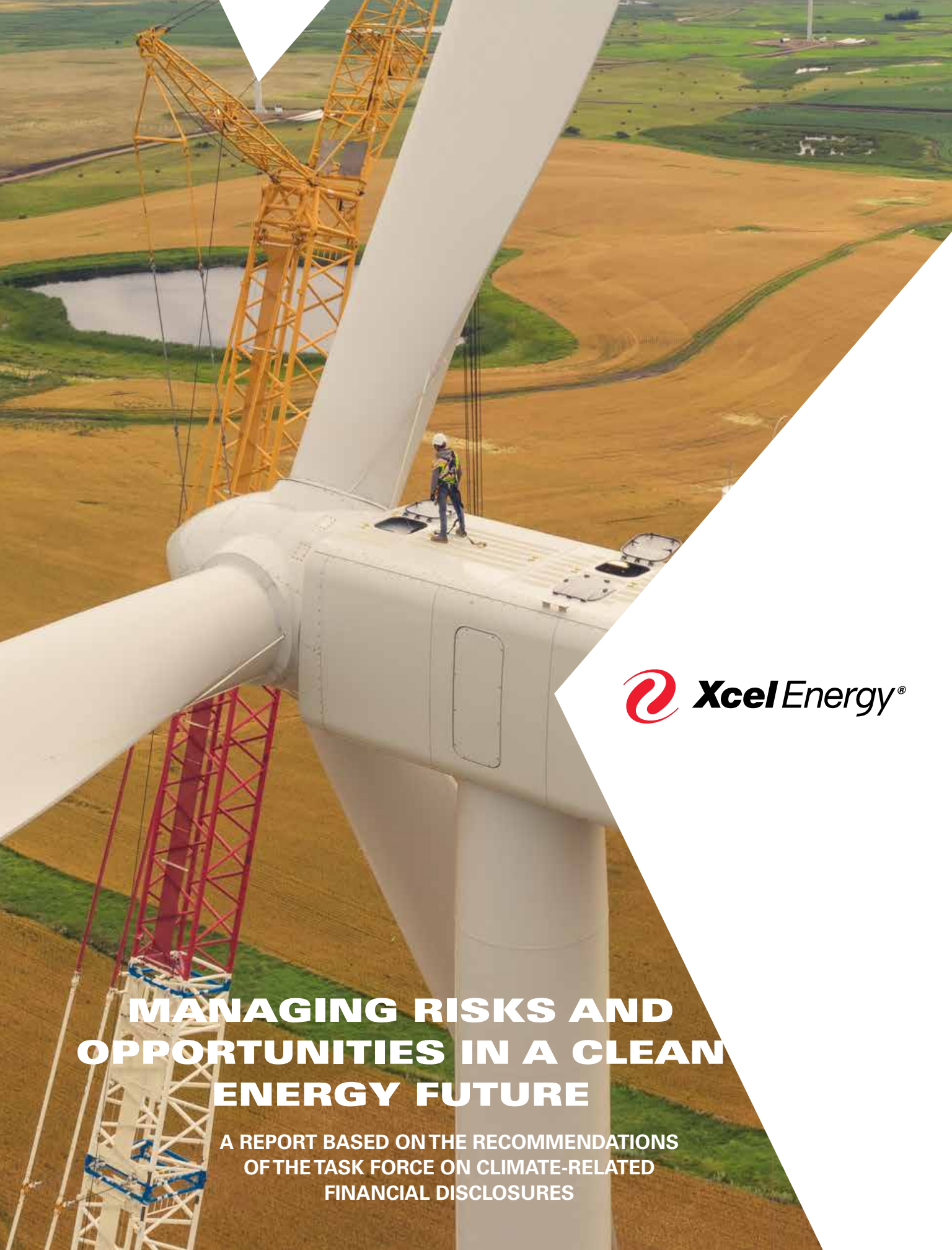


Xcel Energy®

MANAGING RISKS AND OPPORTUNITIES IN A CLEAN ENERGY FUTURE

A REPORT BASED ON THE RECOMMENDATIONS OF THE TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

TO OUR STAKEHOLDERS,

The United States and the world face unprecedented challenges in 2020 that are forcing many businesses to reevaluate their strategies. For Xcel Energy, our commitment to clean energy and addressing the risk of climate change remains constant. We know that our customers and other stakeholders are counting on us to lead the clean energy transition and to do so while maintaining reliable, affordable service.

We continue to deliver and build upon over 15 years of steady progress. More than 40% of the electricity we produced in 2019 came from carbon-free sources. We've also reduced carbon emissions 44% since 2005, which puts us over halfway to our goal to reduce carbon emissions 80% by 2030. We're striving to provide customers with 100% carbon-free electricity by 2050, the first major power company in the nation to establish this ambitious aspiration.

Our strategy benefits both customers and investors. We're retiring aging coal plants and replacing that power with clean wind and solar energy backed by natural gas. We're investing in transmission and advanced grid capabilities along with company-owned wind farms, where the cost to construct the projects is more than offset by the fuel savings. We're also looking to extend the use of existing carbon-free nuclear plants. For customers who want to do more to reduce their carbon footprints, we offer a comprehensive portfolio of energy efficiency programs and a broad selection of renewable energy choices, as well as new programs that encourage electric vehicles.

Alongside our electric strategy, we have a comprehensive plan to address the environmental impact of our natural gas business. This includes investing more than $1 billion in projects that secure our pipelines and reduce methane emissions. We've also joined Our Nation's Energy (ONE) Future, a consortium of natural gas companies committed to keeping methane emissions below 1% across the supply chain by 2025.

Through the analysis in this report, we demonstrate that these strategies are built to succeed because they give us flexibility in how we pursue shared goals and adapt to changing markets and environments. Our approach is comprehensive and designed to continue delivering increasingly cleaner energy reliably while keeping customer bills low.

