The Community-First Energy Plan

Final Report

August, 2025

A Comprehensive **Climate Action Plan** for the Miami Valley

Prepared for

Miami Valley Regional Planning Commission

MIAMI VALLEY
Regional Planning Commission

Prepared by

Sustainability Solutions Group (SSG)
and New Reach Community Consulting

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Community Consulting
designed engagement for social impact

Designed by SSG

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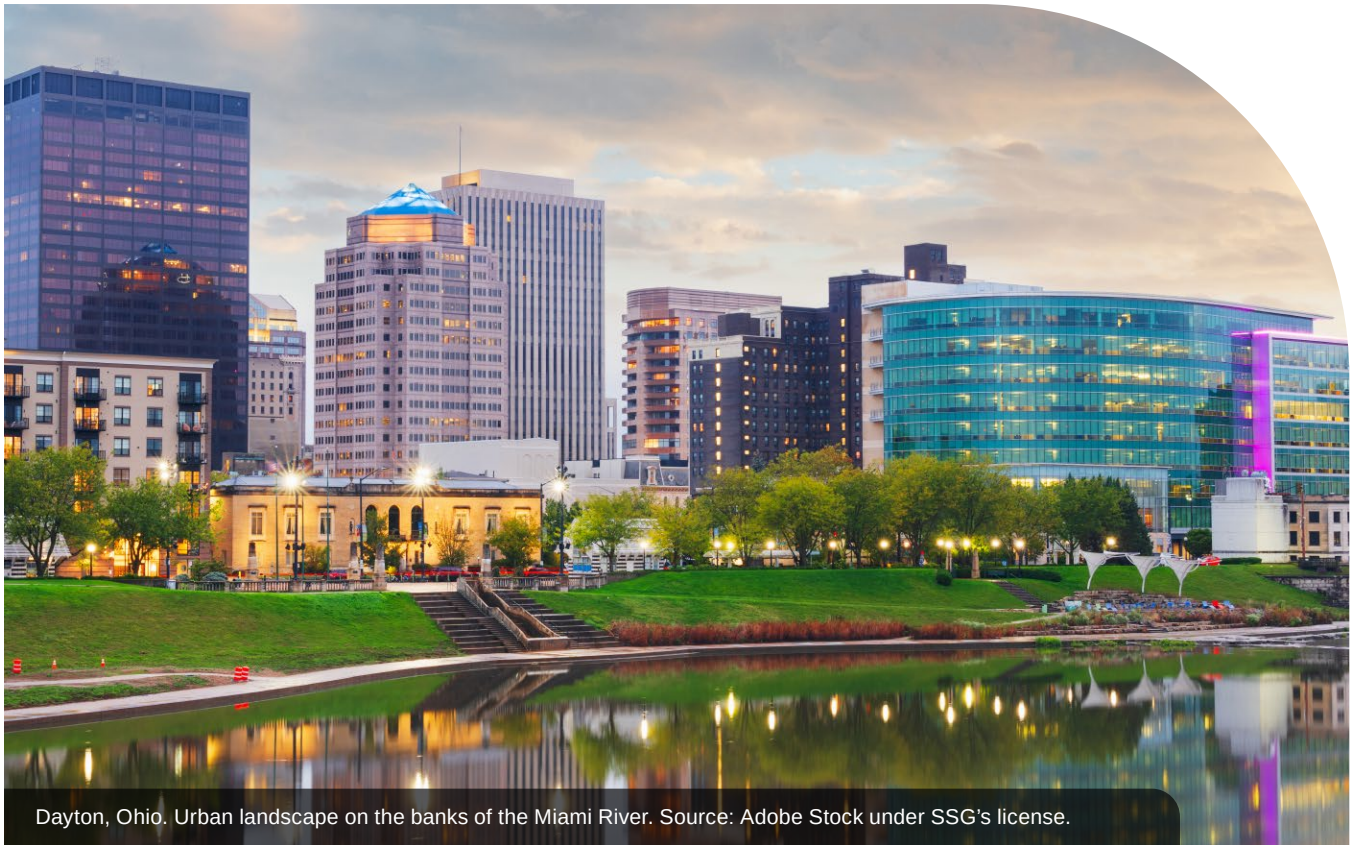

Dayton, Ohio. Urban landscape on the banks of the Miami River. Source: Adobe Stock under SSG's license.

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Definitions and Acronyms

Abbreviation	Definition
BAP	Business-as-Planned
BAU	Business-as-Usual
BPS	building performance standard
CCAP	Comprehensive Climate Action Plan
CEJST	Climate and Economic Justice Screening Tool
CH_4	methane
CPRG	Climate Pollution Reduction Grants
CO_2	carbon dioxide
COPD	chronic obstructive pulmonary disease
DDC	Dayton Development Coalition
EJScreen	Environmental Justice Screening Tool
EPA	U.S. Environmental Protection Agency
EV	electric vehicle
FUDS	Formerly Used Defense Sites
GDRTA	Greater Dayton Regional Transit Authority
GDS	green development standard
GHG	greenhouse gas
GRMI	Greater Region Mobility Initiative
HC	hydrocarbon
HFC	hydroflourocarbon
HVAC	heating, ventilation and air conditioning
IRA	Inflation Reduction Act
LRTP	Long Range Transportation Plan
MCSWD	Montgomery County Solid Waste District

Abbreviation	Definition
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MVLTROG	Miami Valley Long-term Recovery Operations Group
MVRPC	Miami Valley Regional Planning Commission
NOx	nitrogen oxides
NREL	National Renewable Energy Laboratory
PCAP	Priority Climate Action Plan
PPA	power purchase agreement
RAPCA	Regional Air Pollution Control Agency
RNG	renewable natural gas
SO_2	sulphur oxide
SOPEC	Sustainable Ohio Public Energy Council
TIP	Transportation Improvement Program
VOC	volatile organic compound
WRRF	water resource recovery facility
WWTP	wastewater treatment plant

Key Energy and Emissions Units

GHG Emissions

Conversions

1 $kTCO_2e$ = 1,000 $MTCO_2e$

1 $MMTCO_2e$ = 1,000 $kTCO_2e$ = 1,000,000 $MTCO_2e$

Abbreviations

$kTCO_2e$	metric kilotons of carbon dioxide equivalent
$MMTCO_2e$	million metric tons of carbon dioxide equivalent
$MTCO_2e$	metric tons of carbon dioxide equivalent

Energy

Conversions

1 MMBtu = 1.055 GJ

1 MJ = 0.0001 GJ

1 TJ = 1,000 GJ

1 PJ = 1,000,000 GJ

1 GJ = 278 kWh

1 MWh = 1,000 kWh

1 GWh = 1,000,000 kWh = 1,000 MWh

Abbreviations

GJ	gigajoule (1 billion joules)
GWh	gigawatt-hour
kWh	kilowatt-hour
MMBtu	million British thermal units
MJ	megajoule (1,000,000 joules)
MW	megawatt
MWh	megawatt-hour (1,000,000 watts sustained for one hour)
PJ	petajoule (1 million billion joules)
TJ	terajoule (1 trillion joules)

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1 | Introduction

The Miami Valley Region's **Community-First Energy Plan** is a bold strategy to reduce climate pollution while increasing resilience to extreme weather, improving public health and creating jobs. The plan details how the Miami Valley Regional Planning Commission (MVRPC) will work with our communities to tap into the region's vast solar, wind and geothermal energy resources to create new jobs, build a more resilient energy system, lower energy costs, and reduce air pollution. The MVRPC will work with local governments, philanthropic foundations, residents and businesses to cultivate investments in improving the comfort and energy efficiency of our homes, businesses and industries. We will foster a transportation system with greener vehicles and encourage community developments that make it more convenient, easier and safer for residents to walk, bike and take public transit.

The **Community-First Energy Plan** responds to and operationalizes the second pillar of the U.S. EPA's Powering the Great American Comeback[1] initiative in the Miami Valley Region. Investments at the regional scale in distributed energy generation will reduce reliance on overseas sources of energy and lower costs for hardworking families, farmers and small-business owners, while producing and developing the cleanest energy on the planet.

This plan places the Miami Valley Region at the forefront of the global transition to a clean energy economy. We must ensure our region does not get left behind as communities worldwide shift toward renewable energy and electric transportation. The **Community-First Energy Plan** sets up the region to build on our burgeoning green economy, including the anticipated arrival of the Joby Aviation Inc. electric air taxi manufacturing facility at the Dayton International Airport. It is a strategy for building a healthier and more livable community with a vibrant clean economy.

Our Preparation for the Transition

The Community-First Energy Plan is a huge undertaking — the actions within it are meant to transform our energy, building and transportation systems. We will live and work in more energy-efficient buildings, walk and bike more often, drive more electric vehicles (EVs) and significantly reduce waste. Shifting to clean energy technologies will involve a massive effort.

[1] U.S. Environmental Protection Agency (February 4, 2025). EPA Administrator Lee Zeldin Announces EPA's "Powering the Great American Comeback" Initiative. Accessed July 21, 2025. https://www.epa.gov/newsreleases/epa-administrator-lee-zeldin-announces-epas-powering-great-american-comeback

The Miami Valley Region is up to the task. We have a long history of choosing and succeeding at challenging endeavors. This is a region that:

- **Thinks big about building resilience:** After surviving the devastating 1913 flood, we built a watershed-scale flood-protection system that still protects our cities a century later.
- **Thinks long-term about environmental protection:** We essentially invented drinking water protection to ensure that our 1.5 trillion-gallon naturally recharging freshwater Buried Valley Aquifer provides safe and plentiful water for residents, industry and the natural world.
- **Thinks holistically about public infrastructure:** Our cities decided to separate our storm and sanitary sewers long ago — avoiding the huge costs other communities are paying now to separate combined sewers that lead to water pollution and health problems.
- **Thinks broadly about efficient transportation:** We spent the last 50 years building the nation's largest paved trail network, pioneering bike-on-bus services and continuing to operate electric trolleys.

This plan supports local leaders ready to follow in the footsteps of our forward-thinking leaders from the past century and lead the Miami Valley Region to achieve greater sustainability and resilience. We know Miami Valley communities are up to the challenge of making sure our region does not fall behind, or get left behind, in the clean energy transition.

What Brings Us Here

Every day, thousands of people across the Miami Valley Region drive to offices, school, shops or recreational activities. They switch on lights, heating or air conditioning. They work in factories, in hospitals, in schools, on farms, in office buildings, in stores or in their homes. They dispose of waste and send water down the drain — waste that ends up in landfills or wastewater treatment plants.

Most of these activities rely on fossil fuels such as gasoline, diesel, natural gas and coal. While fossil fuels have supported decades of development, they also release harmful air pollutants that contribute to respiratory illnesses like asthma, cancer and neurological disorders.

We have technologies that enable people to travel, live, work and play in the Miami Valley Region without creating pollution and at lower cost. And reducing or eliminating pollution will bring many additional benefits for those who call the region home — including those who live here now and the generations to come. This Community-First Energy Plan is a map to get those technologies in people's hands as soon as possible, advancing the clean energy transition.

Another impetus for this undertaking is the changing global climate. Among the pollutants from fossil fuel use are greenhouse gases (GHGs) — like carbon dioxide (CO_2), methane (CH_4) and nitrogen oxides (NOx) — that trap heat in the atmosphere and warm the planet.

The GHG effect is driving immediate and long-term shifts in climate, increasing extreme weather and natural disasters. Heat waves, extreme storms and flooding fueled by climate change are threatening our homes, health and the places we love in the Miami Valley Region and beyond. As the atmosphere continues to warm, the intensity of extreme weather events will continue to increase, causing more damage and disruption to our communities. The region is becoming hotter, wetter and wilder (Figure 1),[2] with consequences for people's health, income, safety, food availability, insurance costs and the availability and cost of energy.

Severe weather events across the U.S. are increasing heat-related illnesses and death, causing costly damage to buildings, bridges and other infrastructure, creating droughts that reduce crop yields and strain water systems, and sparking severe wildfires that threaten homes and air quality. In the 1980s, the country experienced, on average, one natural disaster every four months that caused $1 billion of damage (inflation-adjusted). Now, it faces a $1-billion natural disaster every three weeks, on average. Extreme events cost the U.S. close to $150 billion each year — a conservative estimate that does not account for loss of life, healthcare-related costs or damage to ecosystems.[3]

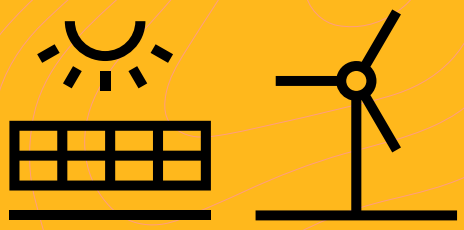
Furthermore, the negative impacts of extreme weather events and a changing climate are not spread evenly across our region, state, nation or world. The reality is that some in the Miami Valley Region are and will continue to be more vulnerable to climate pollution-related impacts. Those with poorly insulated or energy-inefficient homes will see more of their incomes go toward utility bills. Communities not fully protected from flooding will experience more severe and more frequent urban flooding events. These disparities in consequences are a third impetus for regional action to reduce climate pollution (Figure 1).

[2] First Street is a non-profit research organization that develops transparent, peer-reviewed climate risk models to assess threats like flood, fire, heat and air quality at the property level. Their work is grounded in open science and trusted by academia, government and industry to inform resilient decision-making.

[3] U.S. Global Change Research Program (2023). Fifth National Climate Assessment. https://nca2023.globalchange.gov/

Figure 1. Impacts of a changing climate in the Miami Valley Region.
Source: Based on First Street, 2022.[4]

[4] First Street (2022). Dayton, OH Extreme Heat Map and Heat Wave Forecast. https://firststreet.org/city/dayton-oh/3921000_fsid/heat?from=riskfactor.com



Clean energy technology will transform our communities and help prevent the worst effects of climate change.

The Impact of Unnatural Disasters on the Midwest

Selected excerpts from the Fifth National Assessment.[5]

- Crop production is projected to change in complex ways due to increasing extreme precipitation events and transitions between wet and dry conditions, as well as intensification of crop water loss. Changes in precipitation extremes, timing of snowmelt, and early-spring rainfall are expected to pose greater challenges for crop and animal agriculture, including increased pest and disease transmission, muddier pastures and further degradation of water quality.

- Projected increases in droughts, floods and runoff events across the Mississippi River basin and the Great Lakes will adversely impact ecosystems through increased erosion, harmful algal blooms and expansion of invasive species.

- Evidence suggests that pest distributions have shifted northward since the early 20th century, and projections indicate that increasing temperatures will allow pests (e.g., brown marmorated stink bug, corn earworm, Japanese beetle, Mexican bean beetle, potato leafhopper) to continue expanding northward across the Midwest. Warming winters lead to insect population expansion throughout the Great Lakes, while hotter, drier conditions exacerbate yield loss from weed competition.

