School District and other schools in the City to identify key next steps for building upon the state's requirements for green schools. (7)

Note: (Related Action numbers shown in parentheses)

LEADING BY EXAMPLE

MEDICAL CENTER COMPANY ENERGY EFFICIENCY GRANT FUND



Medical Center Company (MCCo) Energy Efficiency Grant Fund

The MCCo Energy Efficiency Fund (EEF) is a $3 million revolving grant fund that provides up-front capital for projects that reduce their Member Institutions' environmental impact through energy efficiency efforts.[i] MCCo was founded in 1932 as a non-profit district energy system in the University Circle neighborhood of Cleveland to serve the energy needs of their Member Institutions, including Case Western Reserve University, University Hospitals, The Cleveland Museum of Art, Severance Hall, and Cleveland Botanical Garden. The EEF eligibility guidelines state that projects must result in energy savings to a facility served or committed to be served by MCCo and have a payback period of five years or less. The EEF was developed as one of MCCo's Energy Management programs to reduce the neighborhood carbon footprint through greater efficiency in energy use and consumption. Implementation of the program's initial projects began in late 2012. Additional information can be found at: www.mcco.org

FOCUS AREA 1

ENERGY EFFICIENCY & GREEN BUILDING

LEADING BY EXAMPLE

ENERGY EFFICIENT AFFORDABLE HOUSING

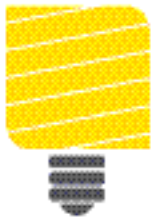
Renovations of older, distressed homes throughout the City of Cleveland are meeting improved green standards because of incentive programs and funding opportunities. Over the past two years, Environmental Health Watch (EHW) managed a HUD-funded technical study of green retrofits of 12 affordable homes. Six of the houses were upgraded to EHW's deep energy retrofit specs to achieve at least 70% energy-use reductions. The other six were renovated to Cleveland's "Green Building Standard," which included affordable green housing standards established by Enterprise Community Partners (www.greencommunitiesonline.org) and energy-efficiency standards set by Energy Star v.2.

Some of the key improvements made to these houses include tighter building enclosures, better windows and doors, more efficient mechanical systems, energy-efficient lighting and appliances, energy recovery ventilation, and increased insulation. EWH is monitoring energy usage (actual vs. predicted) and indoor air quality in all 12 homes.

The homes were developed by a nonprofit community development organization, Cleveland Housing Network (CHN), for lease-purchase to low-income residents. Other partners in the project included the Swetland Center for Environmental Health at Case Western Reserve University's School of Medicine, and Intwine Connect, a Northeast Ohio tech company.

A house before retrofit

A house after retrofit (Note: The above images are not of the same house)



LEADING BY EXAMPLE

CLEVELAND ENERGY $AVER

The Cleveland Energy $aver program is an affordable, common-sense way for Cleveland homeowners to improve their homes' comfort, durability, resale value and overall health and safety -- while simultaneously saving money on utility bills through improved energy efficiency. The City of Cleveland, Cleveland Housing Network, and Cleveland Action to Support Housing (CASH) have collaborated to create the program through which qualified City of Cleveland homeowners can save up to 40% off the cost of home energy efficiency improvements.

In 2009, the City of Cleveland allocated $550,000 of Energy Efficiency and Conservation Block Grant (EECBG) funds from the US Department of Energy to plan and conduct a pilot program for residential homeowners throughout the City. This pilot, now known as the Cleveland Energy $aver program (CE$), has developed into one of the most comprehensive home energy assessment programs in the country today.

The program is a 3-step process: Energy Assessment, Upgrade, and Savings. There are a variety of eligible home energy upgrades, such as installing:

- insulation, air sealing, and weatherstripping
- high efficiency furnaces (or repairing old units)
- energy efficient air conditioning units
- lighting, such as compact fluorescent lamps (CFL) or Light Emitting Diodes (LED)
- high efficiency water conservation devices
- Energy Star appliances
- doors and windows

CE$ provides homeowners with a 20% discount on the price-approved measures, up to $2,500. The remainder of the cost can be financed by a low-interest loan (as low as 2.3%) with flexible financing and payment terms made available through CASH and their lending partners. After the work is completed, the homeowner receives a check in the mail from CE$, up to $1,250, depending on which improvements were made.

Because similar programs already exist for lower-income residents, CE$ is targeted to middle- and upper-income households making 200% or more above 2012 federal poverty guidelines.

Ultimately, CE$ is overcoming the barriers to home energy efficiency by providing simplified financing, little to no up-front costs, and support services. As of September 2013, of more than 300 audits, approximately 150 homes have moved forward with recommended retrofit work. Program participants saw an average savings of more than 30% off the cost of this work, with 49 homeowners utilizing the low-interest financing options offered through CASH. Additionally, CE$ provides verified savings reports based on utility information for each property upgraded. Initial reports show an average savings of 30% off utility bills, with some homeowners saving as much as 53%.

FOCUS AREA 1

ENERGY EFFICIENCY & GREEN BUILDING

LEADING BY EXAMPLE

COSE ENERGY CHOICE

Many small business owners have little time on their hands to dedicate to energy management, but smart and efficient energy use can yield major savings that can be reinvested back where it counts – into their businesses. That's why the Council of Smaller Enterprises (COSE), the region's largest small business support organization, has worked to be its members trusted energy adviser through the COSE Energy Choice program. For nearly 14 years, COSE Energy Choice has helped its members lower electricity and natural gas rates, reduce their energy consumption and improve their bottom lines. Businesses that take advantage of COSE Energy Choice's turnkey solutions receive customized energy-savings opportunities that combine quick payback through utility savings, rebates, and flexible financing.

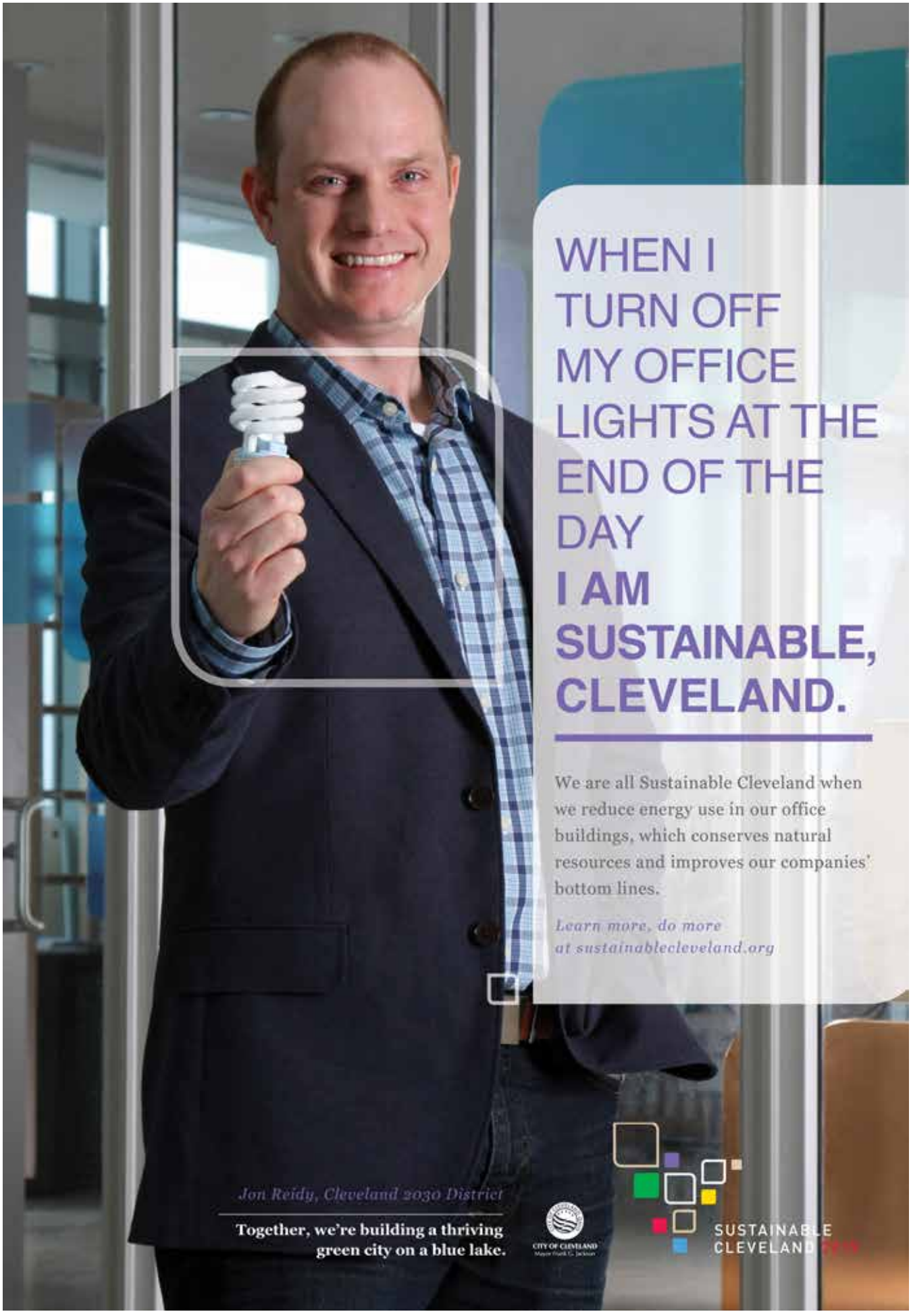
The success of the COSE Energy Choice program is evident. In 2012 alone, businesses benefitted from $5.6 million in utility rebates plus $7.8 million in annual utility savings through a reduction of 78,692,834 kWh. In 2012, COSE completed 150 energy assessments and is on target to perform 1,450 by 2016. For businesses small and large, these simple energy assessments can help identify wasted energy and provide recommendations to develop an actionable energy efficiency strategy.

The COSE Energy Choice programming has resulted in real savings and emissions reductions for Cleveland-based businesses. For example, entrepreneur Paul Benner opened The Cleveland Brew Shop in 2012 and was dismayed by his business' high utility bills. As a young startup, he could not imagine continuing to pay such high bills. Therefore, he participated in a no-cost energy assessment offered by COSE and Dominion East Ohio. As a result of the assessment, he made targeted efficiency investments and he will save $1,250 a year from lighting retrofits and adjustments to how he uses his HVAC system.

While energy efficiency is proven to reduce operating expenses and produce long-term savings, COSE is working to eliminate the first cost barrier of implementing more efficient measures, such as new insulation or lighting retrofits. To lessen the impact of those costs, COSE has developed two pathways aimed to help small businesses finance an energy efficiency investment.

- COSE Energy Loan Program: COSE is partnering with KeyBank to introduce the COSE Energy Loan Program, which is designed to help Ohio small businesses unlock capital for energy efficiency investments. The concept is simple: Loans are structured such that the reduction in utility bills covers the loan repayment, spreading out the cost of the equipment without negatively impacting cash flow. COSE provides a loan guarantee as a credit enhancement tool for small businesses that have difficulty obtaining financing from a bank.

- Ohio Efficiency Resource Fund: COSE has partnered with efficiency-services financer Metrus Energy and CalCEF, two leading organizations focused on accelerating clean energy technologies, to create the Ohio Efficiency Resource Fund. The Ohio Efficiency Resource Fund is a pioneering financial tool that provides otherwise hard-to-get financing for mid-sized market businesses to make energy efficiency improvements, with no upfront costs and no risk. This is made possible through an innovative structure called an Efficiency Services Agreement, which converts the capital investment typically associated with energy efficiency into a long-term operating expense.


WHEN I TURN OFF MY OFFICE LIGHTS AT THE END OF THE DAY
I AM SUSTAINABLE, CLEVELAND.
We are all Sustainable Cleveland when we reduce energy use in our office buildings, which conserves natural resources and improves our companies' bottom lines.
Learn more, do more at sustainablecleveland.org
Jon Reidy, Cleveland 2030 District
Together, we're building a thriving green city on a blue lake.
CITY OF CLEVELAND
SUSTAINABLE CLEVELAND

ADVANCED & RENEWABLE ENERGY

FOCUS AREA 2

GOALS:

- 25% of energy use in Cleveland is supplied from renewable sources by 2030 (15% by 2020)
- Reduce Cleveland GHG Emissions 2,100,000 MTCO2e by 2030
- Minimize brownouts during heat waves with on-site energy generation and storage

THE IMPORTANCE OF ADVANCED & RENEWABLE ENERGY

When combined with energy efficiency and conservation strategies, advanced and renewable energy technologies offer additional ways for property owners/managers to reduce energy consumption and costs. Renewable energy sources are clean and inexhaustible. Types of renewable resources include moving water (hydro, tidal, wave power), thermal gradients in ocean water, biomass, geothermal, solar, and wind. Cogeneration, anaerobic digestion, energy recovery from waste plastic, and municipal solid waste are considered types of advanced energy generation. (Note that advanced vehicle technologies, such as alternative fuel vehicles, are addressed in the Sustainable Mobility section) Increasing the amount of energy supplied from advanced and renewable sources can offset energy generation from traditional, non-renewable fuel sources and their associated GHG emissions.