Xcel Energy has never shied away from telling its clean energy story and reporting its progress. We disclose these details and discuss the risk of climate change in our financial reports, as well as our annual Corporate Responsibility Report.

In our response to the recommendations of the Task Force on Climate-related Financial Disclosures, we've expanded our commitment to transparency to meet the interests of investors and other stakeholders who want additional details on the resilience of our approach to climate change. It's one more way we're meeting the demands of our changing business landscape.

Sincerely,

Ben Fowke
Chairman and CEO

INTRODUCTION

Xcel Energy is a major U.S. investor-owned electricity and natural gas company with annual revenues of $11.5 billion. Headquartered in Minneapolis, we provide a comprehensive portfolio of energy-related products and services to approximately 3.7 million electricity customers and 2.1 million natural gas customers in eight Midwestern and Western states under four wholly owned, regulated utility subsidiaries.

We continue to demonstrate industry leadership in mitigating the risk of climate change and carbon policy through a comprehensive clean energy strategy that has consistently reduced carbon emissions while providing our customers with reliable, affordable energy. In December 2018, we became the first major U.S. electricity company to announce an aspiration to provide 100% carbon-free electricity for customers by 2050. Following that, we had our largest one-year decline in carbon emissions in 2019, achieving a more than 10% reduction in emissions compared to 2018. From 2005 to 2019, we reduced carbon emissions 44% from the electricity that serves customers, putting us more than halfway to our interim goal of reducing carbon emissions 80% by 2030.

Xcel Energy's strategy rests on a foundation of transparent, public disclosure. We joined The Climate Registry (TCR) as a founding member in 2007. The nonprofit organization was established to design and operate greenhouse gas reporting programs globally and assist organizations in measuring, reporting and verifying their emissions with the goal of reducing them. We annually third-party verify, register and publicly disclose our greenhouse gas emissions through TCR and are currently the only U.S. electricity company with 14 consecutive years of this reporting. For the past two years, TCR has recognized our reporting with its top Allstar status for excellence, and in 2020, recognized Xcel Energy with a Climate Leadership Award for Organizational Leadership for our carbon reductions and support for customers and communities in achieving their clean energy goals.[1]

The breadth and quality of Xcel Energy's public disclosures has improved since the company released its first annual Corporate Responsibility Report in 2005 to routinely share its environmental, social and governance performance. Our filings with the Securities and Exchange Commission provide insight into our clean energy strategy and detail our risk oversight process, including climate-related risks. Additionally, Xcel Energy was among the first U.S. electricity companies to tie carbon reduction directly to executive compensation more than 15 years ago and includes annual carbon results in the compensation discussion of its annual Proxy statement.

We report relevant environmental, social, governance and sustainability information following industry-wide templates developed by the Edison Electric Institute and American Gas Association to provide a measurable and consistent format for investors. Specific to climate change, Xcel Energy released a special carbon report in March 2019 — Building a Carbon-free Future — that outlines the company's path to achieving ambitious carbon reductions and provides an in-depth analysis of its carbon trajectory through 2050 compared to the climate science.

Building on this extensive record of reporting, Xcel Energy supports the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and demonstrates this by responding to the recommendations in this report. TCFD was created in 2015 by the Financial Stability Board, an international organization that monitors and makes recommendations about the global financial system. TCFD's purpose is to develop recommendations for voluntary climate-related financial disclosures by companies that publicly report financial data.

While Xcel Energy's existing reports address most of TCFD's recommendations, this report does so systematically and comprehensively, with the goal of providing information to investors and other interested stakeholders on how we consider transition and physical risks, evaluate risks and opportunities, and design a business strategy that succeeds in different possible futures.

We cover the four topic areas that TCFD recommends — strategy, governance, risk management, and metrics and targets — as well as the climate scenario analysis that evaluates our business strategies and goals against potential future climate outcomes. Through this analysis, we show that Xcel Energy's corporate strategy is robust to the transition risks of a low-carbon future, that we are well positioned to capitalize on the opportunities of this transition, and that our operations are resilient to the potential physical impacts of climate change.

We recognize that climate risk assessment and disclosure are rapidly evolving, and our ability to analyze transition and physical risks and modify our strategy accordingly will likewise evolve. We commit to continuing to improve our analysis and disclosures over time.

CONTENTS

FORWARD LOOKING STATEMENTS

The material in this report contains forward-looking statements that are subject to certain risks, uncertainties and assumptions. Such forward-looking statements include projections related to emission reductions and targets; changes in technology; statements regarding greenhouse gas reduction strategies; demand outlooks; expected future cost and benefit analyses; statements about Xcel Energy's future business plans, including programs and initiatives to respond to evolving customer preferences; and planned capital investments and are identified in this document by the words "anticipate", "assume", "believe", "can", "could", "committed", "expect", "help", "likely", "may", "plan", "project", "will" and similar expressions. Actual results may vary materially. Factors that could cause actual results to differ materially include, but are not limited to: impacts from the COVID-19 pandemic and its duration; operational safety; successful long-term operational planning; qualified workforce and third-party contractors; commodity risks; reductions in our credit ratings, including the actions of rating agencies; general economic conditions, including the availability of credit; actions of rating agencies and their impact on capital expenditures; business conditions in the energy industry; competitive factors; unusual weather; effects of geopolitical events; including war and acts of terrorism; changes in federal or state legislation; regulation, including the ability to recover costs from customers; actions of regulatory bodies; and other risk factors listed from time to time by Xcel Energy in its Annual Report on Form 10-K for the fiscal year ended Dec. 31, 2019 (including the items described under Factors Affecting Results of Operations) and the other risk factors listed from time to time by Xcel Energy Inc. in reports filed with the SEC. Xcel Energy and its subsidiaries expressly disclaim any obligation to update any forward-looking information.