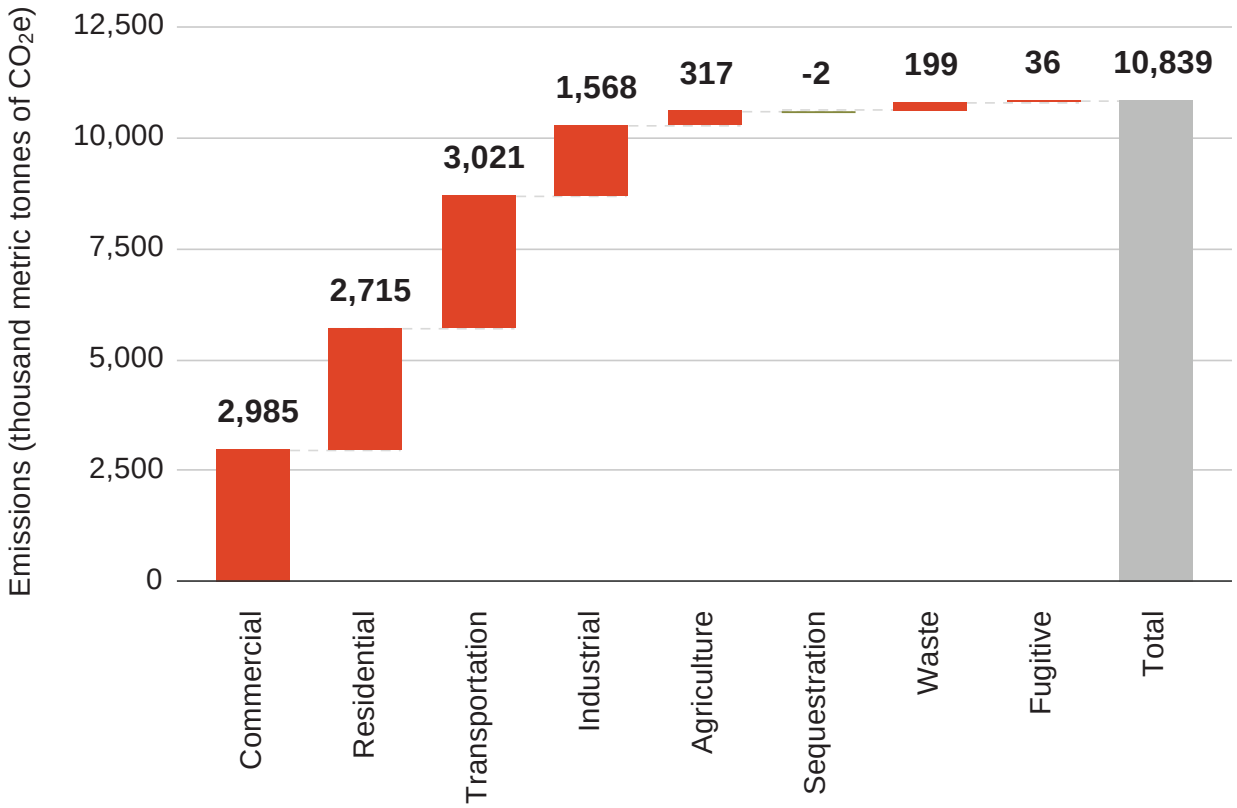
[5] U.S. Global Change Research Program (2023). Fifth National Climate Assessment. https://nca2023.globalchange.gov/chapter/24/

2 | The Challenge

The Starting Point

GHG emissions in the region totaled 10.8 million metric tons of carbon dioxide equivalent ($MMtCO_2e$) in 2021 (Figure 2). With a population of 800,000, this means that per capita emissions in 2021 were 13.5 $MtCO_2e$/person, which is below the national per capita emissions in 2021[6] (14.8 $MtCO_{2e}$/person). Figure 3 illustrates the breakdown by sector.

Figure 2. GHG emissions by sector within the Miami Valley Region, 2021.
Source: SSG analysis.

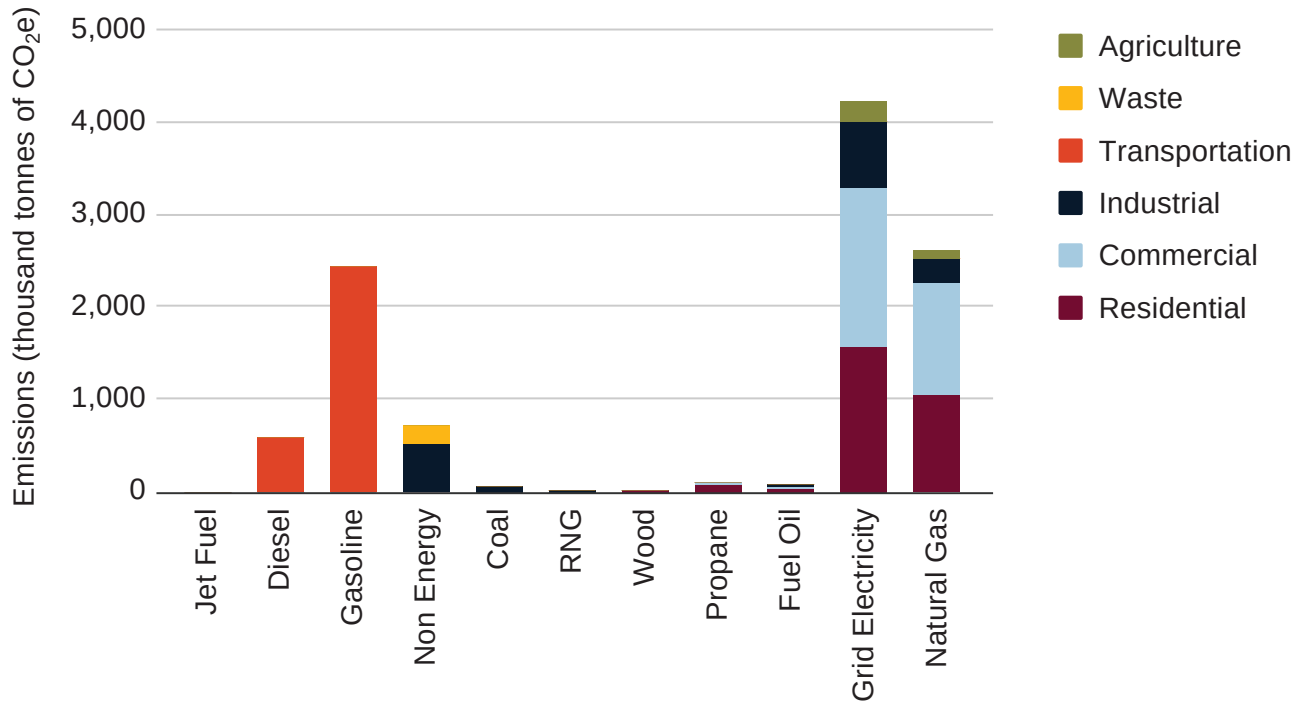


[6] "Data Page: Per capita CO_2 emissions", part of the following publication: Hannah Ritchie, Pablo Rosado, and Max Roser (2023) - "CO_2 and Greenhouse Gas Emissions". Data adapted from Global Carbon Project, Various sources. Retrieved from https://ourworldindata.org/grapher/co-emissions-per-capita [online resource]

The primary sources of GHG emissions in the area are the transportation, commercial and residential sectors. More specifically:

- Emissions from the transportation sector are primarily generated from gasoline and diesel. In 2021, they accounted for 28% of the region's total GHG emissions.
- Emissions from the residential and commercial sectors come from the energy used to heat and cool buildings, as well as to operate appliances and machinery within buildings. This energy is primarily electricity and natural gas, and the emissions come from the generation of grid electricity and from the combustion of natural gas. In 2021, the commercial sector accounted for 28% of the region's total GHG emissions, while the residential sector accounted for 25%.

Figure 3. GHG emissions by fuel type and sector within the Miami Valley Region, 2021. Source: SSG analysis.



Science and international agreements tell us what is required to protect future generations. In 2016, 196 countries signed the Paris Agreement, a global agreement to limit warming to "well below" and 2°C (3.6°F) and ideally 1.5°C (2.7°F), a critical threshold for keeping future generations safe. Under this agreement, each country prepares a plan to reduce its share of GHG emissions; the U.S. has committed to reduce GHG emissions by 61%-66% below 2005 levels by 2035, and to achieve net zero by 2050.

How Dangerous Is 2°C (3.6°F) of Warming?

Extremely. Two degrees of warming is a threat to future generations. As Yale Climate Connections writes:

"Picture yourself:

- In Phoenix, Arizona, where you have to endure roughly nine additional days of over 110 degrees Fahrenheit per year than people there used to.
- In Montecito, California, where if you're not shopping for new air filters due to expected wildfire smoke, you're practicing your evacuation plan in preparation for the mudslides that are becoming more common on fire-scarred hillsides.
- In a Gulf Coast community, where hurricanes are getting more frequent and more severe — like Hurricane Ian, which was 10% wetter than it would have been if not for climate change."[7]

That's just over 1°C of warming. Every fraction makes these impacts much worse and increases them. And there is a risk of catastrophic and irreversible tipping points,[8] such as:

- The breakup of the Greenland ice sheet causing sea level rise of approximately 20 feet
- The shutdown of the Atlantic circulation current causing increased cold temperatures in Europe
- The dieback of the Amazon forest
- The die-off of coral reefs

[7] Daisy Simmons., "Myth-buster: Why two degrees of global warming is worse than it sounds.", Yale Climate Connections (February 13, 2023)., Accessed July 21, 2025. https://yaleclimateconnections.org/2023/02/myth-why-two-degrees-of-global-warming-is-worse-than-it-sounds/

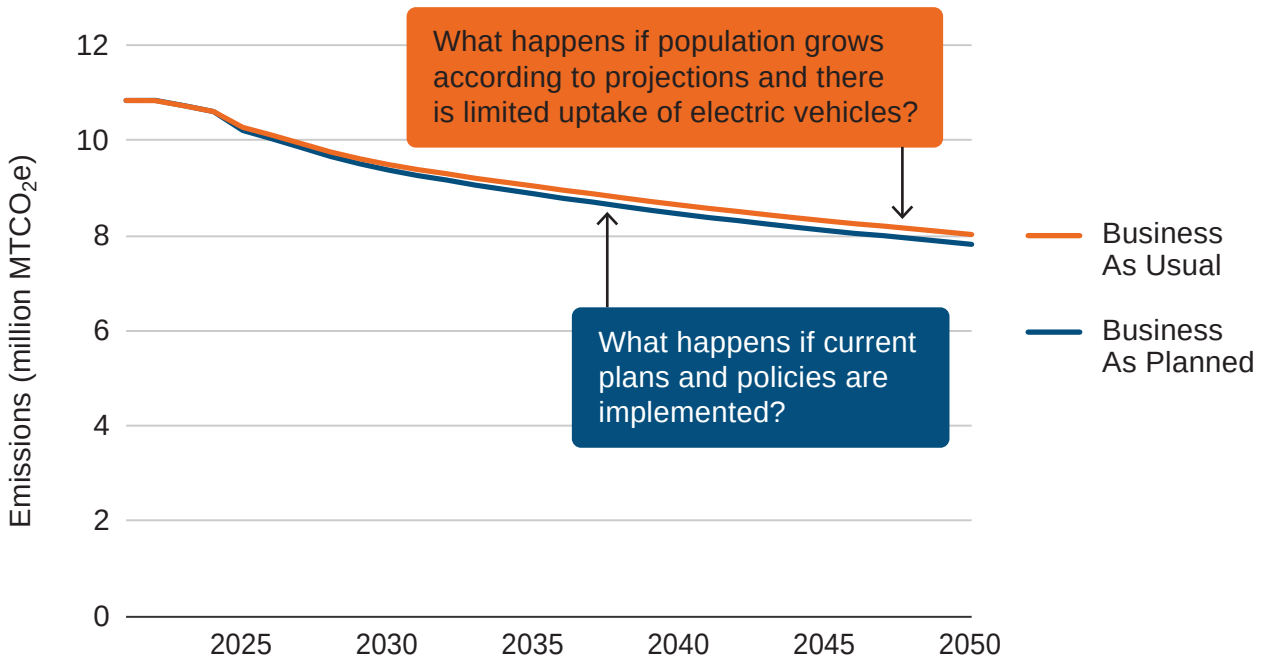
[8] David I. Armstrong McKay et al. "Exceeding 1.5°C global warming could trigger multiple climate tipping points." Science, Volume 377 (2022). https://www.science.org/doi/10.1126/science.abn7950

The Current Trajectory

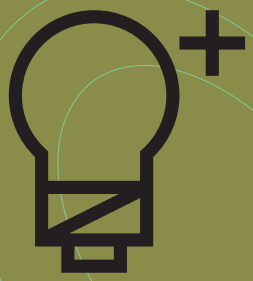
Using a computer model, this plan explored future scenarios, including reference scenarios — the focus of this section — and the Communty-First Scenario. The reference scenarios evaluated a range of possibilities, asking what would happen to energy, GHG emissions and costs year-over-year out until 2050, in order to understand the Miami Valley Region's "playing field."

The first scenario, called Business-as-Usual (BAU), projects a small population decline by 2050 and keeps existing technologies and activities constant, with a small increase in the share of EVs. In this scenario, annual GHG emissions decline to around 8 million $MTCO_2e$ by 2050. A second scenario, Business-as-Planned (BAP), asks what happens if current policies and plans are implemented. The small change indicates that current plans and policies have a relatively small impact (Figure 4).

Figure 4. Projected total community GHG emissions in the BAU and BAP Scenarios, 2021-2050. Source: SSG analysis.



The BAU and BAP modeling results demonstrate that existing policies, regulations, market trends and efficiency improvements are not enough to achieve deep emissions reduction ambitions in the Miami Valley Region.



We have solutions.

3 | The Opportunity

We now have technologies that enable people to travel, live, work and play in the Miami Valley Region without creating pollution and at lower cost. And reducing or eliminating pollution will bring countless benefits for those who call the region home — including those who live here now and the generations to come. The Community-First Energy Plan is a map to get those technologies in people's hands as soon as possible, advancing the clean energy transition.

An Energy Transition Is Underway

The Transformation of the Energy System

"The energy world is in the early phase of a new industrial age — the age of clean energy technology manufacturing. Industries that were in their infancy in the early 2000s, such as solar photovoltaic and wind, and the 2010s, such as EVs and batteries, have mushroomed into vast manufacturing operations today. The scale and significance of these and other key clean energy industries are set for further rapid growth. Countries around the world are stepping up efforts to expand clean energy technology manufacturing with the overlapping aims of advancing net zero transitions, strengthening energy security and competing in the new global energy economy. The current global energy crisis is a pivotal moment for clean energy transitions worldwide, driving a wave of investment that is set to flow into a range of industries over the coming years. In this context, developing secure, resilient and sustainable supply chains for clean energy is vital."[9]

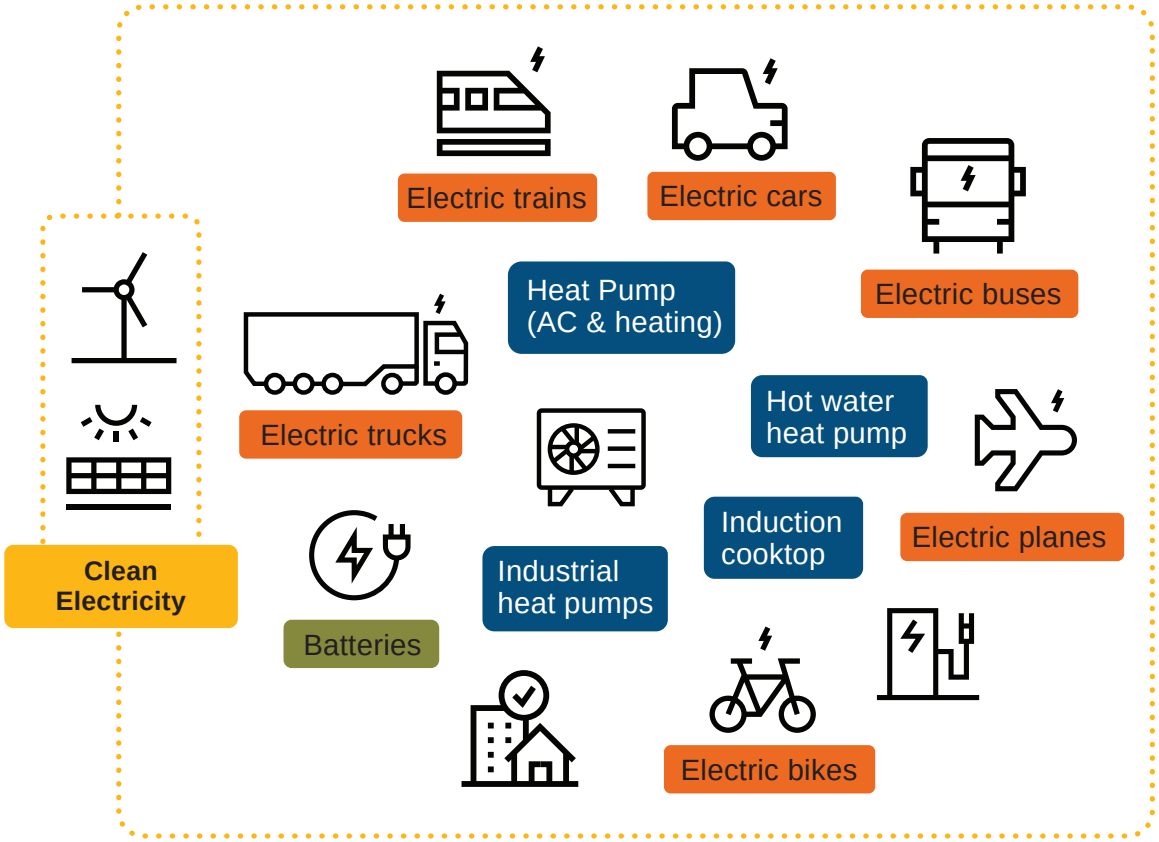
In the past, reducing climate pollution was motivated by the need to save the planet, a moral imperative to future generations. The moral imperative remains, but instead of requiring sacrifice, reducing climate pollution is now about opportunity — opportunity in terms of dollars and cents, but also the broader opportunity to improve the well-being of the people. For example:

- Electric cars **are quieter, faster and cheaper to operate**. They are closer and closer to being the same cost of gasoline cars. In some places, they can store and sell electricity back to the grid, becoming a revenue source.
- Heat pumps **use less energy** than other heating technologies and can **also provide cooling** in the summer with a single device.
- Solar panels **use a free source of energy** — the sun — to make electricity and can be installed on a single home or a large solar farm.

