

# MI HEALTHY CLIMATE PLAN



MICHIGAN DEPARTMENT OF  
ENVIRONMENT, GREAT LAKES, AND ENERGY

APRIL 2022



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ENVIRONMENT, GREAT LAKES, AND ENERGY

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# LETTER FROM EGLE DIRECTOR

Dear fellow Michigan residents:

I am proud to present the MI Healthy Climate Plan, with thanks to Governor Gretchen Whitmer for trusting the Michigan Department of Environment, Great Lakes, and Energy to lead this work and deep appreciation for the hundreds of Michiganders who contributed to it over the past year through thousands of hours of research, reflection, and conversation.



This plan lays out a broad vision for fulfilling the governor's fall 2020 commitment for Michigan to achieve 100% economy-wide carbon neutrality by midcentury – the global science-based benchmark for reducing greenhouse gas emissions to avoid the most devastating and costly impacts of climate change.

As its name suggests, this is a uniquely Michigan plan. It was shaped by a multitude of Michiganders with varied perspectives on climate change. We heard from environmental justice, public transit, local food, and climate action advocates; an array of business and labor leaders; academic experts and local government officials; and concerned residents of all political persuasions and walks of life. I firmly believe conversation leads to better outcomes. In this case, it has produced a bold plan that a broad cross-section of Michiganders can rally around.

This Plan is also rooted in what makes our state special. No state is better positioned than Michigan to advance equity, create good-paying jobs, increase economic competitiveness, and improve quality of life in pursuing carbon neutrality – thanks to our unmatched freshwater resources and heritage as a global manufacturing innovator, diverse agricultural producer, world-class outdoor recreation hub, and home to talented people and vibrant communities.

Finally, the responsibility for implementing this Plan and refining it over time is ours. All 10 million of us have big parts to play in decarbonizing our economy – from the governor and state lawmakers who will make the necessary state policy changes and budgetary decisions to the workers, business leaders, and entrepreneurs who will turn cutting edge climate solutions into high-quality jobs and economic prosperity; the community leaders and advocates who will ensure this work reaches every corner of the state and benefits every Michigan family; and each of us as individuals and consumers who will take myriad actions in our daily lives.

It is essential that we act now to greatly accelerate the decarbonization of Michigan's economy, building on the recent progress Michigan has made thanks to our public and private sector leaders. While some solutions to achieve a 100% decarbonized economy that delivers good jobs and justice are still on the drawing board, most are well known to us and awaiting our commitment to getting the job done and equitably sharing the burdens and benefits.

Fortunately, we have the resources to demonstrate that commitment and kickstart progress. Governor Whitmer's 2023 state budget recommendation includes over \$500,000,000 for climate, clean energy, and mobility initiatives. And the state is committed to fully leveraging the current dramatic influx of federal dollars to move Michigan closer to our decarbonization goals.

In other words, we have a commitment, a plan, and a financial platform. We have what we need, so let's get to work.

A handwritten signature in blue ink, appearing to read 'Liesl Eichler Clark', written over a light blue horizontal line.

Liesl Eichler Clark, Director

Michigan Department of Environment, Great Lakes, and Energy

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# EXECUTIVE SUMMARY

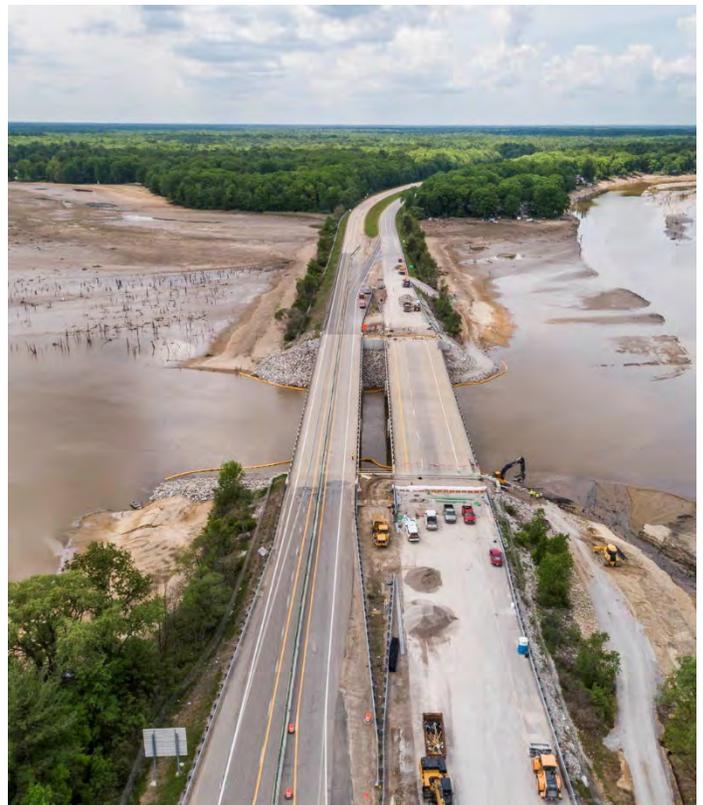
The real and costly impacts of the climate crisis are irrefutable and that was especially obvious on the ground in Michigan during 2021. Severe, climate-induced weather events over the summer caused more than one million Michiganders to lose power, some for a week or more. Southeast Michigan was hit by intense rain, causing widespread floods and sewer backups. All this came on the backend of a decade in which our state has experienced massive flooding and dam failures, high water levels and erosion that destroyed public and private property, major crop failures from erratic spring temperatures, and three polar vortexes that challenged Michigan families to keep the heat on.

Sadly, Michigan is not alone. We all remember Texas freezing over after unprecedented cold and ice storms in February 2021, taking lives, freezing pipes, and causing historic damage.

Meanwhile, California was ablaze, hit by twice as many wildfires as the previous record year. A “heat dome” that settled over the Pacific Northwest in late June broke the previous record temperature by more than 10 degrees.

Globally, the seven warmest years in recorded history have occurred since 2015, a trend the United Nations’ Intergovernmental Panel on Climate Change has called “a code red for humanity.”

If we do not act aggressively to reduce greenhouse gas (GHG) emissions, these changes will only intensify, and the impacts will become more challenging, dangerous, and expensive for Michigan residents. It is imperative that we reduce emissions as quickly as possible and simultaneously prepare for the changes we cannot prevent.



The good news is we have made progress in recent years in reducing our GHG emissions. In the process, we have learned that aggressive action on climate change presents a variety of significant opportunities to better the lives of all Michiganders, including offering immediate opportunities to **reduce costs** and create **good-paying jobs for working families**.

Governor Whitmer has taken bold action to dramatically accelerate Michigan’s progress down that promising path, including committing Michigan to economy-wide carbon neutrality no later than 2050 with aggressive interim targets on the way to midcentury and net negative GHG emissions thereafter. To achieve these ambitious goals, she charged the Michigan Department of Environment, Great Lakes, and Energy’s (EGLE) Office of Climate and Energy with developing the *MI Healthy Climate Plan* (Plan). ([See Introduction](#))

**MICHIGAN - one of only 14 states with bold economy-wide goals**

- ✓ Reduce GHG emissions 28% below 2005 levels by 2025 and 52% by 2030
- ✓ Achieve economy-wide carbon neutrality by 2050
- ✓ Maintain net negative GHG emissions thereafter

## OBJECTIVES

 <p>Mitigate the worst impacts of climate change</p>	 <p>Spur economic development and create good-paying jobs</p>	 <p>Capture economic development and create good-paying jobs</p>	 <p>Protect and improve the health of Michiganders</p>
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### OBJECTIVES OF THE MI HEALTHY CLIMATE PLAN

 <p>Position Michigan as a leader in climate action</p>	 <p>Protect our natural resources and wildlife</p>	 <p>Make Michigan energy independent</p>	 <p>Address environmental injustices</p>
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The Plan strongly emphasizes environmental justice to ensure Michigan’s climate strategies uplift every portion of the state, including individuals and communities that have borne the brunt of climate impacts and are at the greatest risk of being left behind in the transition ahead. It also spotlights decarbonization strategies that will yield significant health, economic, and other benefits. (See [Why Climate Action Matters for Michigan](#)).

The Plan is meant to identify what needs to happen for Michigan to reach carbon neutrality by 2050 with a prioritization on actions from now until 2030. It focuses most heavily on the areas where the biggest, most rapid gains in GHG reductions can be made – energy, transportation, and buildings. The Plan’s full complement of recommendations are detailed in the [Roadmap to 2030](#) section. The following briefly summarizes the highlights across the six categories the Plan uses to group the climate actions needed to achieve our goals.

**Commit to Environmental Justice and Pursue a Just Transition:** Ensure that at least 40 percent of state funding for climate-related and water infrastructure initiatives benefit Michigan’s disadvantaged communities (in line with the federal government’s Justice40 guidelines for federal funding); that Justice40 is developed in partnership with leaders in disadvantaged communities; and that Michigan emphasizes a just transition for all workers through proactive engagement, job training, and workforce development.

**Clean the Electric Grid:** Generate 60 percent of the state’s electricity from renewable resources and phase out remaining coal-fired power plants by 2030. Limit energy burden from powering and heating homes to not more than 6 percent of annual income for low-income households.

**Electrify Vehicles and Increase Public Transit:** Build the infrastructure necessary to support 2 million electric vehicles on Michigan roads by 2030. Increase access to clean transportation options – including public transit – by 15 percent each year.

**Repair and Decarbonize Homes and Businesses:** Reduce emissions related to heating Michigan homes and businesses by 17 percent by 2030. Increase investments in repairing and improving buildings to reduce costs for working families and small businesses.

**Drive Clean Innovation in Industry:** Encourage clean innovation hubs where private enterprises strategically co-locate and collaborate to develop and deploy new, cleaner manufacturing technologies and conduct research and development to reduce emissions from hard to decarbonize industries. Triple Michigan’s recycling rate to 45 percent and cut food waste in half by 2030.

**Protect Michigan’s Land and Water:** Protect 30 percent of Michigan’s land and water by 2030 to naturally capture GHG emissions, maintain and improve access to recreational opportunities for all Michiganders, and protect biodiversity. Leverage innovative strategies to support climate-smart agriculture.

The Plan’s comprehensive set of policy recommendations in these areas will help reduce GHG emissions at the scale and pace necessary to reach our interim goal of reducing GHG emissions 52% by 2030. However, they do not go far enough on their own. Additional policy changes and actions in every sector will be necessary to get all the way to that target. That is why we must continue to evaluate and update strategies (and this Plan) and seek new emissions-reduction pathways that will spur a self-reinforcing cycle and more fully unleash Michigan ingenuity.

Beyond 2030, the steps necessary to make Michigan’s economy carbon neutral by 2050 are no less urgent. In many cases, the actions necessary to fully achieve this goal over the next 28 years will require substantial efforts in the sectors of our economy that are hardest to decarbonize, including industry, buildings and housing, and agriculture. The Plan takes a balanced approach to these issues, identifying the actions we can take today to make real progress between now and 2030, while also immediately digging into the hard work of identifying strategies to get us the rest of the way to carbon neutrality by 2050. To achieve our goals, we must also avoid actions between now and 2030 that make it more difficult to reach carbon neutrality.

It is also important to note that this Plan is a climate mitigation and greenhouse gas reduction plan, not a comprehensive plan to adapt and become resilient to the effects of climate change. That said, as we work toward our 2030 and 2050 goals, the State will support residents and communities in adapting to the climate impacts we are already facing, especially those in historically disadvantaged and underserved communities. Additionally, mitigation and adaptation are not mutually exclusive – their actions often overlap and benefit each other. Still, while there are climate adaptation considerations in this document, they do not constitute a holistic climate adaptation strategy for Michigan.

Concerted action by all Michiganders will be required to achieve the steep reductions in GHG emissions our state needs to achieve its goals. Fortunately, our communities, businesses, and institutions have already stepped up and created strong momentum for us to build upon. As described further below, the State of Michigan is also leading by example with Governor Whitmer directing state departments to use all the tools at their disposal to reduce GHG emissions in their operations and otherwise act on climate. (See [Leading by Example in State Government](#))

While the objectives detailed in the rest of this Plan are ambitious—and in some cases daunting—it is important to recognize that our journey to carbon neutrality has already begun thanks to the leadership, creativity, and ingenuity of Michiganders across our state.



# INTRODUCTION

## GOVERNOR WHITMER'S COMMITMENTS



Recognizing the urgency of the crisis and the opportunities to build a better future for Michigan as we reduce our GHG emissions (see [Why Climate Action Matters for Michigan](#)), Governor Gretchen Whitmer has taken bold and sustained action on climate change since taking office.

In September 2020, she signed [Executive Directive 2020-10](#), which committed Michigan to a goal of achieving economy-wide carbon neutrality no later than 2050 and maintaining net negative greenhouse gas emissions (GHG) thereafter. [Carbon neutrality](#) means that any carbon dioxide released into the atmosphere is balanced by an equivalent amount being removed. She also reaffirmed the goals in Executive Directive 2019-12, which committed Michigan to pursue at least a 26-28 percent reduction below 2005 levels in GHG emissions by 2025. In addition to the goals set by these directives, Michigan joined 24 other states and Puerto Rico – under the umbrella of the U.S. Climate Alliance – in committing to an interim goal of a 52 percent GHG reduction by 2030.

Executive Directive 2020-10 charged EGLE, through its Office of Climate and Energy (OCE), with developing the *MI Healthy Climate Plan* to serve as this state's action plan to reduce GHG emissions and transition toward economy-wide carbon neutrality with a focus on solutions that support communities disproportionately impacted by the changing climate.

## Michigan's Commitment

In addition to leadership from state government, this progress has been driven – and will continue to be driven – by the actions and commitments of Michigan's communities, businesses, and institutions, including, but not limited to, the examples below.

**Leading communities:** At least [16 Michigan communities](#), ranging from the City of Ann Arbor to Shelby Township, have set goals to be carbon neutral or to reach 100 percent renewable energy by 2050.

**Tribal leadership:** The [Sault Ste. Marie Tribe of Chippewa Indians](#) has a net-zero energy goal and aims to reduce greenhouse gas emissions by four percent per year.

**Our largest universities:** The [University of Michigan](#) committed to eliminate both direct emissions and emissions from purchased energy between 2025 and 2040. [Michigan State University](#) committed to carbon neutrality by 2050 with interim reduction goals.

**Homegrown businesses:** [Steelcase](#) has achieved carbon neutrality and has set a target to become carbon negative by 2030. [Whirlpool](#) set a net-zero emissions target in its plants and operations by 2030. [Dow](#) set a target of being carbon neutral by 2050. [General Motors](#) (GM) set a goal of carbon neutrality in its global products and operations by 2040. [Ford Motor Company](#) set a goal of carbon neutrality by 2050 and committed to powering its manufacturing plants with 100 percent locally sourced renewable energy by 2035. And many more Michigan businesses – large and small – are stepping up.

**Our largest utilities:** [Consumers Energy](#) set a goal of net-zero carbon emissions by 2040. [DTE Energy](#) set a goal to achieve net-zero carbon emissions by 2050 with interim reductions targets.

## A CLIMATE PLAN SHAPED BY MICHIGAN RESIDENTS

The Plan was developed by EGLE with input from hundreds of Michigan residents. To serve as the primary venue for gathering and channeling that input, Governor Whitmer created the Council on Climate Solutions through [Executive Order 2020-182](#).

The [Council](#) consists of 14 Michigan residents appointed by the governor to represent a range of sectors, experiences, and expertise relevant to climate issues. Additionally, the Council includes the directors (or their designees) of EGLE and the Michigan Departments of Agriculture and Rural Development (MDARD), Labor and Economic Opportunity (LEO), Michigan Economic Development Corporation (MEDC), Natural Resources (DNR), Transportation (MDOT), and Health and Human Services (DHHS), as well as the State Treasurer and the Chair of the Michigan Public Service Commission (MPSC).