XCEL ENERGY'S CLIMATE STRATEGY

Xcel Energy operates in a dynamic and changing industry. Rapidly evolving technology is changing how we serve our customers and is driving our customers' preference for more sophisticated products and services. To ensure our company succeeds in this new environment, Xcel Energy's Board of Directors and executive leadership team identified three strategic priorities that represent the keys to continued success in achieving the company's vision to be the preferred and trusted provider for the energy customers need. All three priorities are interrelated and play a role in managing the risk of climate change: lead the clean energy transition, enhance the customer experience and keep bills low.

Lead the Clean Energy Transition

Climate change is an urgent issue for many policy makers and investors and is a growing concern for customers who look to Xcel Energy to act. It is a priority for our company as well, and the reason we have an ambitious vision to provide 100% carbon-free electricity by 2050. Additionally, we are focused on achieving an interim goal to reduce carbon emissions from the electricity that serves customers 80% by 2030, as compared to 2005 levels. By acting now, we increase our ability to achieve these goals while assuring that our customers continue to receive affordable and reliable service. We are working within our states to propose clean energy plans for reducing emissions and creating a pathway to advance the zero-carbon 24/7 technologies necessary to eliminate the last carbon from our system.

From 2005 to 2019, we reduced carbon emissions from electricity serving our customers by 44% — over halfway to our 2030 goal — and we are on track to reach 60% renewable generation by 2030. In addition to increasing our renewable generation, Xcel Energy is transitioning how we produce, deliver and encourage the efficient use of energy by offering energy efficiency programs, retiring coal units and modernizing generating plants, and advancing power grid capabilities. We also have a comprehensive strategy for reducing greenhouse gas emissions across the natural gas supply chain. It focuses on helping customers reduce their carbon emissions from natural gas use, while operating the cleanest natural gas delivery system possible and leveraging our buying power to influence suppliers.

Xcel Energy is further influencing and leading the industry-wide clean energy transition. Elected in June 2020 for a one-year term, Xcel Energy's chairman and CEO Ben Fowke serves as chairman of the board for the Edison Electric Institute (EEI), the national association of investor-owned electric companies. One of his primary objectives is to advance the industry's clean energy goals and the emerging technologies critical to this transition. In fact, since Xcel Energy announced its 100% carbon-free vision, other EEI members have made similar commitments to achieve net-zero carbon or carbon-free electricity systems by 2050.

Enhance the Customer Experience

Customers' energy expectations continue to evolve, and Xcel Energy is committed to providing the options and solutions they want and value. To further build customer relationships, we are bringing together the people, processes and technology within Xcel Energy to transform our products and services and simplify how customers access them. We are investing in the tools and capabilities to help customers take charge of their energy and maximize their own investments in smart technology to keep their energy costs down and participate on the journey to carbon-free electricity by 2050.

Xcel Energy continues to expand its renewable energy production and offerings and is further developing and promoting energy efficiency. We currently offer a comprehensive portfolio of rebate and conservation programs designed for all types of customers and have spent more than $2.1 billion on these programs over the past decade. We are also transforming our power grid to accommodate increased levels of renewable energy, distributed energy resources and corresponding data growth, while maintaining high levels of reliability and security.

We have partnered with policy makers, state agencies and innovative companies to develop nation-leading electric vehicle solutions for our customers. We are preparing for a substantial number of electric vehicles (EVs) on roads across our service territories by 2030 and are focused on raising awareness of the benefits of EVs, making charging installations simple and keeping customer bills affordable through new rates and programs. We continue to develop a portfolio of innovative pilots and programs in our states in three areas: home charging, public charging and fleet operations.

We continue to develop and deliver new renewable energy solutions for residential, commercial and industrial customers who want directly sourced clean energy. Through programs such as Renewable*Connect® and Windsource®, we provide options for customers to power up to 100% of their electricity consumption with renewables and retire the environmental attributes on their behalf, enabling them to make renewable energy claims while keeping electricity affordable.

Keep Customer Bills Low

Affordability is a critical part of our customers' experience. We are focused on the impact our operations, as well as regulation and legislation, have on customers' bills. Our objective is to keep bill increases at or below the rate of inflation. Over the past decade, Xcel Energy residential customers have paid on average $3,000 less for electricity and $1,000 less for natural gas compared to the national average.

Our service territories benefit from the geographic concentration of favorable renewable resources. Strong wind and high solar output lower the lifetime cost of these resources. This, coupled with renewable tax credits and avoided fuel costs, enables us to invest in more renewable generation, in which the capital costs are largely or completely offset by fuel savings. We call this our Steel for Fuel strategy. Steel for Fuel not only expands the company's renewable energy portfolio but allows delivery of carbon-free energy without raising customer bills through replacement of fossil fuel generation with fuel-free wind and solar.

Strategy for Transitioning to Clean Energy

Vision for a Carbon-free Future

Approximately 99% of greenhouse gases associated with Xcel Energy's operations are carbon dioxide from the use of fossil fuels to generate electricity. Because of this, our clean energy strategy and long-term goals are primarily directed toward reducing carbon emissions from the electricity that serves our customers. We are confident we can reach our interim goal to reduce carbon emissions 80% by 2030 affordably and reliably with the technology available today. In setting the goal, our company analyzed a variety of cost-effective pathways that had common elements for achieving significant carbon reductions. These common elements include:

- Adding thousands of megawatts of wind and solar power to our system
- Incorporating both natural gas and storage resources, including batteries and pumped-storage hydro, to help integrate high levels of wind and solar energy
- Continuing to implement industry-leading energy efficiency programs
- Operating our nuclear plants through the remainder of their licenses while proposing to relicense and extend one of these units' operations and leaving open the option of relicensing other nuclear units in the future
- Retiring additional coal units or changing their operations to minimize emissions affordably and reliably
- Investing in supportive infrastructure to modernize the power grid, including the expansion of the transmission system and advanced technologies to improve the operation of the distribution system

To reduce carbon emissions 80% by 2030, we are working with stakeholders engaged as part of our state resource planning processes. Looking beyond 2030 to our aspiration to provide 100% carbon-free electricity, we are putting in place the drivers that will make this vision possible, even though 2050 is decades away. This includes building the necessary state and stakeholder support, public policy and advanced technologies.

