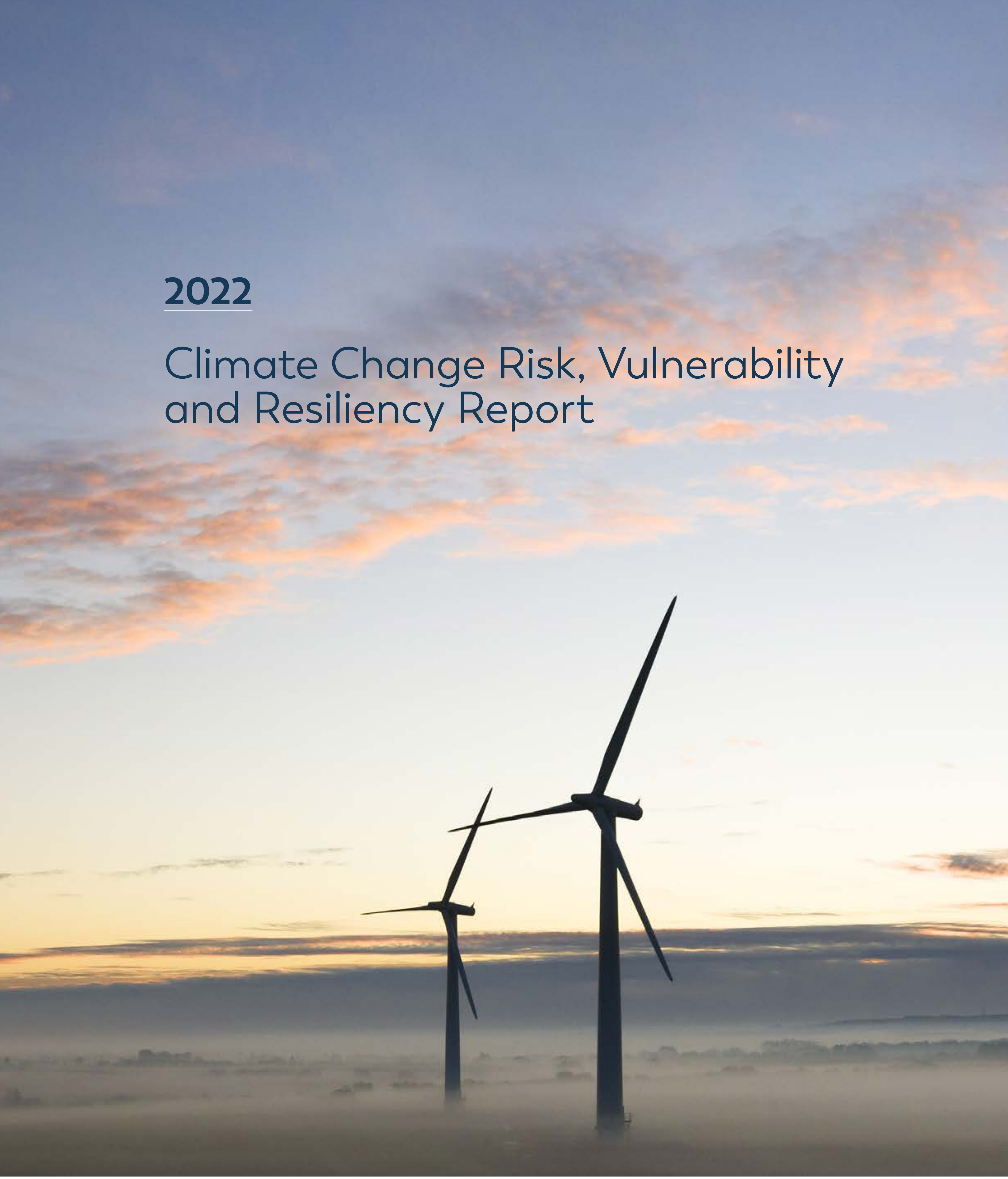
2022

Climate Change Risk, Vulnerability and Resiliency Report



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Executive Summary

CMS Energy, and its largest subsidiary, Consumers Energy, have worked hard to provide clean, safe, reliable and affordable energy for Michigan. We've seen many changes within our company from our beginnings as a small operator of hydroelectric facilities to Michigan's most far-reaching energy provider today. For much of our history, the climate has seen small changes, but our weather patterns and climate are changing at an accelerated rate.

The Great Lakes region is not immune to climate change. Heavier rainfall, higher temperatures and more extreme weather events have already increased in frequency, a trend that may continue in part due to climate change.[1] This Climate Change Risk, Vulnerability and Resiliency Report shares our approach to remain resilient as new climate patterns emerge.

This report identifies our company's susceptibility to the potential adverse effects of climate change, including increased precipitation and heat, severe storms and the potential for rising water levels. It discusses our governance structures to maintain an agile and effective response to climate change over time, and then describes our proactive efforts to remain resilient to climate change's potential impacts on our infrastructure. This includes our gas and electric infrastructure plans, dam safety programs and our overall efforts to reduce our own emissions.

"There's no doubt climate change is real – and we're fulfilling our commitment to our state and the planet by transitioning away from coal to lead the clean energy transformation," said Garrick Rochow, President and CEO of CMS Energy and Consumers Energy. "But we also accept that climate change isn't somewhere out there in the future – it's here. That's why we're taking a close look at our infrastructure risks and developing resiliency plans to make sure we can deliver the services our customers count on for years to come."

> ***"There's no doubt climate change is real – and we're fulfilling our commitment to our state and the planet by transitioning away from coal to lead the clean energy transformation."***
>
> *Garrick Rochow*
> *President and CEO,*
> *CMS Energy and Consumers Energy*

We are fortunate to live in a region less likely to endure the worst impacts of climate change – like more frequent hurricanes, wildfires and long-term droughts. But we know we cannot ignore even the more subtle changes happening in our state. Careful planning for climate change is necessary to continue providing safe, reliable, affordable and increasingly clean electricity and natural gas services over the coming decades.