The Council met 14 times in 2021 to develop a common knowledge base on the climate challenge and discuss the content and recommendations laid out in this Plan and its appendices. To dig deeper and tap broader expertise across Michigan in key areas, five topical workgroups were formed to support the Council:



Energy Production, Transmission, Distribution, and Storage	
Transportation and Mobility	
Buildings and Housing	
Natural and Working Lands and Forest Products	
Energy Intensive Industries	

In addition to the above workgroups, an internal group led by EGLE staff provided recommendations on decarbonization related to materials management.

Hundreds of Michiganders participated in these come-one-come-all workgroups, the membership of which was open to the public. Each was co-chaired by a State of Michigan official and a private-sector resident with subject-matter expertise in the relevant field. These workgroups met periodically through much of 2021 and presented their recommendations to the full Council in the closing months of the year. Listening sessions were then conducted to receive public input on those recommendations (a complete set of which is provided in the appendices).

In 2022, EGLE released a draft of this Plan for public feedback, welcoming written comments and creating forums for the public to engage and comment on the plan. After overwhelming interest, EGLE extended the timeline for input. In addition to public forums, EGLE facilitated consultation with tribal governments and hosted meetings with Council and workgroup members, key stakeholders, and the Michigan Advisory Council on Environmental Justice (MAC-EJ).

**17**

Council on Climate Solutions meetings held to date (open to public)

**2**

Consultations with Tribal government

**10+**

Presentations from experts at Council meetings

**6 TOPICAL WORKGROUPS**



Energy production, Transmission, Distribution, and Storage



Transportation and Mobility



Energy Intensive Industries



Buildings and Housing



Natural and Working Lands and Forest Products



Materials Decarbonization (ad hoc)

**1929 PUBLIC COMMENTS RECEIVED ON DRAFT PLAN**

**243**

Original emails

**1,570**

Form message emails

**2**

Regular mail

**114**

Via 3 listening sessions

**7 LISTENING SESSIONS 2021-2022**

April 22, 2021 • May 5, 2021 • December 1, 2021 • December 2, 2021  
 January 26, 2022 • February 8, 2022 • February 14, 2022

# WHY CLIMATE ACTION MATTERS FOR MICHIGAN

## MICHIGAN IS FEELING THE IMPACTS OF CLIMATE CHANGE

*Immediate, aggressive action on climate change ensures that Michiganders – present and future – can thrive in Michigan.*

In just the last three years, Michigan has felt the real impacts of climate change. The state has faced a polar vortex that forced residents to come together to keep the heat on, high lake levels that crumbled personal property and public infrastructure, record flooding that caused sewers to back up into homes, increased instances of disease-carrying insects, toxic algal blooms that put our waters in danger, the temporary closure of businesses that rely on seasonal consistency, the breaking of dams that led to the evacuation of a community, and week-long power outages.

Historically stable patterns are changing rapidly in unpredictable ways. Compared to 1900, Michigan is [almost 3 degrees warmer](#) and gets around five more inches of rain per year.

### Frequent and intense storms

Michigan is experiencing historic levels of rain and intense storms. A continuation of extreme rain will lead to more property loss and infrastructure failures, an increase in the likelihood of contamination, bacteria, algal blooms in water supplies, and the risk of contracting waterborne diseases like Legionnaire's. The state has also seen extreme changes in Great Lakes water levels.



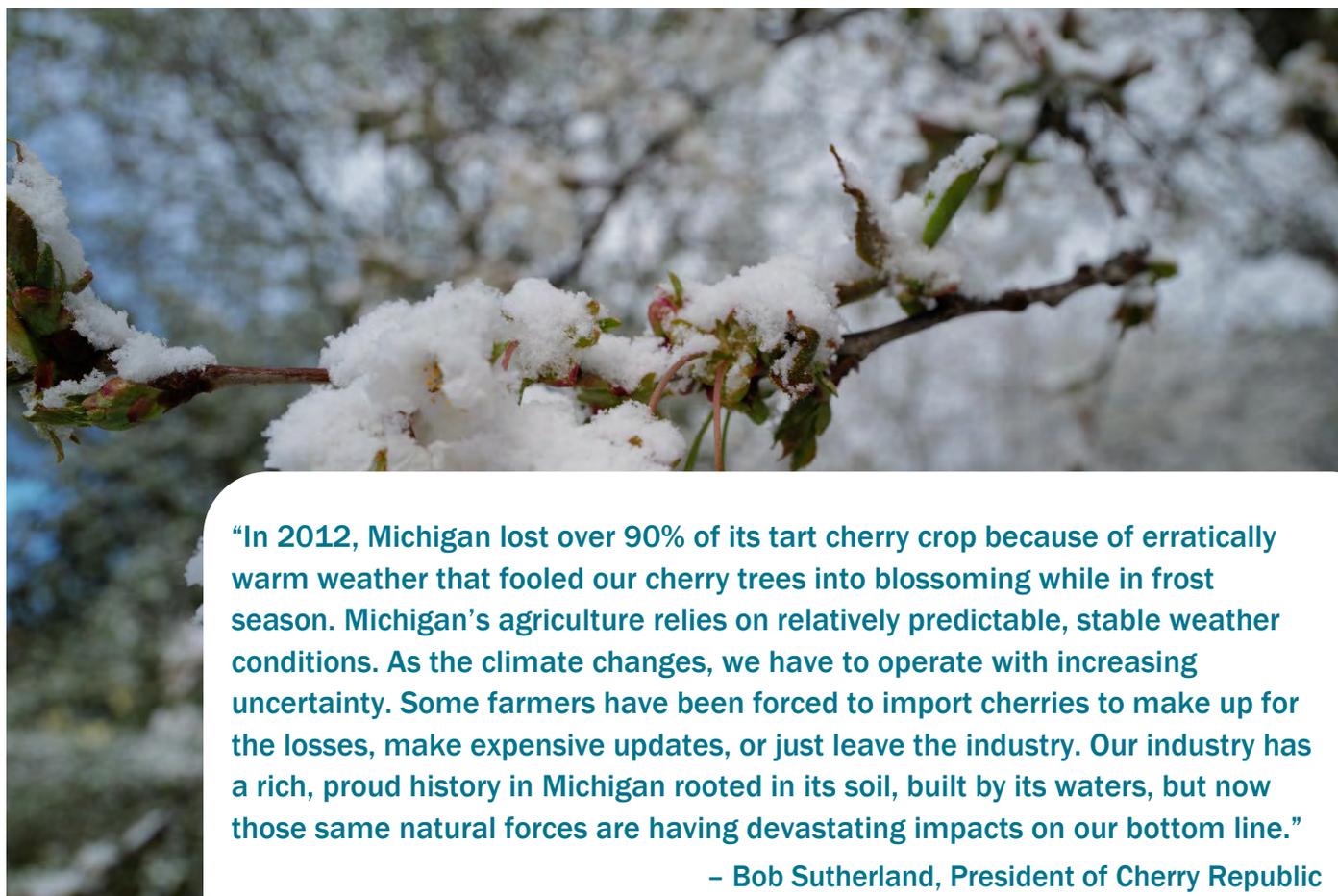
**“When the flood hit on June 25<sup>th</sup> five feet of water flooded our basement. We lost everything that was down there. A lot of the stuff we lost can’t ever be replaced. My husband and I had to leave the house for 2-3 days because we didn’t have any air conditioning and the heat was unbearable. It’s been a devastating experience – and it wasn’t just me, it was the whole community.”**

**– Frankie, a 65-year-old woman from Ypsilanti, Michigan.**

## Rapid temperature changes

Michigan summers are becoming hotter and drier. The latest science suggests that summers in Detroit in 2100 will feel like [summers in Dallas do now](#). Extreme heat will lead to increased hospitalizations due to heat exhaustion and heatstroke, wildlife loss from habitat changes, and increased levels of mosquito and tick populations that carry diseases like West Nile Virus and Lyme Disease. As with intense rains, high heat can damage infrastructure and personal property. Michigan is already seeing roads and sidewalks buckle and break from rising temperatures. On the other side of the calendar, Michigan winters are becoming more unpredictable. In the last 10 years, the state has experienced three polar vortexes leading to irregular cold blasts.

Along with more severe extremes, uncertainty in temperatures has also presented newfound challenges, especially for seasonal activities and industries like farming, hiking, camping, boating, skiing, snowmobiling, and ice fishing. This uncertainty was especially prominent in March 2012 when the state experienced a [record-breaking crop loss event](#) when temperatures hit over 80 degrees causing Michigan cherry trees to bloom, only for the crop to be almost entirely lost when temperatures dipped back below freezing in April.



**“In 2012, Michigan lost over 90% of its tart cherry crop because of erratically warm weather that fooled our cherry trees into blossoming while in frost season. Michigan’s agriculture relies on relatively predictable, stable weather conditions. As the climate changes, we have to operate with increasing uncertainty. Some farmers have been forced to import cherries to make up for the losses, make expensive updates, or just leave the industry. Our industry has a rich, proud history in Michigan rooted in its soil, built by its waters, but now those same natural forces are having devastating impacts on our bottom line.”**

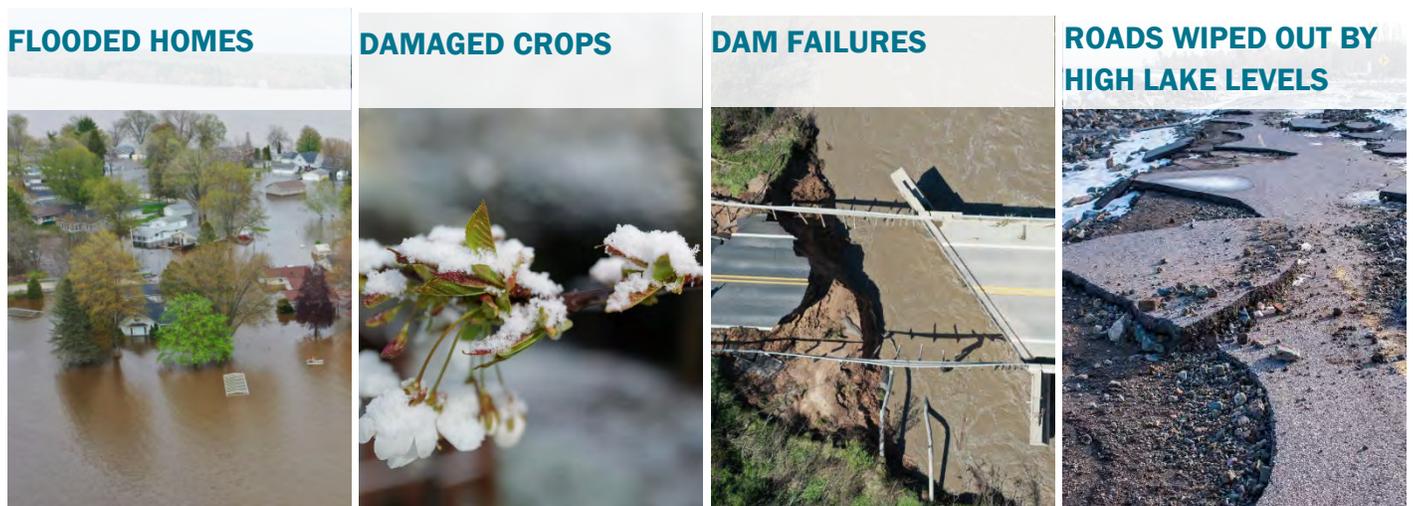
**– Bob Sutherland, President of Cherry Republic**

If we don't act aggressively to reduce GHGs, these impacts will only intensify and become more challenging and expensive for Michigan residents. It is imperative that we reduce emissions as quickly as possible and simultaneously prepare for the changes we cannot prevent.

### Importance of adaptation

The MI Healthy Climate Plan is a climate mitigation and greenhouse gas reduction plan, not a comprehensive plan to adapt and become resilient to the effects of climate change. That being said, Michigan families are already feeling the impacts of climate change – with the most vulnerable being hit hardest. Governor Whitmer and the State of Michigan are committed to continuing to support communities as they prepare for and adapt to climate change. This will be done through regular engagement and communication, the sharing of tools and best practices, and a commitment to robust emergency response protocols in the event of a disaster.

The State is also working to make state-owned infrastructure more resilient and is providing funding and guidance to communities to help them do the same. Mitigation and adaptation are not mutually exclusive. In fact, combining the two is essential. According to the [IPCC's most recent report on impacts, adaptation, and vulnerability](#), adaptation measures become less effective the more the planet warms, and mitigation efforts that do not anticipate future conditions are less effective. We must adapt to the existing impacts of climate change as we work to decarbonize our economy.



## ACTION IS AN OPPORTUNITY TO IMPROVE HEALTH OUTCOMES

*Protecting our public health, air, and water by reducing our reliance on fossil fuel technologies like coal-fired power plants.*

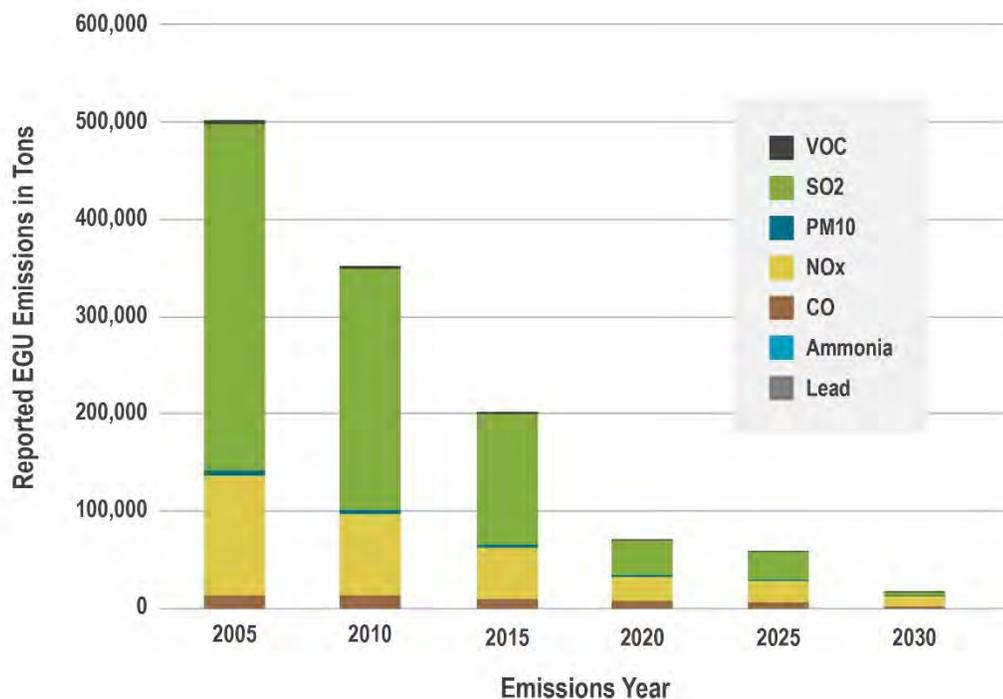
As Michigan implements the strategies in the Plan to reduce GHG emissions, levels of other harmful pollutants in our environment will continue to drop in tandem. That's why determined action to achieve carbon neutrality is an opportunity to dramatically improve public health outcomes, reduce health costs, and avoid lost wages from trips to the doctor, emergency room, or worse. This is especially true for families and communities historically impacted by pollution.

### Easier to breathe

To take the example of one air pollutant, [studies](#) have found that breathing in particle pollution—of which coal-fired power plants are a major source – leads to decreased lung function, increased levels of asthma, exacerbated respiratory symptoms such as coughing or difficulty breathing, and even premature death in people with heart or lung disease. According to state and national data, Michigan's particulate matter pollution from power plants has dropped 73 percent since 2005 as the state has transitioned away from coal-fired power to cleaner energy sources.

As Graph A shows, closing coal-fired power plants and transitioning to cleaner energy sources has spurred similar emissions reductions in Michigan across the five common air pollutants for which the U.S. Environmental Protection Agency sets National Ambient Air Quality Standards (because of their respiratory, cardiovascular, and other harms). Emissions of those pollutants from energy generation in Michigan has dropped 85 percent since 2005. With the closure of our state's remaining coal-fired power plants by 2030, that figure is expected to rise to 96.4 percent. In addition, estimated PM2.5 emissions from electric generating utilities declined from 2,302 tons in 2005 to 1,349 tons in 2020.