Advanced and renewable energy sources can help to diversify energy supplies providing a hedge against long-term price volatility associated with traditional non-renewable fuels. When equipped with battery storage back-ups, these systems can allow residences and businesses to continue operating during power outages caused by storms and heat waves. The advanced and renewable energy industry also offers the greater Cleveland area significant economic development benefits, including job creation, local capacity building, and the attraction of skilled professionals to Northeast Ohio. In addition, a strong local economy can be more capable of adapting to stresses caused by climate change.

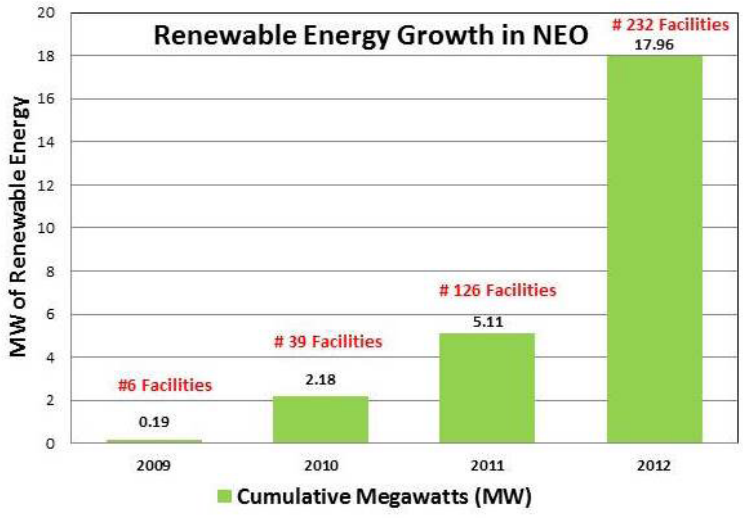
Case Western Reserve University Wind Turbine

OBJECTIVE: ACCELERATE RENEWABLE ENERGY USE BY CLEVELAND'S RESIDENTS & SMALL BUSINESSES

KEY FACTS:

From 2009 - 2012, **232 renewable energy facilities in Northeast Ohio** were installed with a generating capacity of **17.96 Megawatts*.** This supports the **electricity requirements of 13,100 average homes.**

Figure 14: Cumulative Capacity of Renewable Energy Facilities in Northeast Ohio



Source: **Public Utilities Commission of Ohio (PUCO)** certified cases of Renewable Energy Installations (Solar Photovoltaic, V Biomass, Fuel Cells) required to sell Renewable Energy Credits (RECs).

ADVANCED & RENEWABLE ENERGY

Distributed energy generation provides Cleveland residents and businesses with a local, clean energy supply that helps to protect against energy price volatility, reduce energy costs over time, and also provide opportunities for local job creation through system development and installation.

ACTION 8: INCREASE DISTRIBUTED ENERGY INSTALLATIONS

2030 Emissions Reduction Potential: 35,000 $MTCO_2e$ = 2,600 Cleveland homes

Encouraging residents and businesses to install on-site renewable energy systems, such as solar photovoltaic panels, solar thermal systems, geothermal systems, or wind turbines, can help to reduce building energy costs, potentially improve property values, and also help energy utilities better manage peak demand. Providing households and business owners with information on the solar potential for their home/business, as well as available incentives and financing mechanisms to support implementation will increase the adoption of on-site energy generation. Adoption can also be encouraged by streamlining project permitting and removing code barriers that prevent or hinder renewable energy installations. Additional assistance can be provided by engaging utilities to make it easier for interconnections and virtual net-metering setup for on-site and small-scale renewable energy projects.

Geothermal systems save energy at the Cleveland Museum of Contemporary Art *(Dean Kaufmann, Courtesy of MOCA Cleveland)*

By developing on-site generating capacity with storage capabilities, Cleveland residents and businesses will also be able to better respond to and manage the increased energy load that is expected to accompany more intense heat waves in the future.

ACTION 9: SAVE MONEY AND SUPPORT RENEWABLE ENERGY THROUGH MUNICIPAL AGGREGATION

2030 Emissions Reduction Potential: 340,000 $MTCO_2e$ = 25,000 Cleveland homes

The City of Cleveland currently purchases electricity for 58,500 residents and 7,200 small business customers of the Cleveland Electric Illuminating Company, leveraging its "buying power" to solicit the lowest price for those participating, while also supporting renewable energy. Beginning in July 2013, these customers receive both a 21% electricity bill savings compared to the market rate, and 100% of their electricity from renewable sources like wind and hydropower. More than half of the wind energy purchase is generated in Ohio, helping to support the state's renewable industry. Municipal aggregations in the future will continue to explore opportunities to support local renewable energy projects.

OBJECTIVE: USE LOCAL PROJECTS TO HELP MEET OR EXCEED THE UTILITY RENEWABLE ENERGY STANDARDS

To meet their organization's renewable energy standards, Cleveland Public Power, Cleveland Electric Illuminating Company, and others can purchase power from local renewable energy projects which would support local economic development.

ACTION 10:BECOME A NATIONAL LEADER IN REUSING VACANT LAND FOR RENEWABLE ENERGY PROJECTS

2030 Emissions Reduction Potential: 23,000 $MTCO_2e$ = 1,700 Cleveland homes

Great Lakes Science Center Wind Turbine

Collinwood Bioenergy Facility

There are more than 200 acres of brownfield land located in the City of Cleveland, as well as other vacant and City land. While challenging to manage, these sites also present opportunities, including the potential for spurring renewable energy projects, especially solar photovoltaic (PV). Some of the initial research related to renewable potential on vacant land was led by the City Planning Commission, which is summarized in the report "8 Ideas for Vacant Land Reuse." It's important to build off the success of a couple 1-MW solar PV projects on vacant land, and perform a more comprehensive screening of land most suitable for renewables.

ACTION 11: DEVELOP A PILOT OFFSHORE WIND FARM

2030 Emissions Reduction Potential: 67,000 $MTCO_2e$ = 5,000 Cleveland homes

The Lake Erie Energy Development Corporation (LEEDCo) is a regional non-profit organization spearheading an effort to build and install an 18-megawatt (MW) wind project in Lake Erie. This project would be the first freshwater offshore wind farm in North America. With this initial project, LEEDCo and its partners aim to make Ohio a cornerstone of the American offshore wind industry and re-energize Northeast Ohio's economy.

ACTION 12: UTILITIES INVEST IN ADDITIONAL PROJECT TO MEET RENEWABLE ENERGY STANDARDS

2030 Emissions Reduction Potential: 1,200,000 $MTCO_2e$ = 90,000 Cleveland homes

In 2008, the City of Cleveland adopted a voluntary Advanced Energy Portfolio Standard (AEPS) that calls for 15% of Cleveland Public Power's energy to come from advanced or renewable sources by 2015, 20% by 2020, and 25% by 2025. To help meet these voluntary goals, CPP is currently purchasing electricity from the Collinwood BioEnergy facility. This facility uses anaerobic digestion to produce electricity from organic waste. CPP also committed to purchase a portion of energy generated from the proposed pilot off-shore wind farm in Lake Erie (see Action 11), as well as hydro-power from regional sources. CPP is on track to meet its renewable energy goals. Because CPP is a municipal utility, it is not subject to the requirements of Ohio's Renewable Portfolio Standard (RPS) that took effect in 2008. However, the Cleveland Electric Illuminating Company (part of FirstEnergy) is subject to Ohio's RPS, which requires the state's four investor-owned utilities to generate at least 12.5% of their electricity from renewable sources (e.g., wind, solar, landfill gas) by 2024 and 12.5% from advanced energy sources (e.g., clean coal, advanced nuclear, combined heat and power) by 2025.

ADVANCED & RENEWABLE ENERGY

OBJECTIVE: IMPLEMENT ADVANCED ENERGY TECHNOLOGIES

ACTION 13: ACCELERATE CONVERSION OF ORGANIC WASTE TO ENERGY USING ANAEROBIC DIGESTION

2030 Emissions Reduction Potential: 52,000 $MTCO_2e$ = 3,900 Cleveland homes

The Northeast Ohio Regional Sewer District (NEORSD) provides wastewater service to the City of Cleveland and surrounding areas at three treatment facilities. The energy required to treat wastewater generated by Cleveland residents comprises about 1% of the total energy consumed within the City. Wastewater treatment plants provide a significant opportunity for renewable energy generation through the capture of biogas from anaerobic digestion for electric or thermal energy generation, as well as energy capture during the incineration of dry solids from the facility. NEORSD's Renewable Energy Facility at its Southerly Wastewater Treatment Center will save $1-2 million/year in electricity costs[xii].

ACTION 14: SWITCH TO LOW-CARBON FUEL SOURCES FOR DISTRICT HEATING AND COOLING

2030 Emissions Reduction Potential: 120,000 $MTCO_2e$ = 9,000 Cleveland homes

There are two district energy companies serving the City. Cleveland Thermal serves downtown Cleveland while the Medical Center Company serves non-profit organizations located in University Circle. Distributed/district-scale energy generation is often more efficient than having separate heating and cooling equipment for each facility. And with emerging technologies, the smaller district-scale solutions can often produce energy more efficiently and with fewer emissions than large central power plants, partially due to less electricity losses from distribution.

Alternative fuel sources such as refuse derived fuel pellets and biomass should also be considered as an option to further reduce district energy emissions.

Additionally, combined heat and power (co-generation) is a cost-effective, viable technology, especially for industrial users and should be evaluated as part of any district energy emissions reduction strategies.

NEORSD Southerly Waste Water Treatment Plant - Renewable Energy Facility

Midtown Solar Array

KEY BENEFITS OF ADVANCED & RENEWABLE ENERGY

- Improved air quality and health
- Local Job Creation and Economic Development
- Reduced Vulnerability to Energy Price Volatility
- Leadership and Recognition
- Education and Awareness

ACTION 15: SUPPORT CLEVELAND BUSINESSES TO REDUCE INDUSTRIAL PROCESS EMISSIONS

2030 Emissions Reduction Potential: 390,000 $MTCO_2e$ = 30,000 Cleveland homes

Industrial process emissions make up 36% of the total emissions generated within the City of Cleveland and will be an important emission source to address for the City to meet its reduction goals. These emissions come from burning fuels on-site to generate energy needed for manufacturing. The City should support industrial players within the City to achieve their emissions reductions goals and projects.

LEADING BY EXAMPLE

SOLAR ARRAY FOR CMHA HEADQUARTERS

Carbon Vision, a renewable energy analysis and project development firm, worked with the Cuyahoga Metropolitan Housing Authority and Cleveland Public Power to contract, design, build and operate a one-megawatt solar field next to CMHA's headquarters at the intersection of Kinsman Avenue and East 82nd Street. The solar field consists of 4,212 solar panels capable of generating enough electricity to meet 70% to 80% of the building's needs. The system uses four Eaton inverters and racking from Toledo based AP Alternatives.