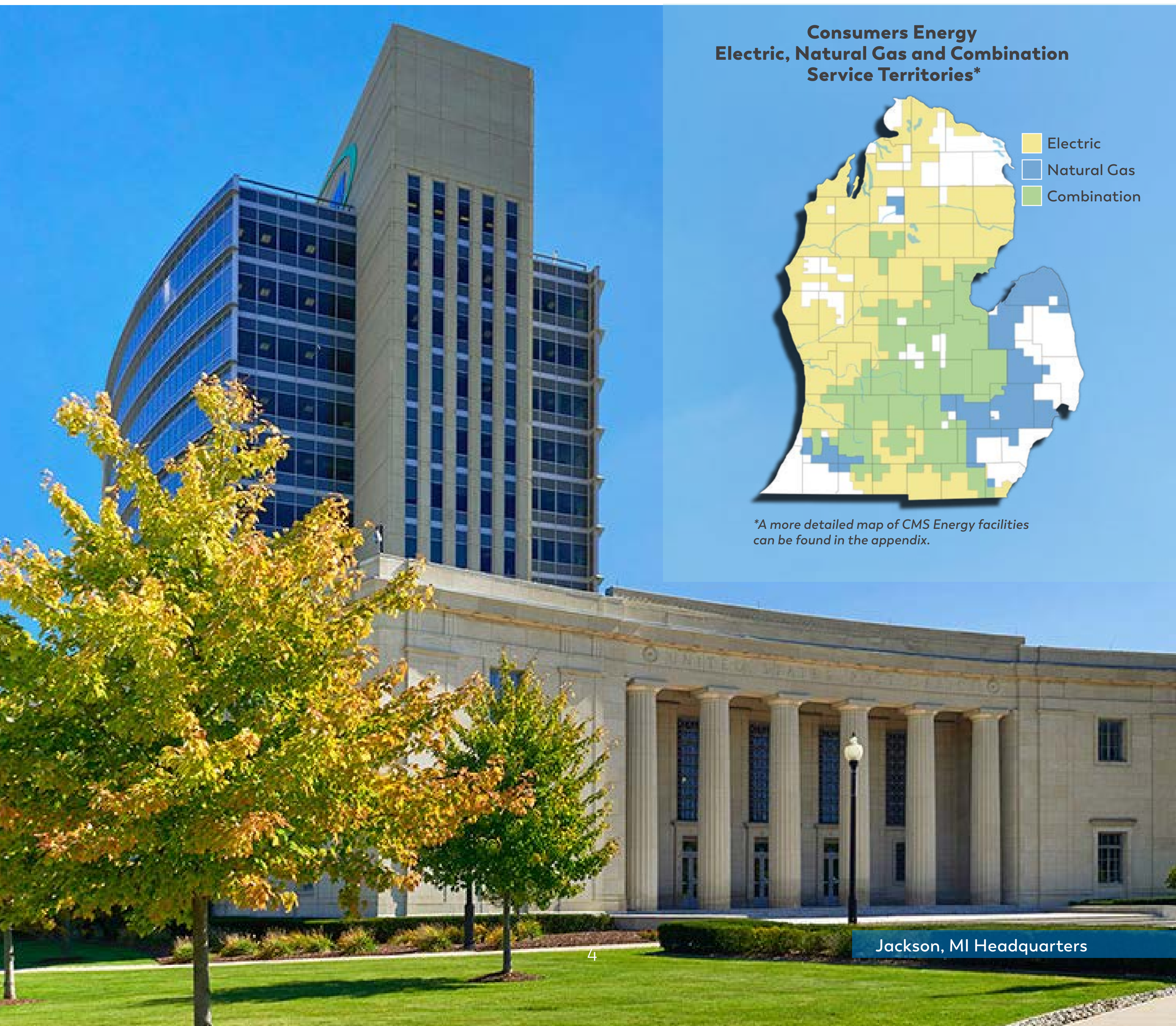
We will continue to sustainably meet our customer's energy needs in the face of a changing climate. We know safeguarding our infrastructure is critical to health, safety and quality of life. Ensuring climate change resiliency also supports our Triple Bottom Line – People, Planet and Prosperity – which balances the interests of all stakeholders, including co-workers, customers, regulators and our investors.


Delta Solar Plant

Our Company

Advancing our climate change resiliency plans begins with understanding the facilities we own and operate for our customers. CMS Energy Corporation is the parent company of Consumers Energy and CMS Enterprises. Consumers Energy is the largest subsidiary of CMS Energy Corporation and provides natural gas and/or electric services to 6.8 million of Michigan's 10 million residents. Consumers Energy's electric and natural gas infrastructure is crucial to the state of Michigan. For more than 135 years, Consumers Energy has provided critical services like power, heat and cooling for homes, schools, hospitals, businesses and manufacturing facilities.

CMS Enterprises works nationwide with corporate, industrial and municipal customers to provide energy from wind, solar, natural gas, biomass and energy storage facilities.



A more detailed map of CMS Energy facilities can be found in the appendix.

Jackson, MI Headquarters

Electric Line Operations

Consumers Energy serves 1.9 million electric customers. Its line operations include about 87,000 miles of overhead distribution lines, more than 1,000 substations and about 9,400 miles of underground lines. We also have a network of distribution stations and transformers that deliver electricity to homes, businesses and our industrial customers.


Substation at dusk

Renewables: Wind Parks, Solar Generation, Hydroelectric and Battery Facilities

Consumers Energy currently owns four wind energy parks: Cross Winds® Energy Park in Michigan's thumb, Lake Winds® Energy Park near Ludington, Gratiot Farms Wind Project in Gratiot County and the Crescent Wind Farm in Hillsdale County. These energy parks produce enough energy to power about 250,000 homes.

Consumers Energy owns three solar generation sites and obtains solar energy from more than a dozen third-party solar providers. Plans call to add 4,500 megawatts (MW) of owned and contracted solar energy by 2030 and reach 8,000 MW by 2040. The newest solar projects, which were announced in late 2021, include sites in Jackson, Washtenaw and Calhoun counties.


Cross Winds® Energy Park

In addition to wind and solar, Consumers Energy operates 13 dams on five Michigan rivers and the Ludington Pumped Storage facility on Lake Michigan, which is among the largest energy storage facilities in the world. Consumers Energy's river hydroelectric facilities produce enough clean, renewable energy to serve about 65,000 Michigan residents.

Consumers Energy is also piloting two battery facilities: Circuit West in Grand Rapids and a facility on Western Michigan University's Kalamazoo campus. Our company's integrated resource plan (IRP), also known as our Clean Energy Plan, includes our goals to increase the number of battery facilities in the coming years.

Natural Gas-Fired Electric Generation Facilities

Consumers Energy operates several natural gas-fired electric generation units. These facilities release about half the carbon emissions of coal-fired generation and are important for providing reliable electricity in conjunction with wind and solar generation.

Jackson Generating Station, which is Consumers Energy's newest generating station, has a 847 MW generating capacity. Zeeland Generating Station has a total generating capacity of 530 MW. Finally, Karn Generating Plants 3 and 4, which use natural gas and fuel oil, can generate more than 900 MW. Retirement of Karn 3 and 4 facilities is proposed for 2023.


Ludington Pumped Storage

Coal-Fired Electric Generation Facilities

Consumers Energy currently owns and operates five coal-fired generation units – three at our Campbell Generating Station and two at our Karn Generating Station, with a collective generating capacity of nearly 2,000 MW. The Karn units are scheduled to retire in 2023, and our most recent IRP proposes retiring the Campbell units no later than the end of 2025, many years ahead of their design lives. If approved by the Michigan Public Service Commission (MPSC), these retirements will greatly reduce our company's carbon emissions and help us remain on track to reach net zero carbon emissions by 2040.

Our Clean Energy Plan will reduce our electric business' carbon dioxide emissions by about 60% by the end of 2025, making us an industry leader in emissions reduction. This reduction will be five years faster than the Intergovernmental Panel on Climate Change's (IPCC) global emissions goal of a 40-60% reduction by 2030 to limit global warming to 1.5°C (2.7°F).[2]


Karn Generating Station

Natural Gas Delivery Operations

Consumers Energy delivers natural gas to about 1.8 million customers across 45 Lower Michigan counties, including about 1.7 million homes, 129,000 businesses and 4,900 industrial facilities. Our natural gas deliveries to end-use customers were about 282 billion cubic feet in 2021.

Our natural gas system comprises of more than 28,000 miles of pipeline, including 2,400 miles of transmission pipeline; 15 storage fields; 8 compressor stations; and hundreds of pressure reducing facilities throughout the state.

Our Natural Gas Delivery Plan, a 10-year plan for the natural gas system, calls for infrastructure investments to improve safety and reliability and bring our methane emissions to net zero by 2030.