### Criteria Pollutants from EGUs



All data is in estimated tons of emission in 2017

Sources: Michigan Air Emissions Reporting System (MAERS) and the EPA's triennial National Emissions Inventory (NEI)

Demonstrating how this Plan’s primary focus on decarbonizing Michigan’s energy production, transportation, and buildings will drive public health benefits, Table A shows the extent to which each of those sectors contribute to emissions of those five common air pollutants.

The transportation sector is currently the largest source of those pollutants in Michigan (Table A). Federal auto emission standards have and will continue to reduce pollution from internal combustion engines. In fact, total emissions dropped around 20 percent between 2014 and 2017. However, we can accelerate those reductions by electrifying our transportation sector. As Michigan residents transition to electric vehicles, we can expect greater improvements in air quality and a decline in related health problems. Better public transit and an increased availability of walking and biking opportunities will also reduce harmful emissions and give residents better opportunities for exercise and enjoyment of Michigan’s recreational amenities.

This is particularly important in areas disproportionately impacted by pollution from the concentration of major transportation corridors there. As Michigan works to decarbonize our transportation sector according to this Plan, state and local transportation planning processes should more fully account for health impacts and emphasize solutions that will accelerate the reduction in transportation-related air pollution.

### Emissions by Pollutant

Pollutant	Electricity Generating Units	Residential Heating	Transportation		
			Heavy Duty	Light Duty	Refueling
Ammonia	98	3,592	220	2,830	
Carbon Monoxide	10,287	82,401	38,133	641,545	
Nitrogen Oxides	38,704	18,053	39,332	66,297	
PM10 Primary	1,134	10,560	4,095	4,919	
Sulfur Dioxide	66,296	485	106	533	
Volatile Organic Compounds	971	11,310	4,342	52,992	4,456

All data is in estimated tons of emission in 2017.

Sources: Michigan Air Emissions Reporting System (MAERS) and the EPA’s triennial National Emissions Inventory (NEI)

While improved air quality is the most direct and widely recognized link between reduced GHG emissions and improved public health, Michigan’s pursuit of carbon neutrality can also benefit our land and water. To take one example, Michigan’s more than two dozen coal ash landfills are another legacy of our state’s historic coal-fired power production. Located close to current and former plants—and in some cases residential areas—these landfills have a history of leaking into underlying aquifers that residents rely on for drinking water. Our transition away from reliance on coal-fired power production will help avoid this contamination in the future.

Finally, we must recognize that climate change is already—and will continue to—have significant public health consequences. Power outages, extreme heat events, exposure to bacteria during sewer backups, and other such climate-related impacts harm Michigan families. Avoiding the most severe such consequences by reducing our GHG emissions as rapidly as possible will help Michigan avoid costly and devastating health outcomes to the greatest extent possible.

In short, decarbonizing Michigan’s economy is a powerful strategy for improving the health and well-being of our 10 million current residents and the generations to come.



**“The [Midland] flood in 2020 had great impact on those with diabetes in this area. We had patients that lost homes or were living outside of their home for a long time after the flood. This led to issues with refrigeration for their insulin and obtaining supplies for their insulin pump because they had no address for their durable medical equipment company to ship their diabetes supplies to.”**

**– Erin, RN, CDCES, Diabetes Center Manager,  
MyMichigan Medical Center, Midland**

## ACTION IS AN OPPORTUNITY TO RIGHT ENVIRONMENTAL INJUSTICES

*Addressing historical harms, prioritizing environmental justice, and creating equitable opportunities for all Michigan residents.*

The State of Michigan should be a place where everyone, no matter their zip code or what is in their wallet, should have the opportunity to thrive – to meet their basic needs, enjoy the dignity of good work, and live in a healthy community with access to affordable housing, water, heat, power, and transportation. Unfortunately, this has not always been the case, particularly for Black, brown, indigenous, rural, and low-income people.

Environmental justice communities are most often communities of color and/or low-income

*The State of Michigan defines environmental justice as the equitable treatment and meaningful involvement of all people, regardless of race, color, national origin, ability, or income in the development and application of laws, regulations, and policies that affect the environment, as well as the places people live, work, play, worship, and learn.*

communities. In addition to facing disproportionate impacts from environmental harms, they generally have been excluded from the opportunities enjoyed by most of society and left behind during major historic economic shifts like our current transition to carbon neutrality.



Environmental injustices are part of a long history of race-based discrimination rooted in the sustained actions, behaviors, and attitudes of institutions and individuals and encoded in our laws at every level. As a result of this structural racial discrimination, environmental justice communities disproportionately neighbor highways, power plants, factories, and other facilities that release pollution into the air and water. Exposure to this pollution over time leads to health issues and lower quality of life. These communities also tend to enjoy fewer trees and lack access to green spaces and other quality outdoor recreation amenities.

Environmental justice considerations are a key component of equitable climate action and will continue to be a priority for the state as it works to eliminate racial disparities impacting the health and well-being of Michiganders. Recognizing that bringing communities of color off the frontlines of the climate crisis and ensuring that they will be full beneficiaries of a carbon neutral economy, Governor Whitmer called on those developing the MI Healthy Climate Plan to design and recommend decarbonization strategies that will prioritize and advance equity and environmental justice. The transition to a carbon neutral economy has the potential to help alleviate existing environmental injustices, address historical harms, and create new opportunities for Michiganders.

## Disproportionate impacts

While Michiganders have relied for generations on the burning of fossil fuels for everything from driving to work to cooking dinner and turning on the lights, many of Michigan's most disadvantaged communities and communities of color have faced the brunt of the environmental and other impacts of an economy based on fossil fuels.

In the electricity sector, high-emitting power generation facilities and related fossil-fuel infrastructure are often located in low-income communities and communities of color. Meanwhile, in Michigan, households with an income below the Federal Poverty Line spend [18 percent of their income on energy](#), compared to an average of 3 percent for the overall population.

In the transportation sector, high-emitting transportation corridors often run right through low-income communities and communities of color, splitting historic neighborhoods in two, [burdening them with higher pollution, and otherwise undermining their quality of life](#).

In homes and businesses, many disadvantaged communities live and work in subpar buildings, face higher energy burden, and are subject to health-related impacts from natural gas appliances, all while lacking access to the investments in energy efficiency and onsite renewable energy seen in other communities.



In the industrial sector, low-income communities and communities of color often endure the environmental and other harms of life on the fence lines of heavy industrial facilities.

Michigan recognizes that tribal nations have also faced disproportionate burdens in our fossil fuel economy and are especially vulnerable to the impacts of climate change because of their deep ties to the land and reliance on hunting, fishing, and gathering. Oil spills and other such contamination have impacted resources like wild rice. The changing climate threatens the sustainability of the Great Lakes fishery which tribal fishers rely upon to earn a living and feed their families. Many cultural practices and traditions require access to species, like the maple tree, that are put at risk by climate change. Michigan's climate strategies and actions must honor, embrace, benefit, and not interfere with the cultural heritage and treaty rights of federally recognized tribal nations in Michigan and preserve the fragile balance of the Great Lakes ecosystem at the heart of that heritage and those rights.



### Just transition

As Michigan transitions away from fossil fuels and traditional carbon heavy industries, it is critical to prepare our workforce for the new opportunities of a carbon neutral economy and ensure all Michigan families have access to those opportunities, particularly those who have not enjoyed equitable access in the past. To ensure our transition to carbon neutrality is just—and avoid responding to climate change in a way that reinforces challenges that historically disadvantaged communities have faced—we need to proactively and intentionally plan for equity and environmental justice. During the transition to a carbon neutral economy, Michigan’s most vulnerable communities must be prioritized. The transition to a carbon neutral Michigan needs to happen as fast as possible without leaving anyone behind.

**In response to a 100-year rain event, the Macomb County Health Department surveyed homes.**

“The responses to our post-flood survey allowed us to see the impact socioeconomic factors have on our population's health. We found it concerning that low-income households (37%) were more than twice as likely to report a decline in their health status than high income households (16%). This has provided an opportunity to focus our messaging and community engagement activities going forward to help us better prepare for future emergencies.”

Tom, Environmental Health Services Division Director, Macomb County Health Department

## ACTION IS AN ECONOMIC OPPORTUNITY FOR MICHIGAN

*Creating good paying jobs for Michigan families, increasing our state's economic competitiveness, and lowering costs as we pursue carbon neutrality.*

Climate change is already resulting in economic costs to families and businesses across the state, but strategic and aggressive climate action also presents immediate and long-term opportunities to create economic growth, support good-paying union jobs, and lower costs for working families. Immediate and sustained action on climate is also necessary for Michigan to remain globally competitive in the decades ahead. The transition to a carbon neutral Michigan needs to happen as fast as possible without leaving anyone behind.

### Economic opportunities

Businesses are increasingly focused on climate and are looking to invest and locate in states that embrace clean energy, advanced manufacturing, and the next generation of transportation. If the State acts aggressively on climate and builds on Michigan's strengths

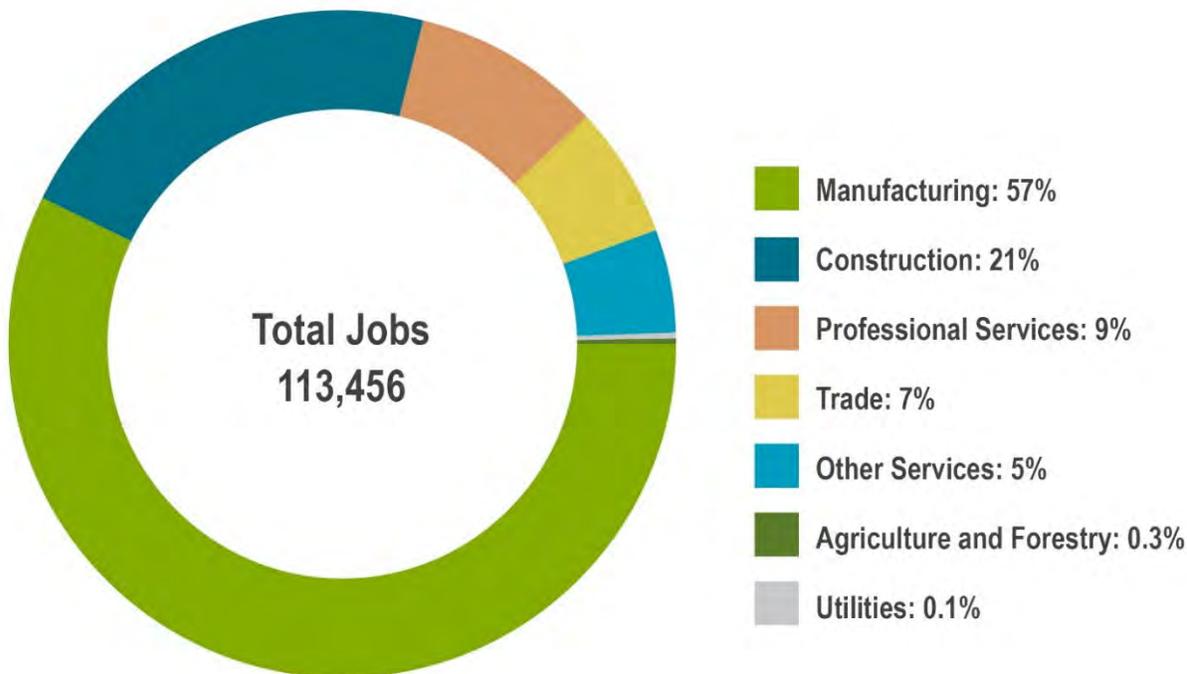
in manufacturing and the automotive sector, we can ensure that homegrown companies stay in Michigan and that the state is more attractive to new economic development opportunities.

In 2021, Michigan was ranked as a [top 3 state](#) for sustainable development. Over the past three years, according to the Michigan Economic Development Corporation, Michigan has received more than \$16 billion in private investment from mobility and automotive companies. In early 2022, GM announced the company's largest ever investment—a total of [\\$7 billion](#) to develop a new battery factory in the Lansing area and convert an existing factory in Orion Township to electric pickups. This major stake in making Michigan an electrified transportation leader will create 4,000 new jobs and retain another 1,000 existing ones in our state. Michigan has also seen significant investments in clean energy projects with more than [\\$5 billion](#) worth of renewable energy projects coming online since the passage of the state's clean energy law in 2008.



## Good-paying jobs

Michigan is home to over 113,000 clean energy jobs in every region of Michigan with the majority in manufacturing (57 percent) and construction (21.7 percent). Showing its resilience and staying power, [Michigan's clean energy industry](#) rebounded faster than the state's overall economy following the initial onset of the COVID-19 pandemic.



The largest number of clean energy jobs in Michigan are in energy efficiency, ranging from HVAC installation to advanced materials manufacturing. The fastest-growing industry is advanced transportation, which employs more than 24,000 Michiganders. Over two-thirds of Michigan's clean energy jobs are with small businesses employing less than 20 workers. Clean energy jobs [pay up to 25 percent more](#) than the national median wage and are more likely to be unionized and come with health care and retirement benefits than the rest of the private sector. Many of these jobs do not require college degrees. Growing our clean energy workforce, connecting opportunities to the Michiganders who need them most, and providing workers the training and skills that they need to succeed will take sustained, deliberate action from the State and the business community.

**"The transition to electric vehicles is a big deal for union workers, union electrical contractors, businesses, and working families. As a union journeyman, I've worked to provide safe, reliable electrical systems for communities and homeowners, but I am so excited about the new opportunity to install and provide service for electric vehicle charging stations and be a part of this transition. This transition is critical to secure Michigan's spot as the home to the future of electric vehicles."**

**- Karen from Detroit**

## Reduced costs for working families

Climate action will also lower costs for working families and small businesses. To achieve our GHG reduction goals, Michigan must make transformative investments in weatherizing and reducing energy waste in our homes and places of business. Combined with the increased use of renewable energy, this will lower the monthly utility bills for Michigan families and businesses. At the same time, the transition to electric vehicles will reduce costs related to fueling and maintaining our cars, while improved public transit will help Michiganders cut the share of our incomes spent on transportation and provide the [8% of Michigan households](#) without personal vehicles greater access to jobs and other opportunities.

Examples of the powerful math behind these benefits include the following:

- For every \$1 invested in reducing energy waste in our homes – through more efficient windows, lighting, and other energy-saving technologies – [homeowners save more than \\$3.20](#) in reduced future energy bills. Energy efficiency also reduces energy burden by as much as 25 percent, translating into more than [\\$400 in annual savings for households](#).
- The [levelized cost of electricity](#) for new onshore wind and solar resources that are coming online in 2023 was \$25.55/MWh and \$25.89/MWh respectively, compared with \$34.78/MWh for new combined-cycle natural gas units. Adding new wind and solar resources is comparable – and in many cases cheaper – to the cost of running existing power plants.
- Michigan sends [billions of dollars out-of-state](#) annually to purchase fossil fuels. If we produce more of our energy right here in Michigan from clean, renewable resources, we will be more energy independent and lower costs for working families.
- Owners of electric vehicles are expected to [save between \\$6,000 to \\$10,000](#) over the life of the vehicle, compared to a gas-powered vehicle, because charging is half as expensive as the equivalent amount of gas and electric vehicles require half as many repairs and cost half as much to maintain.



**“We recently bought an electric vehicle, installed solar panels on our roof, and switched to a geothermal HVAC. We're saving money on utility bills and gasoline without compromising any of our needs. When I tell people about this, they wonder how I could afford it. There are a lot of generous financing options and federal tax credits for these investments. Depending on the project, the payments might be around the same as the energy savings and the project will pay for itself right away! You can make modest investments, lower your bills, and be a part of the climate solution right now.”**

**– John, Farmington Hills resident**

## High cost of inaction

While the opportunities to create good jobs, cut costs, and grow our economy should be more than enough to inspire ambitious action to decarbonize our economy, it is also important to remember that climate *inaction* will come at a high price for Michiganders. Climate change increases the likelihood of natural disasters, damaging infrastructure that is costly to repair and disrupts business. More erratic and unpredictable temperatures lead to uncertainty and losses for our farmers and other sectors that rely on seasonal consistency. And extreme weather worsens health outcomes leading to lost productivity and wages.