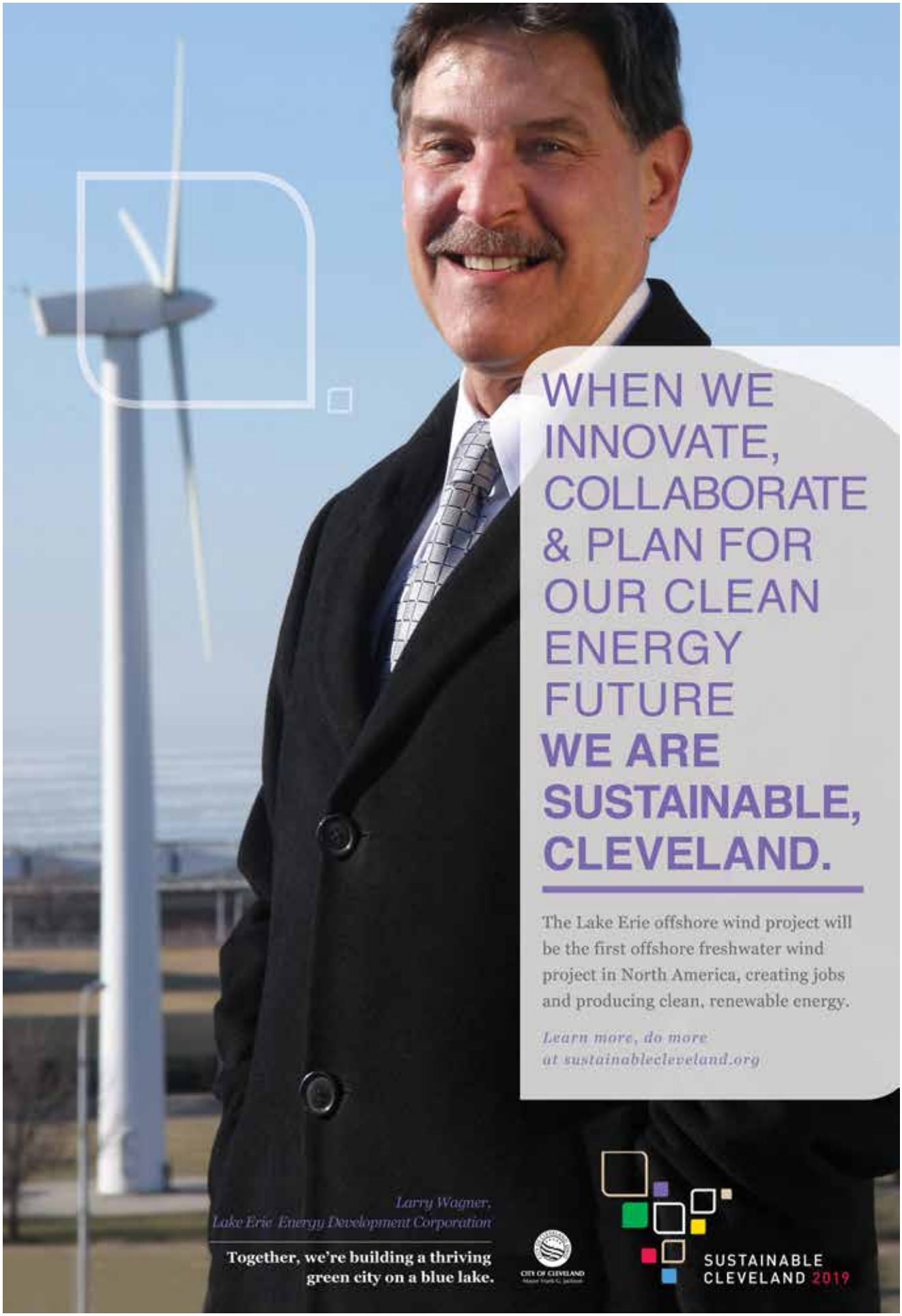
CMHA is purchasing the electricity that the solar system will generate over a 20 year power purchase agreement. Carbon Vision is leasing the six-acre piece of land from the housing authority, which is a former brownfield.

ADVANCED & RENEWABLE ENERGY

ADVANCED & RENEWABLE ENERGY NEXT STEPS TO BE COMPLETED BY 2016:

1. Create and/or utilize an online solar mapping tool that identifies the solar potential on every building in Cleveland, and provides a high level financial analysis for residents and businesses. (8)
2. Review current zoning, height, permitting, interconnection, net-metering, and other regulations related to development of small-scale renewable energy in order to reduce implementation costs while ensuring system safety. (8)
3. Cleveland Pubilc Power to offer 100% renewable option for customers. (8)
4. Further develop an array of financing mechanisms and educate customers on options: (8)
    a. Rebates (build on Green Energy Ohio solar thermal program)
    b. Renewable Energy Certificate (REC) purchases and Power Purchase Agreements (PPAs)
    c. Loans (e.g. KeyBank program) and on-bill repayment
    d. PACE and lease financing
    e. Tax credit financing
    f. Local fund
5. Establish Cleveland as a national leader in reusing vacant land for large renewable energy projects:
    a. Complete analysis of renewable potential on brownfields and other underutilized land, and implement findings. (10)
    b. Identify good candidates for community solar pilot projects in terms of buyers (e.g. EcoDistricts) and location (e.g. brownfield site): (10, 12)
    c. Work with electric utilities on virtual net metering pilot, allowing a customer to assign the net production from an electric generator (e.g. solar panels) to other metered accounts that are not physically connected to that generator. (12)
6. Identify opportunities to support LEEDCo to ensure completion of offshore wind pilot. (11)
7. Cleveland Thermal and Medical Center Company to transition from coal to cleaner energy sources. (14)
8. Identify potential for cogeneration (combined heat & power) in Cleveland, complete additional site-specific feasibility studies as necessary, and break down any barriers to implementation. (14, 15)
9. Work to strengthen and meet renewable energy requirements in state and national policy. (8-15)

Note: (Related Action numbers shown in parentheses)


WHEN WE INNOVATE, COLLABORATE & PLAN FOR OUR CLEAN ENERGY FUTURE
WE ARE SUSTAINABLE, CLEVELAND.
The Lake Erie offshore wind project will be the first offshore freshwater wind project in North America, creating jobs and producing clean, renewable energy.
Learn more, do more at sustainablecleveland.org
Larry Wagner, Lake Erie Energy Development Corporation
Together, we're building a thriving green city on a blue lake.
CITY OF CLEVELAND
SUSTAINABLE CLEVELAND 2019

SUSTAINABLE MOBILITY

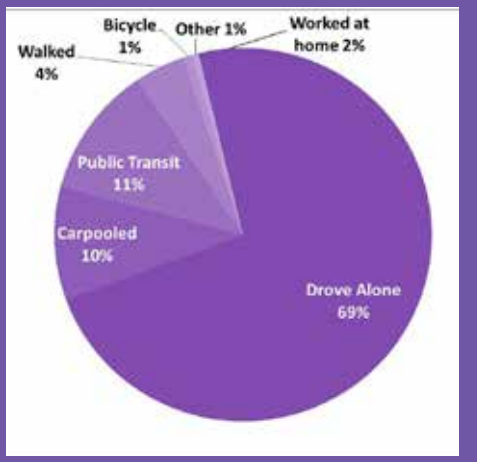
FOCUS AREA 3

2030 GOALS:

- Reduce single occupancy vehicle mode share from 69% to 62% by 2020, 55% by 2030
- Reduce Cleveland GHG Emissions 250,000 $MTCO_2e$ by 2030
- By 2030, $56 million saved by Cleveland households and businesses due to reduced energy costs ($24 million saved by 2020)
- Reduce pedestrian and bicyclist fatalities at least 50% by 2020 with the goal of zero fatalities by 2030
- Improved air quality due to reduced vehicle emissions, particularly during the warmer summer months when ground level ozone and fine particulate concentrations are high

KEY FACTS:

Almost **three-quarters of the commuters in Cleveland** get to work in a single occupancy vehicle.



Over **5.7 million vehicle miles** are traveled on Cleveland roadways each day. This equates to **14.5 miles per Cleveland resident per day.**

THE IMPORTANCE OF SUSTAINABLE MOBILITY

Reducing fuel consumption, vehicle emissions and vehicle miles traveled (VMT) are important emission-reduction strategies. On-road transportation from passenger cars and trucks in the City of Cleveland contributed to approximately 8% of the City's GHG emissions in 2010 while airline travel at both Cleveland Hopkins International and Burke Lakefront Airports contributed 2% (Figure 8). Of the transportation emissions, gasoline fuel consumption (typically by passenger vehicles) is by far the largest contributor (Figure 9). It should be noted that freight rail emissions were not included in the GHG inventory, but preliminary analysis suggests that these emissions are relatively low. Emissions associated with electricity use for electric vehicles are also considered negligible.

In addition to reducing emissions, Complete and Green Streets initiatives will have co-benefits of reducing stormwater runoff, providing more tree canopy for urban cooling, and improving the health of Clevelanders.

OBJECTIVE: REDUCE CONGESTION AND VEHICLE EMISSIONS

Increasing the use of transportation options such as public transit, cycling, and carpooling reduces congestion on roadways and transportation related emissions in the City while providing health benefits, such as increased activity levels and improved air quality. Additional ways to reduce transportation related emissions include encouraging Cleveland residents and businesses to purchase more fuel efficient vehicles, supporting improvements to national fuel efficiency standards, and reducing the carbon intensity of fuel sources.

ACTION 16: DEVELOP POLICIES AND PROGRAMS THAT PROMOTE MORE EFFICIENT VEHICLES

2030 Emissions Reduction Potential: **150,000 $MTCO_2e$ = 11,000 Cleveland homes**

On-road transportation accounts for 8% of the City's total emissions. Programs and policies can be used to educate, promote, and facilitate more efficient vehicles and practices. Federal policies like the

FOCUS AREA 3
SUSTAINABLE MOBILITY

Corporate Average Fuel Economy (CAFE) regulation raises the fuel efficiency standards of new vehicles and over time will result in a more fuel efficient fleet in Cleveland. In addition to improving the efficiency of current fuels, incentivizing the adoption of alternative fuels, such as electricity and compressed natural gas (CNG), should be considered. Facilitating infrastructure, such as electric vehicle charging stations and compressed natural gas (CNG) fueling stations, and providing incentives like preferential parking and lane incentives for low-emission vehicles will encourage residents and businesses to use more alternative fuels.

ACTION 17: ENCOURAGE ANTI-IDLING CITYWIDE

Driving 2030 Emissions Reduction Potential: **8,500 $MTCO_2e$ = 640 Cleveland homes**

RTA Healthline, a bus rapid transit best practice in the U.S.

KEY BENEFITS OF SUSTAINABLE MOBILITY ACTIONS

- Better air quality and less asthma
- Improved health from exercise
- More vibrant public spaces
- Local job creation and economic development
- Cost savings
- Less vulnerability to fuel price volatility

Driving behaviors, such as excessive idling, have a significant impact on fuel consumption and unnecessarily contributes to air pollution. A citywide effort to improve traffic management and synchronize traffic signals would reduce emissions across the board by reducing congestions and delays. Tools such as the parking guidance currently being used at Cleveland Hopkins Airport also reduce idling. Through public and private education programs Cleveland residents can learn eco-driving skills and behaviors reduce fuel consumption. Additionally, businesses can improve fleet efficiency by reducing diesel vehicle idling and adopting policies similar to the City of Cleveland's anti-idling ordinance such as GPS tracking/efficient routes and trip optimization.

ACTION 18: EXPAND USE OF CARPOOLING AND CAR SHARING

2030 Emissions Reduction Potential: **8,700 $MTCO_2e$ = 650 Cleveland homes**

Carpooling for commuters and car sharing for individuals making personal trips can reduce fuel use, parking costs, vehicle costs, and traffic congestion in Cleveland. Options for increasing carpooling include incentivizing the use of OhioRideshare as a resource for identifying carpool opportunities, implementing lane incentives for carpoolers, and establishing preferential parking for carpoolers. OhioRideshare also has a guaranteed ride home program (www.noaca.org/grh.html).

Car-sharing is typically a membership-based rental alternative to owning or using a private vehicle for occasional trips. It lowers the cost and reduces the burden of traditional transportation. Members reserve a vehicle online for a specific trip, pick up and return the vehicle at a designated location, and have the benefit of a private vehicle without the burden and expense of upkeep and ownership. The car-sharing service typically covers fuel, maintenance, and basic insurance costs. While there is an increase in vehicle miles traveled for those who do not have their own vehicle, there is a greater reduction in vehicle miles traveled for those who have a vehicle but opt to car-share. It can eliminate the need for a second vehicle and encourages smarter trip planning.

ACTION 19: INCREASE THE USE OF PUBLIC TRANSIT THROUGH INCENTIVES AND ADDITIONAL INFRASTRUCTURE

2030 Emissions Reduction Potential: 84,000 $MTCO_2e$ = 6,300 Cleveland homes

The Greater Cleveland RTA already provides an extensive transit system that serves the City of Cleveland and surrounding communities. Further improving this service to better meet the needs of the community through efforts such as financial incentives and revisions to the current fee structure, real-time information about routes and schedules, and expanded service could further increase ridership and decrease vehicle miles traveled within the city. Educating Clevelanders about the potential cost savings associated with using public transit as compared to personal vehicles could also help to increase ridership.

Greater Cleveland Regional Transit Authority

OBJECTIVE: CREATE COMPLETE AND GREEN STREETS

In September 2011 the Cleveland City Council passed the Complete and Green Streets ordinance that requires best practices in complete and green streets be implemented during re-construction and resurfacing of City streets. Complete and Green Streets means designing streets for all transportation modes, all users of all abilities and to provide environmental benefit. This program considers features such as bike lanes, enhanced crosswalks, energy-efficient lighting, and porous pavement that will increase the use of alternative transportation options, reduce transportation GHG emissions, and also manage stormwater impacts in the City.