Ray Compressor Station

CMS Enterprises Facilities

Since Consumers Energy is the primary subsidiary of CMS Energy and is wholly located in Michigan, this report focuses primarily on climate change risks in Consumers Energy's service territories. However, CMS Enterprises facilities in the Great Lakes region and beyond are also included in this report.

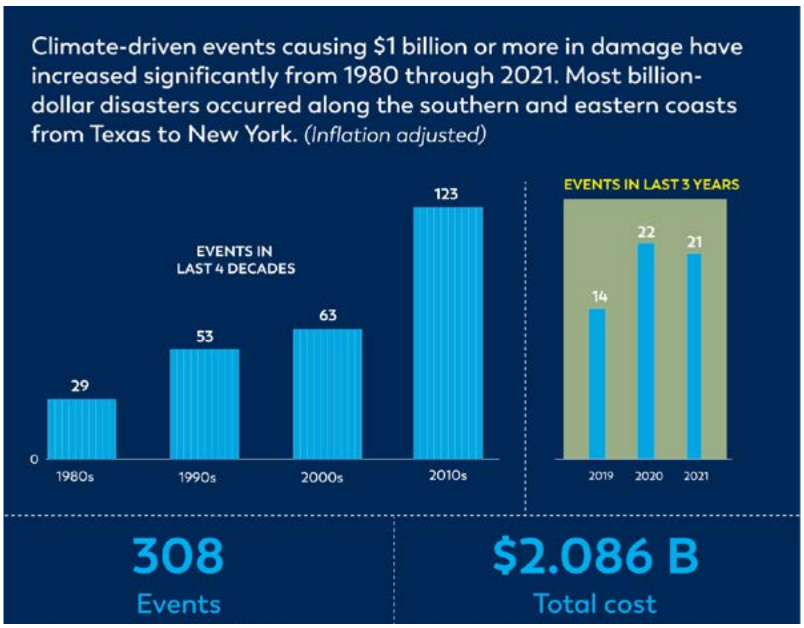
CMS Enterprises is focused on helping commercial and industrial customers across the U.S. reach their decarbonization goals. The CMS Energy subsidiary owns and operates five renewables projects across wind and solar, delivering about 650 MW of clean energy. This includes Aviator Wind Farm in Texas, which was acquired in 2020. It was the largest single-phase wind project in the U.S. at the time of construction. The farm can power the equivalent of 230,000 homes annually at a 41% capacity factor. CMS Enterprises is currently constructing two new solar projects to bring on another 180 MW of clean energy. Hart Solar, located in Oceana County, Michigan, is one of these projects. It will provide 100 MW of clean, renewable energy, which will produce the carbon offset of planting nearly three million trees.


Delta Solar Plant

Climate Change - Past and Future

Climate change is caused by the release of greenhouse gases, including carbon dioxide and methane, that trap heat in the earth's atmosphere. Climate change effects are typically measured using changes in temperature and precipitation over many decades, including averages and extremes. Other measures of climate change include storm duration and intensity trends, the duration of temperature highs and lows and the number of frost-free days per year.

Climate change risks vary by region. In the U.S., the most destructive risks are along coastal areas where hurricanes are prevalent. Extreme drought is also a climate change risk. Nationally, the overall cost of climate-related events has increased dramatically since 1980.



Source: National Oceanic and Atmospheric Administration Billion Dollar Disasters

Great Lakes Historical Climate Change Trends

While national trends are insightful, this vulnerability assessment focuses on historic trends and projections in the Great Lakes region including precipitation amounts, average temperatures and the frequency of extremes and severe weather. Since we have hydroelectric and other facilities located in potentially wet soils, we also considered the potential for rising waters.

Although researchers predict the Great Lakes region will experience less severe climate change effects due to low susceptibility and better preparation including policies already in place to reduce climate risks,* understanding risks and developing resiliencies through planning is woven into our operations and culture at CMS Energy.

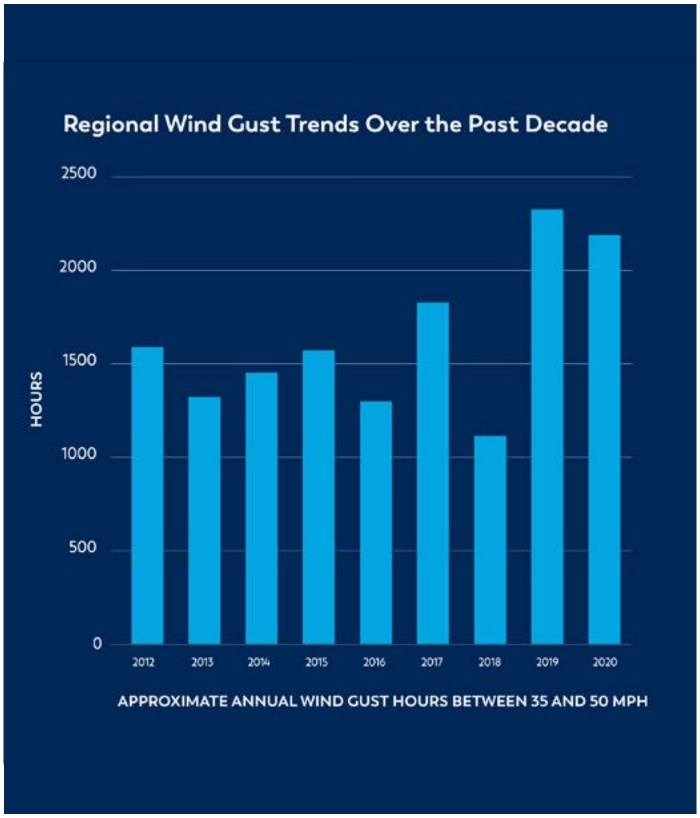
To better understand potential climate change impacts in the Great Lakes region, we partnered with Great Lakes Integrated Sciences and Assessments (GLISA). GLISA is a nationally recognized team of climate scientists based at the University of Michigan and Michigan State University and supported by the National Oceanic and Atmospheric Administration (NOAA) Climate Program Office. GLISA's climatologists study climate changes in the Great Lakes region and work with public and private sector entities to integrate climate change projections into planning efforts to increase climate resiliency. Our company is the first utility to partner with GLISA.

GLISA's data shows temperatures across the Great Lakes region have increased by 2.3°F (1.3°C) since 1951. Over the same period, annual precipitation increased 14% in the Great Lakes region, as have the number of heavy precipitation events. For example, the region experienced the heaviest precipitation in more than 120 years of recorded history over a five-year period ending in August 2019.[3]

Heavy precipitation events, defined as the amount of precipitation falling in the heaviest 1% of storms, increased 35% from 1951 to 2017. The intensity of storms has also increased, a pattern expected to continue as climate change effects become more pronounced.[4] This particular trend is important for infrastructure owners like us because more severe storms tend to cause more damage.

One way our company monitors storm-related trends is through wind gust speeds, which are measured as hourly duration of gusts over the course of a year. Our data shows a fairly consistent increase in wind gust hours since 2010. Gusts in the 35-39 mph range have increased the most, but stronger gusts have also increased, including those reaching or exceeding 50 mph.

* According to Policy Genius, a group that ranks states based on insurance-risk, Michigan scored first among U.S. states for climate change resiliency. The group used data from the following sources: **Temperature**: Climate Central; Union of Concerned Scientists; U.S. Census Bureau: **Wildfire:** U.S. Department of Agriculture; **Flood Risk:** Climate Central: **Drought**: 2020 National Oceanic and Atmospheric Administration (NOAA) study "Drought Vulnerability in the United States: An Integrated Assessment." **Preparedness:** Climate Central's States at Risk Report Card.