[9] International Energy Agency (January 2023). Energy Technology Perspectives 2023," p. 4, https://www.iea.org/reports/energy-technology-perspectives-2023

These technologies are being adopted rapidly as a result of the economic benefit and government policies around the world.[10,11,12] All of them are possible to power with a clean electricity system (Figure 5).

Figure 5. Clean electricity powers the energy system. Source: SSG elaboration.



Globally, EV sales are growing at 25% annually and just reached 17 million in sales.[13]

Although market growth of heat pumps has been slower than EV growth in the U.S., 2022 marked the first year in which sales of heat pumps exceeded those of gas

[10] International Renewable Energy Agency (March 21, 2023) Record Growth in Renewables Achieved Despite Energy Crisis. https://www.irena.org/News/pressreleases/2023/Mar/Record-9-point-6-Percentage-Growth-in-Renewables-Achieved-Despite-Energy-Crisis

[11] Tom Randall. "US Crosses the Electric-Car Tipping Point for Mass Adoption." Bloomberg (July 9, 2022). https://www.bloomberg.com/news/articles/2022-07-09/us-electric-car-sales-reach-key-milestone

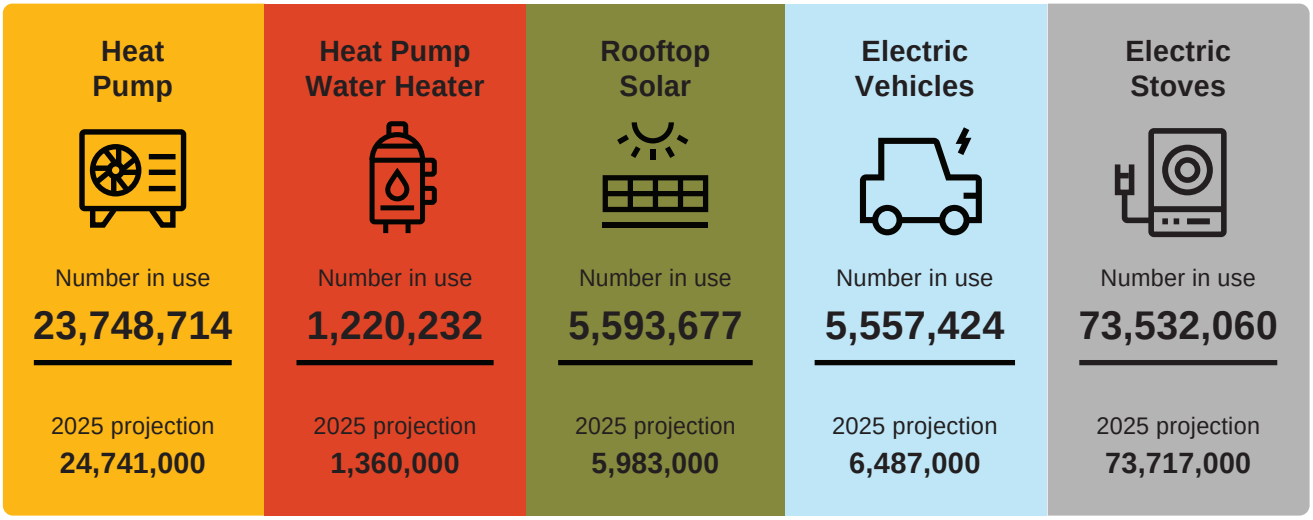
[12] Yannick Monschauer, Chiara Delmastro, Rafael Martinez-Gordon. "Global Heat Pump Sales Continue Double-Digit Growth." International Energy Agency (March 31, 2023). https://www.iea.org/commentaries/global-heat-pump-sales-continue-double-digit-growth

[13] International Energy Agency (2024). Global EV Outlook. Executive Summary. https://www.iea.org/reports/global-ev-outlook-2024/executive-summary

furnaces. Electrification continues to grow (Figure 6) for both space and water heating, with the latter reaching 55% of total water heaters in the U.S. being electric by 2024.[14]

In 2024, global clean electricity surpassed 40% of electricity generation, driven by record growth in renewables, especially solar.[15] In the past few years, solar installations have increased exponentially due to enabling government policies and the falling cost of the technology[16] — to the point where more than a gigawatt of solar is being installed globally every day.

Figure 6. Adoption of key low-carbon technologies is growing across the U.S. Source: Rewiring America.[18]



A notable offshoot of the trend toward wind and solar generation is the regionalization of global energy markets. This regionalization, and even localization, provides enhanced energy security as communities no longer rely solely on long supply lines for fuel or equipment that can be imperiled by geopolitical events and natural disasters across the globe. Localization of energy supply, typically in the form of electricity, has become so pervasive as to merit its own terminology: distributed energy resources (DERs).

[14] RMI (June 2025). Tracking the Heat Pump & Water Heater Market in the United States. https://rmi.org/insight/tracking-the-heat-pump-water-heater-market-in-the-united-states/

[15] Euan Graham, Nicolas Fulghum, Katye Altieri. "Global Electricity Review 2025." EMBER (April 8, 2025). https://ember-energy.org/latest-insights/global-electricity-review-2025/

[16] Lazard (2024). Levelized Cost of Energy." https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf

[18] Rewiring America, (2025). Electric Machine Counter. https://www.rewiringamerica.org/research/electric-machine-counter

Yellow Springs: A Clean Energy Community[19]

The Village of Yellow Springs is powered almost entirely by renewable energy. Its most recent project is a solar array of 3,024 solar panels on six-and-a-half acres of village-owned land. This complements five hydroelectric facilities on the Ohio River, procured energy from renewable natural gas produced by the Erie County landfill in Milan, Ohio, and the Brown County landfill, 69 miles south of Yellow Springs. The Village purchases renewable energy certificates from the Locust Ridge Wind Project in northwest Pennsylvania and two federal hydroelectric projects along the Niagara and St. Lawrence Rivers. Electricity is also provided by a solar array on the Village-owned Glass Farm.

Rich Energy Reserves Still Largely Untapped

The Miami Valley Region has vast local energy reserves it can tap into in the form of solar, wind and geothermal power that will contribute to lowering national reliance on foreign energy sources. An estimate for rooftop solar alone indicates the total solar reserve of Montgomery, Greene and Miami counties is 11.1 million MWh on rooftops[20] — this is more than the total electricity consumed in the region in 2021 (9 million MWh) and 70% of the total energy required in 2050, when the energy system is much more efficient. Figure 7 illustrates an assessment of the proven solar resource on rooftops in downtown Dayton.

Proven Solar Reserves[21]

Proven solar reserves are those quantities of solar energy, which, based on analysis of atmospheric and land cover data, can be estimated with reasonable certainty to be economically producible. This estimate is made from a given date forward; from known access to direct sunlight; and taking into account existing economic conditions, operating methods and government regulations.

The City of Dayton is planning to use these solar reserves to expand distributed local generation across the city through the development of the Solar for All program. The program will support 1,000 income-eligible households in installing solar panels and reducing their energy bills.

[19] Reilly Dixon. “Village Council reviews the local power portfolio. The Yellow Springs News (October 24, 2023). https://ysnews.com/news/2023/10/village-council-reviews-the-local-power-portfolio

[20] Project Sunroof calculates the technical potential using roof size and shape, shaded roof areas, and local weather. The estimated technical potential assumes economics and grid integration are not constraints. For more details see: https://insights.sustainability.google/methodology?hl=en-US

[21] Adapted based on the definition of proven oil and gas reserves. Credit: Brian Ross, Great Plains Institute.

Figure 7. Rooftop solar potential in Dayton, where darker colors indicate greater levels of shading. Source: Sunroof Project.[23]

Additional renewable energy sources available locally include ground-mounted solar, wind and geothermal. Geothermal can include deep geothermal, which extracts heat from far below the Earth's surface to power a turbine, as well as harvesting heat from the Great Miami Buried Valley Aquifer.

[23] Sunroof Project (2018). Estimated rooftop solar potential of Ohio. https://sunroof.withgoogle.com/data-explorer/place/ChIJwY5NtXrpNogRFtmfnDlkzeU/

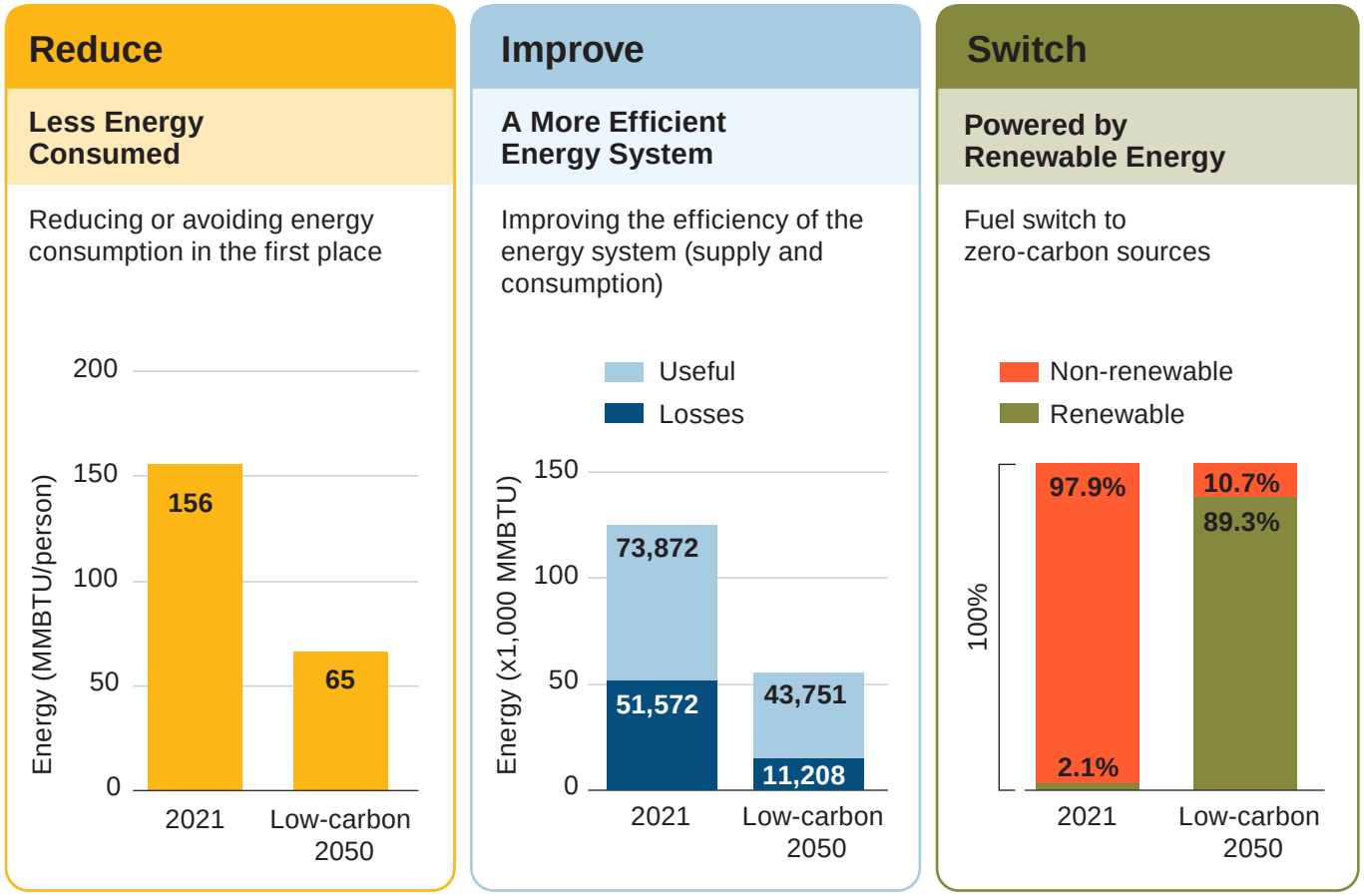
We have a clear path forward.

4 | The Pathway

A low-carbon pathway for the Miami Valley Region was identified through the analysis of different scenarios, described in detail in the technical companion report. The scenarios illustrate viable routes to decarbonization, with the Community-First Scenario emerging as the preferred pathway for the region. This scenario aligns closely with community values, reflecting the priorities expressed during public engagement, such as improved indoor air quality, lower energy bills, and a cleaner environment.

The Community-First Scenario defines a future energy system that is powered by renewable energy and much more efficient than the current energy system, as illustrated in Figure 8. The set of actions in the Scenario will start by reducing the amount of energy consumed by the community, followed by improving the efficiency of the energy system with the adoption of more efficient technologies resulting in reduced wasted energy, to finally switch away from fossil fuels to renewable energy.

Figure 8. Indicators of the Community-First Pathway. Source: SSG analysis.



The pathway in this scenario starts in the Miami Valley Region's current context and leverages existing and available technologies to transform the energy system and the built environment over a 25-year period.

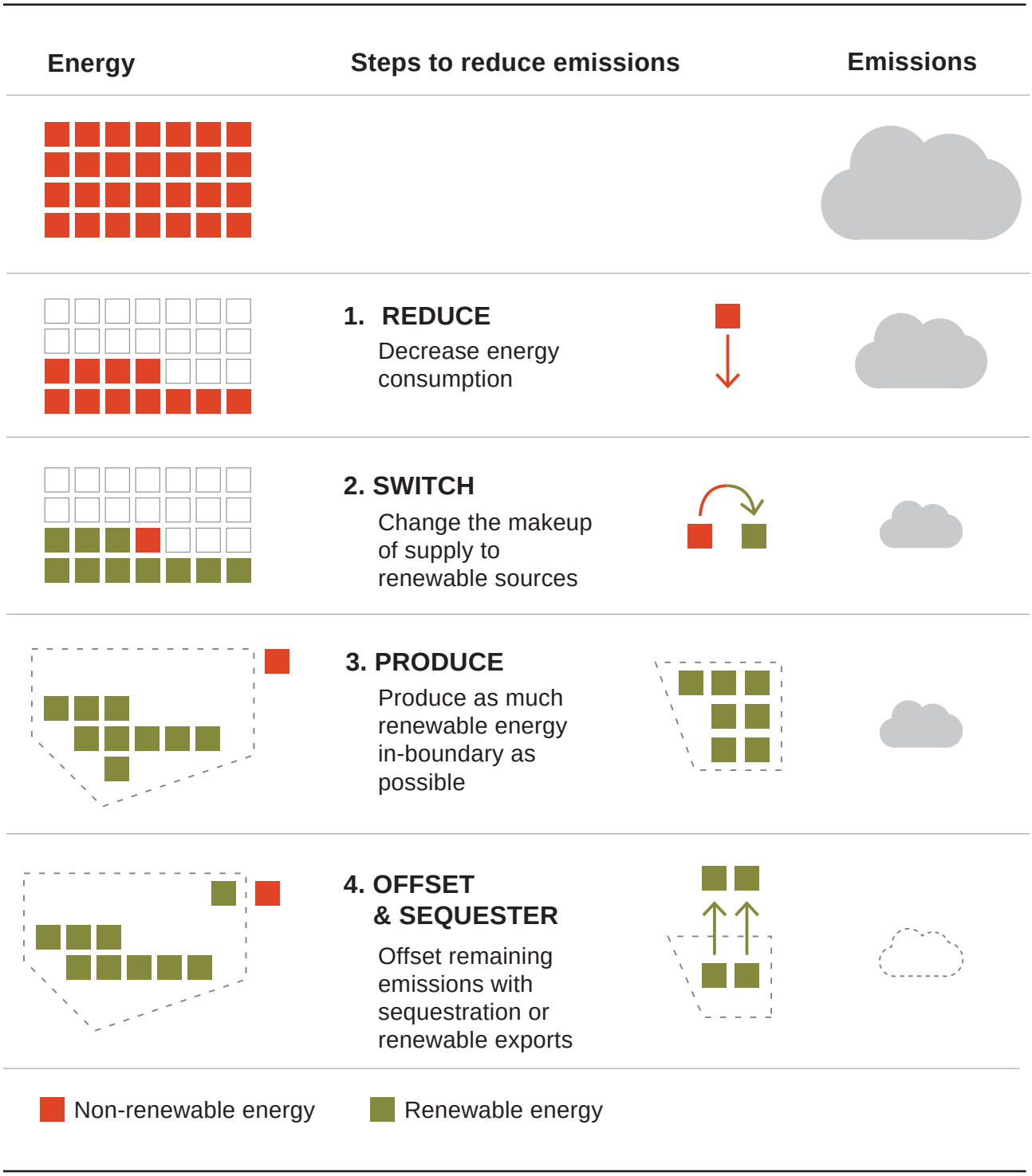
The **"Reduce, Switch, Produce, and Offset and Sequester" approach** is a simple mantra to follow in energy and emissions planning, and guided the development of measures for the region's CCAP (Figure 9).