ACTION 20: MAKE BIKING AND WALKING EASIER AND SAFER

2030 Emissions Reduction Potential: 2,600 MTCO2e = 190 Cleveland homes

Shifting from driving to cycling or walking as the preferred mode of transportation can reduce GHG emissions, save Cleveland residents money from

FOCUS AREA 3

SUSTAINABLE MOBILITY

The Bike Rack in Downtown Cleveland, the region's first full service bicycle parking and commuter center

reduced fuel costs, and also provide health and fitness benefits. Currently, there are approximately 45 miles of bikeways in the City of Cleveland. In 2012, there were approximately 750 bike commuters and 4.4% of commuters in Cleveland walked. Bicycle communiting increased more than 280% from 2000 to 2010. According to the Bikeway Master Plan developed by the Cleveland Planning Department, there are 180 miles of proposed bike paths throughout the City of Cleveland. There are a number of different activities that can be implemented to encourage more biking and walking in the City, including but not limited to the following:

- Increasing the number of bikeway miles in the City and implementing more bicycle support facilities, such as racks, storage lockers, changing facilities, and bike parking at key locations
- Improving pedestrian and bicycle access in commercial districts, employment centers, and new development
- Ensuring bike facilities are safe, convenient, comfortable, and installed equitably throughout the City
- Developing Safe Routes and Walk to School programs for all CMSD schools focusing on safety through biking and walking programs
- Implement a bike sharing system where determined feasible
- Continuing to increase biking outreach and education (driver education, information on bike paths/routes, etc.)

ACTION 21: DEVELOP A STREAMLINED PROCESS TO IMPLEMENT COMPLETE AND GREEN STREETS POLICY

A number of cities and regions across the U.S. are changing how they design streets, shifting from a design strategy centered on moving cars quickly to one that considers all modes of transportation and enables safe access for all users. A smaller number of cities are also addressing stormwater management and the implementation of green infrastructure into their street design programs. Complete and green streets projects help to increase alternative transportation options and reduce vehicle miles traveled and GHG emissions in the city. Complete Streets also improve safety for all, increase physical activity, and help to stimulate the local economy by reducing transportation costs for residents and making local businesses more accessible. Because the City of Cleveland is integrating Complete and Green Streets into its existing Capital Improvement Plan, it will be automatically included within the transportation budget and transportation grants requested.

Detroit Superior Bridge Walkway

FOCUS AREA 3

SUSTAINABLE MOBILITY

LEADING BY EXAMPLE

EUCLID HEALTHLINE

In the 1990s, the City of Cleveland, Greater Cleveland Regional Transit Authority (RTA), Northeast Ohio Areawide Coordinating Agency (NOACA) and other stakeholders embarked on a plan to revamp the Euclid Avenue Transportation Corridor in order to improve access to the City's two largest employment centers, downtown Cleveland and University Circle. Completed in 2008, the RTA HealthLine route runs down 6.8 miles of Euclid Avenue from Downtown to East Cleveland, connecting the city's cultural and educational institutions, medical and business centers and numerous locally owned businesses and restaurants. The 21 rapid transit vehicles utilize hybrid technology that combines a clean diesel engine with an electronic transmission, resulting in 97% lower particulate emissions and 75% better fuel economy . Additional features include dedicated bicycle lanes, over 1,500 new trees, and 58 transit stations.

Over $4.3 billion has already been invested along the route. This includes the rehabilitation of old buildings into housing and retail centers, new construction for business startups, plus major expansions of universities, museums and hospitals. New enterprises like bioscience and tech firms now proudly call Euclid Avenue home and the corridor leads the state in job creation and research.

MORGANA RUN TRAIL

Morgana Run Trail is a paved, off-road trail, completed in 2007, that runs along an old Wheeling & Lake Erie Rail corridor through the Slavic Village Neighborhood. The trail begins on E. 49th Street just north of Fleet Ave and terminates near the Garfield MetroParks Reservation. This rail/trail connects residents and visitors to the Cleveland Metro Parks Mill Creek Park and Trail through the Slavic Village/Broadway and Union-Miles neighborhoods of Cleveland over to Washington Park and the new "First Tee" Golf Course and then further to the established Ohio & Erie Canal Way Reservation and Tow Path Trail.

The trail is located near a 95-home development, dubbed Trailside at Morgana Run, that will feature affordably-priced homes within a completely new urban subdivision with access to green space and the trail. This project demonstrates that bicycling infrastructure is good for economic development and quality of life, as illustrated by the associated housing development. The project was a joint partnership between local community organizations, the City of Cleveland, Cuyahoga County, NOACA, State of Ohio, and private, grant-making foundations. The trail was completed at a total cost of approximately $2.5M.

SUSTAINABLE MOBILITY NEXT STEPS TO BE COMPLETED BY 2016:

1. Support the development of renewable and alternative fuel infrastructure, including the identification of locations for installing electric vehicle charging stations and CNG fueling stations. (16)
2. Identify and implement eco-driving educational programs. (17)
3. Identify businesses with large fleets to participate in anti-idling program. (17)
4. Encourage carpooling: (18)
    a. Identify and engage large employers in OhioRideShare,
    b. Identify problematic parking areas within the City and select a pilot area for less expensive fees for carpoolers (or increased fees for single occupant vehicles),
    c. NOACA to continue analyzing the feasibility of High Occupancy Vehicle (HOV) lanes throughout the region and on a project basis.
5. Identify organizations and proactive neighborhoods willing to push for community membership and contract with a car sharing company, much like the Case Western and Cleveland State programs. (18)
6. Expand upon the success of RTA's commuter advantage program with the goal of encouraging increased use of public transit. (19)
    a. Explore possibility of providing a discount for purchasing bulk (e.g., monthly) passes,
    b. Subsidize transit passes for small businesses, discount for employers purchasing tickets in bulk for employees, etc.
7. Evaluate options for expanding RTA system around job center nodes. (19)
8. Build off NOACA's 2013 Bikeway Plan to update the City's Bikeway Master Plan, allowing for a more coordinated approach to creating bicycling infrastructure. (20)
9. Implement Bike Share in Cleveland. (20)
10. Review parking space requirements and prioritize advanced parking strategies (such as the Cleveland Hopkins Airport's Smart Parking program), especially in areas of compact, mixed-use development. (20)
11. NOACA to develop a Regional Strategic Plan and a complete streets policy. (21)
12. Finalize Complete and Green Streets toolkit and report on implementation progress annually. (21)

Note: (Related Action numbers shown in parentheses)

WASTE REDUCTION & RESOURCE CONSERVATION

FOCUS AREA 4

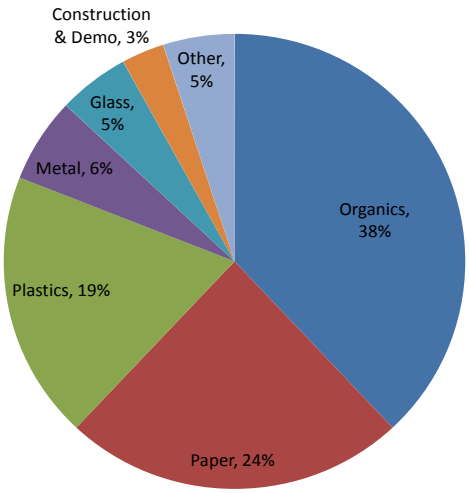
2030 GOALS:

- Achieve diversion rate of at least 50% by 2030 for both residential and commercial waste (25% by 2020)
- Reduce Cleveland GHG Emissions 77,000 $MTCO_2e$ by 2030

KEY FACTS:

In 2010, Cleveland residents generated over **230,000 tons of solid waste**

89% of this waste was sent to the landfill



38% of waste in Cleveland is made up of **organic** materials that could be **composted or processed to extract energy.**

The majority of waste can be reduced, reused, or recycled.

THE IMPORTANCE OF WASTE REDUCTION & RESOURCE CONSERVATION

As organic material decomposes in a landfill it releases GHG emissions. Recycling, composting, and other waste reduction and diversion efforts are important strategies for reducing GHG emissions, prolonging the life of landfills, and reducing disposal costs. Solid waste collected from residential, commercial, and industrial properties in the City of Cleveland contributed to approximately 1% of the City's GHG emissions in 2010 (Figure 8).

OBJECTIVE: SIGNIFICANTLY REDUCE THE AMOUNT OF WASTE SENT TO LANDFILLS

Major facilities and tracts of land are required to accommodate waste, and monitoring and mitigation are needed long after disposal. Actions that promote diversion of solid waste from landfills, such as recycling, composting and waste-to-energy initiatives, can reduce GHG emissions, prolong the life of landfills, and reduce disposal costs.

ACTION 22: IMPLEMENT PROGRAMS AND POLICIES TO ENCOURAGE WASTE REDUCTION AND DIVERSION BY RESIDENTS AND BUSINESSES

2030 Emissions Reduction Potential: 56,000 $MTCO_2e$ = 4,200 Cleveland homes

A coordinated approach to waste reduction and diversion across Cleveland, starting with policies that restrict certain materials, such as plastic bags, or divert others, such as organic waste, are important tools in encouraging waste reduction both at the residential and commercial level. Furthermore, a coordinated approach provides consistent messaging and education to guide businesses and community members. For example, outreach to businesses could include guidelines for sustainable purchasing policies, supply chain engagement, zero waste events, hazardous materials diversion, and incentives for meeting waste reduction targets.

FOCUS AREA 4

WASTE REDUCTION & RESOURCE CONSERVATION

KEY BENEFITS OF WASTE REDUCTION & RESOURCE CONSERVATION

- Cost savings
- Reduced natural resource consumption
- Local job creation and economic development
- Education and awareness
- Improved water quality
- Improved air quality

Similarly, neighborhood outreach, such as consistent signage, updated recyclable materials lists, and locations for organic waste drop-off, has the potential to empower residents to reduce waste.

Continuing the roll-out of citywide curbside residential recycling and creating a more robust recycling program overall will increase the rate of recyclable waste diverted from the landfill. A large part of successful recycling and diversion involves consumer education, consistent messaging, ease and availability of ways to divert materials, and partnerships with businesses to coordinate recycling efforts across organizations. While a variety of opportunities for recycling exist in Cleveland, a coordinated approach strengthens the opportunity for aggressive waste diversion. This includes expanding existing single-stream curbside service; identifying target recycling streams, such as glass bottles from bars and restaurants; and conducting neighborhood sweeps and business recycling seminars.

In addition to recycling, composting organics also helps to increase diversion rates. Not only do organics, including food and yard waste, account for approximately 38% of Cleveland's waste that ends up in landfills, it is typically heavy with moisture and removing it from the waste stream can reduce tipping fees that are paid by weight. This action can be built off the City's pilot composting effort at the West Side Market, where organic material (primarily food waste) from vendors and customers is collected in closed bins and sent to a composting facility. The resulting product is used for soil amendment. To address the larger volume of yard debris, it is important to offer more drop-off sites and ultimately curb-side collection. This action is closely linked with increased recycling and can leverage community education efforts that inform residents and businesses about composting and disposal of yard debris.

ACTION 23: DEVELOP A COST-EFFECTIVE APPROACH TO DECONSTRUCTING AND RECYCLING DEMOLISHED BUILDINGS

Deconstruction aims to remove building material with as little damage as possible, thus increasing the likelihood the material will be re-used rather than recycled. In almost any case, re-using material has higher environmental value than recycling. Traditional demolition projects yield diversion rates in the range of 0 to 10%. Given the value of metals, effort is usually made to salvage metals during the demolition, if practical. Full structural deconstruction projects often result in diversion rates of 75% or higher. Diversion rates over 90% are considered exemplary.

While traditional demolition and landfilling of materials creates little to no environmental or economic benefit, full deconstruction also has a point of diminishing return as the time and money invested becomes disproportionate to the resulting environmental, social, and economic benefits. The concept of an optimized approach, somewhere in the range between standard demolition and full deconstruction – based on the four indicators of cost, time, diversion rate, and economic development potential – can be a viable option for many buildings. High value materials can be removed for reuse while medium to low value materials can be diverted using the most cost effective method with preference of reuse whenever possible. Achieving a moderately aggressive diversion rate of 60% to 80% should be possible if materials such as metals, concrete, stone, wood, and unpainted drywall can be diverted.

ACTION 24: DEVELOP AND IMPLEMENT A SUSTAINABLE INTEGRATED WASTE AND ENERGY PLAN FOR THE CITY OF CLEVELAND

A variety of technologies exist to convert waste into energy or usable materials that reduce GHG emissions. The City seeks a sustainable, cost effective and long-term solid waste management solution. The solution will include recycling and keeping organic waste out of the landfill. There is potential for energy generation – whether through anaerobic digestion or the creation of refuse derived fuel (RDF) pellets. The City has identified opportunities for these technologies and is establishing a framework for implementation. Technologies being considered include:

- Opportunity 1: RDF production, after mixed waste processing to recover recyclables and compostable materials;
- Opportunity 2: RDF production with energy production; and,
- Opportunities 3A and 3B: RDF production and anaerobic digestion with or without energy production.