Although many gusts have no impact on our system, strong gusts can cause significant damage. For example, our internal analysis shows a correlation between gusts that exceed 45 mph and the number of outages.

In addition to temperature, precipitation and wind gusts, changes in lake and stream water levels have also occurred in part because of climate change. Due to our proximity to the Great Lakes and the substantial number of inland lakes, rivers and streams in Michigan, these changes can impact our infrastructure and communities.

One trend is that the variability of lake levels has reached new extremes. For example, Great Lakes water levels were low from the 1990s to mid-2010s, but recently rose at an unprecedented rate.[5] Many Lake Michigan beaches experienced severe erosion in 2020 because of rising water levels, an effect exacerbated by greater variability in water levels. Since then, however, Lake Michigan water levels dropped 16 inches from August 2020 to 2021.[6]

GLISA expects the extreme variability of lake levels to continue due to climate change. Rising water levels are of concern to our facilities since these can cause flooding and erosion and expand wetland areas.

Climate Change Projections

While reviewing historic climate trends is important, it's equally important to consider projected future climate trends. This information allows us to plan for a more resilient infrastructure system.

Scientists use sophisticated climate models to develop climate projections for decades into the future. These projections factor in various global emissions levels, technological developments and societal choices, like dependence on fossil fuels or a commitment to reduce emissions.

Temperature Projections

Depending on future emission levels and other factors, the IPCC, in its 2021 Sixth Assessment Report, projects global temperatures will rise between 2.9°F to 4.3°F by mid-century compared to the 1850-1900 preindustrial period.[7]

Those same climate models project a global average temperature increase of 2.5°F to 7.9°F by 2100.

GLISA relies on a set of climate model projections designed specifically for the Great Lakes region.† These projections offer more reliable information for regional planning since they incorporate climate data associated with the Great Lakes and lake-land-atmosphere feedbacks, which are missing from many global climate models. GLISA's temperature projections for Michigan are consistent with the global trend. They suggest Lower Michigan's average temperature may increase up to 4°F by mid-century compared to the 1850 to 1900 period.

In addition, the number of days in Lower Michigan reaching more than 90°F by mid-century is projected to increase by 19 days. GLISA also projects six more days reaching more than 100°F by mid-century, with more occurring in the southern half of Michigan's Lower Peninsula. This trend could increase electricity demand, including air conditioning.

Precipitation Projections

GLISA's models project relatively modest increases in the average annual total amount of precipitation for Michigan by mid-century. However, models suggest changes in timing, frequency and intensity of precipitation. For example, heavy precipitation events are projected to increase by mid-century, and models vary on whether they project increases or decreases across the seasons.

Beyond GLISA's seasonal and annual rainfall projections, a 2021, third-party climate analysis conducted for CMS Energy suggests the amount of rain falling during storms may increase up to 25% by 2050, using the preindustrial baseline, 1850-1900.

In addition, a greater frequency of freezing rain may occur, increasing the potential for electric outages. GLISA does not currently provide freezing rain projections. However, our third-party analysis indicated the region may experience a four-fold increase in days favorable to freezing rain by 2050 as compared to the period between 1986-2005. Note that not all days will produce freezing rain. Data already shows that the rain-snow boundary is migrating north in Lower Michigan.[8]

Because of this change, areas that traditionally experience snowfall are now experiencing more rain and freezing rain. Because freezing rain can significantly damage our electric distribution system, we intend to further evaluate this climate impact.

Severe Storm and Wind Gust Projections

GLISA also predicts that the frequency and intensity of severe storms may continue as the effects of climate change become more pronounced.[9] However, since climate models do not simulate highly localized wind gusts, uncertainty remains. We expect stronger winds to coincide with more intense storms.

Water Levels

Water levels are influenced by precipitation over the Great Lakes basin, runoff into lakes and streams and evaporation from water surfaces. Modeling future water levels is an ongoing area of research, GLISA advises stakeholders to plan for future highs, lows and an overall increase in water level variability.[10]

Groundwater projections for the region suggest a potential drying out during summer months, even as annual precipitation totals increase.[11] Warmer temperatures increase evaporation from the surface, creating drier soils and potentially reducing wetland areas. However, more rain instead of snow may increase streamflow during winter and spring.

A summary of observed and projected climate trends can be found in Figure 2 of the appendix.

† GLISA's climate projections factor in 6 models that consider a future of low income, high population growth and high energy demand (Representative Concentration Pathway 8.5). Alternative future emissions scenarios are not currently available in the models GLISA uses. Projections reflect mid-century (2040-59) changes relative to trends from 1980-1999.

Identified Risk: Higher water levels (i.e., groundwater, Great Lakes and inland lakes)

Example: Increased water levels, including risks to dams, spillways and areas prone to flooding (e.g., near wetlands or floodplains).

Identified Risk: Increase in air temperatures

Example: Increased temperature highs and in prolonged periods of extreme heat.

Identified Risk: Increase in storm frequency and intensity

Example: Increased storms featuring high winds, lightning and/or ice.

Identified Risk: Increase in precipitation

Example: Increased annual rainfall that presents infrastructure risks and other impacts to areas surrounding facilities.

Climate Resiliency Assessment

The risks identified in the above section are considered the most serious climate-related threats our company faces according to climate change models. Fortunately, we have many existing strategies in place to reduce these risks. Our assessment next considers our company's specific vulnerabilities as they relate to future climate change.

Throughout 2021, we researched the most likely scenarios and projections for Michigan's future climate. We used our own analysis and projections developed by our partners at GLISA to conduct an initial assessment of our infrastructure's climate vulnerabilities. To complete this assessment, we also surveyed facility and subject matter experts to collect data on the greatest susceptibilities our facilities may likely encounter.

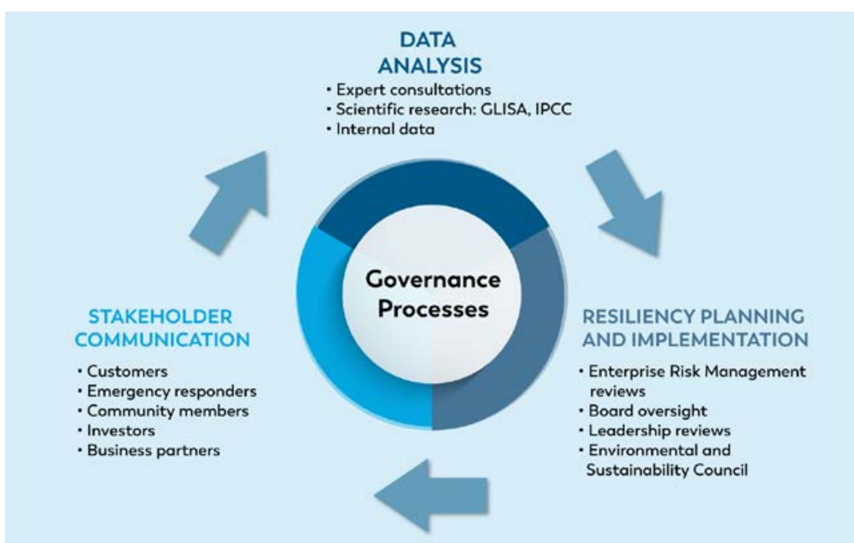
This assessment highlights four categories of risk: rising water levels, extreme temperatures, increased storm frequency and intensity and more frequent heavy rainfall events.