Michigan currently spends millions of dollars annually responding to climate-related emergencies and other impacts. Early intervention is a much sounder strategy with a much better return on investment. According to a recent study, the state will avoid **\$4 to \$11 worth of future damages** for every **\$1** it commits to climate adaptation.

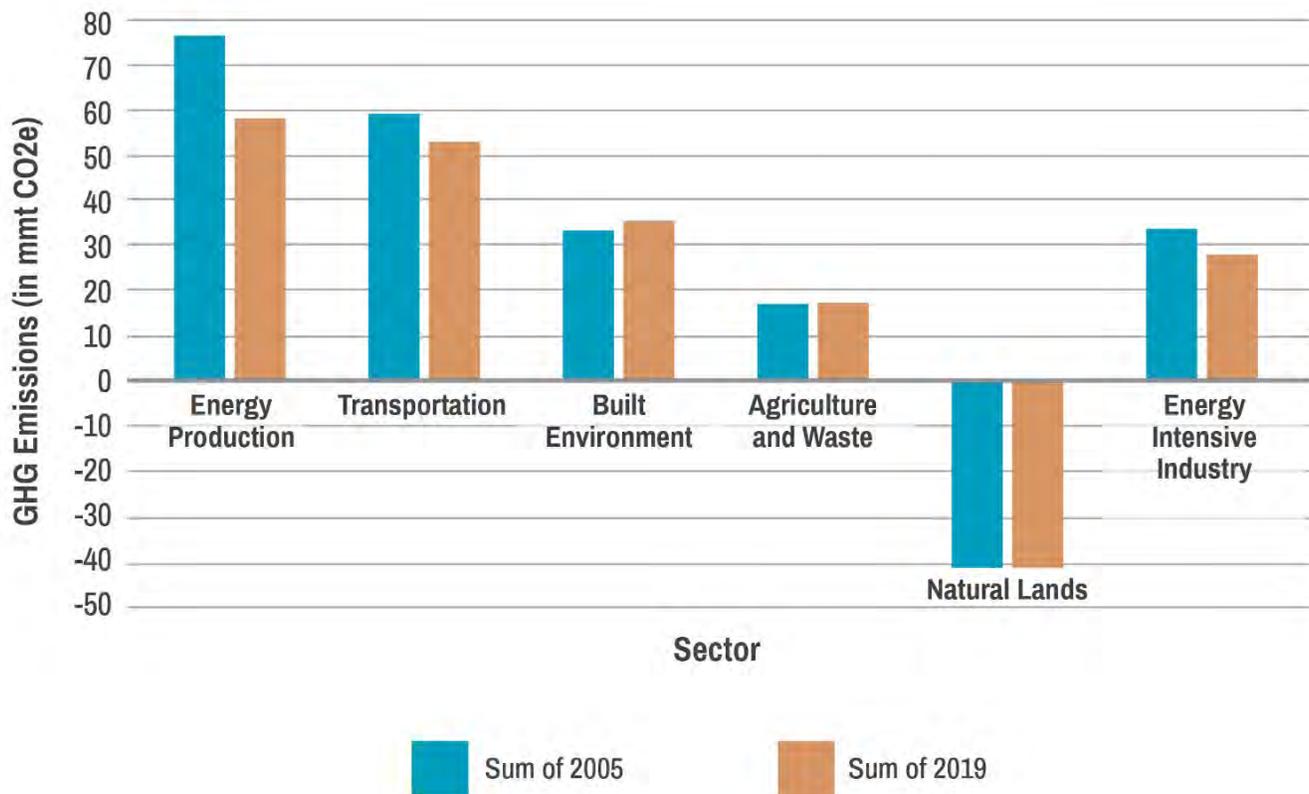
Climate action will spur innovation, increase the state's economic competitiveness, create good-paying jobs for Michigan workers, and cut costs for working families. This Plan sets the state on track to a more prosperous and sustainable Michigan.

# MICHIGAN'S GREENHOUSE GAS EMISSIONS

Governor Whitmer’s emissions reduction goals use a 2005 baseline for Michigan’s GHG emissions, which can be categorized into five key sectors: energy production, transportation, the built environment, natural and working lands, and energy-intensive industries. The following uses [Rhodium Group’s 2021 emissions outlook data](#) to summarize the share of Michigan’s GHG emissions that come from each sector and provide a basic sense of the task ahead and the areas of our economy with the furthest to go in our quest for carbon neutrality.

The electric power sector and the transportation sector are the state’s two leading sources of GHG emissions with the transportation sector set to eclipse the electric power sector imminently. Emissions from heating Michigan’s buildings and running fossil-fuel-burning appliances account for the third largest contribution. Energy-intensive industries contribute a similar level of emissions to buildings—from onsite fuel usage and emissions inherent in certain industrial processes like cement manufacturing. Natural and working lands – which include emissions from agriculture and land-use changes (i.e., developing green spaces or impacting wetlands) – contribute the smallest percentage of overall emissions. However, because natural and working lands also present an opportunity to capture GHG emissions—an important piece of the carbon neutrality puzzle—they should not be undervalued or overlooked.

**Greenhouse Gas Emissions by Source**



## **ENERGY PRODUCTION**

In 2005, the power sector in Michigan emitted 76.55 million metric tons (mmt) of carbon dioxide equivalent emissions (CO<sub>2</sub>e). Those emissions came primarily from coal-fired power plants, followed by natural gas power plants. Michigan also benefits from a diverse power sector that includes nuclear power plants and the pumped hydro facility at Ludington. Through the closure of coal plants and the expansion of renewable energy resources, power sector emissions in Michigan fell to 58.2 mmt CO<sub>2</sub>e in 2019 – a 24 percent decrease over that decade and a half period.

## **TRANSPORTATION**

In 2005, the transportation sector in Michigan emitted 59.26 mmt CO<sub>2</sub>e. Most of those emissions came from light-duty passenger vehicles and heavy-duty freight trucks (our state of 10 million people has nearly 7 million vehicles!). As electric vehicles became more available and modern internal combustion engine (ICE) vehicles became more fuel efficient, transportation emissions dropped slightly to 53.04 mmt CO<sub>2</sub>e in 2019 – a 10 percent reduction since 2005.

## **BUILT ENVIRONMENT**

In 2005, homes and businesses emitted 33.39 mmt CO<sub>2</sub>e, mostly from the use of sources like natural gas, fuel oil, or propane for heating and appliances. Driven by increased emissions from commercial buildings, this sector saw a slight uptick to sector-wide emissions of 35.61 mmt CO<sub>2</sub>e in 2019.

## **ENERGY-INTENSIVE INDUSTRY**

In 2005, Michigan's oil, gas, and industrial sectors emitted 33.78 mmt CO<sub>2</sub>e. Michigan has a rich history of manufacturing, and most of these emissions came from the process of producing new goods, like iron, steel, cement, and chemicals. Industry is always innovating and improving efficiency, leading to reduced emissions of 28.05 mmt CO<sub>2</sub>e in 2019 – a 17 percent change in the right direction.

## **NATURAL AND WORKING LANDS**

Michigan has a unique diversity of land uses and ecosystems. Agricultural soil management is a major source of emissions from this sector, primarily from the large-scale farm operations in the southern portion of the state, while the forests in the north are the state's major carbon sink. This sector's net GHG emissions have remained almost unchanged over the past decade and a half. Agriculture and waste sources emitted 17.12 mmt CO<sub>2</sub>e in 2005 and 17.37 mmt CO<sub>2</sub>e in 2019. Natural lands sequestered 41.35 mmt CO<sub>2</sub>e in 2005 and 41.41 mmt CO<sub>2</sub>e in 2019.

While our emissions are projected to stay on a downward trend, we need to accelerate reductions across all sectors to meet our decarbonization goals on our established timelines. Reducing our emissions at the scale necessary will take concerted action at the international, federal, state, local, and individual levels. To track progress of the MI Healthy Climate Plan and help identify the areas for greatest GHG reduction potential, Michigan will develop a GHG inventory working with public and private partners and stakeholders.

## A CARBON NEUTRAL MICHIGAN

While we are immediately focused on the short-term—and the objectives in the [Roadmap to 2030](#) section below—our long-term goal to achieve economy-wide carbon neutrality by 2050 is no less urgent. Economy-wide carbon neutrality means that every sector of Michigan’s economy – energy production, transportation, built environment, natural and workings lands, and energy-intensive industry – will work together to meet our decarbonization goals. Reaching our mid-century milestone will require particularly substantial effort and innovation in the sectors of our economy that are hardest to decarbonize, including industry, buildings and housing, and agriculture. Since these sectors will take strategies and approaches that are not yet fully developed, we must start now. Also, we cannot take steps between now and 2030 that will jeopardize our ability to meet our 2050 goal.

But what does a carbon neutral Michigan look like? If we take a creative, strategic, and aggressive approach to reducing our GHG emissions, Michigan will be a state where residents enjoy better health outcomes and an improved quality of life; working families have more opportunities, high-paying jobs, and a lower cost of living; equity is centered in every decision; our global leadership in clean innovation and related economic development drives sustained prosperity; and everyone has greater access and a deeper connection to our state’s natural beauty.



# In Michigan in 2050...

As we implement the strategies in this Plan and transition Michigan to a thriving carbon neutral economy—while mitigating and adapting to the negative impacts of climate change—Michigan can take transformative steps toward a future in which:

**Every individual has clean air to breath and clean water to drink.**

**Every business and household has access to affordable energy sourced from reliable, clean energy.**

**Every worker has a good-paying, sustainable job to support their family.**

**Every resident has access to clean, affordable transportation.**

**Every family lives in a healthy, sustainable, efficient home.**

**Every individual has easy access to healthy, affordable, local food.**

**Every resident has safe, natural spaces to enjoy.**

**Every community has the resources to be resilient to the impacts of climate change.**

**Michigan has addressed racial disparities in health outcomes.**

**Michigan is globally known for its leadership in clean innovation and industry.**

**Michigan's land and resources are abundant and healthy.**

**Michigan has mitigated the worst impacts of climate change and worked to adapt and become resilient to existing impacts of climate change.**

As we look to this bright future, we know the best solutions to achieve these goals will emerge and evolve through innovations in technology, strategy, and policy, as well as individual and community level problem-solving. This work must start now and continue through 2050 and beyond.

# A ROADMAP TO 2030



The State of Michigan has committed to carbon neutrality by 2050 with 52 percent GHG emissions reductions by 2030 as an interim target. Achieving our 2030 goal will require Michigan to reduce annual GHG emissions by approximately 92.95 million metric tons of CO<sub>2</sub> equivalent based on today's emissions levels.

Sustained, aggressive action across Michigan's economy is necessary to reach these targets. A variety of factors will determine the extent to which various sectors and subsectors reduce emissions during this time, including technological breakthroughs and constraints, economic opportunities and costs, and public support/consumer demand for change.

The MI Healthy Climate Plan intends to spur the changes that are imperative—that must happen, and happen now, to meet our goals. It also seeks to shape *how* Michigan achieves carbon neutrality by recommending strategies that will maximize the benefits for Michigan families from decarbonization. To that end, the Plan focuses most heavily on the three sectors with the greatest opportunity for rapid and substantial gains in GHG reductions—energy production, transportation, and the built environment. It also prioritizes environmental justice across all actions and spotlights pathways to carbon neutrality that will lead Michigan to better health outcomes, good jobs, and economic prosperity for all Michiganders.

This 'Roadmap' provides recommendations but should not limit additional actions. State government, local governments, tribal governments, and private institutions should strive to move beyond these recommendations and seek innovation and new approaches to reduce GHG emissions. Across all sectors, Michigan should use every tool and chase every dollar available, including Infrastructure Investment and Jobs Act funds, to help meet our climate goals.

**NOTE:** This section borrows liberally from the concepts and language that the five topical workgroups submitted to the Council on Climate Solutions along with their recommendations. The workgroups included: Energy Production, Transmission, Distribution, and Storage; Transportation and Mobility; Buildings and Housing; Energy Intensive Industries; and Natural and Working Lands and Forest Products. In addition to the above-listed workgroups, an internal group led by EGLE staff provided recommendations on decarbonization related to materials management. This section intentionally includes environmental justice recommendations in every sector, not just the environmental justice section.

## Key Recommendations

In the pages that follow, this Roadmap offers several recommendations in each of the areas below with a brief background discussion of each. A brief summary of key recommendations is provided here.

**Commit to Environmental Justice and Pursue a Just Transition:** Ensure that at least 40 percent of state funding for climate-related and water infrastructure initiatives benefit Michigan’s disadvantaged communities (in line with the federal government’s Justice40 guidelines for federal funding); that Justice40 is developed in partnership with leaders in disadvantaged communities; and that Michigan emphasizes a just transition for all workers through proactive engagement, job training, and workforce development.

**Clean the Electric Grid:** Generate 60 percent of the state’s electricity from renewable resources and phase out remaining coal-fired power plants by 2030. Limit energy burden from powering and heating homes to not more than 6 percent of annual income for low-income households.

**Electrify Vehicles and Increase Public Transit:** Build the infrastructure necessary to support 2 million electric vehicles on Michigan roads by 2030. Increase access to clean transportation options – including public transit – by 15 percent each year.

**Repair and Decarbonize Homes and Businesses:** Reduce emissions related to heating Michigan homes and businesses by 17 percent by 2030. Increase investments in repairing and improving buildings to reduce costs for working families and small businesses.

**Drive Clean Innovation in Industry:** Encourage clean innovation hubs where private enterprises strategically co-locate and collaborate to develop and deploy new, cleaner manufacturing technologies and conduct research and development to reduce emissions from hard to decarbonize industries. Triple Michigan’s recycling rate to 45 percent and cut food waste in half by 2030.

**Protect Michigan’s Land and Water:** Protect 30 percent of Michigan’s land and water by 2030 to naturally capture GHG emissions, maintain and improve access to recreational opportunities for all Michiganders, and protect biodiversity. Leverage innovative strategies to support climate-smart agriculture.

## COMMIT TO ENVIRONMENTAL JUSTICE AND PURSUE A JUST TRANSITION

We are committed to addressing past, present, and future environmental injustices and providing equitable access to the jobs and other benefits of Michigan’s carbon neutral future. This section of the Plan focuses on policies and programs that will ensure the equitable treatment and meaningful participation of all Michiganders in that future.

### Key Strategies

- **Justice40** – Ensure that at least 40 percent of state funding for climate-related and water infrastructure initiatives benefit Michigan’s disadvantaged communities, in line with the federal government’s Justice40 guidelines for federal funding. Develop Justice40 in close partnership with leaders in disadvantaged communities.
- **Environmental justice analysis** – Engage all state agencies in determining how environmental justice screening tools can assist them in designing better information gathering, outreach, engagement, and decision-making processes to reduce existing and future impacts to residents (this includes permitting decisions). Expand on the efforts of the Michigan Public Service Commission to conduct an environmental justice and health impact analysis as part of Integrated Resource Planning (IRP) so the potential community impacts of utility investment decisions are more fully considered.
- **Workforce development and job training** – Strengthen and create workforce development, job training, pre-apprenticeship/apprenticeship, joint labor management training, and other such programs for in-demand clean energy jobs – from pre-weatherization services to grid maintenance, electric vehicles, and renewables. Ensure these programs are federally certified by the Department of Labor where applicable. Incentivize workforce development and training for workers experiencing energy-related employment transitions and those in underrepresented or disproportionately impacted communities.
- **Just transition** – Expand transparency around the Energy Transition Impact Project’s work and provide financial support and best practices to communities addressing economic transitions from closures of fossil fuel facilities and other large industrial operations. Work with employers and other partners to develop sector-specific retraining solutions.
- **Development, retention, and attraction of clean energy businesses** – Expand efforts to support business development, retention, and attraction around clean energy businesses. Conduct trainings to support minority-owned, veteran-owned, women-owned, tribal-owned clean energy businesses and help them compete in utility and state procurement programs. Identify tools and best practices to expand opportunities for these firms in Michigan.