To eliminate the remaining 20% of carbon from our system, we need advanced zero-carbon 24/7 generation or storage technologies not yet commercially available at the cost and scale needed. This includes technologies such as advanced renewable energy, carbon capture utilization and storage, long-duration energy storage, zero-carbon fuels such as hydrogen, and advanced nuclear. To ensure these technologies are ready when we need them at an affordable price, there must be more research, innovation and development done today.

Technology advancement is key to the long-term success of our strategy, and it has a long lead time for development. Because we cannot do it alone, we are working with others who share our interests on the research, development and deployment of advanced technologies. Specifically, we are pursuing policy objectives to support increased research and development, as well as programs and incentives to foster commercial demonstration and early deployment of promising technologies. As new technologies are developed, we also need the "ecosystem" in place to streamline the permitting, installation and operations, helping to accelerate their adoption.

Thanks to low-cost natural gas, Xcel Energy is reliably integrating high levels of wind and solar energy on the power grid and retiring coal units. While renewable energy is replacing most of our retiring coal generation, we need natural gas to help balance the system today and to achieve our goal to reduce carbon emissions 80% by 2030. If technologies and strategies, such as storage, demand response or load shifting become more economical and reliable than natural gas, we will deploy them instead. We will also continue to evaluate technologies that can make natural gas generation carbon free, such as hydrogen blending and carbon capture, utilization and sequestration. If there comes a day when we decide we can operate reliably and save our customers money by retiring natural gas units, we will do it.

A Leading Strategy for Addressing Greenhouse Gas Emissions from Natural Gas

Cleaner, low-cost natural gas is an essential component of Xcel Energy's clean energy transition. As we invest in new, zero-carbon technologies, we need natural gas to balance our power grid, and customers need it to affordably heat homes and businesses and as a key input for industrial processes. Natural gas is an energy workhorse, and there are no cost-effective substitutes available today. We believe that because of the vital role natural gas plays in our economy and low-carbon future, more must be done to address its environmental impact.

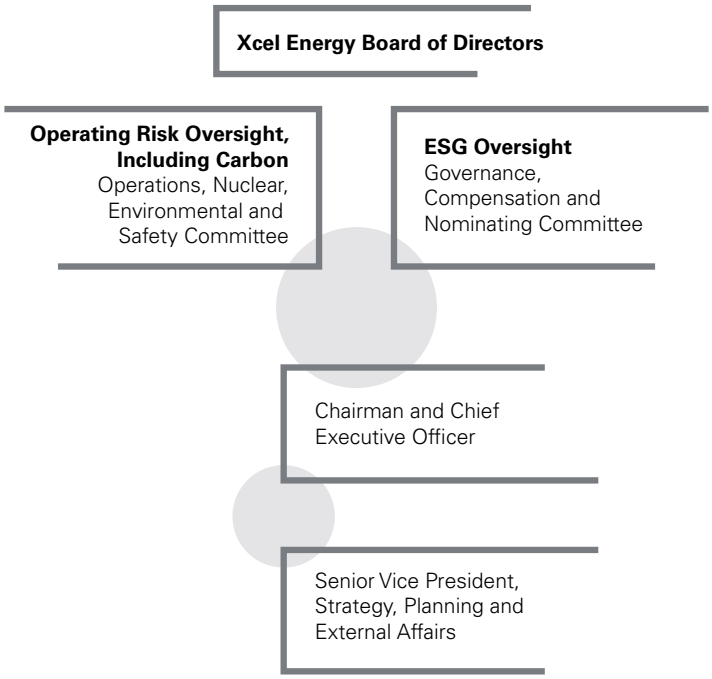
There are two sources of greenhouse gases from natural gas. Methane — a potent greenhouse gas — can be released during the production and delivery of natural gas. When natural gas is burned in power plants or in appliances, such as furnaces and water heaters, carbon dioxide is emitted. We launched a comprehensive plan in 2019 that covers all segments of the natural gas supply chain to reduce both methane emitted during production and delivery and carbon emissions from combustion. Xcel Energy is committed to helping customers reduce their carbon emissions from natural gas use while operating the cleanest natural gas delivery system possible, seeking opportunities to integrate new low-carbon fuels, and influencing natural gas suppliers to do their part in reducing the environmental impact of producing and transporting natural gas.

Xcel Energy is committed to reducing methane emissions from its natural gas system. Our company has a long history of implementing operational improvements that support this, including our pipeline replacement work and participation in EPA's Natural Gas STAR and Methane Challenge programs. Building on this commitment, we joined Our Nation's Energy (ONE) Future to partner with others in the industry to expand our emissions reporting and collectively limit methane emissions across the entire natural gas supply chain to 1% or less by 2025.

Through the natural gas we purchase for both our natural gas distribution and electric generation businesses, we can leverage our buying power to influence the practices of suppliers. In addition to industry partnerships to develop more consistent and transparent disclosure, we are advancing efforts to better understand and influence our supply chain. Xcel Energy has started gathering information directly from its suppliers on their methane emissions intensities and best practices for reducing emissions. This information will help us better understand the emissions footprint of the natural gas we purchase and allow us to take future action.

GOVERNANCE AND RISK MANAGEMENT

The Xcel Energy Board of Directors and executive management are responsible for the oversight of material risks and maintaining an effective risk monitoring process. The company has established clear roles and responsibilities for risk management, including risks associated with climate change, with specific responsibilities assigned to board committees and executive leaders.