These climate-related risks present a variety of potential threats to our infrastructure. The table on pages 11 and 12 presents our most significant climate vulnerabilities, potential impacts and our risk mitigation measures, including potential and existing strategies. Subsequent sections will discuss resiliencies already in place. *(See tables on pages 11 and 12)*

Governance Process

CMS Energy actively manages the potential risks and vulnerabilities presented by climate change. These management processes are built into our governance structure, plans and regulatory and voluntary disclosures. These include facility-specific risk identification and response planning.

Management of climate risks is embedded across our ongoing processes and includes consulting with experts, evaluating research, performing resiliency planning and communicating our climate risks and resiliency plans with stakeholder groups.



Vulnerability and Resiliency Assessment Matrix

<table>
<tr><th>Climate Risk</th><th>Impacts</th><th>Infrastructure Risks</th><th>Existing/Potential Resiliency Measures</th></tr>
<tr><td>All</td><td>Changes in temperature, water levels, storm frequency and intensity and increased precipitation across our service area</td><td>Increased construction and maintenance costs</td><td>Increased examination of prudent expenditures to increase resiliency of equipment to reduce outages</td></tr>
<tr><td rowspan="4">Rising water levels/ flooding</td><td>Expanded wetlands and flooding near gas and electric distribution lines</td><td>• Additional permitting and new wetland impact mitigation procedures.
• May extend customer outages if lines are inaccessible.</td><td rowspan="4">• Prioritize resilient methods and materials in new facility construction.
• Thoroughly evaluate sites and buried lines for potential effects of higher water levels and design accordingly.
• Investigate needs for spillway projects in vulnerable areas near dams.
• Proactively relocate or harden shorelines near threatened infrastructure; stabilize shoreline and jetties at facilities along the Great Lakes.
• Increase monitoring and maintenance of access sites.</td></tr>
<tr><td>Localized flooding near some facilities</td><td>• May need to relocate facilities to higher ground.</td></tr>
<tr><td>Higher water levels near dams</td><td>• May require dam facility enhancements to meet or exceed industry best practices.</td></tr>
<tr><td>Increased Great Lakes water levels</td><td>• Distribution lines may require relocation away from shorelines or higher ground.
• May require stabilization of shoreline facilities.</td></tr>
<tr><td rowspan="4">Increased air temperatures</td><td>Increased demand on gas transmission system as a result of extreme weather events</td><td>• May require additional gas transmission system capability to respond to changing peaks in the electric supply.</td><td rowspan="4">• Manage through yearly natural gas storage survey and remediation work.
• Increase maintenance of existing cooling equipment at compression stations, and conduct engineering evaluation of cooling systems to determine requirement to increase heat transfer capability.
• Create standards to ensure capacity increases can accommodate higher air conditioning loads.
• Construct new facilities to accommodate peak demand.
• Evaluate loading criteria for new equipment and utilize a plan that supports peak day demands while considering contingency options.
• Employ resources, information technology solutions, data analysis, visualization and analysis software to support optimization.
• Use software analytics to support optimization evaluations and transient studies that support proactive asset maintenance.
• Upgrade measurement and information technology software for access to hourly usage to improve visibility on customer usage patterns.
• Expand program and tariff offerings to provide more customer choices to reduce demand.
• Increase system transmission, storage, compression and distribution capacity as needed.
• Increase minimum size and capability of assets for distribution line and substation components to build in additional capacity and resiliency.</td></tr>
<tr><td>Increased customer use of air conditioning, resulting in greater peak-hour demand</td><td>• Electric and gas distribution facilities may require larger equipment, including conductors, transformers and generating facilities, to meet demand.
• Overloaded equipment may increase potential for failures.
• May increase gas storage reliance to ensure availability for generation during high-demand scenarios.
• Since peaks may be higher and longer in duration, it may impact storage assets including the Ludington Pumped Storage Plant.</td></tr>
<tr><td>Increased use of electric generation equipment within facilities</td><td>• Increased or faster wear and tear on equipment may increase the frequency and cost of repairs.</td></tr>
<tr><td>Electric generation capacity limitations</td><td>• May result in customer tariffs or contracts if unable to meet peak demands; reduced operating range of equipment. This includes, but is not limited to, generators, compressors and engines.
• May require additional plants and/or storage, which come at a cost to customers.</td></tr>
</table>

Vulnerability and Resiliency Assessment Matrix

Climate Risk	Impacts	Infrastructure Risks	Existing/Potential Resiliency Measures
Increase storm frequency and intensity, including ice storms	Severe weather damage	• Outages could increase with more frequent and extreme damage, extending restoration duration. • National Electric Safety Code changes may impact design requirements and result in higher costs.	• Harden system assets to prepare all facilities for future climate conditions. • Employ resources including information technology solutions and predictive analytics to support proactive asset maintenance, optimization evaluations and transient studies. • Continue hardening electric infrastructure, including pole replacement, tree wire and aerial spacial cables. • Further increase forestry to clear trees from electrical lines that may be damaged by storms, wind and ice. • Evaluate current standards and built-in factor of safety loads so that loadings withstand more extreme weather. • Use backup generators or batteries to reduce potential issues during transfer to mitigate short-term, recoverable outages. • Strategically underground certain overhead electric lines to avoid more extreme weather challenges like wind and ice. • Increase redundancy and further sectionalize electric lines to lower the impact of power outages.
Increased rainfall	Increased erosion on unvegetated and/or sloped surfaces	• Surface erosion may increase at landfills with a greater land surface slope and less vegetation.	• Add tile, or similar drainage system, to mitigate overland flows, including downslope flows that lead to erosion.

Governance Structures

We design our governance structures to ensure accountability in our management of potential impacts caused by threats like higher temperatures, increased precipitation and severe storms. These processes help manage threats that could pose reliability risks to our customers or a financial threat to our company.

Our enterprise risk management (ERM) program, which applies to CMS Energy and all its subsidiaries, is another governance mechanism we use to identify, understand and mitigate significant risks, including climate risks. The program addresses various threats including operational, regulatory, environmental and financial. It begins with risk owners and is discussed with our risk department, executive leadership and board of directors.

In addition to board oversight, our Environmental and Sustainability Council (E&SC) – a group of critical leaders that includes senior leadership – meets quarterly to ensure our environmental intentions match our actions. The E&SC discusses probable future environmental trends and effective responses and fosters a culture of environmental accountability. The group also presents up-to-date climate related news, data and information to senior leaders.

Stakeholder Engagement

Another important part of our resiliency plan involves transparent communication about climate risks and how they may impact our stakeholders and operations.

Transparent communication about climate risks is growing in importance. For example, the investment community has increased interest in climate change risks that might affect a company's long-term financial outlook.

Recently BlackRock, one of the world's largest investment firms, put companies on notice that climate change is a defining factor in a company's long-term prospects and will shape the future of investments.[12] Additionally, the Taskforce on Climate-Related Financial Disclosures (TCFD), which includes banks, global assessment managers, pension funds, credit agencies and accounting firms, recently encouraged companies to voluntarily report climate risks and opportunities, including climate-related vulnerabilities, and develop adaptive solutions that reduce risk.[13]

For many years, we've disclosed climate risks under various reporting frameworks including the TCFD Index, our ESG and Sustainability Reports and the Carbon Disclosure Project (CDP). Key areas addressed include efforts to reduce our emissions to net zero. This type of information helps inform our stakeholders about our strategies to withstand future climate change effects.