The first step is to prioritize reductions in energy consumption. This will reduce the level of needed investment in renewable energy (energy from naturally replenishing sources such as solar or wind) and result in energy cost savings. Maximizing energy consumption reductions and energy efficiency opportunities reduces total energy costs and per unit energy costs by reducing the overall build-out of the electricity system, which is logistically complex and capital intensive.

The second and third steps are to switch to locally produced renewable electricity, which will maximize local economic benefits and the resilience of the electricity system. The final step is to offset (compensate for emissions by reducing or removing an equivalent amount elsewhere) and sequester (capture and store carbon to prevent it from entering the atmosphere) any remaining emissions to reach net zero.

Other key considerations are to identify actions and investments that will improve durability and avoid lock-in patterns of behavior and capital. From this perspective, the first priorities are land-use and infrastructure planning including development density or intensity, mix of land uses, energy supply infrastructure, and transportation infrastructure. The second priorities are major manufacturing or production processes including industrial processes, choice of transportation modes, and building and site design. The final priority is energy-using equipment including transit vehicles, motors, appliances and HVAC systems.

Figure 9. A systematic approach to reducing GHG emissions. Source: SSG elaboration.



The Measures

The Miami Valley Region will need to take steps — or "Big Moves" (Figure 10) — in the building, transportation, energy, industry and waste sectors — and across sectors — to reduce emissions. Advancing these "Big Moves" will require a clear implementation roadmap for the region (Table 1).

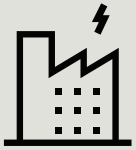
Figure 10. Big Moves. Source: SSG analysis.

Table 1. Measures in the Community-First Pathway. Source: SSG elaboration.

Measure	Description	Impact	Implementation Action
Big Move #1 **Affordable and Sustainable Buildings**			
1. Build more energy-efficient new buildings	New residential and commercial buildings are constructed to reduce their energy use intensity (EUI) by 30% in 2030 and 50% by 2040, below 2021 levels.	Avoided/ reduced energy use	1.1 Green Development Standard
2. Retrofit existing buildings	All existing residential, commercial and industrial buildings are retrofitted to achieve 50% reduction of building energy use intensity (EUI) per unit of floor area by 2035 and 60% by 2050.	Avoided/ reduced energy use	2.1 Retrofit Programs 2.2 Benchmarking Program 2.3 Building Performance Standard
3. Switch new and existing buildings to heat pumps and renewable natural gas (RNG) use for commercial and residential buildings	All new buildings are equipped with heat pumps by 2035, and 50% of existing buildings by 2045. Replace natural gas with RNG in remaining buildings.	Avoided/ reduced energy use, fuel switching	3.1 Air Conditioner Replacement Program
4. Electrify water heaters and stoves	All new sales of water heaters are electric by 2035 and stoves by 2035.	Avoided/ reduced energy use, fuel switching	4.1 Home Electrification Program

Measure	Description	Impact	Implementation Action
Big Move #2: Clean Transportation for All			
5. Electrify transportation	50% of light-duty and 30% heavy-duty vehicle sales are electric by 2030, 100% of the transit fleet by 2035, and 100% of carbon-free aviation by 2040. Advances in expanding charging infrastructure are made.	Fuel switching	5.1 Clean Fleets 5.2 Clean Cars for All 5.3 Charging Infrastructure 5.4 Clean Freight Strategy
6. Increase transit and active mode shares	By 2040, at least 20% of trips are made by modes other than driving by car (drive alone).	Avoided/ reduced energy use	6.1 Regional Planning Initiative 6.2 Safe Streets for All 6.3 Mobility Hubs 6.4 Healthy Transportation Funding Program 6.5 Micromobility

Measure	Description	Impact	Implementation Action
Big Move #3: Clean Energy			
7. Build a zero-emissions grid	Grid provider retires fossil-fuel power generation plants and replaces them with zero-emissions power.	Fuel switching	7.1 Clean Electricity Aggregation Programs
8. Expand solar generation and other renewable energy	Solar rooftop photovoltaic (PV) installations for residential and commercial buildings increase.	Fuel switching	8.1 SolSmart Program
9. Implement adistrict energy system	A district energy for space heating, water heating and space cooling is implemented in the City of Dayton, with a capacity of 0.77 MW.	Fuel switching	9.1 District Energy in Dayton 9.2 Waste Energy Strategy
10. Adopt renewable energy procurements for industrial processes	Industries adopt energy procurements to provide 100% clean electricity.	Fuel switching	10.1 Renewable Energy Champions

Measure	Description	Impact	Implementation Action	
 **Big Move #4:** **Re-energized Clean Industrial Sectors**				
11. Improve energy efficiency of industrial processes	By 2031, industrial sites reduce their energy intensity by 30% relative to the 2021 baseline.	Avoided/ reduced energy use	11.1	Industrial Energy Innovation Partnership
12. Electrify industrial processes	By 2050, 50% of energy use for industrial processes is electricity.	Fuel switching	12.1	
13. Switch to RNG in wastewater treatment plants	Wastewater treatment plants capture 90% of methane to use as RNG.	Fuel switching	13.1	Renewable Natural Gas

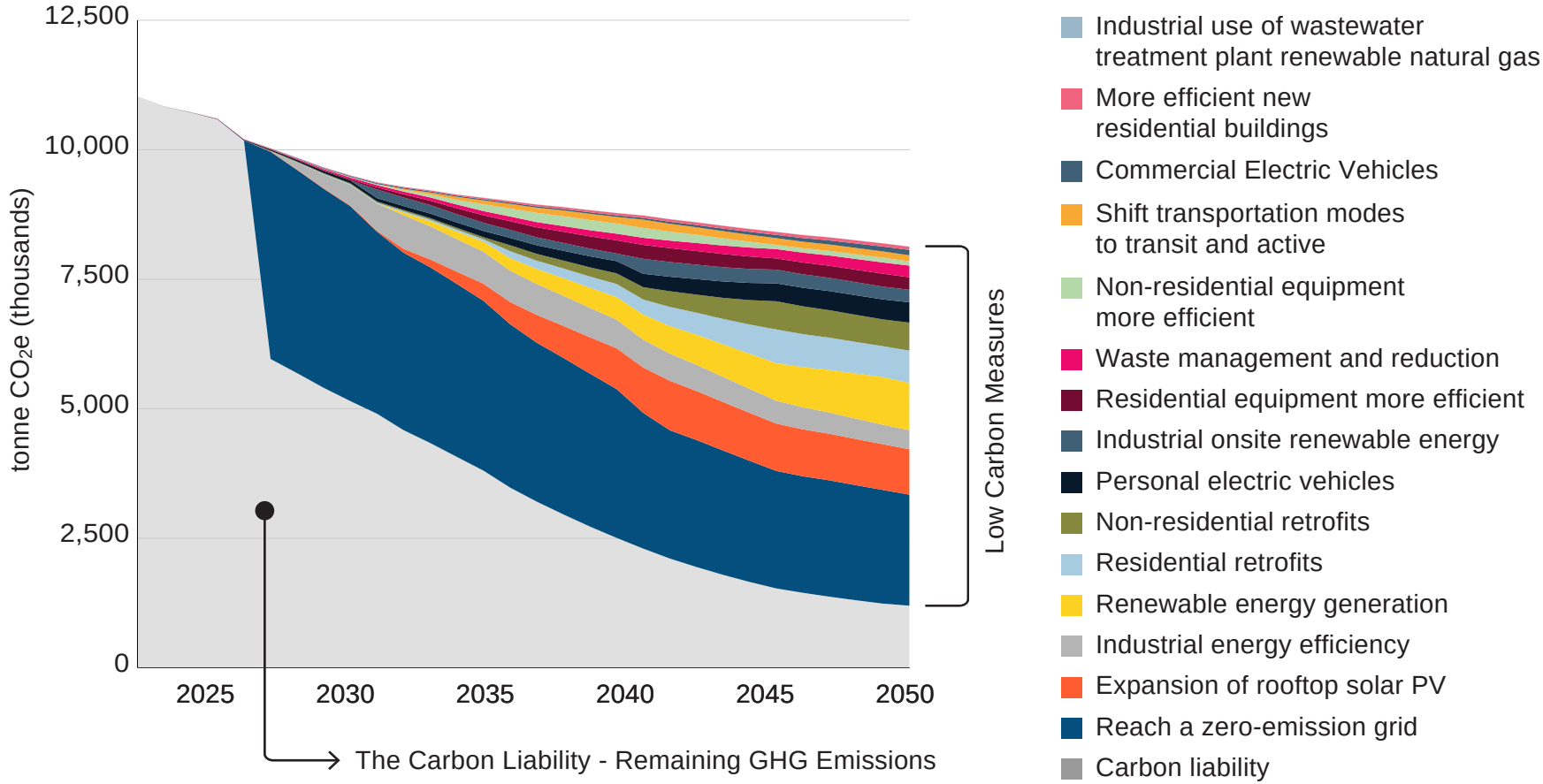
Measure	Description	Impact	Implementation Action
 **Big Move #5:** **Circular Economy**			
14. Residents reduce waste generation per capita	By 2050, waste generation per capita is reduced by 30% relative to the 2021 baseline.	Avoided/ reduced energy use	14.1 Zero Waste Campaign
15. Divert landfill waste	By 2050, 90% of waste is diverted from landfills and sent to recycling and community composting facilities.	Avoided/ reduced energy use	15.1 Circular Economy Strategy

Measure	Description	Impact	Implementation Action
Big Move #6: Leadership and Democracy			
16. Leadership and Democracy	Governance, funding and reporting structures to support regional and local climate action are established.	N/A	16.1 Green Bank 16.2 Coordinating Philanthropy 16.3 Municipal Leadership Program 16.4 Community Energy Planning 16.5 Citizens Climate Assembly 16.6 Miami Region Climate Action Commission (MRCAC) 16.7 Challenge Teams 16.8 Annual Report

Figure 11 illustrates the impact of each of the low-carbon measures on GHG emissions. While specific measures have a more significant impact, it's important to note that they are interdependent. For example, the emissions reductions from EVs are intertwined with the development of clean electricity.

GHG emissions decline 94% from 10.8 $MMTCO_2e$ in 2021 to 0.4 $MMTCO_2e$ in 2050. The modeling results indicate that the Community-First Pathway is technically and economically possible.

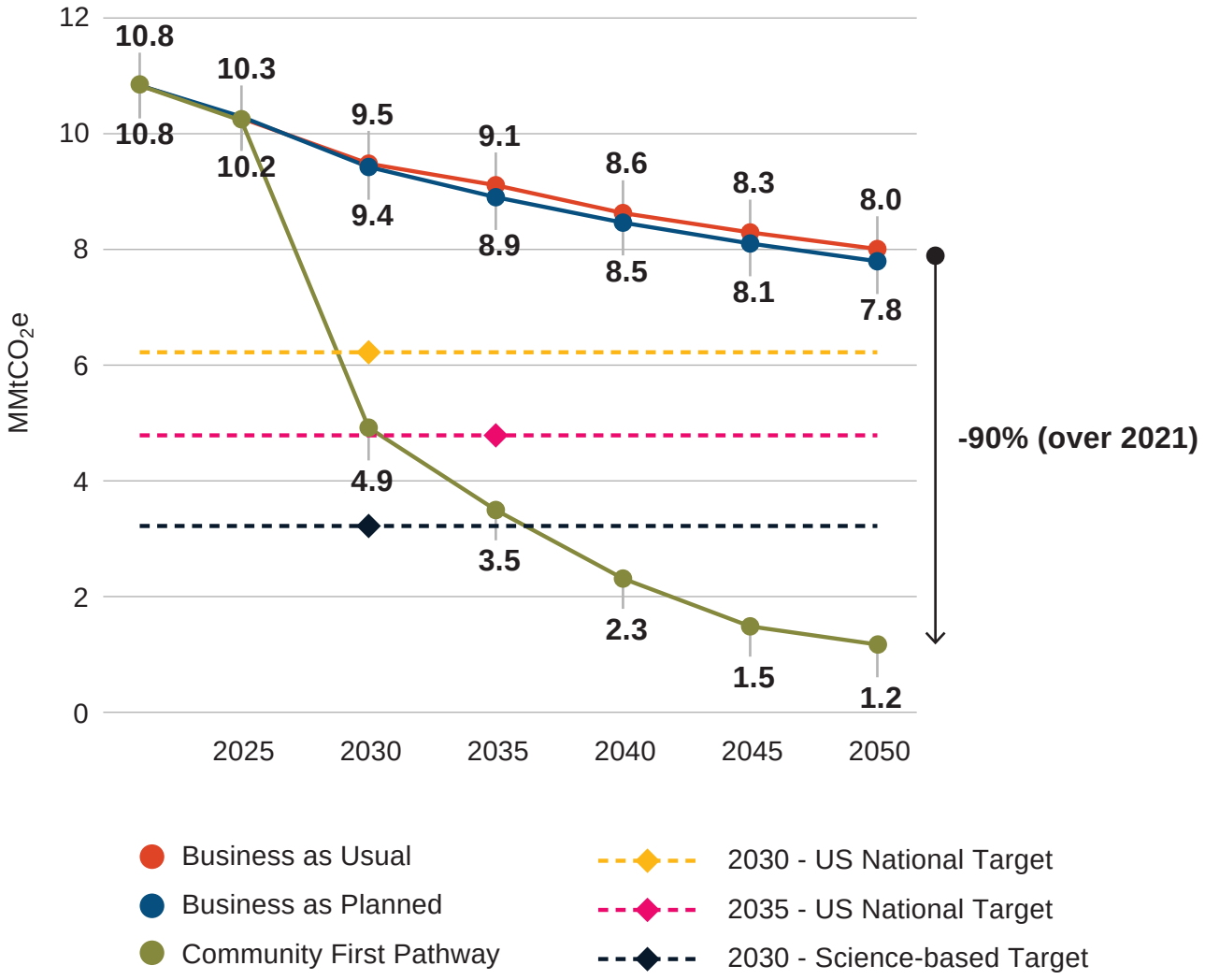
Figure 11. Projected emissions reductions by action for the Community-First Scenario, 2021-2050. Source: SSG analysis.



Targets

In the Community-First Pathway, the Miami Valley Region is projected to reduce economy-wide GHG emissions by about 55% by 2030, 78% by 2040, and 89% by 2050. These targets align with the U.S. federal target for 2030, but not for 2050, which is net-zero emissions (Figure 12 and Table 2).

Figure 12. Illustration of GHG pathways relative to national and science-based targets. Source: SSG analysis.



The federal target falls short of science-based targets that aim to limit global warming to 1.5°C; this would require a -70% reduction by 2030 and net-zero emissions by 2045. As a result, the Miami Valley Region should continue to seek additional opportunities to exceed its GHG targets beyond the Community-First Pathway.

Table 2. GHG reductions for scenarios. Source: SSG analysis.

	Baseline 2021	2025	2030	2035	2040	2045	2050	Cumulative (2025-2050)
Business as Usual								
Total (thousand $MTCO_2e$)	10,839	10,274	9,491	9,120	8,641	8,307	8,021	232,074
Change over 2021		-5%	-12%	-16%	-20%	-23%	-26%	
Community-First								
Total (thousand $MTCO_2e$)	10,839	10,179	4,907	3,482	2,304	1,536	1,203	86,950
Change over 2021		-6%	-55%	-68%	-79%	-86%	-89%	
Per capita ($MTCO_2e$/capita)	13.5	12.7	6.1	4.3	2.9	1.9	1.5	
% change over 2021		-6%	-55%	-68%	-79%	-86%	-89%	
% reduction for US National Targets			-42%	-56%			net zero	
% reduction for Science-Based Targets			-70%			net zero		

The carbon budget in the Community-First Pathway for the Miami Valley Region is 87 $MMTCO_2e$ (Figure 13). Table 3 shows the cumulative GHG emissions from each scenario.

Figure 13. Illustration of a carbon budget. Source: SSG analysis.