Role of the Board of Directors

The board of directors plays a key part in the oversight, management and mitigation of risk. Oversight of critical risks is assigned to each of the four board committees to ensure these risks are well understood and given appropriate focus. New risks are considered and assigned as appropriate during the annual board of directors and committee evaluation process, resulting in updates to the committee charters and annual work plans. Additionally, the board of directors conducts an annual strategy session where the company's plans and initiatives are reviewed.

Each board committee has a role in aspects of managing risks associated with climate change, but the Operations, Nuclear, Environmental and Safety (ONES) Committee has specific responsibilities for the oversight of climate-related risks. The ONES Committee oversees all operational aspects of the business including those related to Xcel Energy's environmental strategy and performance, which includes the company's clean energy strategy and carbon reduction initiatives.

The Governance, Compensation and Nominating (GCN) Committee has oversight of executive compensation including the long-term incentive for carbon reduction targets. It also oversees key policies, such as the Code of Conduct and Political Contributions Policy, and has primary responsibility for environmental, social and governance related issues and risks.

Role of Executive Management

Within the company, the senior vice president, Strategy, Planning and External Affairs serves the role of chief sustainability officer. This position reports to the chairman and CEO and is responsible for environmental policy, strategy, governance and reporting, including the management of climate-related risks, and regular briefings and discussions with the board.

The entire management team leads an annual risk assessment and business planning process to identify and analyze risks. The risk assessment process determines the materiality and other attributes, such as timing, probability and controllability of key risks and is informed by the financial disclosure process, hazard risk procedures, internal audit, compliance with financial and operational controls, and other factors. Annual business planning is designed to develop goals, establish key performance indicators and identify barriers to implementing the company's strategy.

Management communicates regularly with the board of directors and key stakeholders regarding risks. Executive management presents and communicates the results of the risk assessment to the board of directors for review, which includes areas of existing and future macroeconomic, financial, operational, policy, environmental and security risks, and the effectiveness of our risk mitigation efforts.

Lastly, management plans and executes on strategies designed to achieve Xcel Energy's priorities, including environmental and clean energy responsibilities and initiatives. They are responsible for the execution of the strategic direction of the company and set key initiatives, such as the clean energy strategy. The team considers evolving customer trends and preferences, industry and technology needs affecting our business, developments in the external landscape, and policy considerations. Strategies and key initiatives are crafted and executed to strike a balance among reliability, affordability and environmental impact.

Policies and Procedures

Xcel Energy's executive incentive compensation is tied directly to company performance, specifically reliability, customer satisfaction, public and employee safety, achievement of carbon emission reduction goals, and financial performance. Xcel Energy was among the first U.S. electricity companies to tie carbon reduction directly to executive compensation more than 15 years ago and includes annual carbon results in the compensation discussion of its annual Proxy statement.

The risk mitigation process includes adherence to our Code of Conduct and compliance policies, operation of formal risk management structures, and overall business management. We further mitigate inherent risks through formal risk committees and corporate functions, such as internal audit, and internal controls over financial reporting and legal.

CLIMATE-RELATED RISKS AND OPPORTUNITIES

This report is intended to provide a discussion of the most pertinent climate-related risks and opportunities Xcel Energy has identified consistent with TCFD's framework. All material financial risks, including those related to climate change, are disclosed annually in Xcel Energy's Form 10-K.

TCFD identifies two main categories of climate risks: Those related to the transition to a lower-carbon economy and those related to changes in the physical environment caused by climate change. Transition risks include the risks created by policy, legal, market and technology changes adopted in order to limit the effects of global warming by mitigating emissions. Physical risks include both the long-term chronic changes to the environment as well as event-driven acute risks. Opportunities that the TCFD framework outlines include resource efficiency, energy source transitions, new products and services, access to new markets, and investments in resilience.

Transition Risks

Policy and Legal

Clean Energy Mandates

Our operations are subject to existing and future policies that require the increased use of clean energy technologies and limit greenhouse gas emissions. Anticipating these policies could increase in the future, we have undertaken numerous initiatives to meet current requirements and prepare for potential regulations. This includes reducing greenhouse gas emissions and meeting state renewable and energy efficiency targets. If future environmental regulations do not take into consideration investments already made or if additional initiatives or emission reductions are required, or our regulators do not allow cost recovery of investments incurred to comply with additional regulations, substantial costs may be incurred.

Legislative and Regulatory Responses to Climate Change

Legislative and regulatory responses related to climate change and new interpretations of existing laws create financial risk as our facilities may be subject to additional state or federal regulation in the future. Regulations, such as carbon taxes, cap and trade programs, or clean energy standards, could impose substantial costs. While we are pursuing an aggressive clean energy strategy to reduce emissions 80% by 2030 and deliver 100% carbon-free electricity by 2050, there is a risk that future state or federal climate regulations may not adequately account for the early action we have taken to date. They also could require us to pursue emissions reduction strategies that require procurement of new resources that cannot cost effectively lower emissions.

The United States is not committed to an international emissions reduction target, nor has it set a federal emission reduction mandate applicable to electric or natural gas utilities. However, states and municipalities may continue to pursue climate policies on their own. The steps Xcel Energy has taken to date to reduce greenhouse gas emissions, including energy efficiency measures, adding renewable generation, and retiring coal plants or converting them to natural gas, occurred under state-endorsed resource plans, renewable energy standards and other state policies. If our regulators do not allow us to recover all or part of the cost of capital investment or the operating and maintenance costs incurred to implement state-approved plans, it could have a material effect on our operating results, financial condition or cash flows.

Litigation Risks

We may be subject to climate change lawsuits. An adverse outcome could require substantial capital expenditures and possibly require payment of penalties or damages. Defense costs associated with such litigation can also be significant and could affect operating results, financial condition or cash flows if such costs are not recovered through regulated rates.