Beyond committing to the actions above, this Roadmap includes recommendations infused with environmental justice considerations in each of the major GHG-emitting sectors. For example, this Plan also includes commitments to reduce energy burden for disadvantaged communities, strengthen ratepayer input at the Michigan Public Service Commission (MPSC), and spur more equitable investments in energy saving home repairs, public transportation, and clean energy solutions for schools.

## Background

The State of Michigan should be a place where everyone has the opportunity to thrive, no matter their zip code or the contents of their wallet. This includes the opportunity to enjoy the dignity of good work and live in a healthy community with access to affordable housing, water, and utilities. Unfortunately, this has not always been the case, particularly for Black, brown, indigenous, and low-income people.

[The United for ALICE project](#) documents the struggle experienced by the Asset Limited, Income Constrained, Employed segment of our population. It shows that even with unemployment at record low levels, much of our population struggles to make ends meet. In Michigan as a whole, 38 percent of the population falls into this category with 13 percent below the poverty line and 25 percent above it but still not making ends meet. More than half of Michiganders across much of the Upper Peninsula and the central portion of the Northern Lower Peninsula fall into this category. In Detroit, the figure is approximately 70 percent.

These Michigan families face daily “choices” between paying rent, staying current on utility bills, and buying food for their children. With limited resources, they are also particularly vulnerable to the extreme weather, economic transitions, and other impacts of climate change. If Michigan does not proactively intervene, climate change will only deepen these existing harms and inequities. We must seize our transition to carbon neutrality as an opportunity to chart a new path.

## Guarding against future challenges

Many of the strategies laid out in this plan will help right environmental justice wrongs from the past. Renewable energy and electric vehicles will help clean the air, and green infrastructure will help keep our cities cooler and utility bills lower.

However, if we are not deliberate in moving toward an environmentally just future, we run the risk of creating new inequities as we transform the way we create and consume energy. For example, electric vehicles are not yet affordable or accessible for all Michiganders, so the Plan includes a broad transportation decarbonization strategy to make walking, biking, and public transit more accessible to Michigan families and electric vehicles cheaper and easier to charge.

In the electric sector, there is no automatic guarantee that retiring coal facilities and increasing use of other electric generation assets – current or future – will benefit Michigan communities. That is why the Plan calls for holistic energy planning and increased consideration of environmental justice in decision making. Additionally, while more renewable energy will help all Michiganders, access to the benefits of renewable energy may not be equitable. Thus, the Plan calls for funding programs focused on Michigan’s disadvantaged communities. Finally, we must take particular care to ensure that the energy transition does not result in a disproportionate energy burden for Michigan’s disadvantaged communities. In other words, we must do everything we can to avoid a future in which utility bills cost families in those communities an even greater share of their disposable income.

Our frontline communities will also be hit first and hardest by the impacts of climate change. An environmentally just future includes making sure that no one experiences disproportionate harm from the extreme heat and precipitation that Michigan will experience over the next century no matter how quickly we decarbonize. This Plan does not contain a holistic adaptation and resilience strategy, though resilience will be core to our Plan implementation work.

## Justice in funding decisions

In January 2021, the White House created the [Justice40 Initiative](#) by executive order. It aims to deliver to disadvantaged communities 40 percent of the overall benefits of relevant federal investments. As a part of this Plan, Michigan has committed to aligning our relevant federal and state investments with this initiative.

The State is currently waiting for guidance from the federal government on how to effectively implement Justice40. The State will also actively seek input from environmental justice communities, tribal governments, and other stakeholders as we define the scope, benefits, and community qualifications for this initiative and determine how to best implement Justice40 and track progress.

## Inclusive and transparent engagement and decision-making

In addition to funding decisions, we must ensure all state agencies are considering environmental justice across their operations and decision making.

As mentioned above, the Plan calls for all state agencies to evaluate current information gathering, outreach and engagement, and decision-making processes and determine how environmental justice screening tools can assist them in avoiding and correcting disproportionate impacts on disadvantaged communities.

It also calls for the expansion and improvement of efforts initiated by EGLE and the MPSC to conduct an environmental justice and health impact analysis as part of utility Integrated Resource Planning, so that the potential community impacts of utility investment decisions are more fully and faithfully considered. The Plan also includes multiple opportunities to support meaningful engagement of Michigan's environmental justice communities, including calling for additional funding for the Utility Consumer Representation Fund, which is managed by the Utility Consumer Participation Board, to support ratepayer advocates in their interventions at the MPSC.

As the Plan is implemented, the OCE will establish consistent and transparent practices for engaging

## EXPANDING ON THE WORK OF THE ENVIRONMENTAL JUSTICE PUBLIC ADVOCATE

In 2019, through [Executive Order 2019-06](#), Governor Whitmer created the [Office of the Environmental Justice Public Advocate](#) (OEJPA).

To gather input from impacted communities, the OEJPA has hosted 8 regional roundtables across the state to discuss environmental justice challenges and identify opportunities to pursue more just outcomes in environmental decision-making. It has led the State of Michigan in developing the Michigan [Environmental Justice Screening Tool](#), an interactive mapping tool that identifies Michigan communities that may be disproportionately impacted by environmental hazards. The map will allow users to explore the environmental, health, and socioeconomic conditions within a specific community, region, or across the entire state.

The OEJPA is also working directly with partners in individual communities, including a new pilot to build a [Community Resiliency Plan](#) in the 48217-zip code in Southwest Detroit. And the office coordinates initiatives with Michigan's tribal governments, like the [Michigan Wild Rice Initiative](#), which brings together specialists and managers from all 12 federally recognized tribes, multiple state departments and federal agencies, and others to share information, coordinate approaches, and elevate awareness about wild rice conservation and restoration.

environmental justice communities in close collaboration with existing bodies like the MAC-EJ. In addition, the OCE will ensure robust engagement with tribal governments continues through the existing tribal consultation process.

### **Invest in workforce and a just transition**

As we transition to a decarbonized economy with more efficient buildings, increased renewable energy sources, and expanded electrified transportation solutions, Michigan must invest in our workforce. We need to be prepared to capture new, good-paying jobs for Michigan workers and support those who may need to transition as the economy changes. Michigan is committed to ensuring no Michigan workers get left behind.

In 2020, Governor Whitmer launched the [Energy Transition Impact Project \(ETIP\)](#) under the leadership of the Department of Treasury. ETIP is designed to identify communities that will be impacted by the changes to the mix of energy production facilities in Michigan. The program works directly with those communities and workers to minimize impacts from a facility closure, including the loss of employment, property tax revenues, and related community services. Comprehensive transition strategies are developed to reposition communities for future economic development, high-paying jobs, new infrastructure investments, housing improvements, and other needs identified by local leaders and residents.

In addition, to support worker transitions and keep Michigan competitive for the clean energy jobs of the future, State of Michigan programs expanded their focus on high-quality workforce development, job training, pre-apprenticeship and apprenticeship, and joint labor management trainings for in-demand clean energy jobs. And, to make sure there is a demand for graduates of these programs, the Plan includes business development, retention, attraction, and other supports for minority-owned businesses in the clean energy industry. It is critical that workers who may be displaced by the energy transition—and residents who have been disproportionately impacted by climate change—are able to take advantage of new clean energy job opportunities.



## CLEAN THE ELECTRIC GRID

In 2019, Michigan’s power sector contributed approximately 30 percent of Michigan’s total GHG emissions. In 2020, coal and natural gas, the two primary sources of GHG emissions in the power sector, provided 59 percent of all electricity generation in the state. To meet our climate goals, Michigan will need to increase the adoption of wind and solar generation, increase energy waste reduction, invest in grid infrastructure and planning, and ensure that all of these actions are done in a manner aligned with environmental justice.

### Key Strategies

- **Clean energy resources** – Generate 60 percent of the state’s electricity from renewable resources by adopting a renewable energy standard of 50 percent by 2030, supporting voluntary utility green pricing programs, and creating more favorable conditions for customer-sited behind-the-meter distributed energy resources like rooftop solar. Work with Michigan utilities to effectively phase out coal-fired power plants.
- **Holistic and integrated energy system planning** – Improve energy system planning by fully integrating traditional resources, transmission, distribution, new and emerging resources, and considerations related to the interdependency of electric and natural gas systems. Elevate community health impacts and equitable access to infrastructure in energy planning and investment decisions. Continue to develop and refine innovative rate designs to incent behaviors that advance clean energy goals.
- **Affordability and energy burden** – Limit energy burden from powering and heating homes to not more than 6 percent of annual income for low-income households. Increase affordability of utility services through expanded “Percent of Income Pilot Programs” and through minimum allocation levels for utility investment in low-income energy efficiency programs. Direct additional funding to the Michigan Utility Consumer Representation Fund (UCPF) to provide resources to intervenors in MPSC proceedings who represent the interests of low-income communities.
- **Siting** – Assist clean energy developers and communities in adopting best practices for siting renewable energy systems. Implement a plan to site solar on state-owned lands and properties as quickly as possible.
- **Energy storage** – Adopt a statewide storage target to deploy 4,000 Megawatt (MW) of grid scale storage by 2040 with a short-term target of 1,000 MW by 2025 and a medium-term target of 2,500 MW by 2030. Increase consideration of energy storage resources in utility Integrated Resource Plans through accurate modeling.

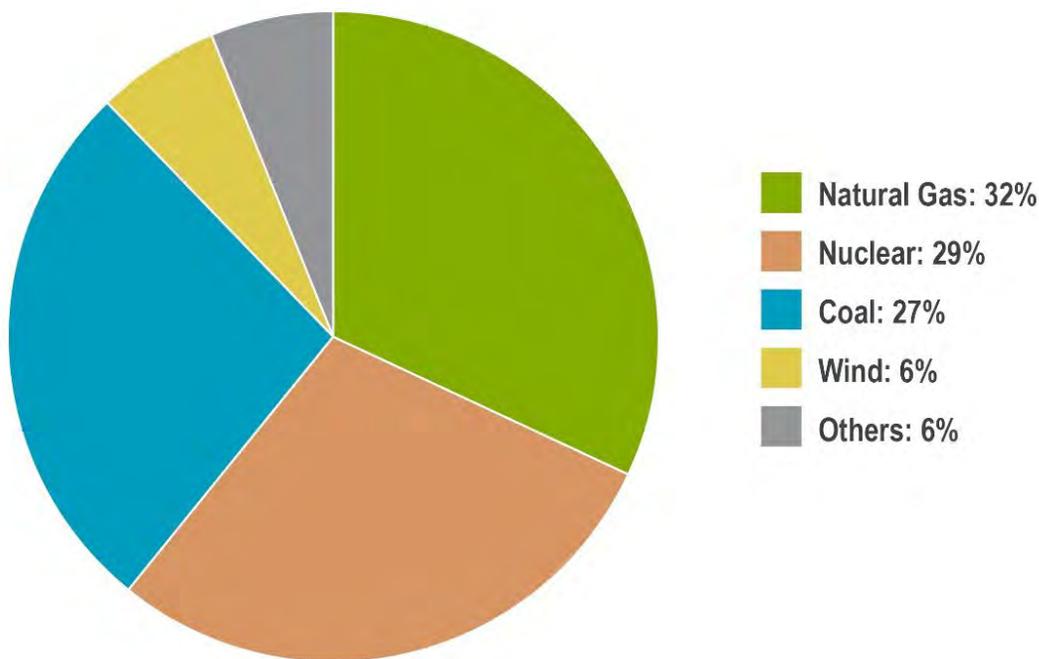
### Background

To reach our climate-related goals, attract clean energy jobs, and drive down costs for Michiganders, rapid and comprehensive action is needed in the electricity sector. In fact, bolder action is particularly wise here—relative to other sectors—because of the cost-effective and scalable nature of decarbonizing the electricity sector.

This Plan’s recommendations prioritize five key strategies for transforming the electricity sector: accelerating the adoption of renewable energy like wind and solar; retiring coal and other fossil fuels; investing in energy waste reduction measures that drive down costs for Michiganders; improving infrastructure and planning to ensure resource adequacy; and making sure all efforts are done with environmental justice in mind.

It is important to note that energy waste reduction is a key strategy in the electricity sector, but it is addressed more robustly in the “Repair and Decarbonize Homes and Businesses” section of the Plan.

### Michigan Electric Generation



### Drive Adoption of Renewables

Michigan’s progress over the last decade has shown that an economy powered by clean, renewable electricity is not only possible but increasingly preferred. Currently, renewable energy generates [about 11% of Michigan's total in-state electricity](#). As deployment has increased and the wind, solar, energy storage, and related industries have scaled up, the cost of renewable energy has continued to fall. According to the [MPSC](#), it cost energy providers an average of \$64.48 per megawatt hour to purchase renewable energy in the period from 2009 to 2020. However, in some cases, recent contracts have dropped in cost by more than 35 percent, thus making them significantly less expensive and more stable for major energy providers than non-renewable resources.

Nearly all of Michigan’s electric utilities have made individual commitments to reduce carbon emissions, with some utilities pursuing levels of renewable energy deployment beyond what is required under the state’s existing mandates and goals. They are also retiring their fleets of aging coal-fired plants. According to utility retirement schedules, just one coal-fired power plant is scheduled to continue operating after 2028.

Despite this progress, Michigan will need a massive scaling up of renewable energy to achieve 60 percent renewable energy penetration this decade and reach carbon neutrality by 2050. To reach that 2030 target, Michigan must adopt a renewable energy standard of 50 percent by 2030 through the passage of legislation or via formal commitments from Michigan’s utilities in proceedings before the Michigan Public Service Commission. As a demonstration of the feasibility of that standard, Michigan’s investor-owned utilities already have plans in place to dramatically scale up their renewables. Taking solar for example, [DTE](#) intends to have at least 10 million panels in its generation mix by 2040, and [Consumers Energy](#) is planning for 8,000 MW built by the same year.

While a 50 percent renewable energy standard serves as a foundation, higher levels of renewable energy penetration will be necessary to achieve our goals and customer-enabled renewable energy will play a central role in additional gains. In Michigan and across the country, large companies and customers are helping to drive the increased adoption of renewable energy through tools like voluntary green pricing programs, customer-sited distributed energy, community solar, demand response, battery storage, and more. By encouraging the most-cost effective investments in clean energy resources for all energy customers, including supporting customer-sited resources, we can increase options for customers to participate in the fight against climate change and make our electric grid more resilient.

Of course, adoption of renewable energy on the scale necessary to achieve our goals will require Michigan to responsibly locate wind, solar, and storage in communities across the state. Local siting challenges have been well documented as a limiting factor in Michigan’s path to reaching carbon neutrality. Through Michigan’s [Catalyst Communities](#) program and tools like [EGLE’s Renewable Energy Ordinance Database](#), the state will expand support for local units of government to adopt best practices for siting renewable energy systems within their communities.



## Transition away from fossil fuels

Retiring coal facilities on an accelerated timeline is fundamental to reaching Michigan’s near-and long-term climate objectives. The Plan recommends that Michigan complete its transition away from coal-fired generation for powering our homes and businesses no later than 2030. It also calls for energy planning that will include options for reducing reliance on natural gas and other pathways for decarbonizing the electricity sector that go beyond coal plant retirement. As this transition takes place, Michigan must invest in support systems for workers displaced from fossil-fuel-powered generation facilities and ensure resource adequacy through investments in new generation assets and improved transmission, distribution, and storage.

## Ensure resource adequacy through investments in infrastructure and planning

Building on the current IRP process at the MPSC—[established with the passage of the 2016 energy laws](#)—Michigan is well-positioned to undertake a comprehensive energy planning process to ensure reliability, affordability, and the cost-effective integration of new technologies as the sector decarbonizes. Comprehensive energy planning includes rate design, traditional resource planning, long-range transmission planning, distribution planning, storage planning, consideration of new and emerging resources, planning around areas of interdependency between the electric and natural gas systems, consideration of community and health impacts, and identification of viable decarbonization pathways aligned with carbon neutrality by 2050.

To help ensure reliability and affordability for ratepayers while we decarbonize this sector, Michigan must continue to invest in transmission and distribution infrastructure and maintain existing clean energy and energy storage assets. In addition, Michigan must invest more robustly in grid scale energy storage through a deployment target of an additional 2,500 MW by 2030 and 4000 MW by 2040.