Anaerobic digestion is a series of processes in which microorganisms break down biodegradable material in the absence of oxygen. The process produces a biogas that can be used directly as cooking fuel, in combined heat and power gas engines, upgraded to natural gas-quality biomethane, or converted to electricity. Quasar Energy Group has built a series of anaerobic digesters throughout Ohio, including a 1.3 MW facility in Cleveland. Cleveland Public Power currently purchases energy from the Collinwood BioEnergy facility.

RDF pellets can be sold on the open market as a coal replacement to local businesses and utilities such as Cleveland Thermal. The City's Ridge Road Transfer Station could become a materials recovery facility (MRF) in addition to be being a recycling disposal facility. A MRF is a specialized plant that receives, separates and prepares recyclable materials for marketing to end-user manufacturers.

Thermal depolymerization involves heating waste plastic extracted from the municipal solid waste stream (e.g., plastic bottles and lunch containers) and converting it to synthetic crude oil that can be refined into gasoline and diesel fuel. While the City of Cleveland is not currently pursuing this technology, two Northeast Ohio businesses, Vadxx Energy and PolyFlow, currently work in this market.

Overall, these technologies offer significant opportunities for waste diversion, renewable energy generation, healthier soils, cleaner air, and economic development in Northeast Ohio.

Recycling Dumpster


Curbside Recycling Bins

FOCUS AREA 4

WASTE REDUCTION & RESOURCE CONSERVATION

LEADING BY EXAMPLE

COLLINWOOD BIOENERGY FACILITY

To meet the voluntary goals of the City's Advanced Energy Portfolio Standard, CPP is currently purchasing electricity from the Collinwood BioEnergy facility, which uses anaerobic digestion to produce electricity from organic waste. The plant, developed by Quasar Energy Group, can generate 1.3 megawatts of electricity per day and will be able to divert 42,000 wet tons of biomass from landfills each year. The biomass that is used as fuel for the production of electricity primarily comes from a variety of sources including food processing waste, expired beverages (dairy, soda, beer), and other fats oils and greases. The residual byproduct of anaerobic digestion is sent to local farms and used as a soil nutrient. Anaerobic digestion has been commonly used in energy facilities in Europe, with over 8,000 systems in operation today. In the United States, anaerobic digestion is emerging as a key component of the country's renewable energy portfolio.

WASTE REDUCTION & RESOURCE CONSERVATION NEXT STEPS TO BE COMPLETED BY 2016:

1. Complete rollout of mandatory residential curbside recycling throughout Cleveland. (22)
2. Expand neighborhood outreach programs to educate residents on waste streams, costs, long-term effects, diversion, and how their actions make a difference collectively. (22)
3. Identify and implement the most cost-effective approach to bringing back yard waste and leaf collection. If successful, consider citywide programs to encourage diversion of yard and organic waste from curbside garbage collection. (22)
4. Create more drop-off sites for organic waste and expand composting in and beyond West Side Market. Explore development of community composting programs on a neighborhood scale, with initial pilots in the EcoDistricts and/or major residential and commercial buildings. (22)
5. Educate businesses about environmentally preferable purchasing, zero waste events, and leveraging supply chains to reduce the volume of waste generated at their sites. (22)
6. Develop and implement approach that significantly reduces the use of disposable plastic bags, implemented in tandem with a public education campaign. (22)
7. Establish a requirement for household hazardous waste, such as paint, be removed and properly disposed before demolition. (23)
8. Develop guidelines for assessing the feasibility of deconstruction incorporating the four indicators of cost, time, diversion rate, and economic development potential. (23)
9. Issue a request for proposals to develop an integrated waste management system for the City of Cleveland and work with the community to identify an optimal approach. (24)

Note: (Related Action numbers shown in parentheses)


WHEN I COMPOST THE FOOD SCRAPS FROM OUR KITCHEN
I AM SUSTAINABLE, CLEVELAND.
We are all Sustainable Cleveland when we recycle food waste for improved soil and to reduce the amount of organic materials that are trucked to landfills.
Learn more, do more at sustainablecleveland.org
Employee at University Hospital
Together, we're building a thriving green city on a blue lake.
CITY OF CLEVELAND
SUSTAINABLE CLEVELAND 2019

FOCUS AREA 5

SUSTAINABLE LAND USE & CLEAN WATER

GOALS:

- Increase Cleveland's population density from 4,800 to 6,000 people per square mile by 2030
- Plant 75 new acres of trees within the City by 2020 and 150 new acres by 2030
- Reduce effective impervious surface in the city 10% by 2030 (5% by 2020)
- Install stormwater control measures on all redevelopment projects
- Reduce Cleveland GHG Emissions 120,000 $MTCO_2e$ by 2030

KEY FACTS:

The land use density of Cleveland is **4,800 people per square mile.**

Cleveland currently experiences approximately **80 combined sewer overflow events** annually.

There are more than **300 community gardens and urban farms** in Cleveland.

THE MPORTANCE OF LAND USE & CLEAN WATER

Reducing stormwater runoff, planting trees, and encouraging sustainable land use are important climate resiliency and emission-reduction strategies. The topics of land use and clean water are at the center of the intersection between climate change mitigation and adaptation. For example, improvements to zoning and land use codes can help create more vibrant communities and reduce transportation emissions, while improvements to stormwater infrastructure can help manage the impact of impervious surfaces and projected increases in flooding as a result of climate change. Actions outlined below address future reductions in water supply, reduce the number of Combined Sewer Overflow (CSO) events, and minimize impacts from flooding and erosion. More sustainable land use practices can also reduce the "heat island" effect caused by the summer heating of heat-absorbing surfaces such as roads and parking lots.

OBJECTIVE: ENCOURAGE VIBRANT DOWNTOWN AND NEIGHBORHOODS

High-density development in both downtown and Cleveland's neighborhoods, creates civic vibrancy, enables greater energy efficiency, and reduces auto use.

ACTION 25: GREEN THE ZONING AND LAND USE CODES TO ENCOURAGE SUSTAINABLE DEVELOPMENT

2030 Emissions Reduction Potential: 1,500 $MTCO_2e$ = 110 Cleveland homes

Cleveland's compact development patterns use land efficiently and provide a range of living choices, employment opportunities, and access to services using transit and active transportation modes. The City needs to build on its history of compact development and continue this sustainable trend. Through a combination of possible incentives (e.g., streamlined permitting, density bonuses, financial incentives, market incentives) and revisions in land use and zoning codes, Cleveland can encourage and promote higher density and more diverse development, mixed-use development, and commercial/residential infill (re)development and preservation of existing building stock within the City. The more efficient use of land could also increase green space, reducing the urban heat island effect and providing more resiliency to flooding and erosion.

FOCUS AREA 5
SUSTAINABLE LAND USE & CLEAN WATER

ACTION 26: PRIORITIZE SUSTAINABILITY AND RIGHTSIZING IN CITY INFRASTRUCTURE IMPROVEMENTS

Infrastructure throughout much of the City, such as roads, is oversized for the current population and economy of Cleveland. Sustainable Infrastructure can be defined as a decision making framework for capital spending that links asset management to an interest in green outcomes and an understanding that the most effective capital investments often integrate efforts across departmental silos. This approach often includes a triple bottom line framework for construction and operation, where project options are compared based on consistent environmental, social and economic metrics. Such strategies also adopt a more holistic approach to cost accounting including use of an asset management system for life cycle analysis, examining project costs from pre-construction to decommissioning to factor into decision making considerations such as durability, operations and maintenance costs, and end-of-life project costs. As upgrades are made to the current systems including water, sewer, and transportation, among others, considerations should be made to allow for flexibility to accommodate a variety of future growth scenarios, to potential impacts of a changing climate such as increased flooding, and the evaluation life cycle impacts in the design selection process. Opportunities should also be found in the existing infrastructure in the City, such as utilizing the excess capacity of Cleveland's streets to provide greater opportunities for complete and green streets programs.

Tree lined street in Cleveland

BENEFITS OF SUSTAINABLE LAND USE & CLEAN WATER

- Cost savings
- Reduced natural resource consumption
- Increased property values
- Improved aesthetics
- Improved air and water quality, health, and quality of life
- Comfort and livability
- Job creation and economic development
- Leadership and recognition
- Education and awareness
- Lower infrastructure costs per capita
- Reduced urban heat island effect

Ohio City Farm

OBJECTIVE: RESTORE AND REGENERATE THE NATURAL ENVIRONMENT

By valuing and leveraging the natural environment in new ways, Cleveland can create new sources of economic value while also creating a healthy and attractive place to live, work, and play.

ACTION 27: DEVELOP AND IMPLEMENT AN URBAN TREE PLAN TO GROW THE CANOPY

2030 Emissions Reduction Potential: 110,000 $MTCO_2e$ = 8,200 Cleveland homes

Trees provide many beneficial functions in cities, from helping capture and store carbon dioxide to providing shade and cooling to minimize the "heat island" effect. Shaded surfaces in cities may be 20-45°F cooler than the peak temperatures of un-shaded surfaces. Urban forests can also provide one long-term solution among many for the use of vacant lots across Cleveland while also helping to manage water runoff during and after rainstorms. For many native tree species, including oaks and maples, each tree planted prevents more than 1,000 gallons per year of stormwater from entering the sewer system. These long-term benefits of tree planting frequently outweigh the costs for planting and maintaining trees. A five-city study by the U.S. Environmental Protection Agency found that, on a per-tree basis, cities accrued benefits ranging from about $1.50–$3.00 for every dollar invested in trees . It is time to make Cleveland a "forest city" once again.

ACTION 28: SCALE UP THE LOCAL FOOD SYSTEM

Cleveland is a national leader in urban farming and gardening, but there is still much work to do. Some residents in Cleveland lack access to healthy food because they have limited incomes, do not live near markets where they can purchase healthy foods, or lack information on access to healthy and nutritious food choices. Expanding Cleveland's local food production can help provide more food choices and easier access to healthy food options while also enhancing the local economy through an expanded network of food producers, processors, and transporters. While having more access to locally-grown food can mean access to fresher produce, it can also help reduce GHG emissions associated with transporting food. According to the Leopold Center

FOCUS AREA 5
SUSTAINABLE LAND USE & CLEAN WATER

Lake Erie city view

Urban bioswale at Water Pollution Control

for Sustainable Agriculture at Iowa State University, food in the U.S. travels 1,500 miles on average from farm to consumer. By contrast, locally sourced food traveled an average of just 44.6 miles to Iowa markets. The conventional food distribution system used 4 to 17 times more fuel and emitted 5 to 17 times more of the GHG carbon dioxide (CO_2) than the local and regional systems. In addition to long-distant transport, food and farm systems contribute to climate change through the release of soil carbon as a result of common methods of plowing and tillage, the release of nitrous oxides from nitrogen fertilizers, and the embodied energy of farm inputs (which require significant energy to manufacture and distribute).

This action seeks to couple growth of the local food system with climate action by reducing emissions through sequestering carbon in our soils and plants, while at the same time storing and filtering our water.

ACTION 29: IMPLEMENT GREEN INFRASTRUCTURE TO CAPTURE STORMWATER ON-SITE

2030 Emissions Reduction Potential: 1,900 $MTCO_2e$ = 140 Cleveland homes

The City of Cleveland has a combined sewer system in which one pipe conveys both stormwater and sanitary sewage. During a rain storm, water flowing over hard surfaces (runoff) rushes quickly into sewers. To prevent urban flooding and damage to wastewater treatment facilities, some of this flow (a combination of stormwater and sewage) is allowed to overflow into area waterways at points called combined sewer overflows (CSOs). The Northeast Ohio Regional Sewer District (NEORSD) has 126 combined sewer outfalls and averages approximately 80 CSO events each year. Unless we act, climate change is expected to increase this number as a result of more intense rainfall and flooding in the region. The United States Environmental Protection Agency is requiring NEORSD to reduce the number of events to two (2) per year. The NEORSD will meet this goal mainly through a combination of large-scale storage tunnels and treatment plant enhancements.

A third approach being used to meet this goal is the implementation of green infrastructure. Stormwater control measures, such as constructed wetlands and bioswales, store, infiltrate, and evapotranspirate stormwater before it even makes its way to the combined sewer system. This "green infrastructure" can be less costly that traditional gray infrastructure, such as tunnels. In addition to potential cost savings, green infrastructure offers a range of other benefits to communities such as additional urban green space and recreational areas.