Technology

Technologies Needed to Achieve Our Carbon Goal

Meeting our aspiration to deliver 100% carbon-free electricity by 2050 requires innovation at a state, national and potentially global scale to develop advanced zero-carbon 24/7 electric generation and long-duration energy storage technologies. Cost-effective carbon-free dispatchable resources will be required to remove the remaining carbon from the system. If that technology does not arrive in time in a reliable, affordable manner, our 2050 carbon-free aspiration would be at risk.

Markets

Community Economic Health

Climate change may impact a region's economy, which could impact our sales and revenues. The price of energy has an impact on the economic health of our communities. The cost of additional regulatory requirements, such as regulation of greenhouse gas emissions, could impact the availability of goods and the prices that suppliers charge which could result in consumers paying higher prices for energy and purchased goods.

Availability of Capital

Utility operations require significant capital investment. As a result, we frequently need to access capital markets. Capital markets are global and impacted by issues and events throughout the world. Any disruption in capital markets could have a material impact on our ability to fund our operations. Capital market disruption and financial market distress could prevent us from issuing short-term commercial paper, issuing new securities or cause us to issue securities with unfavorable terms and conditions, such as higher interest rates. Higher interest rates on short-term borrowings with variable interest rates could also have an adverse effect on customer affordability and our operating results.

Reputation

Customer Satisfaction

We understand that energy is a necessity in people's lives. Above all else, to earn their satisfaction and trust, we must deliver on our responsibility to provide safe, reliable and affordable energy that is increasingly clean. Our reputation as a leader in reducing emissions is dependent on continued progress toward our clean energy goals and providing offerings that customers want and value.

Physical Risks

Acute

Severe Weather and Extreme Temperatures

Severe weather impacts our service territories, primarily when thunderstorms, flooding, tornadoes and snow or ice storms occur. Extreme weather conditions, such as heat waves, freezing cold or damaging winds, can require system backup and contribute to increased system stress, potentially resulting in service interruptions. High energy demand during periods of extreme conditions may raise electricity prices, increasing the cost of energy we provide to our customers, as well as compromising the efficiency of thermal generation and transmission. Increased flooding could disrupt thermal power plants located on rivers, as well as hydroelectric generation, transmission and distribution systems, and fuel supply infrastructure such as railroads and natural gas pipelines. Severe weather events could disrupt our fuel supply chain and the delivery of power to customers by damaging our transmission and distribution systems. To the extent the frequency of severe weather events increases, this could increase our cost of providing service.

Wildfire

Drought conditions contribute to an increased risk of wildfires and fire severity. While we carry liability insurance, given an extreme event, if Xcel Energy is assumed or found liable for wildfire damages, amounts that potentially exceed our coverage could negatively impact our operating results, financial condition or cash flows, and reputation. Wildfires could also impact our transmission and distribution systems, disrupting the delivery of energy to customers.

Chronic

Changes in Temperature

Changes in both average and extreme temperatures could impact Xcel Energy's operations. Customer energy needs vary with weather. To the extent weather conditions are affected by climate change, customer energy use could increase or decrease. Increased energy use due to changing weather may result in increased revenues but may also require us to invest in generating assets, transmission and other infrastructure. Decreased energy use due to weather changes may result in decreased revenues. Higher average temperatures could impact the efficiency of our thermal power generation and impact the capacity and efficiency of our transmission and distribution systems. Changing weather patterns could also affect energy production from wind and solar facilities. Periods of extreme temperatures could impact our ability to meet demand.

Drought

Changes in precipitation resulting in droughts or water shortages could adversely affect our operations in certain water constrained areas. Specifically, it could impact our ability to provide electricity to customers, cause early retirement of electric generating units and increase energy prices. Drought conditions may affect the performance and operability of our thermal and hydroelectric generation facilities. We may not recover all costs related to mitigating these physical and financial risks.

Opportunities

Resource Efficiency

Integrating Wind and Solar Power

The significant wind and solar resources on our systems have fundamentally changed the way we operate. As renewable energy gradually becomes the majority energy source on our system, we are focusing our operations to follow the wind and sun to maximize clean electricity production and do so reliably and cost effectively.

With each increase in renewable capacity, we have improved system operating flexibility, increasing our ability to incrementally grow the use of wind and solar power and achieve new system records. This includes adding more flexible backup generation, cycling coal offline and reducing minimum generation levels, negotiating greater flexibility from our natural gas suppliers, investing in transmission, using control equipment for both wind farms and thermal units, establishing new market mechanisms to decrease the costs of maintaining grid reliability while integrating wind, and adjusting planned maintenance around wind and solar production patterns. Increasingly, we are also aligning flexible customer energy demand to times during the day when variable renewable generation is most available. Our demand-side management and electrification programs and investments in advanced grid technology enable this.

While solar energy is relatively simple to forecast, wind generation has been consistently difficult because of its variability. To improve our wind forecasting capabilities, we began working in 2009 on a multiyear research and development project with the National Center for Atmospheric Research and its affiliate company Global Weather Corp. Today, the WindWX system helps utilities around the globe, including Xcel Energy, to make better commitment and dispatch decisions, which help reduce the cost of integrating higher levels of variable, renewable energy production. The system uses real-time, turbine-level operating data and applies sophisticated algorithms to produce a week-ahead forecast for the amount of wind power that will be produced every 15 minutes.

Energy Source

Steel for Fuel

Xcel Energy operates in some of the country's best regions for producing wind and solar power, and we are putting these resources to work for customers. Increasingly, the customers and communities we serve want their energy from clean, renewable sources, and we are delivering. Renewable energy plays a vital and growing role in our energy supply and plans for meeting customer needs.

Through our Steel for Fuel initiative, we are expanding our renewable portfolio and delivering carbon-free energy without raising customer bills. Under the effort, we are adding renewable resources — the steel — at a net savings because the capital costs of the projects are more than offset by future avoided fuel costs. We are retiring or reducing coal generation with variable costs of $22-$23 per megawatt hour and replacing that generation with new wind farms at a cost below $20 per megawatt hour. The strategy enables us to emit less carbon, reduce coal ownership and lower costs while offsetting our investments with savings in fuel costs, which helps keep customer bills low.