## Ensure affordability and justice

Energy burden is the percentage of household income that a given household spends on home heating and electricity costs. Energy burden is often much higher in low-income households, where residents may be unable to afford energy efficiency upgrades to their existing homes or the purchase of more expensive homes that are already energy efficient. [For example](#), in 2018, households with an income between 0-30 percent of the state median had an average energy burden of 24 percent, compared to an average energy burden of 2 percent for households with an income at or above the state median. Michigan must develop and expand utility programs to ensure no low-income household is paying more than [6 percent of their annual income on energy](#). As these programs are developed, Michigan should increase funding to the UCRF, which is overseen by the Utility Consumer Participation Board, with the express intent of allowing for more participation from disadvantaged communities in the design of these programs.

## ELECTRIFY VEHICLES AND INCREASE PUBLIC TRANSIT

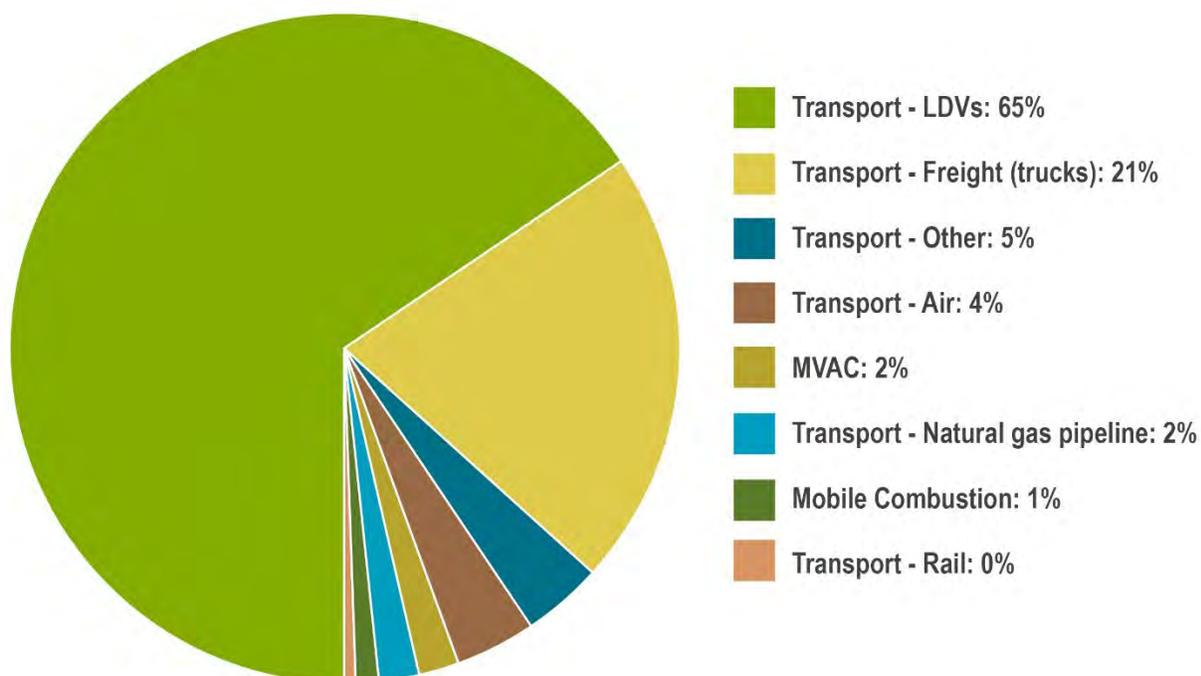
As of 2019, Michigan's transportation sector accounted for almost 28 percent of the state's total GHG emissions, the second highest emitting sector after the power sector. Transportation emissions are primarily due to the combustion of petroleum products such as gasoline and diesel in light-duty vehicles and freight trucks.

It will take a broad, all-options approach to transportation to put Michigan on track to achieve its decarbonization goals, increase equity, and offer new economic opportunities to Michiganders. To decarbonize how Michiganders move, Michigan will need to drive a rapid transition to cleaner fuels and electrification, make unprecedented investments in electric vehicle charging infrastructure, increase access to diverse transportation options, and focus on integrated people- and planet-focused transportation planning.

### Key Strategies

- **Purchase incentives** – Create and fund an incentive program for the purchase of electric vehicles and at-home charging stations. Explore incentives for products like electric off-road vehicles, electric recreational vessels, and e-bikes.
- **Electric vehicle charging** – Build the infrastructure necessary to support two million electric vehicles on Michigan roads by 2030. Leverage the success of the Charge Up Michigan program to equip Michigan with a comprehensive, accessible network of chargers using various financing tools, including public funding opportunities and public-private partnerships.
- **Electrified fleets** – Transition the State of Michigan's fleet to 100 percent zero-emission vehicles. Fund and support local governments and small businesses with fleet transitions and work with schools to quickly electrify school bus fleets, with a prioritization on communities with high levels of air pollution.
- **Clean Fuels Standard** – Adopt a Clean Fuels Standard (CFS) to reduce the carbon intensity of every fuel in use.
- **Transit and diverse transportation options** – Increase access to clean transportation options – from public transit to electric vehicles – by 15 percent each year. Work with communities that are mobility insecure to set community-specific targets to expand access to clean transportation options. Increase investment in more efficient, cleaner public transit systems—as well as bike paths, walking trails, and other such infrastructure—to offer the broadest possible range of options to residents.
- **Transportation planning** – Implement a Safe Systems Approach in transportation planning to work towards the elimination of fatal and serious injuries for all road users. Develop a transportation strategic plan focused on electrification to guide state agencies in moving Michigan toward our cleaner mobility future. Consider creation of a statewide electrification plan for transit.

## Transportation Greenhouse Gas Emissions by Sub-Sector Source



### Background

For over a century, Michigan has enjoyed global automotive leadership. To remain at the forefront, the State needs to lead on the transition to electric vehicles, invest in infrastructure, support the retraining of our transportation workforce to ensure all workers transition into new high-paying jobs, and provide an attractive business environment for our auto industry.

While vehicle electrification is a key technology needed to meet 2050 decarbonization goals for the transportation sector, it cannot be the only decarbonization solution for Michigan. Michigan needs to employ multiple strategies and effective planning to achieve our state's transportation decarbonization goals and mobility needs as the transition to electrification unfolds over time.

### Transition to cleaner fuels and electric vehicles

Electric vehicles represent a small fraction of Michigan's current auto sales today. Just [0.62 percent](#) of all vehicles sold here in 2020 were electric. Two of the key current barriers to widespread uptake are the higher purchase cost typically associated with these vehicles and the real or perceived lack of electric vehicle charging infrastructure.

To address these challenges, the State of Michigan will develop purchase incentives targeted to spur sales of electric vehicles throughout Michigan, particularly in the near-term to stimulate market growth and help more Michiganders access clean transportation options. To lead by example on this path, the State of Michigan will transition its fleet to 100 percent zero-emission vehicles by 2035 for light-duty vehicles and 2045 for medium- and heavy-duty vehicles. Leveraging this leadership, the State will also expand funding options for fleet conversions for local governments, small businesses, and school bus fleets, with a prioritization on communities with high levels of air pollution.

To build out the necessary charging network, Michigan will expand funding opportunities for direct current fast charging stations to make sure that Michigan residents can drive an electric vehicle throughout the state without anxiety over where to get their next charge. Through [Charge Up Michigan](#), the State has already invested more than \$45 million in charging infrastructure and will spend millions more in the coming years thanks to the recent and forthcoming influx of additional federal resources. By expanding funding through the Charge Up Michigan program and partnering with utilities and the private sector, Michigan will deploy enough charging infrastructure to support two million electric vehicles on Michigan roads by 2030. In pursuing that 2030 target, Michigan should aim for electric models to account for at least 50 percent of light-duty vehicle sales, 30 percent of medium- and heavy-duty vehicles sales, and 100 percent of public transit vehicles and school buses sold that year.



Michigan should also pass legislation to adopt a CFS, a technology-neutral, performance-based policy to reduce the carbon intensity of transportation fuels. These standards ratchet down carbon emissions in the transportation sector over time, increasing the use of lower-carbon fuels and reducing the use of higher carbon fuels. By setting a standard that grows more stringent over time, the program will dramatically increase private investment in lower carbon fuels. While providing added encouragement and support for the emerging electrified transportation sector, this policy can also incentivize the use of lower-carbon liquid fuels in non-electric vehicles during the transition to a fully electric future. In addition, a CFS can be designed to create revenue for reinvestment in electric vehicle purchase incentives or charging infrastructure. This policy is a critical bridge between the status quo's carbon-intensive fuels and electrification.

### **Increase access to diverse transportation options**

Vehicle electrification cannot be the only transportation decarbonization solution for Michigan. Vehicle fleets have inherently slow turn-over rates. The vast majority of vehicles on Michigan's roads will still be burning gasoline in 2030, even if we adopt the market incentives recommended in this Plan and automakers aggressively pursue their electric vehicle sales goals. In light of this reality, Michigan needs to employ multiple strategies to achieve our transportation decarbonization goals as the transition to electrification unfolds over time. Expanding access to safe and convenient public transit, mobility solutions like car sharing, and high-quality bike and walking infrastructure will play a vital role in decarbonization.

Better and more widely available transit also represents an opportunity to advance equity. It increases access to opportunities to learn, earn a living wage, and remain healthy for the many Michigan families that currently lack reliable transportation. [Almost eight percent of Michigan households](#) have no vehicle at all, and that number more than doubles to 19 percent for renters. Nearly 3 out of every 5 jobs cannot be reached by public transit, meaning that these opportunities are not equitably accessible to all Michigan families. This is particularly true for non-white households, which make up 79 percent of transit riders. Public transportation is also the best transportation option—and in some cases the only viable one—for many seniors and Michiganders with disabilities. This Plan sets goals to diversify transportation options and increase investments in public transit and related mobility solutions.

### **Implement people and planet focused transportation planning**

Strategic transportation planning will help knit traditional and advanced transportation options into an integrated system that serves all Michiganders equitably. As Michigan develops a statewide electrification plan and related tools to do just that, coordination will be critical given the many key players involved, including local, state, and federal agencies and a great variety of private partners.

The Plan also recommends the implementation of a [Safe Systems approach](#) to transportation planning that focuses on safe mobility for all road users. Implementing the Safe System approach means anticipating and proactively planning for road user mistakes through the design and management of road infrastructure and the development of rules and regulations for drivers that lower the risk of death or serious injury.

## REPAIR AND DECARBONIZE HOMES AND BUSINESSES

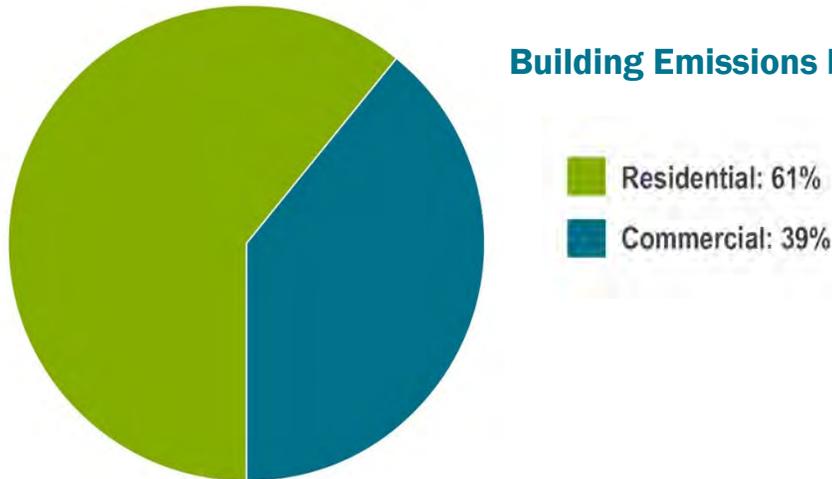
As of 2019, Michigan's buildings accounted for almost 18 percent of the state's total GHG emissions, the third highest emitting sector after the power and transportation sectors. While Michigan's buildings use a significant amount of electricity for lighting, appliances, air conditioning, ventilation, and other purposes, those emissions are accounted for in the electric generation sector. Emissions related to the built environment are primarily due to use of heating fuels such as natural gas, propane, and oil.

In addition to its pivotal role in achieving our climate goals, investing in our building stock will help lower utility and other costs for working families and small businesses, make our homes and workplaces healthier, and expand economic opportunities across the state. Decarbonizing our buildings will require baseline investments in repairing Michigan's homes; stronger requirements, incentives, and financing options for energy efficiency and waste reduction; and evaluation and adoption of innovative home heating alternatives, including electrification in immediately cost-effective use cases.

### Key Strategies

- **Heating Michigan homes and businesses** - Reduce emissions related to heating Michigan homes and businesses 17 percent by 2030. Focus on both public and private-sector investments and targeted efficiency and assistance programs to reduce the energy burden for low-income residents.
- **Clean financing opportunities** - Explore programs, financing options, and public funding opportunities - including the allocation of funds to the state's nonprofit green bank, Michigan Saves - to help families, small businesses, and schools invest in clean energy projects from weatherization to renewables and building decarbonization. Adopt and promote utility on-bill financing and property assessed clean energy programs (PACE). Identify sources of consistent, ongoing funding to address homes that are ineligible for weatherization assistance.
- **Building codes and climate readiness** - Adopt the 2021 Model Energy Code with provisions to support electric vehicle charging and consider incorporation of additional climate mitigating solutions such as energy storage, renewable energy, and building decarbonization.
- **Energy waste reduction programs** - Increase utilization of cost-effective opportunities to reduce energy waste. Achieve at least 2% annual electric energy efficiency savings by increasing the current energy waste reduction target for electric utilities and maintaining the corresponding incentives for exceeding statutory minimums. Restore the energy waste reduction target for municipal and cooperative electric utilities. Increase energy waste reduction (EWR) for natural gas utilities to a minimum of 1.5% annual savings with enhanced cost-effective incentives for exceeding statutory minimums. Work to ensure energy efficiency is on a level playing field with supply-side resources (i.e., power generation) in the MPSC integrated resource planning (IRP) process which guides the financial investments of Michigan utilities. Explore additional pathways to reduce energy demand and energy burden.
- **Incentives for energy efficient appliances** - Establish incentives for the sale of electric appliances that yield immediate energy and cost savings, particularly for low-income Michiganders.
- **Evaluate gas system regulatory and policy options** - Undertake a pathway analysis to assess options to reduce carbon intensity in the built environment.

## Building Emissions by Source



### Background

To reach our 2030 goals of reducing emissions relating to heating Michigan homes and businesses 17 percent by 2030, Michigan must reduce end-use emissions related to heating Michigan homes and businesses by approximately three percent per year from now to 2030. We will accomplish this objective through investments in energy conservation, energy efficiency, smart consumption, cogeneration, and replacing traditional fossil fuel use with cost-effective technologies that rely on electricity and alternatives like renewable natural gas and hydrogen.

Half of Michigan homes are less than 50 years old. With adequate care and maintenance, most will remain in use through and beyond 2050. While the other half of Michigan homes are more than 50 years old, most can be expected to last another 50 years or more with modest investments. However, many of these buildings are inefficient and rely on fossil fuels for heating and appliances like gas stoves. They will require significant upgrades to be fully decarbonized.

Energy efficiency and weatherization investments targeted at Michigan's most inefficient buildings will drive significant investments in Michigan's most disadvantaged communities. Unfortunately, not every home is ready for energy efficiency and weatherization upgrades. Many of Michigan's most inefficient buildings need a new roof or upgrades to remove carbon monoxide from the home before they can qualify for many available funding programs. In fact, 25 percent of all weatherization projects across the state are deferred due to structural challenges. This barrier is even higher in older communities like Detroit where deferral reaches nearly 75%. Michigan must increase investments in home repairs and streamline access to energy efficiency and weatherization funding programs for communities with aging housing stocks. This is a pre-requisite to decarbonizing our building sector and achieving our short- and long-term GHG reduction goals.