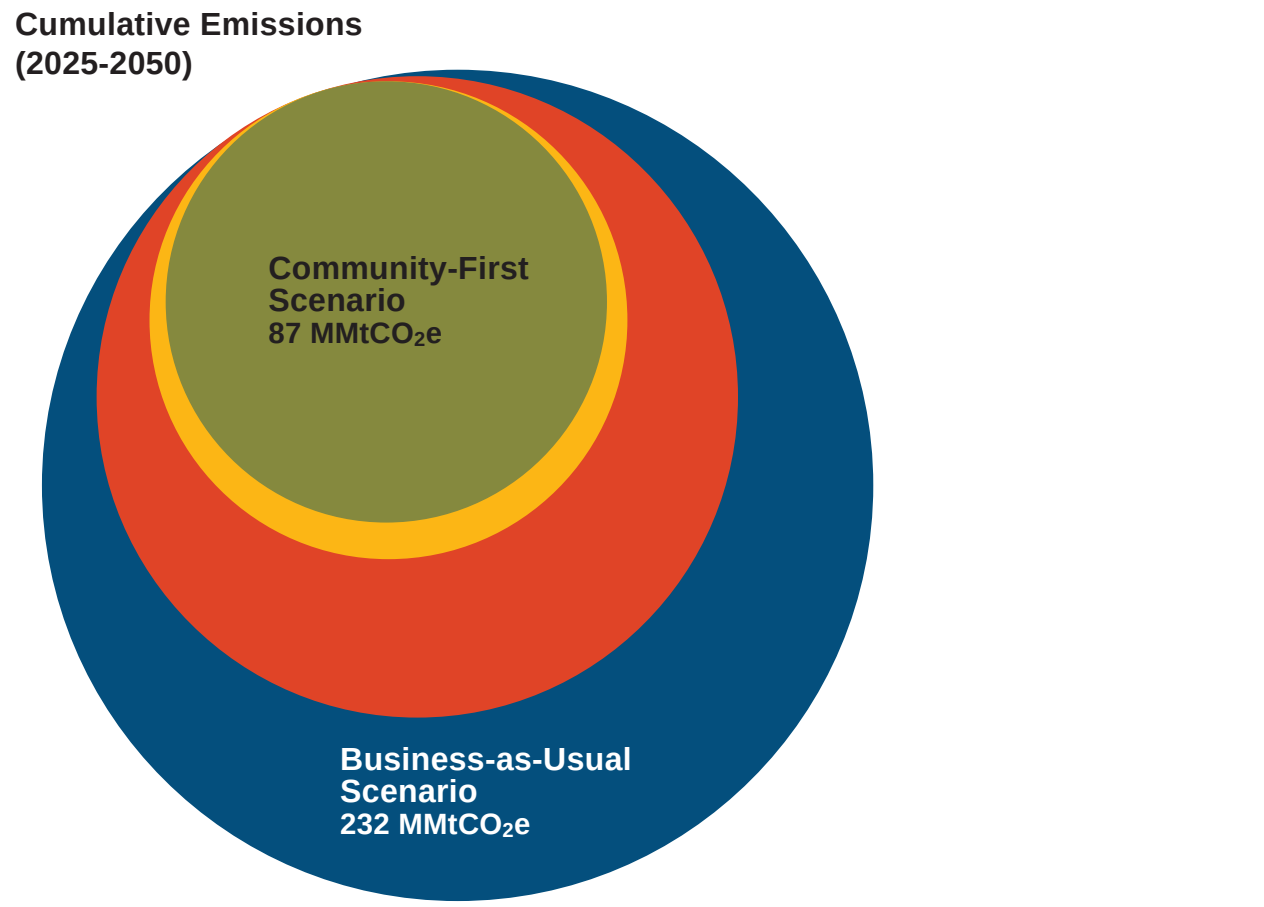


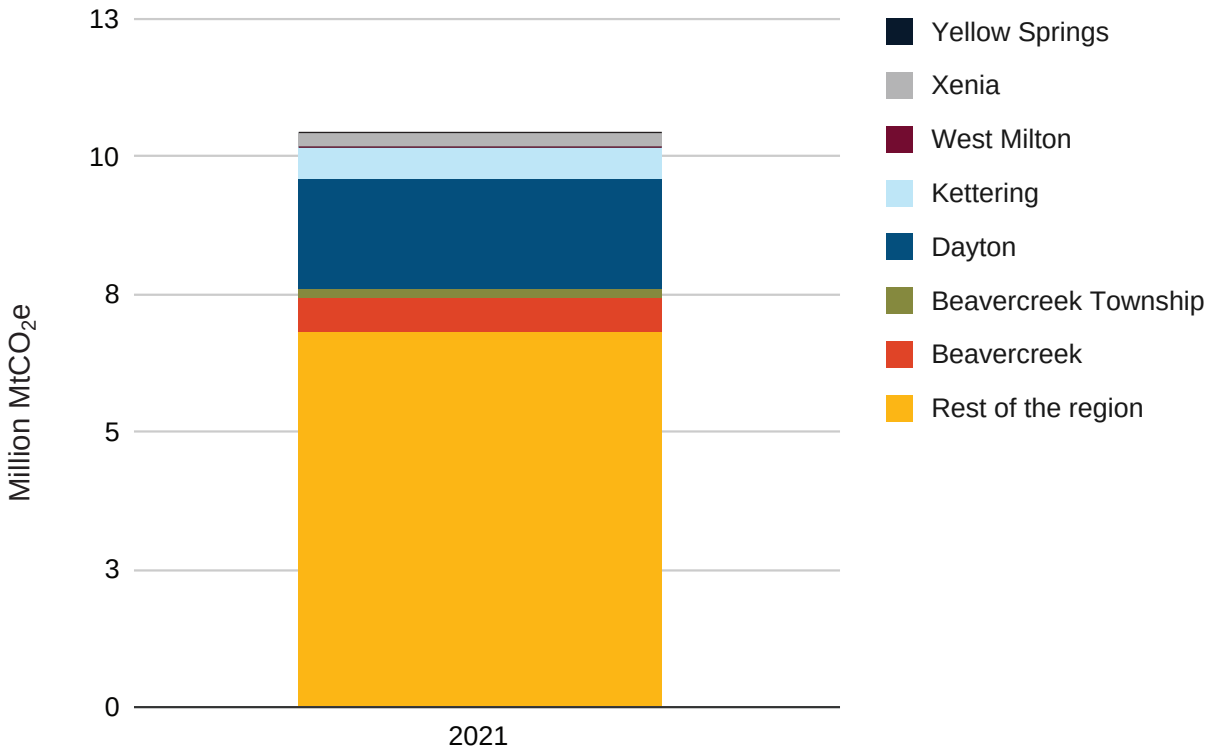
Table 3. Carbon budget relative to cumulative emissions from BAU scenario and Community-First Pathway. Source: SSG analysis.

Scenario	Million $MTCO_2e$	% reduction relative to BAU
Business as Usual	232	
Community-First Pathway	87	63%

Local Pathways

Seven municipalities in the Miami Valley Region developed local Low-Carbon Pathways; these pathways are specific to their context and included as part of the region-wide Low-Carbon Pathway. The participating jurisdictions included Beavercreek, Beavercreek Township, Dayton, Kettering, West Milton, Xenia and Yellow Springs. Collectively, these municipalities account for 34% of the region's GHG emissions (Figure 14).

Figure 14. GHG emissions of municipalities with local pathways as a share of the regional GHG emissions. Source: SSG analysis.



Each jurisdiction developed a custom suite of measures that reflected the local conditions in their community. These measures were modelled to develop a custom pathway, which a municipality can base their own climate action plan on (Figure 15). Collectively, these municipalities reduce 2 $MMTCO_2e$ of emissions in 2050.

Figure 15. Local Pathways. Source: SSG analysis (continued on next page).

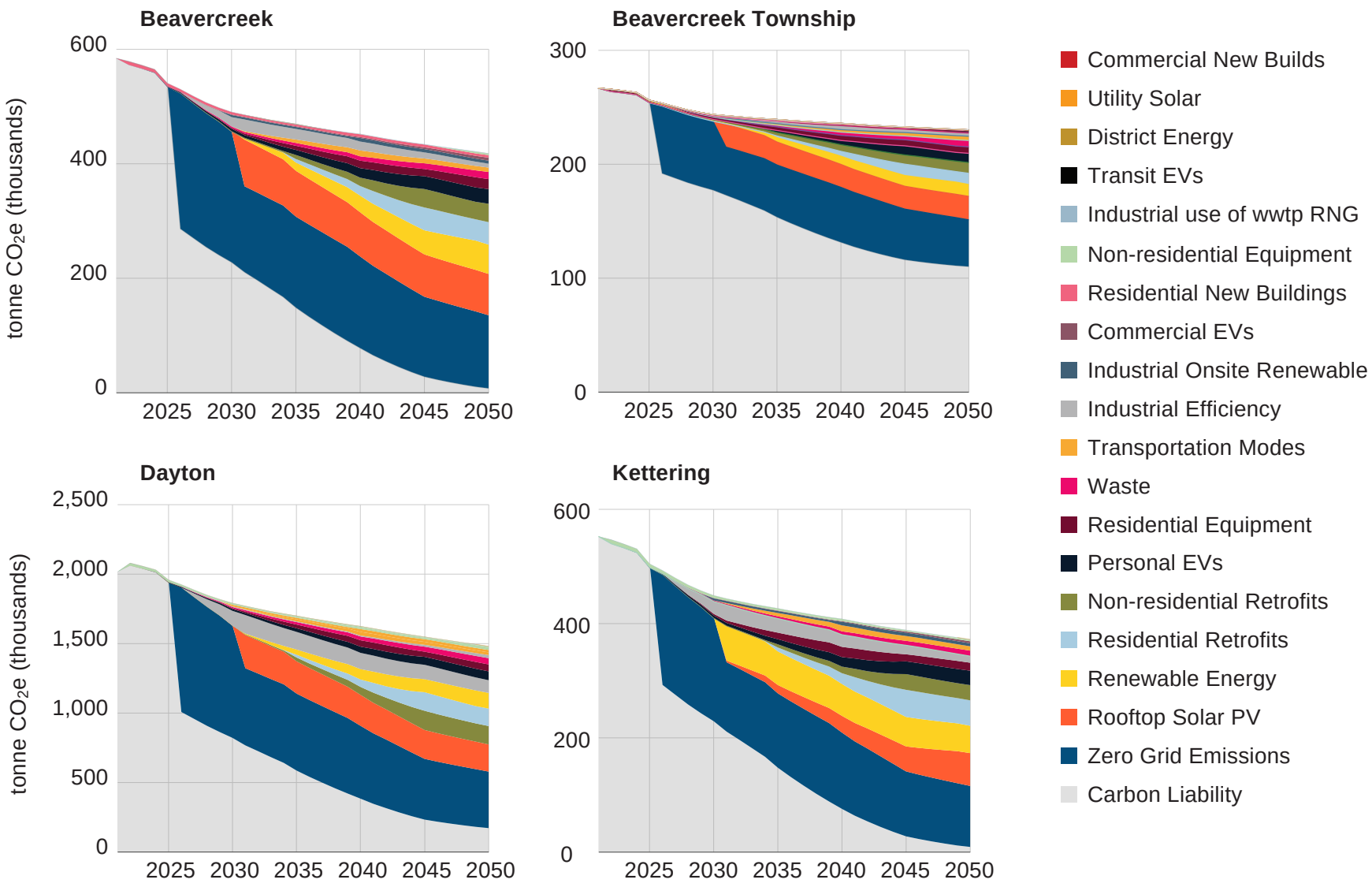
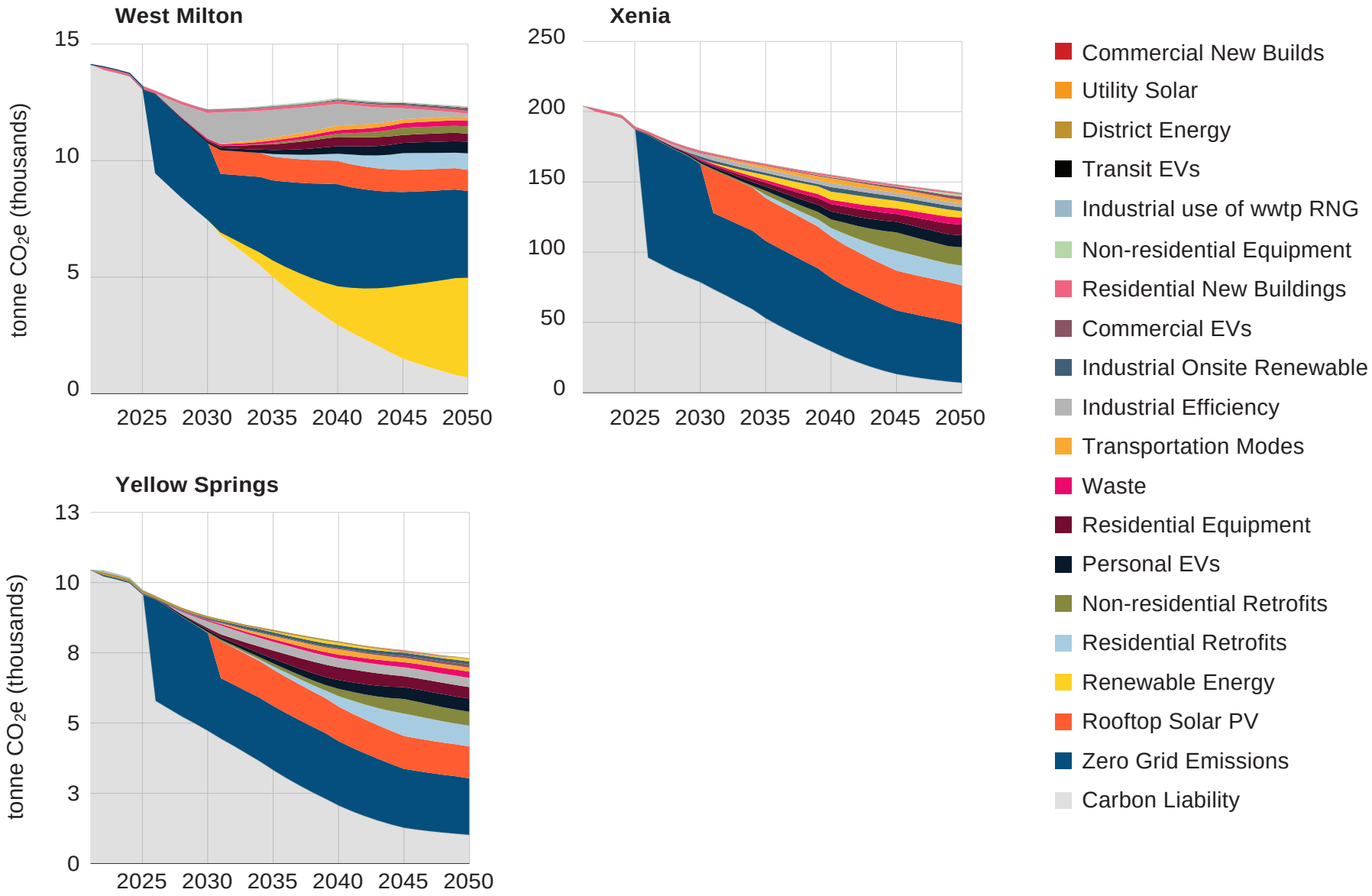
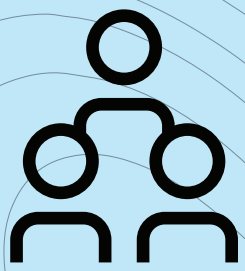


Figure 15 (from previous page). Local Pathways. Source: SSG analysis.



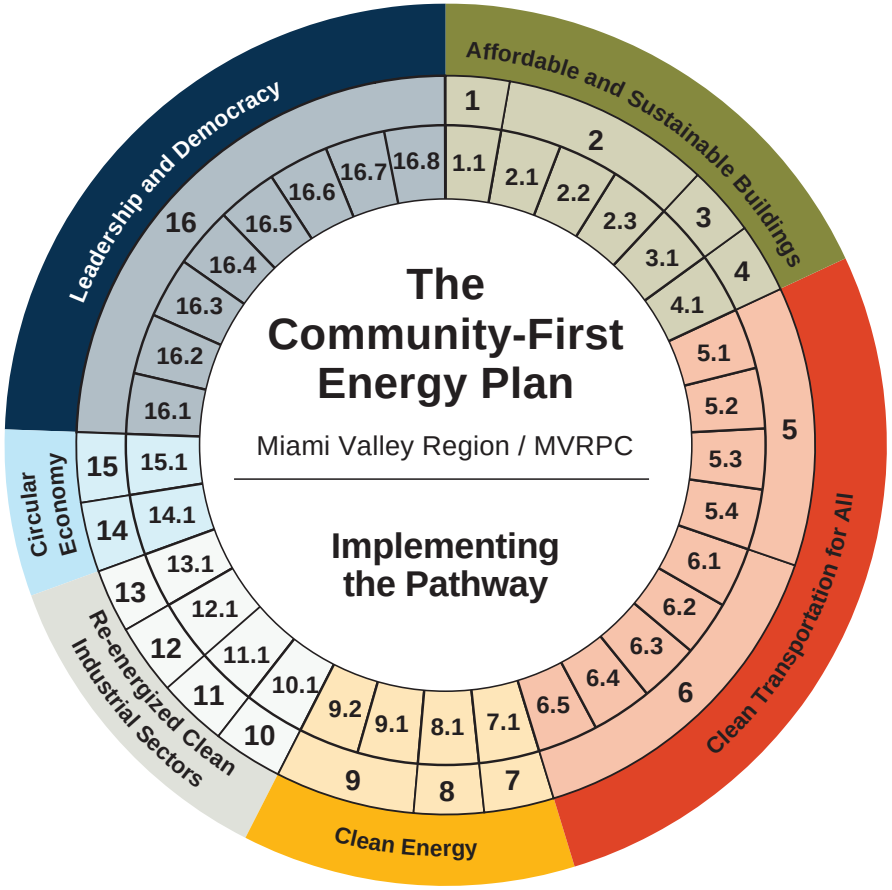


There’s a role for everyone.