NEORSD's efforts to reduce CSO though both gray

and green infrastructure are collectively referred to as Project Clean Lake – a $3 billion, 25 year program for CSO control. In addition to Project Clean Lake, NEORSD has also implemented a Regional Stormwater Management Program. This Program will address flooding and erosion problems caused by a legacy of poor stormwater management within the City and across Northeast Ohio. Under the Program, NEORSD has developed a stormwater fee credit system in which property owners can reduce their stormwater fee through the implementation of approved stormwater control measures that will reduce the rate or volume of runoff.

The City and NEORSD are working together to use vacant lots for green infrastructure projects and implement the Complete and Green Streets program (see Action 21). Implementation of better stormwater management/green infrastructure as land is redeveloped in the City will minimize stormwater runoff, limit the impacts of flooding and erosion, save money for residents and local businesses by reducing their stormwater fee, reduce NEORSD's pumping and treatment costs, clean our water, and provide economic development opportunities to help rebuild our communities.

ACTION 30: INCREASE WATER CONSERVATION AND EFFICIENCY

2030 Emissions Reduction Potential: 9,300 $MTCO_2e$ = 700 Cleveland homes

Water efficiency and conservation includes a variety of solutions to reduce overall water use in the City such as efficiency upgrades to sinks, toilets, showers, and equipment and improved irrigation controls. Additionally, there are a number of instances where drinking water is used for purposes in which water treated to this quality is not required (landscape irrigation, process water use such as cooling towers, etc.) and where water reuse/recycling strategies can be implemented. Conserving water and using it more efficiently reduce distribution and treatment costs (pumping energy, chemicals, etc.) and related greenhouse gas emissions. They also reduce strain on Cleveland's water supplies, which could become stressed in the future as a result of climate change. Some water efficiency strategies, such as rainwater harvesting, also reduce stormwater runoff within the City.

Battery Park

FOCUS AREA 5
SUSTAINABLE LAND USE & CLEAN WATER

SUSTAINABLE LAND USE & CLEAN WATER NEXT STEPS TO BE COMPLETED BY 2016:

1. Conduct a comprehensive review of the city's zoning code to continue encouraging sustainable development and form-based codes. This can be informed by similar initiatives in other cities, such as Buffalo, Columbus, and New York City. (25)
2. Continue exploring creation of agriculture "overlay districts" and innovation zones to encourage local food production and capitalize on opportunities to re-use vacant land for urban agriculture. (25, 28)
3. Support implementation of the Ohio Lake Erie Commission's Protection & Restoration Plan (e.g., priority development and conservation areas). (25)
4. Develop a series of events, projects, and initiatives for 2015, the Celebration Year of Clean Water. (25-30)
5. Building on the "8 Ideas for Vacant Land Re-use in Cleveland" study, identify parcels best suited for tree planting, local food production, renewable energy, and stormwater management. (26-29)
6. Work with Cuyahoga County to develop an Urban Tree Canopy assessment to map the extent of the City's trees. Complement this analysis with neighborhood-level tree inventories. (27)
7. Building off of the data provided by the Urban Tree Canopy assessment, develop a comprehensive urban tree plan that identifies the key steps and resources needed to make Cleveland, once again, the "forest city". Part of this plan will include identifying tree species that can thrive in an altered climate. (27)
8. Along with planting trees, increase green spaces in and around Cleveland to reduce urban heat island effect and provide habitat for plants and animals. (27)
9. Couple growth in local food production with climate action by developing a stronger methodology for emission reductions/sequestration associated with local agriculture, among other actions. (28)
10. Support NEORSD in the development of an implementation strategy to encourage the adoption of on-site stormwater management for Cleveland residents and businesses. (29)
11. Develop a streamlined approach to creating"complete and green streets" that treat stormwater runoff with infiltration into vegetated areas along streets, reducing the amount of pollutants entering streams and lakes. (29)
12. Through education and outreach, link water efficiency and conservation upgrades to any energy efficiency programs being implemented under the Energy Efficiency and Green Building focus area. (30)

Note: (Related Action numbers shown in parentheses)

LEADING BY EXAMPLE

STORMWATER MANAGEMENT AND REINFRASTRUCTURE

The Northeast Ohio Regional Sewer District (NEORSD) is working with various stakeholders to implement numerous stormwater infrastructure projects throughout Cleveland and Northeast Ohio in response to a 2011 consent decree from the U.S. Environmental Protection Agency. The primary purpose of these projects is to reduce combined sewer overflow (CSO) events that result in untreated sanitary sewage waste flowing into waterways and Lake Erie during periods of heavy rain. Reducing and managing stormwater more effectively will reduce flooding, erosion, and water pollution. By involving neighborhood planners and urban designers, the projects will also result in new parks, streetscapes, community gardens, and public amenities.

FOCUS AREA 5

SUSTAINABLE LAND USE & CLEAN WATER

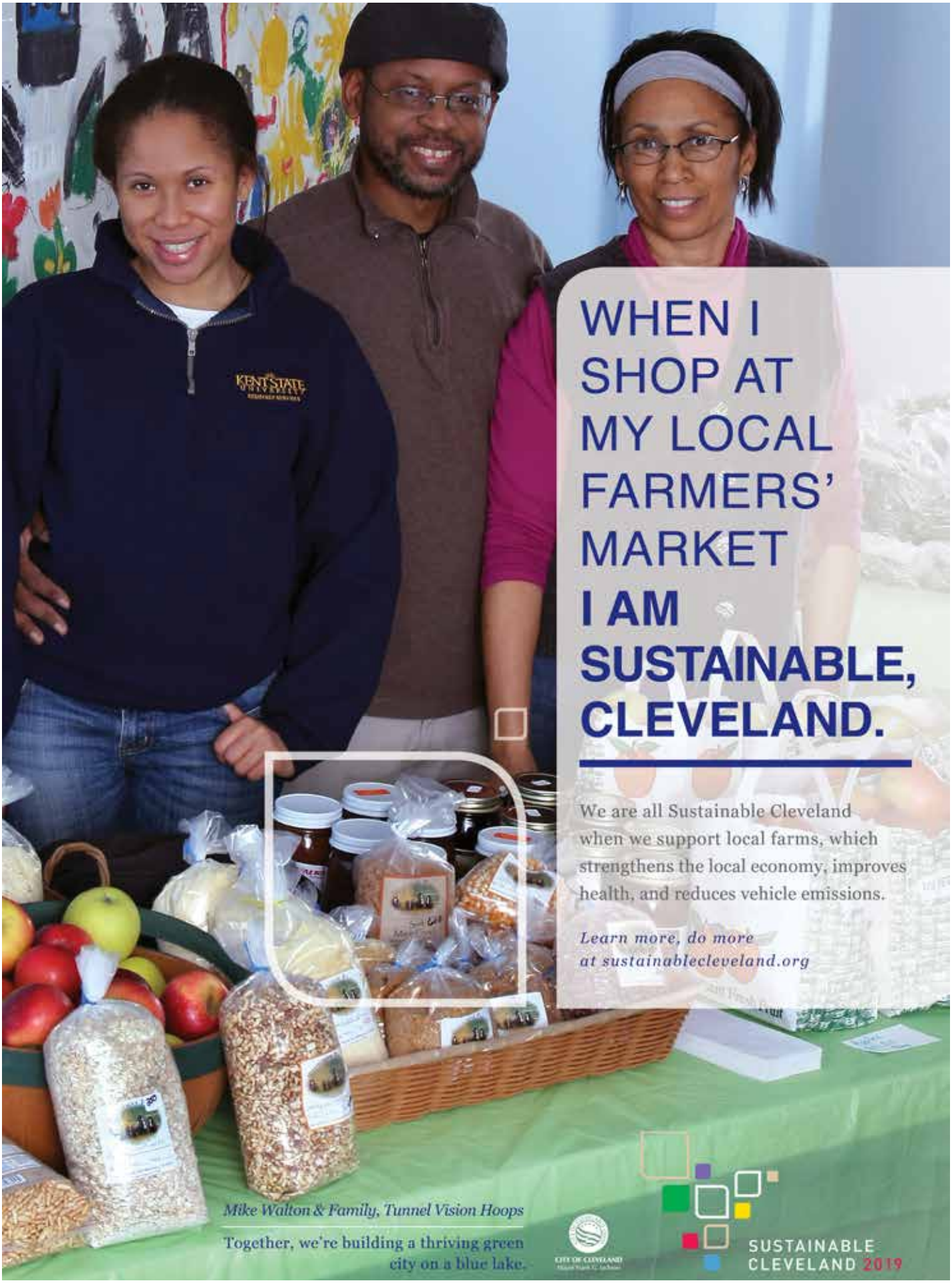
LEADING BY EXAMPLE

OHIO CITY FARM

In 2010 a collaborative effort of Cleveland organizations created one of the largest urban farms in the country. Known as Ohio City Farm, nearly six acres of formerly unused land adjacent to the West Side Market have been repurposed for urban agriculture, community development, and job training. The consortium of partners behind this effort includes Great Lakes Brewing Company, and not-for-profit organizations: The Refugee Response, Ohio City Near West Development Corporation, and Cuyahoga Metropolitan Housing Authority.

The Ohio City Farm is designed to incubate entrepreneurial farm businesses and support workforce development programs. Ohio City Farm provides urban farmers with low-cost land, shared facilities and technical assistance and is designed to develop and support entrepreneurial farmers. Incubator farm tenants are expected to run economically viable businesses and provide financial information on their operations.

(*Photo: Brad Masi*)


KENT STATE UNIVERSITY
WHEN I SHOP AT MY LOCAL FARMERS' MARKET
I AM SUSTAINABLE, CLEVELAND.
We are all Sustainable Cleveland when we support local farms, which strengthens the local economy, improves health, and reduces vehicle emissions.
Learn more, do more at sustainablecleveland.org
Mike Walton & Family, Tunnel Vision Hoops
Together, we're building a thriving green city on a blue lake.
CITY OF CLEVELAND
SUSTAINABLE CLEVELAND 2019

FOCUS AREA 6

COMMUNITY ENGAGEMENT & PUBLIC HEALTH

GOALS:

- Reduce Cleveland GHG Emissions 800,000 $MTCO_2e$ by 2030
- Engage every Cleveland neighborhood in climate action, beginning with the two EcoDistricts and Greater University Circle
- Demonstrate a measurable improvement in climate change resilience related to all key impacts, especially for our most vulnerable populations
- Achieve attainment or maintenance status for all measured criteria pollutants
- Integrate adaptation into all relevant plans at City and County levels

KEY FACTS:

2012 was the warmest year on record in Cleveland, dating back to 1871 when record-keeping began. This excessive heat contributed to a higher number of Unhealthy Air Quality Days for Sensitive Groups in Cuyahoga County.

There are **15 Extreme Heat Cooling Centers** located in the City of Cleveland (59 in Cuyahoga County).

The City of Cleveland Department of Public Health manages **21 Air Quality Monitors**.

THE IMPORTANCE OF COMMUNITY ENGAGEMENT & PUBLIC HEALTH

Sustainable Cleveland's motto, "Together, we're building a thriving green city on a blue lake", emphasizes empowerment, cooperation, action, quality of life, and abundance. People, not programs, are the answer to true and lasting climate action in Cleveland. This means that a whole system, citizen-centered approach will be needed to align climate action with the assets, capacity and priorities of Cleveland residents and business owners. Whole system change is the transformation of an entire organization at one time. For the purposes of this plan, the whole system includes residents from every Cleveland neighborhood, business owners, and stakeholders from many organizations and corporations.

This plan contains a lot of information about the imperative to take action in the face of climate change. However, current research demonstrates that too much information and a fear-based approach is a barrier to individual climate action. People do not generally take action because of information or fear; they take action for something they care about.

Building off of the asset-based Appreciative Inquiry method used during the annual Sustainable Cleveland summits, asset-based community development (ABCD) is a strength-based methodology for sustainable development. The key principles of ABCD are to 1) support communities to discover what their assets are, 2) discover what they care about enough to act on and 3) discover how they can act together to achieve those goals. In order for Cleveland residents to care about and to act upon climate change, it must connect to their everyday lives; they need to recognize climate change and climate action in their own backyards.

By building upon what most people care about—safety, health, youth, education, jobs—there is potential to engage Cleveland's residents and to be led in more creative directions as we take climate action.

"When people discover what they have, they find power. When people join together in new connections and relationships, they build power. When people become more productive together, they exercise their power to address problems and realize dreams."