Federal regulators like the Securities and Exchange Commission (SEC) also stress the importance of assessing a company's long-term sustainability, emissions reduction efforts and climate resiliency. In 2010, the SEC issued Climate Change Guidance, which recommended companies disclose, if material: the impact of pending or existing climate-change related legislation, regulations, and international accords; the indirect consequences of regulation or business trends; and the physical impacts of climate change. The SEC may issue regulations that enhance disclosure of climate change risks in the near future, which could set new standards for companies to disclose specific climate risks.

Our stakeholder engagements also include materiality surveys across all stakeholder groups and face-to-face communications with the communities we serve. These types of communications allow us to gain feedback and address key stakeholder concerns about our environmental impact, including those related to climate change.

These communications also occur for specific portions of our operations that could impact a local community. For example, our dam safety program includes Emergency Action Plans (EAP) in place for each of our 13 hydroelectric facilities and our Ludington Pumped Storage facility. These plans include communications between Consumers Energy staff, emergency responders and community members who would be affected in the event of an unlikely dam failure or other safety-related issue. As part of these plans, we engage in extensive training and communications to ensure robust performance in the event of a safety issue.

Additionally, we communicate with our customers regularly about pending weather events and seasonal risks. For example, we communicate immediate climate-related risks, such as extreme heat and severe weather through press releases, our social media channels and on our website. Similarly, we regularly communicate about risks associated with downed lines and seasonal storms. These communication methods, along with the others discussed above, ensure our stakeholders have frequent and detailed information about climate-related information.

Regulatory Requests and Oversight

As a public utility, our corporation is subject to substantial regulatory oversight. We work with agencies including the MPSC and Federal Energy Regulatory Commission (FERC) to ensure our facilities can withstand changes, including those potentially due to climate change. Given the wide variety and large geographic scope of our assets, we discuss climate-related risk reductions with our regulators.

Our Electric Distribution Infrastructure Investment Plan, (EDIIP), most recently filed with the MPSC in 2021, aims to improve electric reliability and resiliency. The filing explained the need to proactively harden our electric distribution system to minimize outages, increase the speed and effectiveness of outage response and reduce the duration of outages.

To support these types of efforts, we make regulatory agency requests to approve spending to assure our infrastructure is sufficient to manage future threats including climate related asset deterioration. As described in our EDIIP, asset deterioration varies based on climate factors including wind, precipitation and temperature. Differences are also seen based on materials used. For example, wooden poles deteriorate faster in wet soil and are also more susceptible to wind. These types of regulatory requests help protect our company's assets and position us to better serve our customers as we face climate change.

Similarly, we work closely with our federal regulators at FERC to maintain our dams. We consider ourselves a partner with FERC, working together to maintain dam safety, including meeting with FERC outside of routine inspections. Such efforts better position our dams to address the potential increase in precipitation frequency and intensity expected in Michigan due to climate change.

Resiliency Efforts to Date

While further analysis is required, we are not waiting to make our system more resilient to the vulnerabilities we identified. As previously mentioned, we already have climate resiliencies in place. Historic trends have prompted programs, practices and new plans that will help our system be more resilient to the changing climate. Our latest IRP, EDIIP, Gas Cost Recovery Case and rate cases, all filed with the MPSC, provide in-depth information about our supply portfolio plans, electric distribution investment plans, natural gas delivery plan and other resiliency efforts. Much of our planning focuses on electric distribution investments, preparing for increased energy demands and proactively improving dam safety.

Our MPSC filings include explanation of how climate-related impacts may affect our infrastructure and our rate cases reflect our mitigation needs.

Hardening our Electric Distribution System

A key aspect of our climate resiliency strategy is hardening our electric distribution system based on recent climate trends, including storms carrying high winds and ice and days with temperature extremes. Our goal is always to significantly reduce the number and duration of power outages for our 1.9 million electric customers.

Severe storms, including wind gusts and freezing rain, could pose a significant threat to our electric infrastructure. We've increased our investment in forestry 60% since 2018, which will directly help reduce outages. We use premium materials (i.e., tree wire and aerial spacer cables) to increase electrical wire resiliency and help mitigate tree-caused outages.

We also propose dedicating more than $100 million a year to forestry through 2025. Our poles are built to withstand Michigan wind speeds and aging poles and wires are inspected yearly and replaced as needed. Forestry efforts to clear trees from our lines and poles are shown to significantly reduce the number of outages for at least five years following the clearing. Clearing our infrastructure also speeds restoration times by improving access for crews.

Through 2026, our approximate annual investment in the grid proposes the following allocations:

Grid Priority	Yearly Allocation[1] (millions)	Total Allocation[2] 2022-2026
Reliability	$209 million	$1.684 billion
Demand failures	$166 million	$816 million
Capacity	$63 million	$402 million
Forestry	$60 million	$562 million
Storm restoration	$85 million	$480 million

Forestry and storm restoration amounts reflect operations and maintenance dollars. Remaining categories reflect capital investments only.
[1] 2017-2021 average.
[2] Current five-year plan after 2022 and 2023 rate case adjustments.

Providing Reliable Power on High Heat Days

In addition to hardening our electric distribution system, we've prepared for increased electricity demand that results from higher temperatures, the transition to electric vehicles and other emergent and growing needs. The most significant demands on our grid's capacity are on extreme temperature days when home and commercial air conditioning use is highest. We prepare for these demands through our natural gas delivery plan and electric distribution plan.

We submit long-term electric supply plans to the MPSC every three years, which is frequent enough to allow us to adapt to changing electric demands like those due to climate change.

Our customer energy efficiency and demand response programs are key elements of our Clean Energy Plan, which will help us reduce electric demand on the hottest days of the year. These programs reward customers and businesses who reduce energy when demand is at its highest – such as on high-heat days and between 10 a.m. and 7 p.m. during the summer.

Given extreme heat days have increased, likely due to climate change, and are projected to increase more in the future, they are an important tool in our climate resiliency strategy.

These programs to reduce peak demand also include working with customers to reduce energy use through rebates for energy-efficient purchases, conducting at-home energy efficiency assessments and providing, free or reduced cost, energy efficient items like LED lightbulbs and smart thermostats that help customers lower their energy use during peak demand.

Keeping our Dams and Communities Safe During Heavy Precipitation

Heavy rainfall that causes flooding poses an unlikely but potential threat to hydroelectric facilities and their surrounding communities. Given Michigan is expected to experience greater rainfall in the coming decades, we've begun to analyze how to ensure our hydroelectric facilities will remain resilient in the face of these changing conditions. We use risk-based methods to best allocate our efforts to reduce the likelihood of dam failure during high precipitation events.

We are part of the Risk Informed Decision Making pilot study at the Alcona Dam on the Au Sable River, which is a ground-floor collaboration with FERC.

Our resiliency measures also include collaboration with local emergency management authorities to ensure public safety. Our hydroelectric team develops and maintains an EAP for each dam, consistent with federal requirements. Each EAP identifies potential emergencies, response and evacuation plans, public warnings and call down charts for staff and emergency responders. Maps of vulnerable areas are also included. Hydro-generation teams hold practice drills to familiarize responders with their roles in the event of dam failures, which is in addition to annual in-person training. Through these efforts, we keep our dams and communities safe.