Implementing the Plan

Implementing the pathway will require unprecedented collaboration among local and state governments, regional agencies, local foundations, businesses, institutions and residents. Figure 16 shows a clear roadmap toward implementation.

Figure 16. Big Moves and implementation mechanisms of the recommended pathway. Source: SSG elaboration.



Implementing Mechanisms

1	1.1	Green Development Standard
2	2.1	Retrofit Programs
	2.2	Benchmarking Program
	2.3	Building Performance Standard
3	3.1	Air Conditioner Replacement Program
4	4.1	Home Electrification Program
5	5.1	Clean Fleets
	5.2	Clean Cars for All
	5.3	Charging Infrastructure
	5.4	Clean Freight Strategy
6	6.1	Regional Planning Initiative
	6.2	Safe Streets for All
	6.3	Mobility Hubs
	6.4	Healthy Transportation Funding Program
	6.5	Micromobility
7	7.1	Clean Electricity Aggregation Programs
8	8.1	SolSmart Program
9	9.1	District Energy in Dayton
	9.2	Waste Energy Strategy
10	10.1	Renewable Energy Champions
11	11.1	Industrial Energy Innovation Partnership
12	12.1	
13	13.1	Renewable Natural Gas
14	14.1	Zero Waste Campaign
15	15.1	Circular Economy Strategy
16	16.1	Green Bank
	16.2	Coordinating Philanthropy
	16.3	Municipal Leadership Program
	16.4	Community Energy Planning
	16.5	Citizens Climate Assembly
	16.6	Miami Region Climate Action Commission (MRCAC)
	16.7	Challenge Teams
	16.8	Annual Report

Table 4. Implementation measures for the Miami Valley Region. Source: SSG elaboration.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Affordable and Sustainable Buildings	**1.1**	Green Development Standard	MVRPC	Develop a regional approach to a GDS that applies a tiered performance standard supported by incentives for new construction and planning approvals.
	2.1	Retrofit Programs	Municipalities	Implement or coordinate retrofits for three streams of the building stock: (a) public housing, (b) housing in general, and (c) commercial buildings.
	2.2	Benchmarking Program	City of Dayton; program expanded to other communities	Track and report on building performance to enable people or businesses to select higher-performance buildings, as well as to provide a baseline to establish a retrofit program targetting low performance buildings. Benchmarking is a foundational mechanism to develop a BPS.
	2.3	Building Performance Standard	City of Dayton	Develop and implement phased BPSs requiring commercial and residential (single and multifamily) buildings to meet specific GHG reduction targets over time, supported by technical assistance, data transparency tools and joint collaboration across the region.
	3.1	Air Conditioner Replacement Program	MVRPC, Municipalities	Promote and support the installation of heat pumps for space heating and cooling in buildings through technical assistance, aggregated procurement and access to rebates or tax incentives to reduce upfront costs. Policy mechanisms include a requirement in building condition codes and heat protection codes. The initial priority is social and rental housing to protect vulnerable residents.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Affordable and Sustainable Buildings	**4.1**	Home Electrification Program	MVRPC, Community-based Organizations (CBOs)	Provide education on the benefits and challenges of home electrification, including heating, water heating, cooking, technical assistance for municipalities in policy development, procurement aggregation programs and coordination of incentives and grants.
Clean Transportation for All	**5.1**	Clean Fleets	MVRPC	Adopt EVs in municipal fleets through joint procurement and support the provision of technical assistance for municipal electrification strategies. The program can be expanded to private fleets.
	5.2	Clean Cars for All	MVRPC	Clean Cars 4 All provides incentives to help lower-income consumers to replace their old higher-polluting vehicles with newer and cleaner transportation. Participants have the option to purchase or lease a new or used hybrid, plug-in hybrid electric vehicles (PHEVs), battery-electric vehicles (BEVs), zero-emission vehicles (ZEVs), or an alternative mobility option such as an e-bike, voucher for public transit or a combination of clean transportation options. Additionally, buyers of PHEVs and BEVs are also eligible for home charger incentives or prepaid charge cards if home charger installation is not an option.
	5.3	Charging Infrastructure	MVRPC	Promote updates in zoning codes to allow EV chargers, prioritize EV parking with fines and penalties, and adjust right-of-way rules to facilitate and expedite charging point installation in curbside areas. Municipalities integrate EV charging targets and strategies into planning processes by updating comprehensive land-use plans, including criteria for EV access in low-income areas.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Clean Transportation for All	**5.4**	Clean Freight Strategy	MVRPC, DriveOhio	Develop a region-wide clean freight strategy to support clean freight technologies, identify last mile delivery strategies
	6.1	Regional Planning Initiative	MVRPC	Develop an integrated land-use plan for the Miami Valley Region that identifies the major demographic and economic trends and ensures regional coordination between land-use and transportation to minimize emissions, protect greenspace and enhance livability.
	6.2	Safe Streets for All	MVRPC	Develop infrastructure and policies that increase the safety for walking, cycling and transit in communities across the region.
	6.3	Mobility Hubs	MVRPC, transit agencies	Create mobility hubs across the Miami Valley Region, prioritize areas that connect isolated neighborhoods to essential services, and increase access to low-income communities.
	6.4	Healthy Transportation Funding Program	MVRPC	MVRPC implements the Active Transportation Plan. Municipalities access federal and state funding via the Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP), supporting coordination between multiple municipalities for joint applications and project design for active transportation and micromobility infrastructure.
	6.5	Micromobility	Municipalities, Private sector	Continue to provide bike and scooter share programs in Dayton and other municipalities.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Clean Energy	**7.1**	Clean Electricity Aggregation Programs	Sustainable Ohio Public Energy Council (SOPEC), MVCC	Continue to advance and innovate on the aggregation model for clean electricity, energy efficiency (bulk retrofits), clean heating (district heating, heat pumps) and clean transportation (car share).
	8.1	SolSmart Program	MVRPC	Promote and support the installation of solar on rooftops, brownfield sites and agrivoltaics using the SolSmart resources and framework.
	9.1	District Energy in Dayton	City of Dayton	Develop an ambient district energy system for downtown Dayton that provides locally sourced, zero emissions, low cost heating and cooling for existing and new buildings, with major buildings serving as anchor loads.
	9.2	Waste Energy Strategy	City of Dayton	Identify sources of waste energy in the Miami Valley Region. Waste energy can be the basis of zero-emissions heating and a potential revenue source for the generation of the waste heat. Sources can include data centers, wastewater systems and industrial processes.
Re-energized Clean Industrial Sectors	**10.1**	Renewable Energy Champions	Industries, Dayton Development Coalition (DDC)	Coordinate commercial and industrial sector renewable energy procurement for both electricity and RNG. Develop a brand for industry in the Miami Valley Region as 'renewably powered.'
	11.1/ 12.1	Industrial Energy Innovation Partnership	DDC	Develop an Innovation Partnership to identify actions to support industries in reducing GHG emissions and implementation of energy efficiency and electrification measures in industrial processes.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Re-energized Clean Industrial Sectors	**13.1**	Renewable Natural Gas	WWTP operators	Develop a program to support wastewater treatment plant operators to produce RNG and use it internally in replacement of current energy fuels. The program provides technical assistance, support for joint application of funding, and coordination with utilities and state agencies for regulatory compliance.
Circular Economy	**14.1**	Zero Waste Campaign	Solid Waste Management Districts (SWMD)	Provide public education and perform outreach through an advisory table for the community and other participatory processes to reduce waste generation, intergovernmental, across the region.
	15.1	Circular Economy Strategy	SWMD	A circular economy strategy for the Miami Valley Region would focus on transforming local systems — from industry and infrastructure to households and government — to eliminate waste, keep resources in use longer and regenerate natural systems. Circular strategies here could include: material exchange networks between manufacturers (e.g., using waste from one as input for another), remanufacturing and refurbishment (especially electronics, auto parts and industrial equipment), and additive manufacturing (3D printing) to reduce material waste.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Leadership and Democracy	**16.1**	Green Bank	MVRPC, Foundations	Create a task force for green finance for a retrofit and clean energy program, led by MVRPC in coordination with local governments of the Miami Valley Region. The task force should partner with the Green Banks Coalition (e.g., Coalition for Green Capital, Climate United Fund, Power Forward Communities), Public Housing Authorities (e.g., Greater Dayton Premier Management, Greene Metropolitan Housing Authority, Miami Metropolitan Housing Authority), as well as Community Development Financial Institutions (e.g., credit unions, CDFI banks and loan funds).
	16.2	Coordinating Philanthropy	MVRPC, Foundations	The Miami Region Climate Action Commission (supported by MVRPC) leads the development of a philanthropic program in the Miami Valley Region.
	16.3	Municipal Leadership Program	MVRPC	The Municipal Leadership Program is a coalition of engaged and motivated municipalities that can lead and coordinate on climate action across the region, building on the local pathways initiative.
	16.4	Community Energy Planning	MVRPC	Municipalities develop and implement community energy plans alongside their comprehensive plans to ensure coordination between land-use policy, transportation, the energy transition and economic development. The community energy plans can be focussed on the municipal or neighborhood scale.

Big Move		Implementing Mechanisms	Implementation Lead	Implementation measure (summary description)
Leadership and Democracy	**16.5**	Citizens Climate Assembly	Greater Dayton Partners for the Environment	A citizens assembly is convened with representative residents to co-design policy priorities. Members are identified at random and supported with an in-depth education program, after which they provide guidance on policy directions. This approach can address political divides.
	16.6	Miami Region Climate Action Commission	Hanley Sustainability Institute	Create an independent oversight body to include municipal officials, representatives of labor, business, utilities, universities, environmental and community groups, and scientists. Its mandate: refine the CCAP, review and revise interim targets, recommend policies, and review performance across the Region. The MRCAC will hold public meetings and produce annual reports on climate indicators (e.g.,GHG emissions, energy use, job growth).
	16.7	Challenge Teams	MVRPC	Convene time-bound working groups on economic development around specific challenges (e.g. clean energy, building decarbonization, agriculture) that include non-profits, entrepreneurs and citizen experts. These teams will co-create solutions and pilot projects to stimulate community engagement and innovation.
	16.8	Annual Report	MVRPC	Report annually on the progress of the Miami Valley Region's CCAP, including key performance indicators and a regional GHG inventory. The report will be released annually on Earth Day.

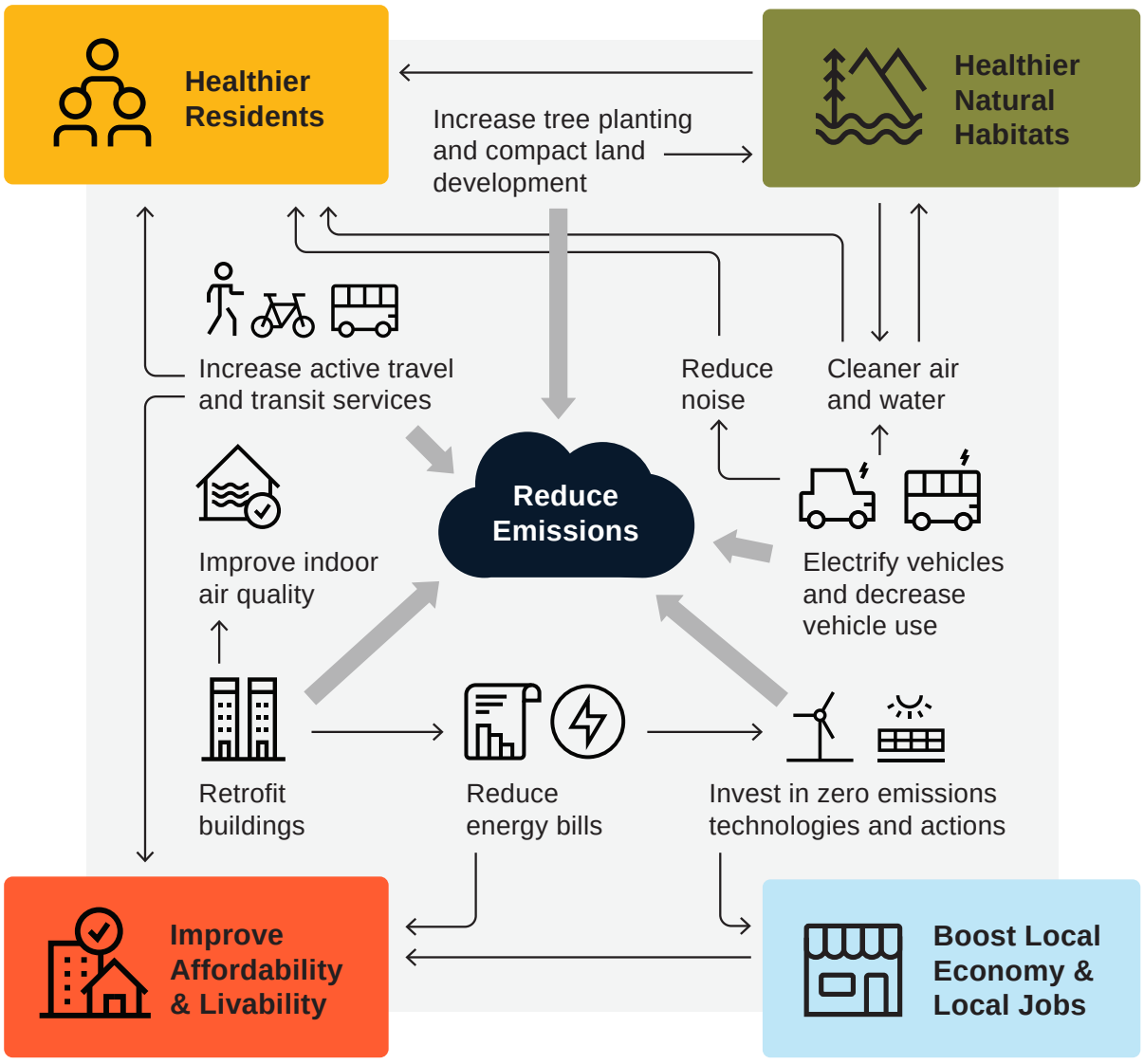
A path that is good for people.

5 | The Benefits

A Better Quality of Life

Beyond reducing GHG emissions, there are many other reasons why the actions in this plan make sense. Broadly speaking, these actions will result in lower energy costs, healthier people, a more affordable community and a more resilient economy (Figure 17).

Figure 17. Actions that reduce emissions can also support healthier residents and natural habitats, boost local economies, create local jobs and improve affordability and livability. Source: SSG elaboration.



Healthier Residents

One of the most beneficial and immediate health co-benefits of reducing GHG emissions is improved air quality, which leads to improved health outcomes. Cleaner air reduces the risk of premature death and supports better health outcomes for residents in the Miami Valley Region. Burning fossil fuels such as gasoline, diesel and natural gas releases air pollutants in addition to GHGs. These pollutants — including sulfur dioxide (SO_2), NOx, fine particulate matter smaller than 2.5 micrometers (PM2.5), fine particulate matter smaller than 10 micrometers (PM10) , carbon monoxide (CO), polycyclic aromatic hydrocarbons (HC), mercury and volatile organic compounds (VOCs) — make people sick. Climate change will increase the likelihood of conditions that exacerbate poor air quality.