### Reduce energy waste

Under [Michigan law](#), electricity providers must achieve annual EWR of one percent per year (based on total annual retail sales of the prior 12 months) and gas providers must hit 0.75 percent. In addition, Michigan law provides financial incentives for energy providers to meet or exceed those standards. In just over a decade, these policies have resulted in a lifetime savings of [nearly \\$1.2 billion for electric and gas customers](#). When it comes to reducing emissions—and saving money for Michigan families and businesses—it is hard to get more bang for the buck than cutting energy use.

Building from their success thus far, Michigan should strengthen existing EWR programs for investor-owned utilities – doubling the energy waste reduction target for electricity to two percent and bumping it up to 1.5 percent for natural gas. The state should also restore the EWR targets for municipal and cooperative electric utilities. In taking these steps, we must create and leverage incentives for over-performance and encourage robust consideration of EWR alongside power generation in IRPs.

### **Building new, clean buildings**

While Michigan’s existing homes and buildings will account for most of the GHG emissions in this sector from now through 2030, we must work to ensure that all new residential and commercial buildings are as efficient as possible, use materials with a low carbon footprint like mass timber, and prepare for new technologies. To help make this possible, Michigan must adopt the 2021 Model International Energy Conservation Code for new buildings. Michigan should also expand on the model code to include provisions to support electric vehicle charging and consider the incorporation of additional climate mitigating solutions such as energy storage, renewable energy, and building decarbonization.

### **Rethink how we heat our buildings**

Moving forward, Michigan should consider and evaluate alternatives to current strategies for heating Michigan’s buildings. According to research from [Rewiring America](#), at least 39 percent of Michigan households—or 1.5 million households—could save a total of \$710 million a year on energy bills if they were using modern heat pump space heaters and heat pump water heaters instead of their current appliances, which use electric resistance, fuel oil, or propane. That’s an average savings per household of \$460 each year. Half of the households with immediate savings potential are considered low- and moderate-income. The switch to electric heating and other appliances may also yield health benefits, such as helping to reduce the risk of respiratory symptoms associated with gas stove use. To make heating less carbon-intensive, Michigan should establish incentive programs for electric appliances and heat pumps for use-cases that will save customers money today, with an emphasis on energy burden relief for low-income residents.

To complement immediate policy actions, the Plan recommends the state undertake a pathway analysis to assess options to achieve carbon neutrality from natural gas production, transmission, distribution, compression, storage, and end uses in a least-cost manner. This analysis should consider a full range of options for decarbonizing natural gas end uses, including energy efficiency, electrification, fuel switching to renewable natural gas and hydrogen, and other potential opportunities.

### **Increase financing**

To facilitate home repairs, energy efficiency investments, and electrification, Michigan should also expand direct state investments and customer-facing financing options. By supporting programs like on-bill financing and property assessed clean energy (PACE), Michigan can create easier access to capital at better terms for customers and attract more private sector capital to the building decarbonization challenge.

## DRIVE CLEAN INNOVATION IN INDUSTRY

As of 2019, Michigan's industrial sector accounted for 15 percent of the state's total GHG emissions, the 4th highest emitting sector after the buildings and housing sector. While aggregated together in tracking emissions, the state's industrial sector is remarkably diverse, and makes products like chemicals, iron, steel, cement and food using specific manufacturing processes that can cause on-site GHG emissions, often require a lot of power, and/or involve GHG emissions in their supply chains.

Decarbonizing these sectors will require process-specific solutions with a focus on advancing research and development, improving facility efficiency, using cleaner products and fuels, and developing new markets for byproducts.

### Key Strategies

- **Buy clean, buy Michigan** – Strengthen public and private-sector procurement programs to favor the use of low-carbon and circular-economy products and identify opportunities to support disadvantaged businesses in procurement. Encourage the production and purchase of materials made by Michigan workers.
- **Recycling and waste** – Triple the state's recycling rate to 45 percent and cut food loss and waste in half by 2030. Expand on efforts like 'Next Cycle' to develop markets for recycled materials.
- **Shared clean industrial innovation** – Encourage clean innovation hubs to collaborate on the development and deployment of new, cleaner manufacturing technologies and reduce emissions from hard to decarbonize industries. Work to ensure that Michigan communities impacted by industrial development and operations are meaningfully engaged in the siting, construction, and operation of clean innovation hubs.
- **Clean industry process improvements** – Provide incentives and technical assistance to advance the energy efficiency and other process improvements necessary to achieve carbon neutrality in the industrial sector by 2050. Deploy combined heat and power (CHP) in new facilities and convert existing facilities to renewable energy or lower-carbon fuels such as biogas, renewable natural gas or biomethane, and clean hydrogen.
- **Carbon capture, utilization, and sequestration** – Explore the use of carbon capture, utilization, and sequestration in industrial applications where eliminating the use of fossil fuels is impossible or cost-prohibitive and for entities attempting to go carbon negative in their operations.

## Background

Michigan's industrial sector represents one of the state's greatest strengths on the path to carbon neutrality. Michigan has the [5th largest](#) advanced manufacturing workforce in the country, with more than 65,000 workers employed in that sector in 2019. The state is a national leader for employment in industries related to [Industry 4.0](#) and automation. Of the top 100 automotive suppliers to North America, 96 have a presence in Michigan and [71](#) are headquartered here. The state is home to nearly [19% of all U.S. auto production](#), more than any state in the nation.

This unparalleled industrial heritage and the technological know-how of our workforce positions Michigan well to develop and manufacture the next generation(s) of innovative products that will be used in every sector of our economy to unlock new decarbonization strategies. To make Michigan the trailblazing home for the low-carbon inventions of tomorrow—and create the corresponding opportunities for sustained economic growth and job creation—the state will need innovative market development and regulatory programs and strong financial incentives.

In addition to manufacturing the products needed to decarbonize other sectors, Michigan's industrial sector has already taken significant steps in reducing GHG emissions from its operations. Between 2005-2018, the industrial sector cut their emissions by [5.9 million metric tons](#) – or more than 23 percent. Additional analysis suggests that the industrial sector has the potential to reduce their annual emissions by [an additional 5.7 million metric tons](#) by 2030 – a reduction of more than 45 percent when compared to 2005 levels.

## Efficient facilities

Energy efficiency is a vital tool that can help Michigan's industrial sector reduce GHG emissions while keeping energy costs reasonable. Importantly, industrial energy efficiency and process improvements may be able to reduce local air pollution in communities located near industrial facilities and can create new workforce opportunities conducting energy audits and implementing the energy saving strategies they identify.

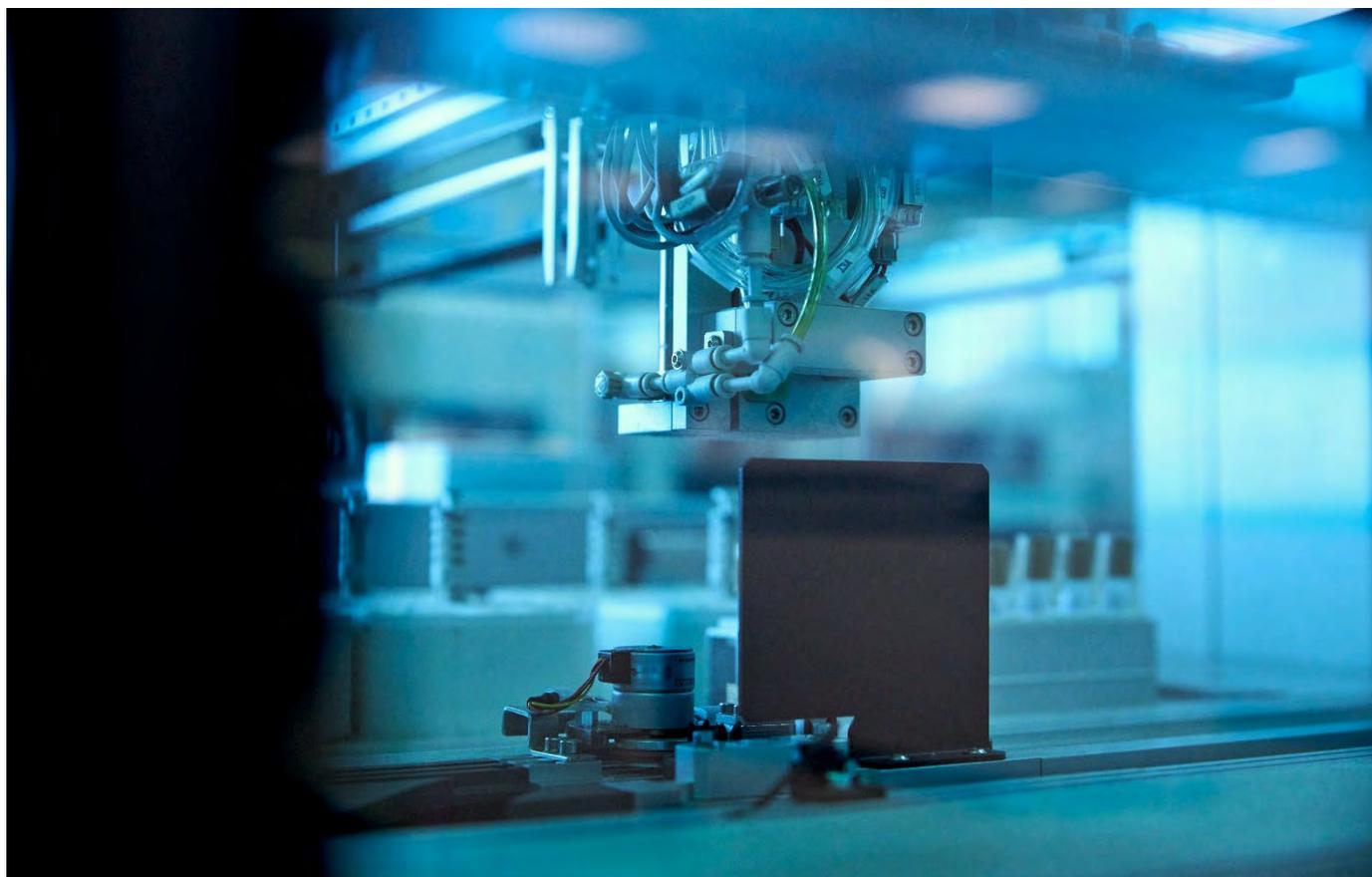
A key efficiency opportunity exists around CHP, which is a process that takes excess heat from an industrial process or facility and uses it to generate electricity. CHP is the most fuel-efficient way to produce and utilize both electric and thermal energy from a single fuel source. In 2018, the Michigan Energy Office released its [CHP Roadmap for Michigan](#), which recommended an optimal level of additional CHP deployment in Michigan ranging from 722 MW to 1,014 MW by 2030. The [next wave of CHP applications](#) will enable deeper decarbonization of the industrial sector through the use of renewable energy or lower-carbon fuels such as biogas, renewable natural gas or biomethane, and hydrogen.

## Cleaner products

Michigan is well-positioned to grow its circular economy—a systems approach that emphasizes growing markets for recyclable materials so they are (re)used by Michigan workers and business to make new products, rather than taken to landfills or other disposal facilities. For example, EGLE’s ‘[Next Cycle](#)’ program works with businesses to incubate ideas that grow Michigan’s recycled materials supply chain and end markets. The Plan identifies a number of opportunities to further spur market demand for cleaner products, such as lower-carbon cement for use in infrastructure projects. It also calls for expanding public and private sector clean procurement programs.

## Clean innovation hubs

While some decarbonization solutions already exist today, many are still waiting to be innovated. As home to many energy-intensive industries, Michigan is well-positioned to lead the way on industrial decarbonization solutions. Clean innovation hubs can help Michigan’s industrial sector achieve GHG emissions reductions as cost-effectively as possible through shared infrastructure, the strategic co-location of industrial facilities, and the efficient use of materials and energy streams. Individual clean innovation hubs could focus, for example, on hydrogen technologies or electric vehicle battery recycling. Safeguards must be put in place to address any public health and environmental justice concerns with these facilities. Potentially impacted communities should have the opportunity for adequate consultation in the siting, construction, and operations of any innovation hub.



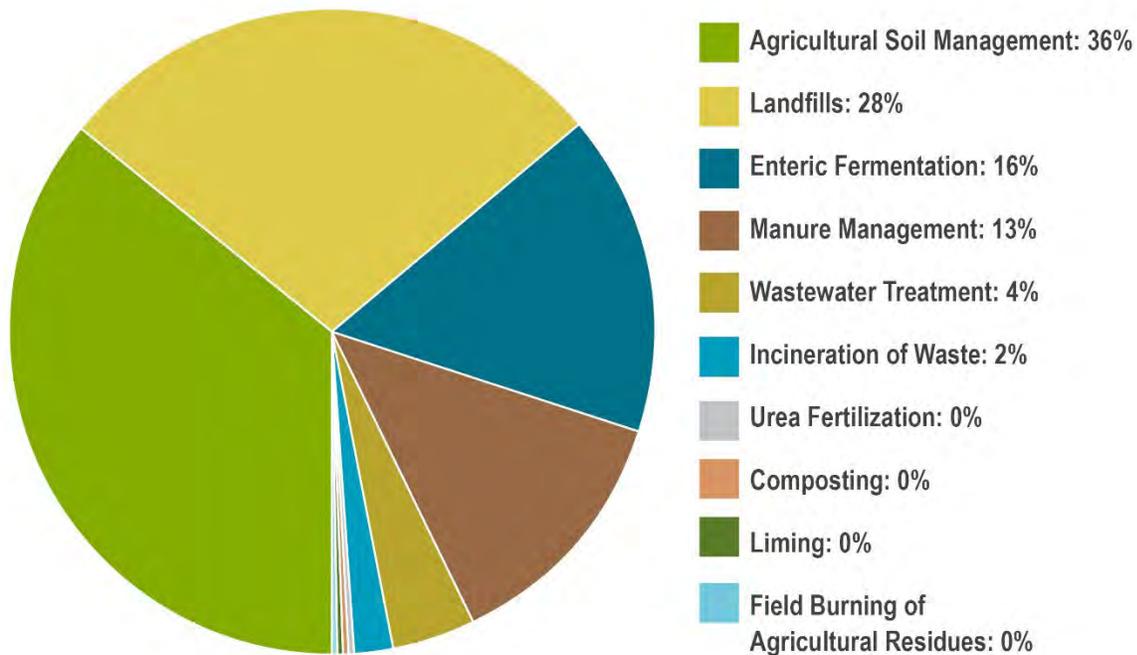
## PROTECT MICHIGAN'S LAND AND WATER

As of 2019, Michigan's natural and working lands accounted for nine percent of the state's total GHG emissions, contributing the smallest percentage of overall emissions from an individual sector. These emissions come primarily from agricultural practices and land-use changes. To drive decarbonization and sequester carbon in Michigan's natural and working lands sector, it will be crucial to protect and conserve Michigan's natural resources and support innovative solutions in agriculture.

### Key Strategies

- **30 x 30** – As a part of the national 'America the Beautiful' initiative, protect 30 percent of Michigan's land and water by 2030 to naturally capture GHG emissions, while maintaining and improving recreational opportunities for all Michiganders, expanding access in disproportionately impacted communities, and protecting biodiversity.
- **Wetlands, waters, soils, forests** – Avoid land-use conversion that causes a net increase in GHG emissions and prioritize land uses that reduce GHG emissions. Protect and restore existing wetlands and waterways and create new wetlands where appropriate. Adopt policies to protect the state's soils and enhance their capacity to capture and store carbon. Maintain and develop healthy forests across public and private lands. Support and promote tools that expand the use of the mass timber as a sustainable building material.
- **Treaty rights** – As conservation efforts move forward, the state will not interfere with treaty rights, treaty resources, and tribal cultural resources and will consult with Tribal Nations. Conservation efforts must respect the exercise of treaty rights.
- **Farm management and practices** – Develop initiatives to support farmers in adopting best management practices to improve soil health, store carbon, and utilize other greenhouse gas emissions, while also protecting water quality. Create programs to catalyze and accelerate the transition to cleaner technologies like electric and hydrogen fuel-cell farm equipment.
- **Michigan grown products** – Fund programs like the 'Buy Michigan Agriculture Campaign' to encourage the purchase of Michigan grown and raised products, address food insecurity challenges, and counter supply chain issues.