Future Fossil Replacements

Today's solid fuel assets — approximately six gigawatts of our combined nuclear and remaining coal assets for which we have not yet set retirement dates — account for approximately $5 billion in rate base for our utility operating companies. As we replace these assets to achieve our carbon goals, we estimate investing $20-$30 billion in 12-18 gigawatts of new wind, solar, storage, natural gas or other clean technologies, beyond our current investment plans.

Products and Services

Renewable Energy Products

By 2030, we estimate that renewable energy will constitute up to 60% of the energy that serves our customers. Some customers want renewable energy at a faster pace than this, including some businesses and communities that have set goals for up to 100% renewable energy. Our goal is to offer innovative solutions to meet their priorities around clean energy and the environment, while maintaining equitable cost allocation and affordable energy for all customers, especially for low-income customers.

We launched our first 100% renewable energy product for customers in 1998. Since then, Xcel Energy's program offerings have expanded to include options for community solar gardens, on-site solar and Renewable*Connect. Xcel Energy directly offers and administers some of these programs, while through other programs, the company provides rebates to customers or third parties that deliver the renewable energy. Through Renewable*Connect, customers can choose to make their energy up to 100% renewable under different contract options, such as month-to-month, five-year and 10-year terms. There is no equipment to install and customers can remain on the program if they move to a different home or business location within our service area. Xcel Energy designed this program to keep bills low for participating customers while not increasing costs for nonparticipants. Our company-administered Solar*Connect Community® program, currently available to customers in Wisconsin, is also designed to minimize impacts on nonparticipants.

Our customers can also choose to participate in renewable incentive programs for customer-owned or third-party renewable energy installations such as Solar*Rewards Community® and Solar*Rewards®. Net metering is also available for private solar installations. These programs, instituted as directed by public policy, are well intentioned and bring value to our customers by creating new opportunities for solar energy, but they require us to purchase energy at costs far above the market price of solar energy. Whether or not they have the ability to participate, customers bear the additional cost of these offerings.

In addition to these renewable energy options, we now offer customers in Colorado, Minnesota and Wisconsin a Certified Renewable Percentage to let them claim the full benefit of our increasingly clean energy mix. We retire Renewable Energy Credits (RECs) to cover the entire renewable energy portion of the electricity we deliver to customers, beyond what we already retire to meet state renewable portfolio standards. Certified Renewable Percentage is not something customers enroll in or subscribe to but is a benefit they automatically receive. This enables customers to make renewable energy claims about their own electric usage from Xcel Energy, which they can pair with a voluntary renewable product offering to reach 100% renewable energy use if they so choose.

Energy Efficiency

Customers rely on the energy we provide for their comfort, security and convenience, but increasingly they want more control and new options for managing and using energy. We are paying attention to the market, listening to our customers and responding with new and improved solutions. We began offering customers energy-saving solutions decades ago, and today, we provide some of the longest running and most successful efficiency programs in the country. We continuously evaluate emerging technologies and program models, looking for opportunities to expand our portfolio of energy solutions and meet evolving customer interests. In some jurisdictions, we earn additional incentives for exceeding energy efficiency targets set by regulators. Our comprehensive portfolio of energy solutions meets the individual needs and preferences of customers and gives everyone an opportunity participate — from large industrial customers to small businesses and customers living on fixed incomes.

Electric Vehicles

Beyond traditional energy efficiency, some customers and stakeholders are increasingly interested in technologies that support the electrification of energy end uses, such as EVs. EVs are dramatically changing the future of transportation, which is the largest source of carbon emissions in the U.S. economy. As more electric vehicle options become available, a growing number of customers want to reduce their carbon footprints through the cars they drive. EVs are ready for wide-scale adoption, having proven that they can save customers money and reduce emissions while optimizing use of the power grid. EVs that charge overnight during off-peak hours cost less than the equivalent of $1 per gallon of gasoline and their carbon emissions are already substantially lower than gasoline-powered vehicles — and will continue to decline as the electricity we provide becomes cleaner. While EVs create a significant opportunity for drivers and fleet operators to save on fuel and other costs, barriers exist to wider-scale adoption, such as customer awareness, high up-front costs and the availability of charging infrastructure. We can help reduce emissions from this sector of the economy by providing cleaner electricity and helping overcome barriers to EV adoption. We are increasing customer interest and helping the states we serve to reach their policy goals by developing new services, piloting them, and then rolling out our most successful ideas to customers on a broader scale.

Markets

Diverse Asset Base

Renewables and our distribution and transmission networks are the main drivers of Xcel Energy's planned capital investments. As we invest in the assets needed to implement our clean energy vison, our rate base is estimated to grow from $30 billion in 2019 to $42 billion by 2024. By 2024, our coal assets will decline from 8% of our rate base to 5%. From 2025 to 2030 and beyond, we will continue our Steel for Fuel and fossil replacement investments, as well as investing more in our transmission system to enable renewables and relieve congestion. We will also invest in advancing and expanding our distribution system with deployment of technologies such as batteries and demand response to enable new product offerings for customers and EV infrastructure to enable charging. This increased investment in clean energy technologies and diversification of our asset base benefits our customers and investors.

Resilience

Advanced Grid Intelligence and Security

Through our Advanced Grid Intelligence and Security (Advanced Grid) strategic initiative, we plan to transform the power grid into an intelligent, integrated network that securely, efficiently, reliably and safely integrates distributed energy resources. We are investing in a modern, efficient and interactive power grid for the future that will enable customers to receive clean, reliable energy and will offer new ways to save money and a better customer experience. Advanced Grid will take advantage of developed and enhanced technology to increase power grid reliability, transparency, efficiency and access. These technologies will work together to support improved distribution technology, a stronger economy, customer choice, and improved energy management and savings.