- Mike Green, When People Care Enough to Act

FOCUS AREA 6

COMMUNITY ENGAGEMENT & PUBLIC HEALTH

Table 2: Examples of Cleveland organizations with Greenhouse Gas and Energy Reduction Goals

Leading Organization	***Reduction Goal***
Case Western Reserve University	Carbon neutral by 2050
City of Cleveland	Reduce GHG emissions 50% by 2030
Cleveland Clinic	Reduce energy use by 20% by 2020
Cleveland Public Power	Reduce dependence on fossil fuels, purchase power from renewable energy sources (15% by 2015, 20% by 2020, 25% by 2025)
Cuyahoga Community College	Carbon neutral by 2050
Eaton Corporation	Reduce energy use 25% by 2015 (global goal)
Greater Cleveland Regional Transit Authority	Reduce GHG emissions by 30% by 2016
KeyBank	Reduce energy use 20% by 2016, 2009 baseline
Parker Hannifin	Reduce energy intensity by 3% per year
Tremco	Reduce energy use 50% by 2020

OBJECTIVE: ORGANIZATIONS, NEIGHBORHOODS, AND INDIVIDUALS BECOME CLIMATE LEADERS

Participation by the Cleveland community is crucial to the successful implementation of this plan.

ACTION 31: PROMOTE LEADING LOCAL BUSINESSES STRIVING TO MEET ENERGY AND CARBON REDUCTION GOALS

2030 Emissions Reduction Potential: 800,000 MTCO2e = 60,000 Cleveland homes

There are a number of stakeholders within the City of Cleveland that have developed their own climate action plans and/or set their own targets for GHG or energy reduction (see Table 2). Supporting the growing number of leading organizations in meeting their internal GHG reduction goals will help the overall Cleveland community achieve its goals for emissions reduction. In order to meet the goal of 40% emissions reduction by 2030, behavior change among residents/employees and additional reductions among leading businesses would need to reduce emissions by a total of 0.8 million MTCO2e in addition to the strategies elsewhere in this plan.

ACTION 32: RECOGNIZE CAPACITY OF NEIGHBORHOOD AND COMMUNITY GROUPS TO IMPLEMENT CLIMATE MITIGATION AND ADAPTATION INITIATIVES

There are many opportunities for partnering with neighborhood and community groups to take action on climate. Examples include:

- Every person who lives or works in the City of Cleveland has the opportunity to sign the Cleveland Commitment, a pledge to incorporate green practices in every aspect of their daily lives. Northeast Ohioans can also sign the LEEDCo Power Pledge, demonstrating support for the offshore wind energy project.

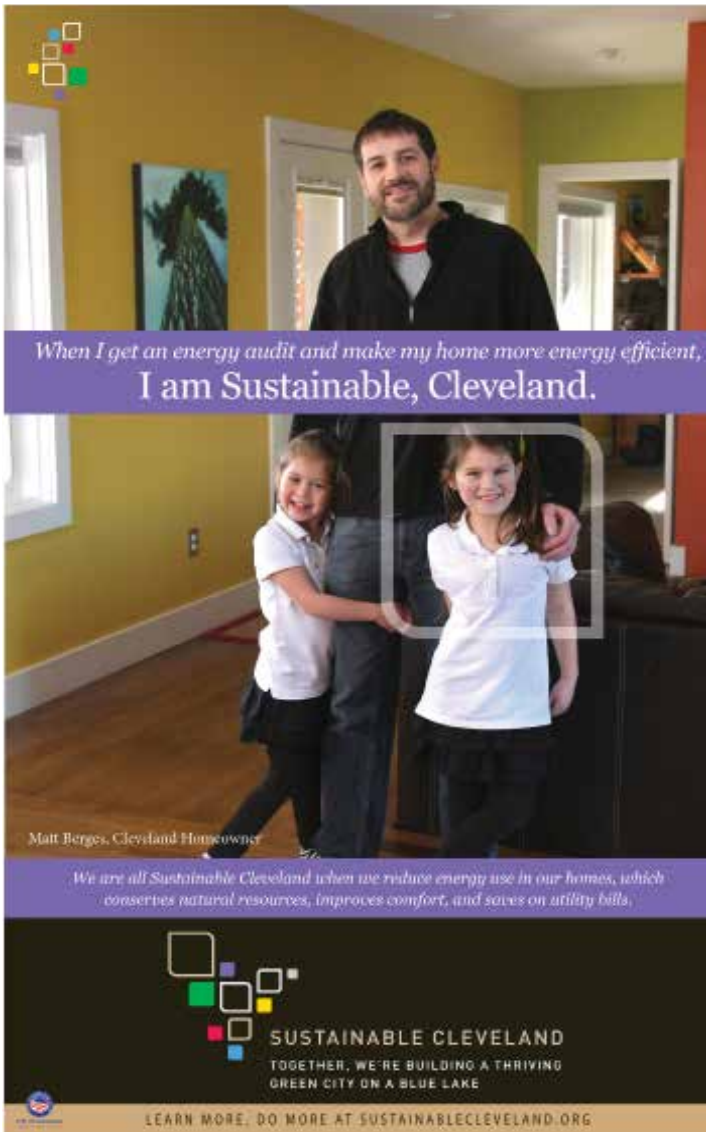
- The Sustainable Cleveland website should be adapted to integrate climate action into the toolkits

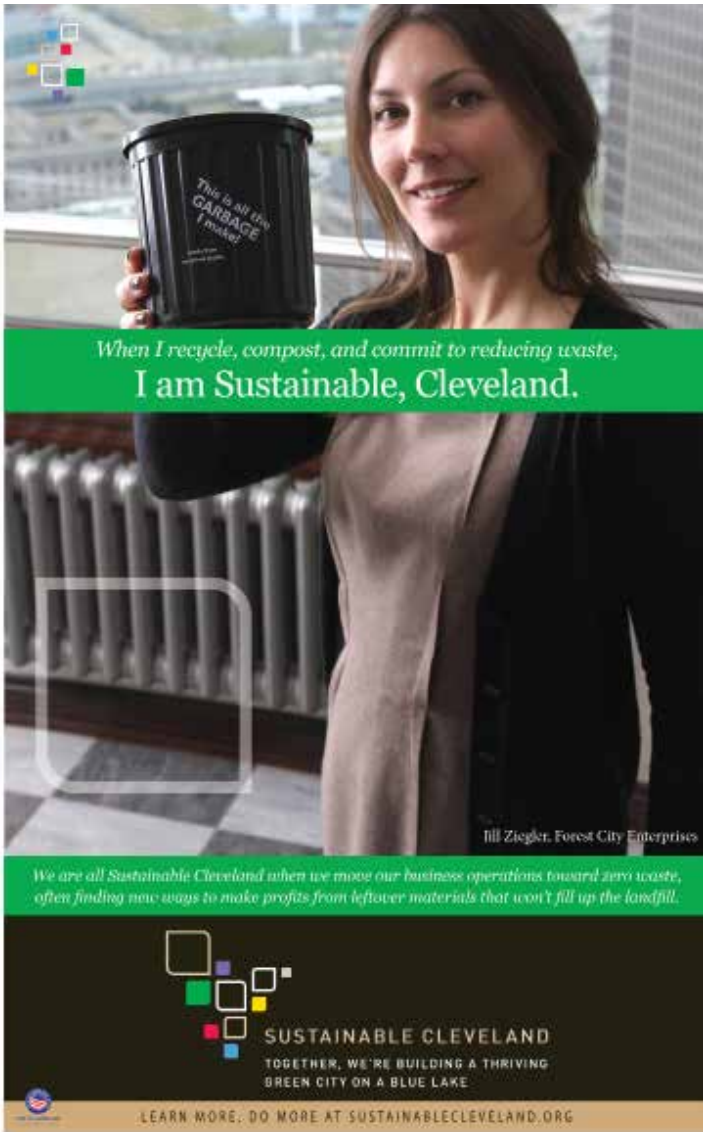
for "At Home", "At Work" and "In the Community" as well as link those actions to the Indicators Dashboard. It's valuable to show the link between individual action and macro level indicators.

- The I am Sustainable Cleveland campaign, blog, social media and monthly newsletters can be used to connect people to resources by sharing success stories and new ideas.

- Explore use of the Cleveland Carbon Fund, Neighborhood Connections, and others to fund neighborhood-based climate action in Cleveland.

- Fun and friendly competitions and recognition programs can act as motivators for concrete actions and results. Examples include photo and essay contests for school children or a "most unusual reuse" contest for all ages.





I am Sustainable, Cleveland. campaign

FOCUS AREA 6

COMMUNITY ENGAGEMENT & PUBLIC HEALTH

KEY BENEFITS OF COMMUNITY ENGAGEMENT & PUBLIC HEALTH

- Cost savings
- Reduced natural resource consumption
- Civic engagement
- Increased property values
- Improved quality of life
- Reduced vulnerability to energy cost volatility
- Job creation and economic development
- Improve aesthetics
- Improved air quality and health
- Improved water quality
- Comfort and livability

- Financial incentives have always been a driving motivator for change. These incentives do not have to come in the way of tax credits alone. Emphasis must be placed on the cost/benefit analysis in implementing new sustainable habits. When clearly shown that these practices save money and help make Cleveland a more livable city, change will be accepted and promoted more readily.

- Collaborate with existing neighborhood-based organizations to identify grassroots leaders who are champions in sustainability.

- Several business sector awards programs, which already exist in the market, are well known and have great participation. Partner with Crain's Cleveland Business Emerald Awards, Cleveland Magazine's Best of Cleveland awards, and others to encourage residents and small business owners to live more sustainably.

Community Involvement in creating a rain garden

- The Cleveland Metropolitan School District has been engaged with Sustainable Cleveland since 2009 and most recently has used the Celebration Year topics as the basis for their district-wide Rock Your World with STEAM program. STEAM stands for Science, Technology, Engineering, Arts, and Math and is an integrated curriculum project that each school creates.

- Engaging students at all levels creates future generations of concerned and informed citizens. Sustainability can be integrated into the curriculum of pre-schools, elementary and secondary schools, community colleges, and universities.

- Promote and encourage the Roots of Success Program to help residents become aware of the job opportunities related to climate action and sustainability.

- Develop Climate 101 workshops that can be easily hosted by grassroots organizations and also offered as content for TV20, the Sustainable Cleveland website, and educational materials of partner organizations. These topics (with appropriate interview resources) could also be offered to local media for their use in programming/publication.

To bring many of these ideas together, a neighborhood climate action toolkit is being created that includes best practices for resident engagement around climate and sustainability. This toolkit will be piloted in two EcoDistricts (Detroit Shoreway and Kinsman) and Greater University Circle. The neighborhood toolkits will grow out of learning conversations to identify the priorities of citizens that can be addressed through climate action. Tools will be tested in the neighborhoods to see how well they engage and draw interest and feedback from citizens. In addition, each neighborhood will have a GHG inventory and narrative to allow for tracking performance and identifying key opportunities for taking action. If successful, this toolkit can be rolled out in neighborhoods throughout Cleveland, including a process for financing neighborhood-based climate action projects.

OBJECTIVE: IMPROVE PUBLIC HEALTH AND RESILIENCY TO CLIMATE CHANGE IMPACTS

Improving public health will better prepare Clevelanders for climate change impacts.

ACTION 33: CONDUCT CLIMATE CHANGE VULNERABILITY ASSESSMENT AND INTEGRATE PROJECTED IMPACTS INTO EXISTING PLANS

While the City works to reduce GHG emissions and their impact on climate change, it can also develop strategies to adapt to an already-changing climate. From the GHGs that have already been emitted globally, Cleveland can expect longer and more pronounced heat waves, greater impacts to air quality during such heat waves, and heavier storm events. These changes to our climate can particularly impact vulnerable populations, such as the poor, elderly, children, and those suffering from certain illnesses.

The City's Emergency Operations Plan addresses these impacts with policies and procedures for heat days, power outages, flooding and disease outbreaks. Better understanding the frequency and severity of these impacts will help the City and other agencies plan ahead. This includes, for example, finding ways to cool and shade the City to reduce the heat island effect (see Figure 4 and Urban Forest Action 27) while also providing support such as cooling centers during prolonged heat waves. Rapid response mechanisms such as alerts to reduce driving can also be deployed to reduce air pollution impacts from high levels of ozone on hot days. Models to predict how stormwater runoff will change over time can be used to anticipate what sort of stormwater treatment will be needed in the future. The City can also engage other community stakeholders to develop strategies and response mechanisms including social service agencies and the healthcare sector.