One recent investment in dam safety is our work near Hardy Dam, our largest river hydroelectric facility. More than 15,000 customers rely on Hardy Dam for electricity. The facility, built in 1931, delivers 31.5 MW of electricity. Like all our hydroelectric facilities, Hardy Dam meets state and national dam safety requirements. However, in 2021, we presented a plan to the MPSC to make a substantial investment in this facility's ability to pass excess flood waters – a move that will help secure its longevity in the face of climate change.

The project includes building a new water overflow spillway to improve the safety of the structure and add additional capacity to pass large rain event river flows.

Hardy Hydroelectric Plant

Plans to Reduce Emissions

This report thus far has focused on our efforts to understand our region's climate change trends, potential future impacts and our work to make our system more resilient. But we are also actively reducing our own impact. Our Clean Energy Plan includes a pledge to reach net zero carbon emissions by 2040, which will reduce greenhouse gas emissions as we do our part to fight climate change.

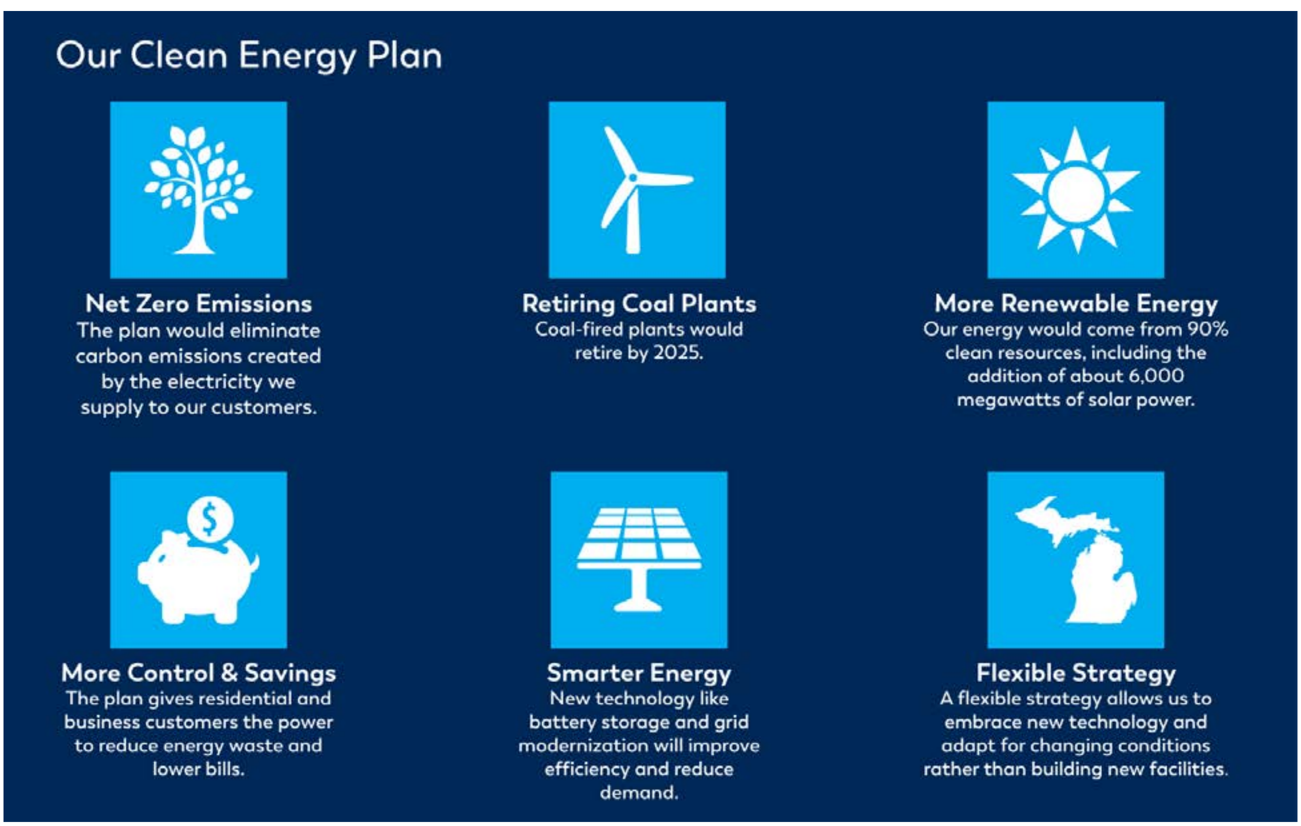
We propose to:

- Close our remaining coal-fired plants by 2025, significantly sooner than their design lives, and rely more on renewable energy like solar and wind.
- Increase customer energy efficiency programs including rebates and energy efficiency incentives.
- Incorporate battery technology to store adequate amounts of renewable energy.
- Purchase four existing natural gas-fired units, which release about half of the carbon dioxide emissions of a coal-fired unit while ensuring resiliency of supply.

Through these efforts, we would reduce our emissions by 60% from 2005 levels by 2025 – which is five years earlier than called for by the Intergovernmental Panel on Climate Change's landmark 1.5°C report. This shift to wind and solar, combined with improved energy storage capabilities and customer energy efficiency, would help us deliver 90% clean energy resources to our customers by 2040.

Methane emissions are also a major contributor of greenhouse gas. We have reduced methane emissions by 15% over the past decade. Our aggressive Methane Reduction Plan advances our emissions reduction goals with a plan to reach net zero methane emissions by the end of 2030 for our gas infrastructure system. Methane is considered a 100 times more severe threat to global temperature warming than carbon emissions. Renewable natural gas helps to decarbonize Michigan's agricultural sector – a difficult sector to decarbonize.

The plan calls for reducing our emissions by 80% by accelerating replacement of aging pipes, updating infrastructure and embracing new technologies like vehicles that are able to detect leaks. Our plan also calls for renewable natural gas, which can have a negative methane footprint, to address any remaining unavoidable emissions.



Conclusions

Our company's long-term success depends in part on how well we prepare for climate change. This report provides a clearer understanding of the climate risks potentially faced by our company and will help us determine our future business strategy. Our governance processes will incorporate these findings as a guide to how future conditions might impact our company, and through continued monitoring we can make strategic recommendations and decisions that are based on specific climate risks. These efforts will help us continue to provide reliable, affordable and clean energy to our millions of customers throughout Lower Michigan.

Our current governance processes, partnerships, infrastructure improvements and net zero goals have already supported climate resiliency efforts. But we understand we must remain steadfast to our commitment to minimize the effects that these identified risks pose to our company.

To respond to our most significant risks, we will:

- Prioritize storm resiliency through forestry and electric infrastructure investments.
- Work to increase our grid's resiliency to climate change effects, such as freezing rain and extreme temperature days, through prudent infrastructure investments consistent with good engineering practices.
- Work to reduce electricity demand through our demand response and energy efficiency programs.
- Take other actions identified in this analysis, as appropriate, to mitigate material risks.

Some of our next steps include:

- Refining our climate resiliency strategy by incorporating it fully across all portions of our business.
- Conducting physical hazard modeling, with the help of outside experts, to assess overall risk and future hazard exposure on the electric distribution system.
- Establish and communicate our gas systems' goals for scope 3 emissions, which are the emissions we indirectly impact through our value chain.
- Continuing communication of our climate risks and resiliencies with external stakeholders.
- Maintaining and growing new relationships with climate experts to help us monitor climate change's current and projected effects in Michigan.
- Evaluating how climate change risks might impact key elements of our supply chain as part of our risk management strategy.