## Agriculture and Waste Emissions by Source



### Background

From birdwatching, hunting, and camping to the timber and forest products that are used in our homes and businesses, our lands, waters, and forests are essential components of what makes Michigan, “Pure Michigan.”

The lands and waters we call Michigan today are the ancestral territories of the Anishinaabe, who have lived in the State of Michigan from before recorded history to present day. The Anishinaabe people’s commitment to this place should encourage us to be better stewards of the land we inhabit and the waters on which we depend.

The Michigan Department of Natural Resources manages [4.6 million acres of public lands](#), 3.86 million of which are forested, and the state contains roughly [5.5 million acres of wetlands](#). Michigan is also home to over 50,000 farms. If protected and appropriately managed, Michigan’s natural and working lands can store and sequester carbon and offer additional benefits including limiting water runoff pollution, providing habitats that support biodiversity, and reducing the impacts on Michigan communities from more frequent and intense flooding, extreme heat, and other effects of climate change. These lands are critical to our economy and the health of all Michiganders.

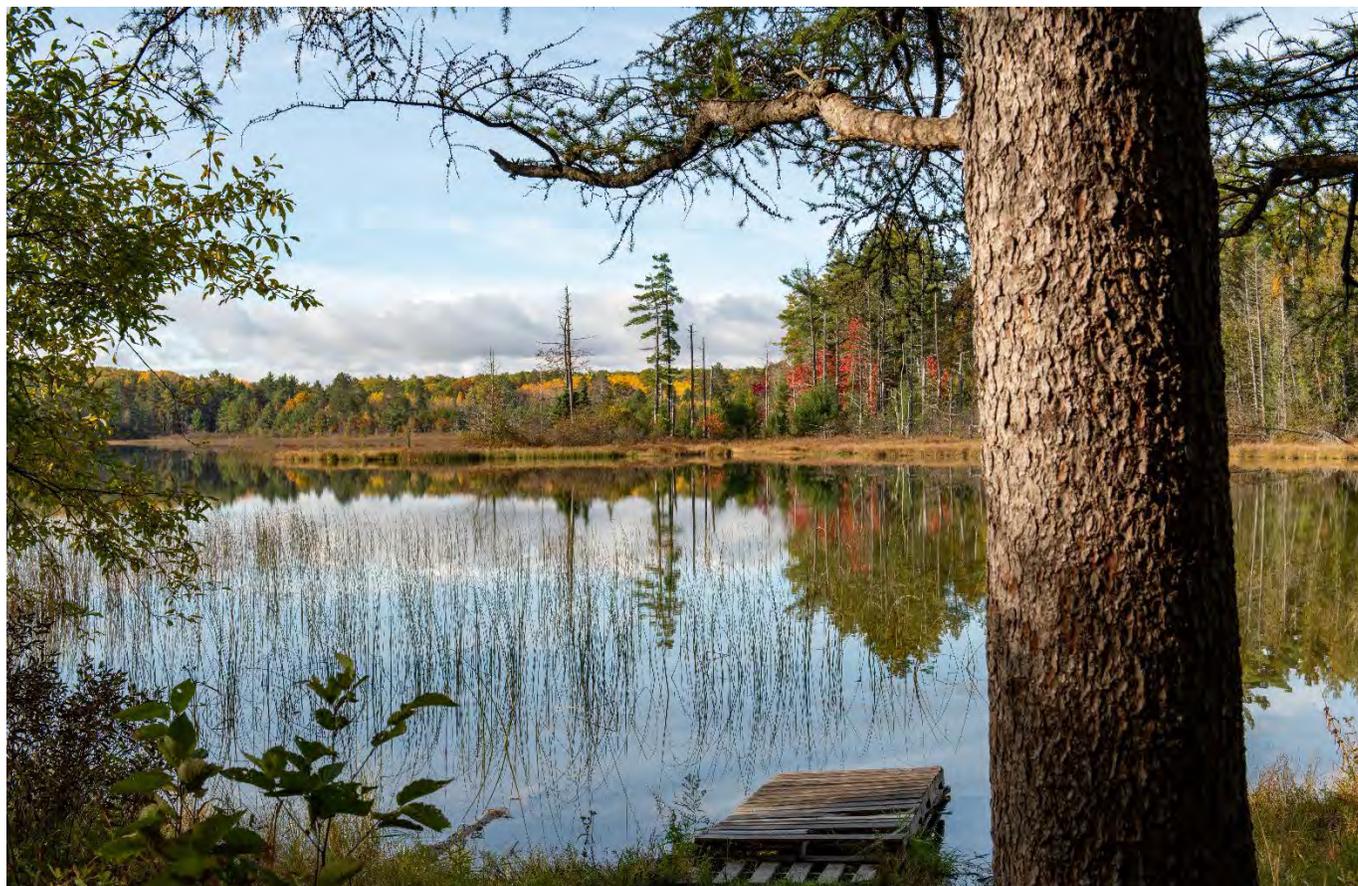
## Michigan's natural resources and land use

Michigan's forests currently store approximately 537 million tons of live tree carbon and 2,045 million tons of total forest ecosystem carbon, and they continue to sequester additional carbon from the atmosphere with each passing day. Sustainable forest management is key to maintaining and expanding the role of forests in reducing carbon emissions – and avoiding the loss of important carbon sinks that would make Michigan's path to carbon neutrality even more challenging.

In addition, sustainable forestry can encourage responsible sourcing and recycling of forest products. Building out a sustainable forestry and forest product industry can create thousands of good-paying jobs for Michiganders, capture new economic development opportunities, and provide sustainable building materials like mass timber.

Many of the state's powerful natural carbon sinks have been developed or converted and lost their natural ability to store carbon, increasing net GHG emissions. Wetlands, in particular, are important carbon sinks and stocks. Building out green waterway infrastructure, like constructed wetlands, can yield both climate adaptation and mitigation benefits. This Plan recommends avoiding further land-use conversions that increase GHG emissions and stewarding Michigan's natural resources by implementing land-use strategies that reduce GHG emissions in partnership with Michigan's tribal governments.

The federal government signed several treaties with tribal nations in Michigan, which reserved hunting and fishing rights for tribal members. Working with and supporting tribal nations will be an essential component of managing natural and working lands in a way that respects and does not interfere with treaty rights, treaty resources, and tribal cultural resources.



## Soil health and innovation in agriculture

Michigan is the second most agriculturally diverse state in the country. The state is [home to nearly 50,000 farms](#), spanning over nine million acres of agricultural land. These lands have an opportunity to sequester carbon, but many agricultural practices also emit it. This Plan recommends solutions to implement best practices for managing working lands to restore soil health and store carbon, provide low-carbon equipment to farmers, increase access to locally sourced agriculture, and reduce food waste.

Promoting climate-smart strategies like cover crops, conservation tillage, and precision agriculture can improve soil health, store carbon, improve water quality, and reduce fertilizer needs. Biochar and compost also have the opportunity to reduce both food waste and reliance on synthetic fertilizers. Innovative animal feed mixes and additives can be used to reduce GHG emissions from livestock.

Across the state, there are communities that lack access to healthy, high-quality food. As we transform our agricultural sector to mitigate and adapt to climate change, we must also take that opportunity to ensure that everyone can get the food they need to live healthy lives. Supporting Michigan-grown agriculture, urban agriculture, and farmer's markets by funding programs like the 'Buy Michigan Agriculture Campaign' can promote healthy local food systems and reduce emissions from transporting food.

While some solutions are apparent for Michigan's working lands, additional funding opportunities, research, and technological advancements will be necessary to understand how to fully decarbonize this sector in a way that balances the needs of farmers, ecosystems, and all Michiganders.



## LEADING BY EXAMPLE IN STATE GOVERNMENT

State governments have a variety of tools in their purview to address climate change. For example, state agencies use energy, procure or purchase vehicles and other goods/services, and make a wide variety of other investments in our communities and economy. Decisions and actions in these and other areas are opportunities for the State of Michigan to show the way to carbon neutrality.

In 2019, the governor's office launched an interdepartmental workgroup to identify opportunities for state government to lead by example and use administrative powers to reduce GHG emissions. This work focused on how the state could incorporate climate mitigation into existing state programs and identify initiatives that departments could pursue to accelerate the transition toward carbon neutrality. This effort demonstrated that every state department – from the Department of Natural Resources to the Department of Treasury – has an opportunity to act on climate.

In response to this work, Governor Whitmer created new offices and initiatives to help strengthen climate action across state government, including the Energy Transition Impact Project at the Department of Treasury and the Office of Future Mobility and Electrification at the Department of Labor and Economic Opportunity (LEO). The leaders of these programs collaborate closely with their colleagues in the Office of Climate and Energy and Office of Environmental Justice Public Advocate, which Governor Whitmer created at EGLE as one of her first acts in office to lead carbon reduction, just transition, and environmental justice efforts.



Solar Panels at Oden State Fish Hatcher – *photo courtesy of the Michigan DNR*

This focus and planning on climate—along with the structuring of climate work directly into state agency organizational charts—has led to bold actions by the State of Michigan to reduce GHG emissions. While not an exhaustive list, the following highlights some examples of the state leading by example.

## LEADING BY EXAMPLE IN STATE OPERATIONS

To reduce GHG emissions in State of Michigan operations, the Whitmer administration and state agencies have:

- Signed agreements to power state-owned facilities with 100 percent renewable energy by 2025.
- Committed to carbon neutrality in state-owned buildings by 2040.
- Pledged to reduce energy usage in state-owned facilities 40 percent by 2040.
- Established a \$5 million Energy Efficiency and Green Revolving Fund to expand renewable energy and energy efficiency projects at state facilities (and proposed an expansion of this investment in the FY 2023 budget proposal).
- Developed a plan to responsibly site solar across state-owned properties.
- Upgraded state systems to deploy more efficient water use (and reuse) techniques, saving energy and thousands of gallons of water per year.
- Launched the nation's first carbon sequestration and carbon market program on state owned forest land.
- Committed to electrify the state's vehicle fleet, starting with a \$10 million FY 2023 budget proposal.
- Required consideration of vendor environmental track records in the state's procurement and purchasing decisions.
- Required all state facilities to offer recycling services.
- Developed a toolkit for state agencies to review sustainability projects on state properties and ensure easy access to information on how to initiate eco-friendly practices.
- Launched a state employee education campaign around sustainability.
- Invested in backup power for all state-owned pumping stations to reduce freeway flooding events in Southeast Michigan.

## LEADING BY EXAMPLE IN STATE BUDGETS

Each of the budgets Governor Whitmer has signed so far have delivered millions of dollars for strategies and investments to address climate change. Most recently, Governor Whitmer proposed an [FY 2023 executive recommendation](#) that included over half a billion dollars in climate, advanced mobility, and clean energy related funding. These proposals ranged from investments in the state green bank and building out electric vehicle charging infrastructure to the reforestation of native trees and grants to communities for climate-resilient infrastructure.

## LEADING BY EXAMPLE IN STATE PROGRAMS

State agencies are also showing the way to carbon neutrality by developing new programs—and reshaping existing ones—to jumpstart progress in implementing the strategies in this Plan.

### Commit to Environmental Justice and Pursue a Just Transition

- EGLE developed a Michigan-specific EJ Screening tool that provides maps and data to help Michigan move toward environmental equity. It allows users to identify where populations are more vulnerable and what challenges communities face. EGLE is also supporting the Michigan Public Service Commission (MPSC) in considering environmental justice and health impacts as a part of the utility integrated resource plan process.
- The Department of Health and Human Services published a *Climate and Health Adaptation Planning Guide for Michigan Communities* to help local units of government and their residents integrate climate and health concepts into existing community planning and decision making.

### Clean the Electric Grid

- The MPSC launched MI Power Grid, a multi-year stakeholder process to maximize the benefits of clean, distributed energy resources for Michigan residents and businesses.
- The Michigan Department of Agriculture and Rural Development (MDARD) developed a policy allowing farmers to rent land for large scale solar operations while maintaining preservation of farmland by suspending and extending agreements for an equivalent number of years to properties enrolled in the PA 116 program.

### Electrify Vehicles and Increase Public Transit

- The Office of Future Mobility and Electrification within LEO has led several projects to promote electric vehicle adoption and eliminate range anxiety associated with the availability of electric vehicle charging infrastructure.
- The Michigan Department of Transportation (MDOT) completed a Transportation Asset Management Plan which included analysis of risks to the department related to climate change. It has also supported external initiatives like the Southeast Michigan Council of Government's climate resiliency and flooding mitigation study to determine which infrastructure assets in southeast Michigan—including roads, bridges, culverts, and pump stations—are most at risk for flooding

### Repair and Decarbonize Homes and Businesses

- The Michigan State Housing Development Authority (MSHDA) within LEO included a Green Policy within their Qualified Allocation Plan to require all its housing projects to achieve a green building certification and to add incentives for projects to achieve higher levels of sustainability commitments and energy efficiency. MSHDA's 2022 Statewide Housing Plan also includes focuses on environmental justice in housing development and rehabilitation.

## Protect Michigan's Land and Water

- The DNR incorporated climate mitigation as a key pillar in their Public Land Strategy to ensure the department identified appropriate strategies for emerging, climate-based threats to natural resources, and launched the nation's first carbon sequestration and carbon market program on state forest land.

## Drive Clean Innovation in Industry

- The Michigan Economic Development Corporation (MEDC) within LEO has started integrating Michigan's climate goals into its business attraction efforts and has adjusted their focus to strategic industries that support the transition to a clean energy future, including energy storage businesses, electrified vehicle manufacturers, and companies that perform research and development in these sectors.



Governor Gretchen Whitmer and EGLE Director, Liesl Clark speak at an Earth Day Event.

**This broad and deep State of Michigan leadership will help spur the state's economy and catalyze rapid progress toward achieving carbon neutrality by 2050.**

## CONCLUSION

The realities of the climate crisis are already directly impacting Michiganders and present our state with both an existential challenge and a compelling opportunity. If we fail to act with the urgency required, the impacts of climate change will likely only get worse, disproportionately affecting those who have long borne the brunt of environmental injustice. Yet a better path exists—a bold and strategic response to the climate crisis that will reward our state with enhanced economic opportunities, good-paying sustainable jobs, affordable and reliable energy for all, and clean air and water for every Michigander.

The steps to achieving this vision are within reach, though urgent action is needed. This MI Healthy Climate Plan lays out in detail the steps we need to take immediately to achieve a 52 percent reduction in GHG emissions by the end of this decade, including efforts to clean the electric grid, electrify vehicles and increase public transit, repair and decarbonize homes and businesses, drive clean innovation in industry, and protect Michigan lands and water. As we drive GHG reductions in each of those areas, the Plan calls on us to pursue environmental justice every step of the way and commit to a just transition to a carbon neutral economy for all Michigan workers and communities.

No less importantly, the Plan identifies the equally urgent actions needed now to fully decarbonize Michigan's economy by 2050, including areas where additional work and study are needed for harder-to-decarbonize sectors including buildings and housing, industry, and agriculture.

With bold leadership by example from state government and every Michigan resident and business playing their parts, we can – together – build a more equitable, just, healthy, and prosperous future and ensure that the benefits of this clean energy transition are enjoyed by all Michiganders.

## IMPLEMENTATION

The State of Michigan is committed to implementing the MI Healthy Climate Plan. As directed by the Executive Order calling for this Plan, the Office of Climate and Energy within EGLE will oversee its implementation in concert with state departments and agencies, tribal and local governments, and key stakeholders. The Council on Climate Solutions and Michigan Advisory Council on Environmental Justice will provide advice, feedback, and guidance along the way. And, as required by the Order, EGLE will submit publicly available annual reports updating all 10 million Michiganders on our progress.



# APPENDICES

- [Workgroup summaries of Key Recommendations presented to the Council on Climate Solutions](#)
- [Michigan Advisory Council on Environmental Justice recommendations to the Council on Climate Solutions and the State of Michigan.](#)