Kurents in Cleveland 2013 Kurentovanje Parade (Photo: Andy Kinney)

Chess at Edgewater (Photo: Trish DiFranco)

FOCUS AREA 6

COMMUNITY ENGAGEMENT & PUBLIC HEALTH

LEADING BY EXAMPLE

KINSMAN AND DETROIT SHOREWAY ECODISTRICTS





EcoDistricts are neighborhoods that develop comprehensive district-scale strategies in the areas of energy, water, waste, recycling, green infrastructure and mobility. When done comprehensively, these strategies can improve affordability, livability and overall quality of life for residents; enhance community identity; and reduce the burden on municipal infrastructure. They also provide a framework from which to implement innovative sustainability features and strategies. Cleveland is home to two EcoDistricts: one in the Kinsman neighborhood on the east side, and one in the Detroit Shoreway area on the near west side.

The EcoVillage in the Detroit Shoreway neighborhood was designated the country's first urban EcoDistrict in 1998 when a grant from the U.S. EPA established the area as a national demonstration project. Projects in the EcoVillage, both completed and underway, have shown that sustainability principles can be used effectively as a long-term vehicle for urban re-investment and socially responsible neighborhood renewal. Features of the EcoVillage include:

- Twenty-four energy efficient market rate and affordable homes
- Twenty-two townhomes being built to Enterprise Green Communities standards (Waverly Station)
- Vacant land reclamation through the creation of greenspace, community gardens, and a resident-run chicken cooperative

- The City's first green, rapid transit station at West 65th Street
- A green surface parking lot to be developed by Metro Catholic School including native vegetation, bioswales and other sustainably developed features

The Kinsman neighborhood contains a unique range of sustainability efforts, centered around the Urban Agriculture Innovation Zone. Burten Bell Carr Development, the neighborhood community development corporation, is in the process of assembling land from the major land holders to turn this food desert into a center of urban agricultural production. Sustainability projects that have been planned, are in progress, or have been completed within the last three years in the Kinsman EcoDistrict include the following:

- **Urban Agriculture Innovation Zone:** Nearly 8 acres of urban agriculture has been established in what is being planned as the largest urban agriculture district in the U.S. The community's vision is to repurpose a total of 28 acres of vacant land.
- **Rid-All Green Partnership:** A group of three childhood friends with roots in the Kinsman neighborhood has cultivated 350 pounds of tilapia, 14,000 pounds of produce, and 1,200 cubic yards of compost on an acre-and-a-half parcel in the Urban Agriculture Innovation Zone in 2012.
- **Kinsman Farm:** Funded by a $1.1 million grant from the U.S. Department of Agriculture, Kinsman Farm is a six-acre urban agriculture incubator for both experienced and beginning farmers. Currently, twelve market gardeners from all walks of life each have a quarter-acre plot of repurposed vacant land for farming. The market gardeners, which harvested more than 22 different types of fruits, vegetables, and herbs in the farm's second year in 2012, sell the produce they grow to local restaurants and at farmers markets.
- **Healthy Food Access Initiative:** This initiative includes four components: 1) a healthy food restaurant, which sells fresh fruits and vegetables in addition to healthy alternatives to fast food; 2) a multi-purpose community space in which cooking, nutrition, and other health-related classes are held; 3) a mobile market that travels to housing estates, apartment complexes, houses of worship, and sells fresh produce where people live, work, and worship; 4) a farmers market.
- **Green City Growers Greenhouse:** A 3.25-acre hydroponic greenhouse in which three million heads of lettuce and 300,000 pounds of herbs are grown annually and distributed within a 150-mile radius opened for business in December 2012. The $17 million project employs low-income residents from the surrounding neighborhoods, and those employees will become owners of the business over time.
- **Heritage View Homes:** A $100 million project, Heritage View Homes replaces 628 units of antiquated public housing units with 350 new-construction townhomes, single-family homes, and apartments. The project, initiated by the Cuyahoga Metropolitan Housing Authority, includes solar panels, geothermal heating, permeable driveways and walkways, well-insulated walls, Energy Star appliances, low-flow water fixtures, and materials built and made in Ohio.
- **Cuyahoga Metropolitan Housing Authority Headquarters:** Cuyahoga Metropolitan Housing Authority centralized its many offices and facilities in one location, bringing more than 400 employees to the Kinsman neighborhood. The building, which was constructed on a former brownfield, received LEED Silver certification. Additionally, 70% to 80% of the housing authority's electricity demands are generated by 4,200 solar panels installed on a six-acre site (see Advanced & Renewable Energy focus area).

FOCUS AREA 6

COMMUNITY ENGAGEMENT & PUBLIC HEALTH

COMMUNITY ENGAGEMENT & PUBLIC HEALTH NEXT STEPS TO BE COMPLETED BY 2016:

1. Coordinate with large emitters in the City to identify opportunities to support their emission reduction efforts, and to inspire others. (31)
2. Provide support services and training tailored to the needs of the local workforce, especially for the growing green job industries. (32, 33)
3. Consider development of a behavior wedge profile for Cleveland to prioritize behavior changes and calculate cost and benefit. (32)
4. Inform houses of worship about Interfaith Power & Light and Greenfaith Certification Programs, among other opportunities. (32)
5. Collaborate with the arts and cultural institutions on performances and exhibits that incorporate sustainability. (32)
6. Consider crowd-funding (e.g., Solar Mosaic) or other models that focus on urban environments (e.g., Cleveland Carbon Fund) as ways to generate funding for neighborhood projects. (32)
7. Partner with education sector to integrate sustainability into pre-K through college curriculum. (32)
8. Expand the "I am Sustainable, Cleveland" marketing campaign. (32)
9. Complete a Neighborhood Climate Action Toolkit pilot in the two EcoDistricts and Greater University Circle, and roll out to all neighborhoods in partnership with Community Development Corporations. (32)
10. Update the GHG inventory at least every two years, and share results with the community. (32)
11. City to report the GHG inventory, mitigation actions, and adaptation actions to the Carbon Disclosure Project at least every two years. (32)
12. Advocate for strong energy efficiency and renewable energy standards. (32)
13. Build off Green Venues work to identify sustainability champions, and celebrate those successes. (32)
14. Develop green guide and map for tourists and Cleveland residents alike. (32)
15. Convene a climate adaptation subcommittee that includes climate scientists, adjacent jurisdictions, regional organizations and coalitions, emergency management, the social service and health care sectors, and community organizations for the purpose of understanding shared vulnerabilities and developing specific adaptation actions. (33)
16. Incorporate the current and projected impacts of climate change into: (33)
    a. City of Cleveland Emergency Operations Plan
    b. Cuyahoga County's Threat and Hazard Identification and Risk Assessment
    c. Cuyahoga County's All Natural Hazards Mitigation Plan
    d. Emergency operations of other key organizations, including hospitals

17. Continue to work with social service and health care stakeholders to increase support for vulnerable populations through actions such as providing cooling shelters during heat waves and alerting people during days of poor air quality. (33)
18. Partner with higher education researchers on a variety of climate and sustainability opportunities, such as modeling future stormwater runoff scenarios to inform stormwater capital improvement planning (34). Coordinate with NOACA to evaluate the feasibility of deploying rapid traffic management strategies to reduce ground-level ozone during times of excessive heat. (33)

Note: (Related Action numbers shown in parentheses)

NEXT STEPS: A ROLE FOR EVERYONE

The development of Cleveland's first community Climate Action Plan is a major step toward managing community GHG emissions and preparing for an already changing climate, while simultaneously furthering community economic development and sustainability. This Plan is meant to be a living document, subject to further review and revision as actions are implemented, progress is monitored and measured, new actions are developed, and objectives and actions are revisited. The Mayor's Office of Sustainability plans to convene key stakeholders every three years to review and revise the Climate Action Plan.

BUILDING ON COMMUNITY PARTNERSHIPS

As discussed under many of the focus areas, objectives, and actions in the Climate Action Plan, partnerships are a particularly important component of implementation. Cleveland is fortunate to have the resources and framework of Sustainable Cleveland 2019 - including many community partners with an interest in sustainability in general, as well as specific actions in the CAP. Valued partners include colleges, universities and other higher education institutions; non-profit and community organizations; the business community; the building industry and professional organizations; communities of faith; and others. Such partnerships can be leveraged to share resources and expertise, but also ensure that climate resiliency becomes part of the fabric of the community, and not an effort dependent on a small handful of champions. Through the Office of Sustainability, the City will continue to work with key stakeholders, Sustainable Cleveland working groups, and community members to build partnerships that support implementation of this Plan.

FUNDING ONGOING EFFORTS

While many of the actions require limited funding, some certainly do. Fortunately, various financing options are available for GHG emission reductions and other sustainability strategies identified in the CAP. One such tool that communities and organizations are using is a revolving loan fund, whereby the City starts by implementing energy saving measures that have no or minimal upfront costs and then uses money savings from these measures to establish the account. This fund can then be used, in turn, to help fund future sustainability initiatives that require some upfront money. Municipalities and businesses can also choose a self-financing model to perform energy/sustainability projects, which allows them to control all aspects of the project while getting assistance from consultants as needed.

Additional popular and successful financing mechanisms for local governments include grants and performance contracts for energy efficiency projects, because neither of these options rely on upfront capital funding. Funding is yet another area where partnerships can be used to leverage resources, such as collaborating with the higher education community on grant proposals; exploring joint public-private partnerships; and seeking out "in-kind" assistance for implementation, such as academic research projects or volunteer programs.

MONITORING PROGRESS

The City and its community partners will be working to establish an implementation monitoring program to track progress over time as the CAP's 33 actions are completed. Implementation of actions will be documented for future reference and shared with the community through SustainableCleveland.org and other outlets. For instance, what was the actual cost of a given action and when was it implemented? Who was involved, and what were their tangible indications of success, such as number of participants, number of residences retrofitted, or tons of GHG reductions achieved? This type of information can be used to celebrate success, adjust actions and implementation steps as desired, or introduce new actions in future updates of the Plan.

A key component of the CAP will also be a set of specific performance metrics that can be used for internal management of GHG reduction and annual public reporting on progress toward the Plan's goals. The City and its community partners are already tracking some performance metrics related to the Plan. As actions are implemented, progress will be tracked and presented on the Sustainable Cleveland website through the Dashboard project and other means.

HOW YOU CAN HELP

While the Climate Action Plan establishes a framework for reducing GHG emissions in Cleveland and provides the initial stepping stones toward goals and objectives, it is ultimately up to all Clevelanders to take steps to reduce GHG emissions at home, at work, and in our communities.

For information, visit www.SustainableCleveland.org.

GLOSSARY

(Adapted from U.S. EPA website, http://www.epa.gov/climatechange/glossary.html)

Adaptation: Actions that help human society and natural systems prepare for and become less vulnerable to a changing environment.

Carbon Dioxide: A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal human-caused greenhouse gas (GHG) that affects global warming.

Carbon Footprint: The total amount of GHGs that are emitted into the atmosphere each year by a person, family, building, organization, or company. A person's carbon footprint includes GHG emissions from fuel that an individual burns directly, such as by heating a home or riding in a car. It also includes GHG that come from producing the goods or services that the individual uses, including emissions from power plants that make electricity, factories that make products, and landfills where trash is sent.

Climate: Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is three decades, as defined by the World Meteorological Organization.

Climate Change: Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

Evapotranspiration: Evapotranspiration is the sum of evaporation and plant transpiration from the Earth's land surface to atmosphere. Evaporation accounts for the movement of water to the air from sources such as the soil, canopy interception, and water bodies. Transpiration accounts for the movement of water within a plant and the subsequent loss of water as vapor through stomata in its leaves. Evapotranspiration is an important part of the water cycle.

Greenhouse Effect: Trapping and build-up of heat in the atmosphere near the Earth's surface. Some of the heat flowing back toward space from the Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the Earth's surface. If the atmospheric concentrations of these GHGs rise, the average temperature of the lower atmosphere will gradually increase.

Greenhouse Gas (GHG): Any gas that absorbs infrared radiation (heat) in the atmosphere. Greenhouse gases include carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride.

Mitigation: Actions that reduce GHG emissions and help to slow climate change.

Resilience: A capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.

Sustainability: Living today in a way that does not degrade natural systems or compromise the ability of future generations to have a high quality of life.

Weather: Atmospheric conditions at any given time or place. It is measured in terms of such things as wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather can change from hour-to-hour, day-to-day, and season-to-season. Climate is usually defined as the "average weather."

END NOTES

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[ix]Adapted from corporate scope diagram in The Greenhouse Gas Protocol, WBCSD/WRI

[x]Only two-thirds of Arcelor Mittal's operations occur within the City of Cleveland, however all of their emissions have been included in the City's GHG inventory.

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Wade Oval Wednesdays in University Circle (Photo: Edward Frierson)

West Side Market (Photo: Jenny Sanders)

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Downtown Cleveland (Photo: Mike Bacanu)

SUSTAINABLE CLEVELAND 2019

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