Finally, given the general scientific consensus that the severity of climate change increases in higher emissions scenarios, we will also continue our path toward net zero carbon and net zero methane emissions. We know this commitment to our clean energy goals is critical to our planet's future, and we are proud to be an industry leader for our efforts. We will continue to work for our customers, co-workers, regulators, investors and all other stakeholders across Michigan toward a sustainable future that can endure the impact of climate change through awareness, planning and agility.


Au Sable River

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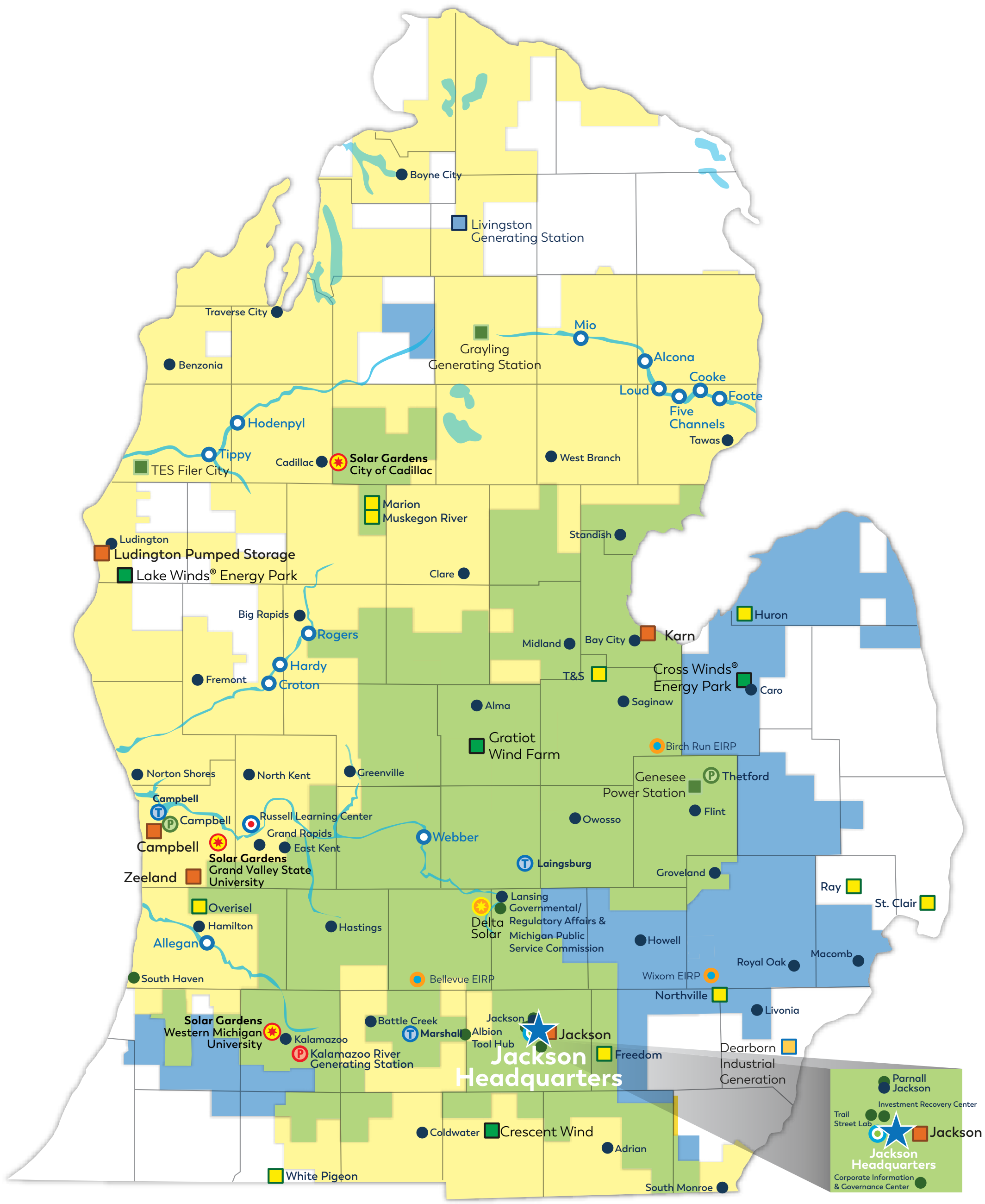
Appendix

Figure 1 - CMS Energy Electric, Natural Gas and Combination Territories and Facilities



Hydro | Solar | Wind | Electric Generation | Natural Gas Compressor | Peaking Plant | Office | Service Center and Office

Enhanced Infrastructure Replacement Program (EIRP) | Training Center | Russell Leadership Center | Innovation Center

Electric Service Territory | Combination Service Territory | Natural Gas Service Territory

CMS Enterprises Facilities

Electric Generation (Biomass) | Electric Generation (Natural Gas and Waste) | Electric Generation (Natural Gas) | Peaking Plant | Solar

Outside Michigan: Northwest Ohio Wind (Ohio) | Craven County Wood Energy (North Carolina) | Flambeau Solar (Wisconsin) | Aviator Wind (Texas)

Figure 2 - Lower Michigan Climate Trends and Projections

Climate Trend	Observed		Projected	
Temperature				
Annual Temperature		**Change from 1951-2020**	**Change 2040-2059**	
	Change in Annual Average High	0.6°F	3.0 to 5.1°F	
	Change in Annual Average Low	1.3°F		
Seasonal Temperature	**Season**	**Change from 1951-2020**	**Season**	**Projected Change 2040-2059**
	Winter	3.8°F	Winter	3°F
	Spring	2.3°F	Spring	3.5°F
	Summer	1.9°F	Summer	5.5°F
	Fall	1.9°F	Fall	4.5°F
Extreme Heat Days		**Change from 1951-2020**		**Projected Change 2040-2059**
	Days > 90°F	Decrease 1.3 days/year	Days > 90°F	19 more days/year
	Days > 100°F	Decrease .04 days/year	Days > 100°F	6 more days/year

Climate Trend	Observed		Projected	
Precipitation				
Annual Precipitation		**Change from 1951-2020**		**Projected Change 2040-2059**
		+1 inch/year		No significant change from historic +1 inch per year trend, although some models predict a substantial increase in days with freezing rain or ice.
Seasonal Precipitation	**Season**	**Change from 1951-2020**	Models for average seasonal precipitation are highly variable. The amount of rainfall will be different across the area by mid-century.	
	Winter	1.3 inches/year		
	Spring	1.89 inches/year		
	Summer	0.89 inches/year		
	Fall	1.77 inches/year		
> 1" Rain Events	**Change from 1951-2020**		**Projected Change 2040-2059**	
	Days with over 1" precipitation	+1.8 more days/year	Days with over 1" precipitation	One additional day per year
			Extreme precipitation events are highly localized. Some locations may see amounts exceeding +4 days/year.	
Storm Precipitation Events (3-day precipitation)			**Projected Change by 2030**	
	Source: Third-party Analysis		Accumulation may increase between 4 to 5 inches as compared to the period from 1986-2005, with a maximum accumulation of about 20%.	

Source: GLISA analysis of climate trends and projections unless noted.

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