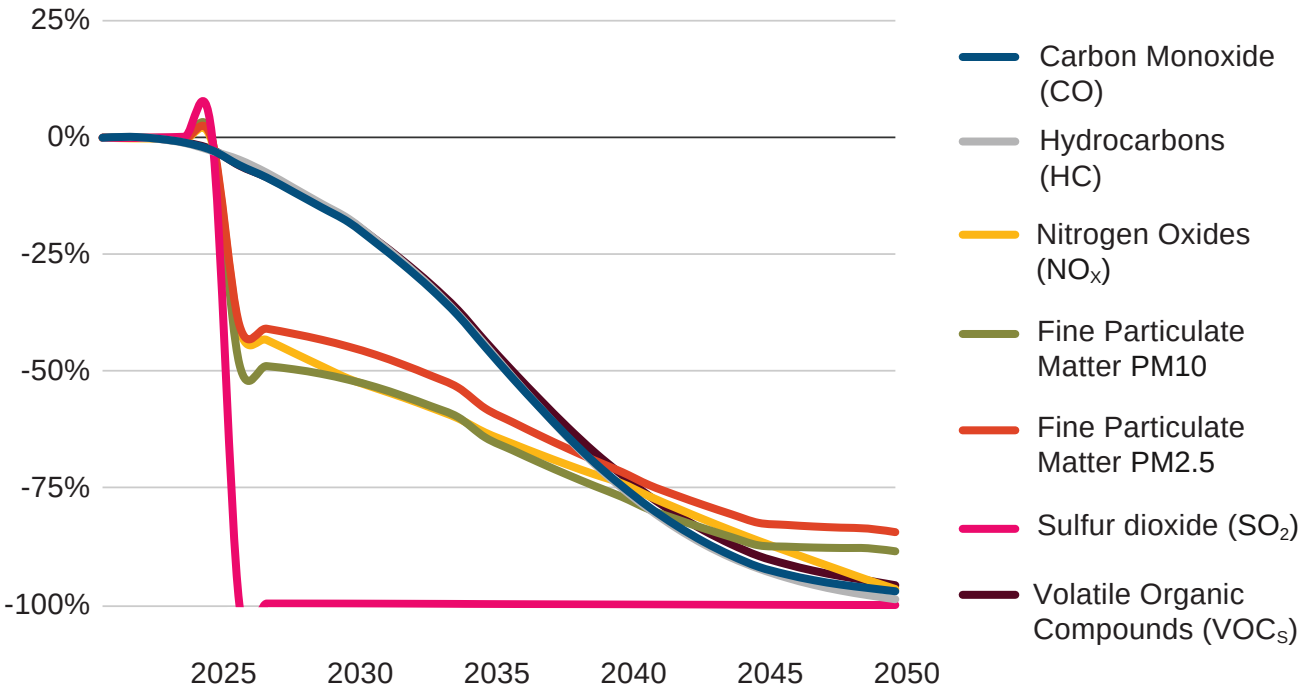
As an indicator, Montgomery, Greene and Miami counties had some of the highest levels of PM2.5 across Ohio, exceeding the World Health Organization (WHO) guidelines.[24] Air pollution does not impact everyone equally. People with asthma (approximately one in 10 adults in the Miami Valley Region[25]) are more sensitive to poor air quality. Outdoor workers and farmworker communities are particularly at risk of exposure. Inequities disproportionately affect communities that have been historically underserved, face low-income burdens, and live near high-traffic areas.

These pollutants are dramatically reduced or even phased out as a result of this plan (Figures 18 and 19). Phasing out these pollutants will reduce health issues such as damage to the lungs, heart, brain, skin and other organs; the development of neurological disorders, including Parkinson's disease, Alzheimer's disease and other dementias; acute bronchitis in children; asthma and other respiratory illnesses; heart disease; stroke; and the risk of cancer, among other impacts.

[24] C40 Knowledge Hub (September 2021). WHO air quality guidelines," https://www.c40knowledgehub.org/s/article/WHO-Air-Quality-Guidelines?language=en_US

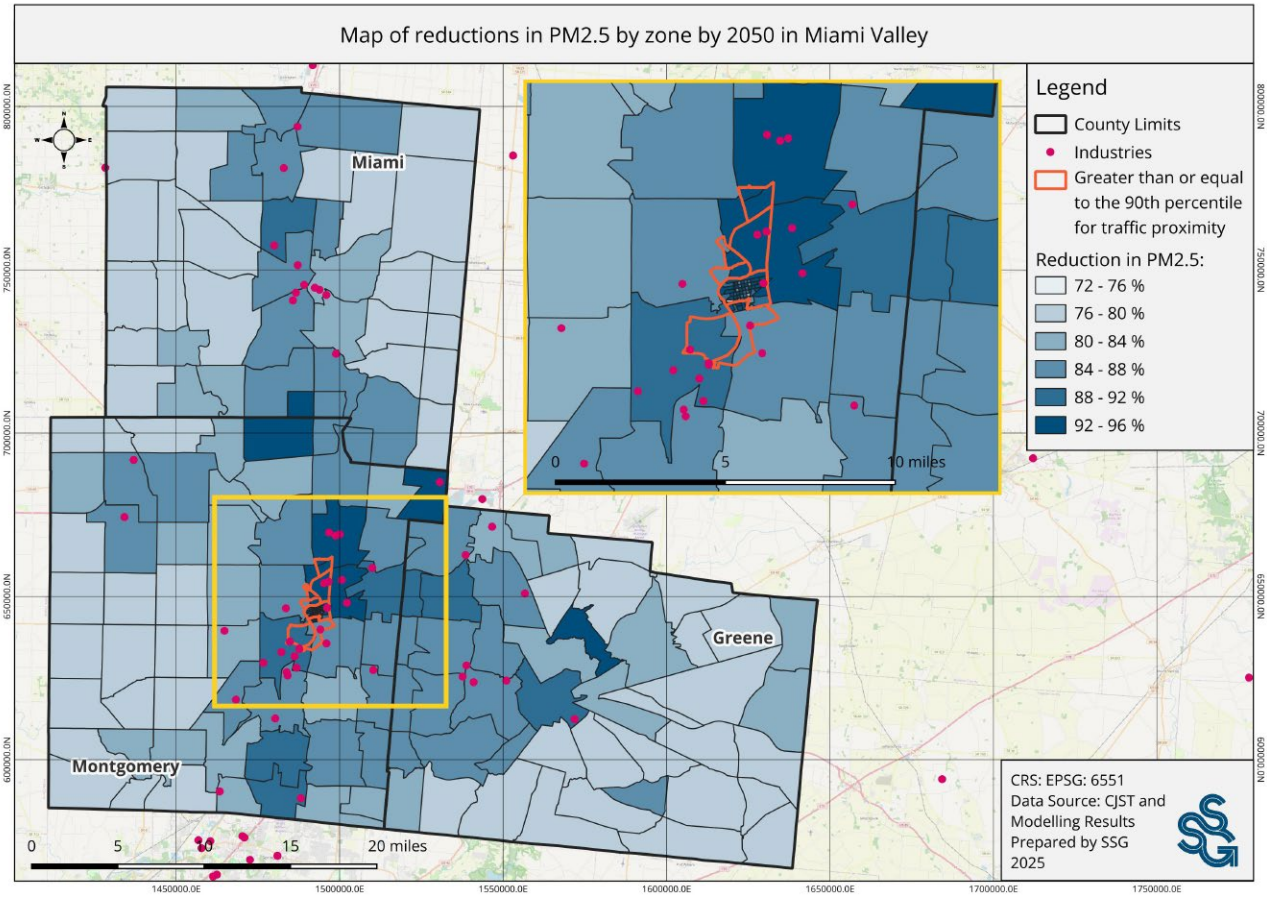
[25] Centers for Disease Control and Prevention (December 2024). PLACES: Local Data for Better Health, County Data 2024 release," https://data.cdc.gov/500-Cities-Places/PLACES-Local-Data-for-Better-Health-County-Data-20/swc5-untb/about_data

Figure 18. Change in air pollutants in the Miami Valley Region.[27] *Source: SSG analysis.*



[27] Note that SO_2 drops drastically due to a greener grid and vehicle electrification actions.

Figure 19. Mapping PM2.5 reductions by 2050 in the Miami Valley Region. Source: SSG analysis.



More Comfortable Homes

The Miami Valley Region's housing stock is aging and energy inefficient. Roughly two-thirds of the region's 375,000 housing units were built before 1980, with a large portion built between 1950 and 1979.[28] Most (70%) of these are single-family detached homes.[29] The average home in the region uses two times Ohio's average energy per household.[30] Natural gas is the main heating source in approximately two-thirds of homes across the region (68%).

[28] U.S. Census Bureau (2023). ACS 2023 1-year, Table 25034: Year Structure Built. https://data.census.gov/table/ACSDT5Y2023.B25034

[29] U.S. Census Bureau (2023). ACS 2023 1-year, Table 25024: Units in Structure. https://data.census.gov/table/ACSDT1Y2023.B25024

[30] U.S. Energy Information Administration (2020). Residential Energy Consumption Survey (RECS) Dashboard. https://experience.arcgis.com/experience/cbf6875974554a74823232f84f563253

This plan will make the housing stock more comfortable by improving the envelope, enhancing insulation, reducing air leakage, improving heating and cooling, and enhancing ventilation. These measures — standard elements of a deep retrofit — will result in homes that are more affordable, maintain a comfortable temperature, and are more resilient to power outages or severe storms. Replacing equipment that combusts fuel inside the household envelope with hot water heaters and stoves with electric options will also reduce indoor air pollution, further improving the health benefits.

Affordable Energy

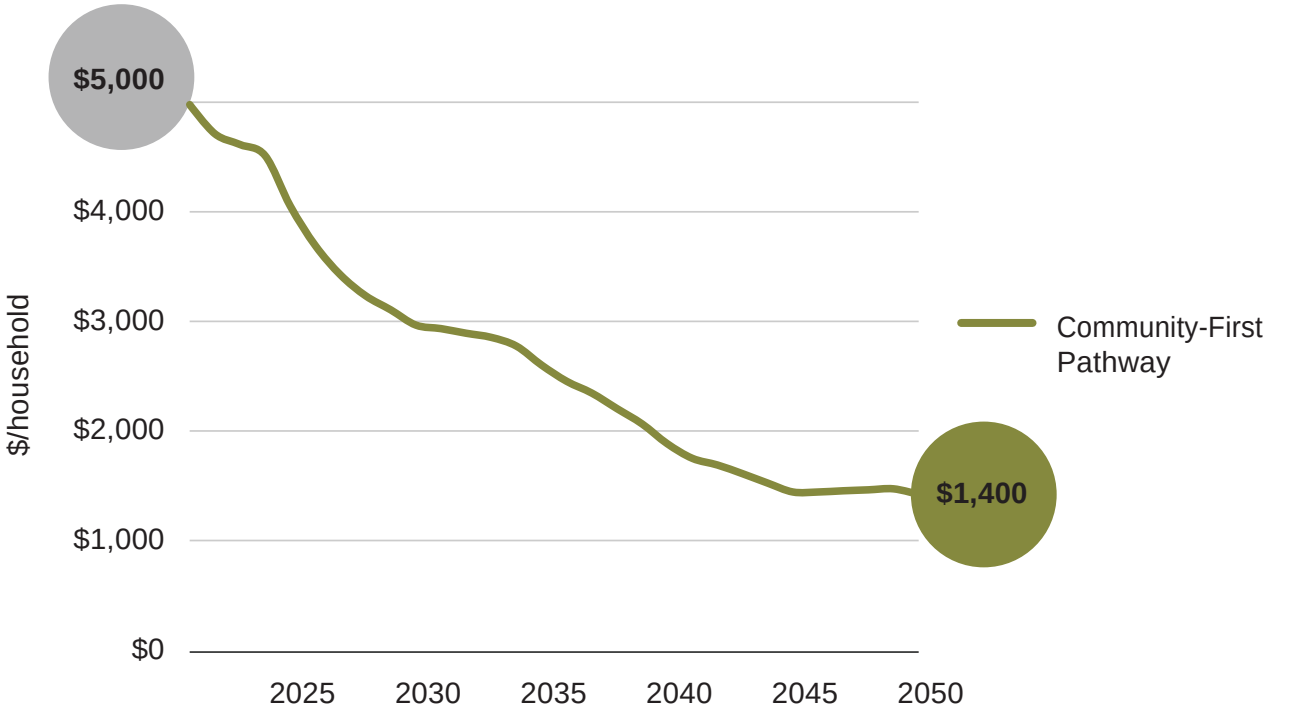
The plan decreases energy costs for households, farms and small businesses across the region for heating and cooling and for transportation (Figure 20). This reduction is particularly critical for households experiencing energy insecurity, a condition during which a household reduces or forgoes food or medicine to pay energy costs, leaves their home at an unhealthy temperature due to inability to afford heating or cooling, receives disconnect or delivery stop notices, or is unable to use heating or air conditioning equipment.[31]

As of 2022, roughly 26% of households in the East North Central census region, which includes Ohio, experienced energy insecurity based on at least one of these indicators. Nearly a fifth of households in the region struggle to pay their energy bills, and have to choose between powering their home and paying for other expenses such as food and medicine.

Low-income households tend to have disproportionately high energy cost burdens, in part because their homes tend to be draftier and older and have poorer insulation than those of wealthier households, making them energy inefficient.

[31] US EIA (2023). 2020 Residential Energy Consumption Survey. Housing characteristics tables: Household energy insecurity (HC11.1). https://www.eia.gov/consumption/residential/data/2020/index.php?view=characteristics#household

Figure 20. Change in household energy expenditures, 2021-2050. Source: SSG analysis.



New Jobs

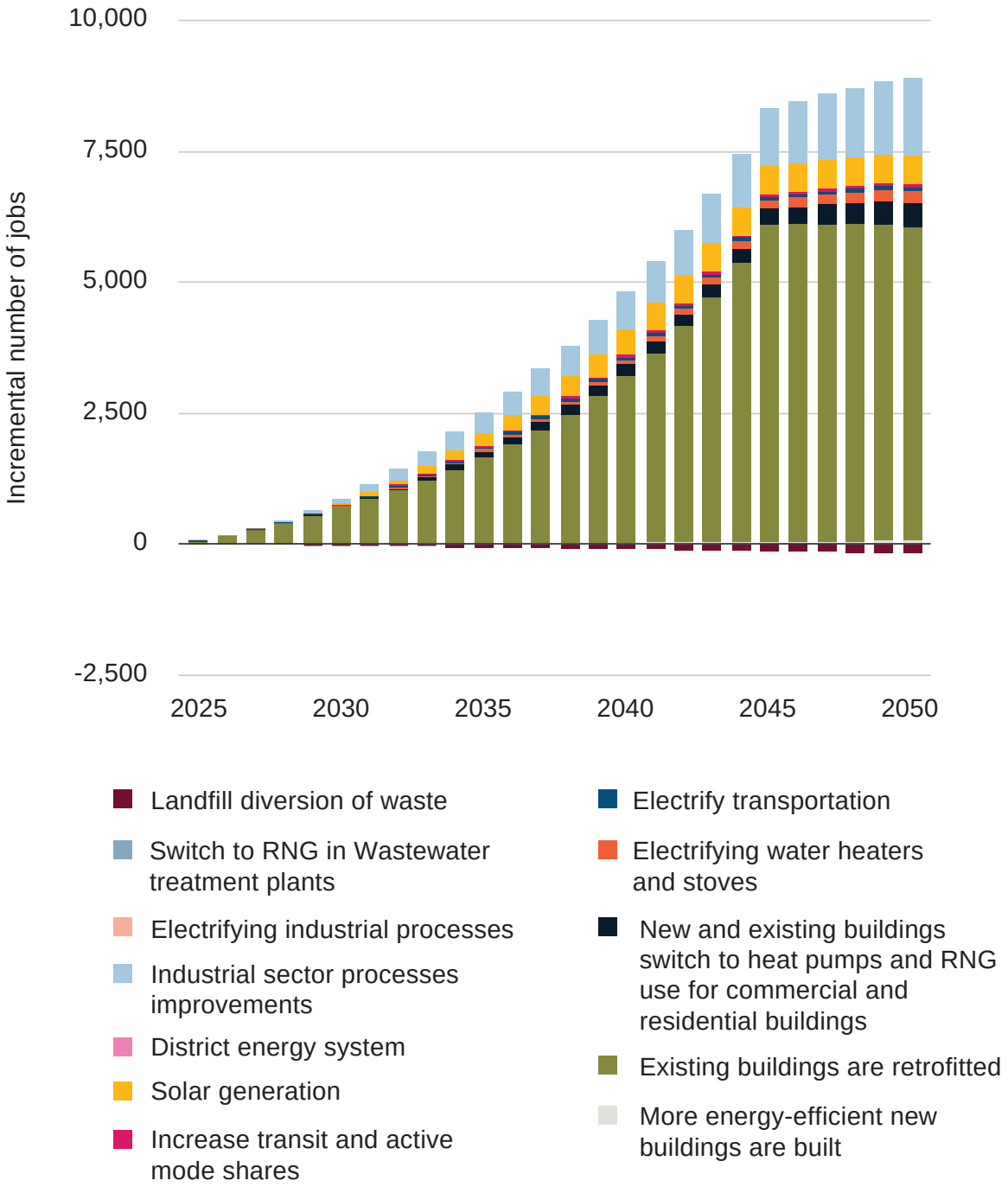
The transition from an energy system based on fossil fuels to one based on renewable energy will require massive investments in infrastructure — across every sector, from vehicles to district energy, from manufacturing to energy efficiency.

These investments will result in many new jobs in EVs, building retrofits and renewable energy. Some jobs will be lost or shifted, for example, in the fossil fuel industries, and some jobs will be less in demand, such as vehicle mechanics who specialize in gasoline motors. Many existing jobs will be transformed and redefined, with some employment opportunities emerging that we cannot yet anticipate.[32]

This plan estimates that the average person-years of employment (which means one job for one year) between 2025 and 2050 will be 4,500 (Figure 21).

[32] Cristina Martinez-Fernandez, Carlos Hinojosa, Gabriela Miranda. "Greening Jobs and Skills: Labour Market Implications of Addressing Climate Change.", OECD Local Economic and Employment Development (LEED) Papers, No. 2010/02 (July 1, 2010). https://doi.org/10.1787/5kmbjgl8sd0r-en

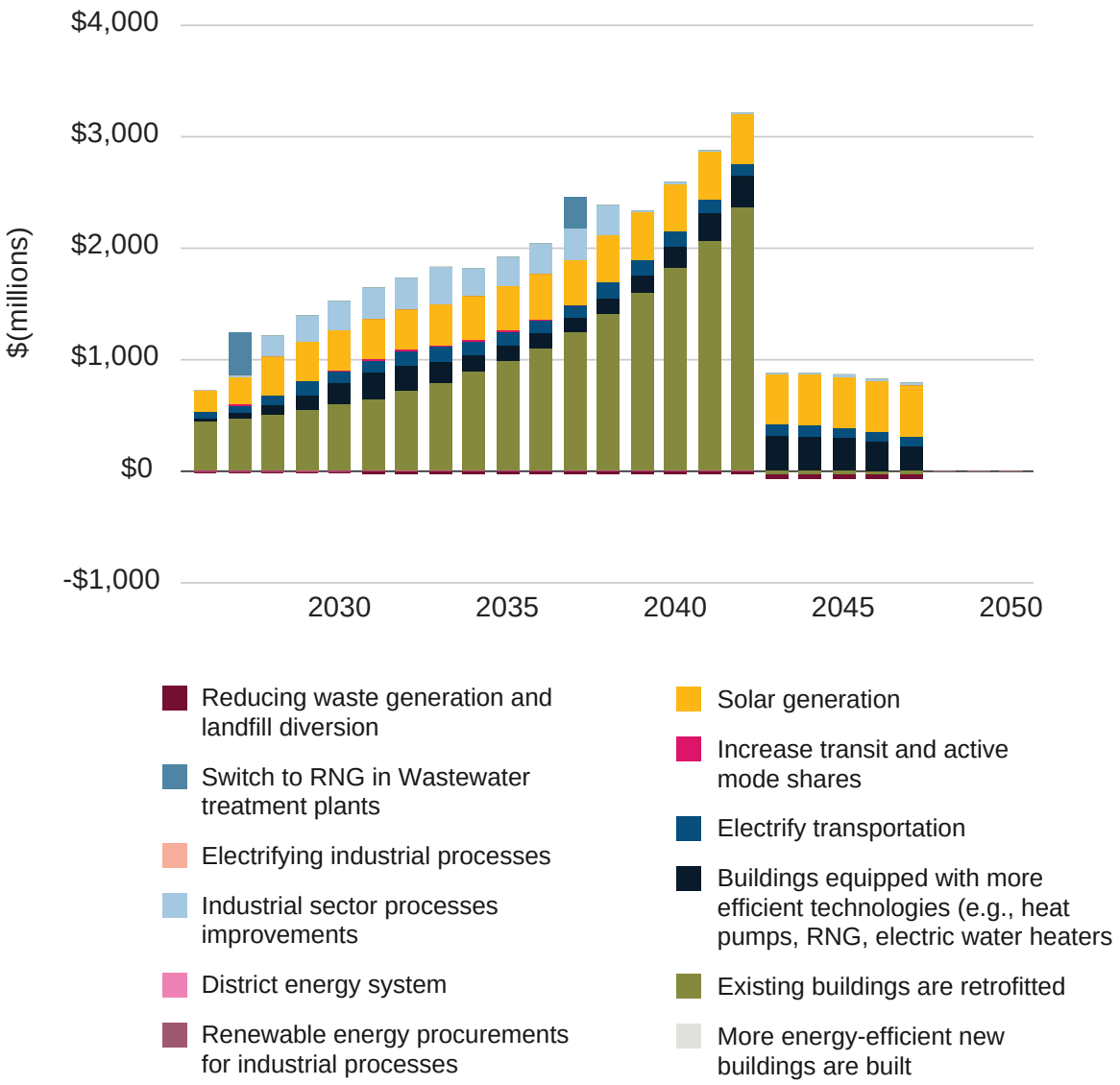
Figure 21. New employment opportunities resulting from the Community-First Pathway actions, 2025-2050. Source: SSG analysis.



Good for business.

The investments identified in this plan (Figure 22) are major opportunities for existing and new businesses in the Miami Valley Region. These businesses include primary beneficiaries such as contractors, HVAC suppliers, construction companies, appliance manufacturers, renewable energy developers, car dealerships[33] and bike shops, and secondary businesses such as banks and credit unions, engineering firms, architects and designers, and insurance companies.

Figure 22. Capital investments by sector, 2026-2050. Source: SSG analysis.



[33] Car dealerships may benefit from increased EV sales, but may lose revenue due to decreased maintenance needs of EVs.

Major investments in the Miami Valley Region are already being made as entrepreneurs seek to engage with these challenging problems.

Cleaning up Aviation[34]

Joby Aviation, Inc. (NYSE:JOBY) is a California-based transportation company developing an all-electric, vertical take-off and landing (eVTOL) air taxi which it intends to operate as part of a fast, quiet and convenient service in cities around the world.

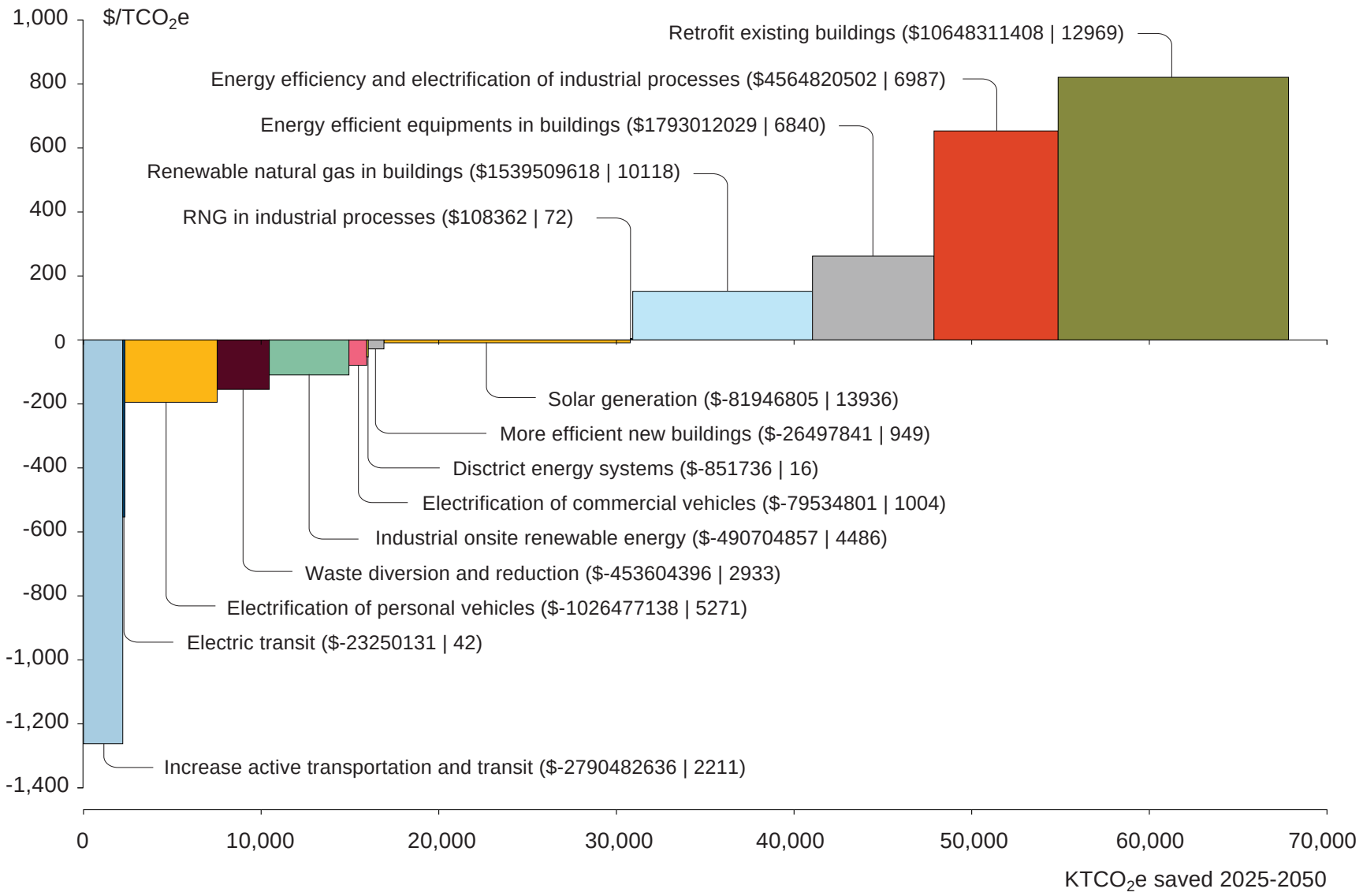
Joby Aviation Inc. will build an electric air taxi manufacturing facility at the Dayton International Airport, creating 2,000 new jobs in the Dayton Region.

Joby Ohio's new assembly-line manufacturing facility will build, test and fly all-eVTOL air taxis that will predominantly be used for commercial passenger operations. The aircraft, designed to accommodate a pilot and four passengers, will be capable of achieving speeds of up to 200 miles per hour over a 100-mile range. The corporation plans to operate the aircraft as part of aerial ridesharing networks in cities and communities around the world.

Many of these investments do not require government investments; their financials may justify private sector investment on their own merits. The marginal abatement cost curve indicates which measures in the plan are the most cost-effective — the more negative the value, the greater the savings (Figure 23). Importantly, other reasons (e.g., permitting, business model, ability to scale) may limit the deployment of the more cost-effective strategies and require specific interventions by governments or other entities.

[34] Dayton Development Coalition (August 2024). "Joby Aviation to Build Electric Air Taxi Manufacturing Facility in Dayton," https://daytonregion.com/success-stories/joby-aviation-build-electric-air-taxi-manufacturing-facility-dayton

Figure 23. Marginal abatement cost curve in the Community-First Pathway. Source: SSG analysis.



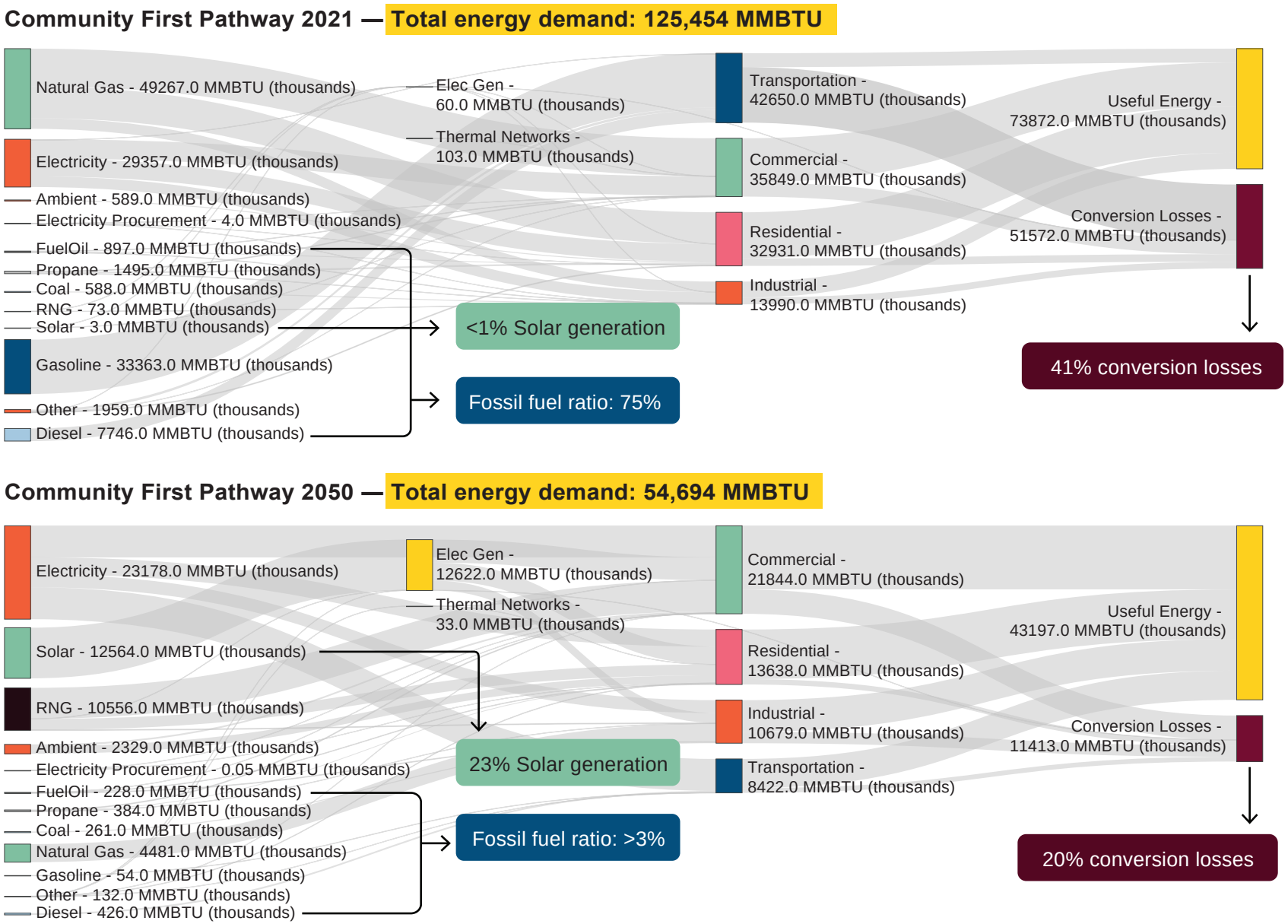
Efficiency Gains Offer a Double Dividend

Efficiency gains are a key driver of the energy transition, reducing overall energy demand and reducing the cost of the transition — less energy consumed means less renewable energy is required to reduce pollution. Heat pumps and EVs use three to four times less energy than the fossil-fuel-powered systems they are typically replacing.

The economic benefits of energy efficiency are clear. Every unit of energy no longer required is not only a unit of energy that a household or business doesn't need to pay for, but it's also a unit of energy that an electricity utility doesn't need to generate, reducing the cost for new wires and generation across the system — a double dividend.

The Miami Valley Region's future energy system wastes much less energy than today. Figure 24 traces energy from source to sector to show how much is used for its intended purpose versus how much is lost in the process ("conversion losses"). The energy system of the future is much more efficient, with conversion losses declining from 41% in 2021 to 20% by 2050. Total energy consumption also declines by 56%. This future energy system not only prioritizes renewable and cleaner sources, but by lowering overall energy demand, it also makes the Miami Valley Region more efficient, smarter and more resilient.

Figure 24. Energy flows in the Miami Valley Region, from source to sector, and if the energy is used for its intended purpose (useful energy) in both 2021 and 2050. Source: SSG analysis.



Looking Ahead

There are headwinds, but there is also momentum. The benefits of success are many: the energy system is more resilient and affordable, new job opportunities emerge, the region's economy is future-proofed, there are opportunities for existing and new businesses, the air is cleaner and people are healthier. And critically, the Miami Valley Region will have done its part to safeguard the future for our children.

Image: Riverscape in Dayton, Ohio. Source: Adobe Stock under SSG's license.

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