TESTING OUR STRATEGY: CLIMATE SCENARIO ANALYSIS

The Purpose of Scenario Analysis

Scenario analysis is a useful tool for assessing the potential implications and robustness of a company's strategies and plans under different possible futures. It is not a prediction of the future, nor is it a comprehensive review of performance against all possible outcomes. We have completed a scenario analysis to "stress test" the effectiveness of Xcel Energy's corporate strategic priorities, climate strategy and risk management processes against the uncertainties that a low-carbon transition and the physical impacts of climate change may represent for our business.

There is a broad range of pathways consistent with limiting temperature increases associated with climate change. In order to standardize our scenario analysis against externally available data, we applied transition and physical scenarios developed by governmental agencies as they are described by those agencies. We may not agree with all underlying assumptions or conclusions presented within these scenarios, and the scenarios do not necessarily represent our view of the future that serves as the foundation for our long-term corporate strategies and plans. For that reason, we have chosen two representative future scenarios combining transition and physical risks and opportunities.

Climate scenarios developed by external parties are a useful check against our internal planning assumptions because they present alternative visions for future developments. These scenarios are also publicly available and allow stakeholders a view into these futures. However, they do not replace the proprietary data that we use to forecast the insights we need to plan and operate our electric and natural gas systems. This information includes but is not limited to energy demand, the cost of new resources, or the impacts of changing public policy.

The two scenarios we selected do not represent a binary view of the possible outcomes that we could experience from climate change and climate policy. They are two possible futures along a spectrum of potential impacts, both those associated with the policy and market impacts of a low-carbon transition and those associated with changes in our physical environment. In many cases, the transition scenarios we selected provide a global or regional view of trends and outcomes and do not fully reflect our company-specific circumstances. There is also a great deal of uncertainty, both in the assumptions on which these models are based and the models themselves. While these global trends help guide a high-level analysis of the resilience of our strategy to manage the risks and opportunities of climate change, we cannot draw specific conclusions about the financial or operational impacts that these scenarios would have on Xcel Energy using the data available to us.

The Impact of COVID-19 on Scenario Analysis

The global COVID-19 pandemic and public health responses have substantially affected the world economy and global energy use. Our scenarios were developed based on research and publications prior to the pandemic, and therefore, do not account for its impacts on some of the fundamental assumptions that these scenarios are based on. We do not yet know the long-term impacts of COVID-19. Notably, economic activity and emissions across the United States and globally have fallen significantly so far in 2020. It is difficult to know at this time how long this contraction will last, what sort of recovery will occur, whether recovery will put the world back on its former emissions trajectory, and whether key drivers of emissions (energy use, work, consumption and travel habits) will return to pre-pandemic patterns or stabilize at a new normal. While this scenario analysis report is useful for evaluating the resilience of our strategy against previously released scenarios, future disclosures may make use of updated scenarios that reflect a greater understanding than exists today of post-COVID economic activity, emissions and policy environment.

Developing Scenarios for Comparison

Conducting a holistic climate scenario analysis requires pairing two different types of scenarios: Transition scenarios that provide insights into the transitions underway in the energy sector (technologies, markets and policies) and physical scenarios that translate levels of emissions to a level of temperature increase and the resulting physical risks, both chronic and acute. Emissions — included in transition scenarios and the main driver of temperature increase in the physical scenarios — offer a pivot point between the two. In this report, we are pairing transition scenarios and physical scenarios to create two climate scenarios that have allowed us to analyze a broad spectrum of climate impacts.

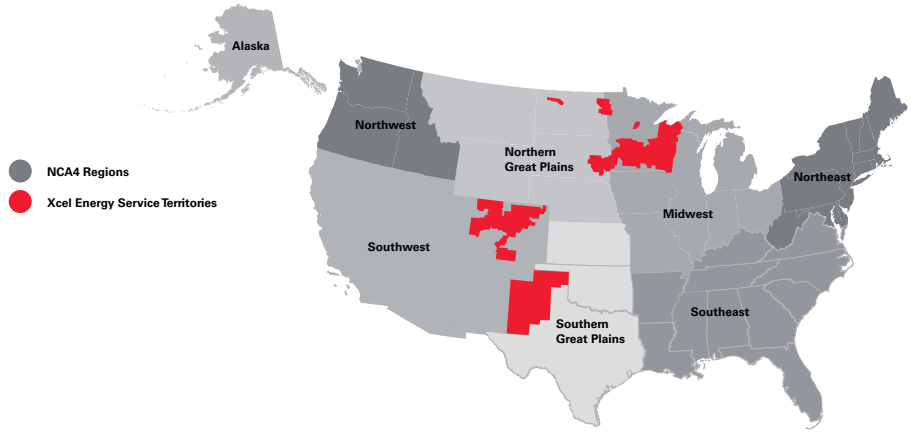
Drawing on the sources discussed below, we defined for the purpose of this report two transition and physical scenarios titled Global Commitments and Global Ambitions. This is our terminology, since they combine scenarios from two different sources, and are not titles used by the agencies that developed them. In these scenarios, we focus on evaluating medium-term impacts in 2030 and long-term impacts in 2040 and beyond, based on the available data. In conducting our analysis, we relied on detailed data and narrative descriptions that underlie the scenarios identified below.

Climate Scenarios		
	Global Commitments: 3 degrees C	**Global Ambitions: Below 2 degrees C**
Transition Scenario Component	International Energy Agency's 2019 World Energy Outlook Stated Policies Scenario	International Energy Agency's 2019 World Energy Outlook Sustainable Development Scenario
Physical Scenario Component	Intergovernmental Panel on Climate Change Representative Concentration Pathway 4.5, as described in the Fourth National Climate Assessment	Intergovernmental Panel on Climate Change Representative Concentration Pathway 2.6, as described in the Fourth National Climate Assessment

To evaluate transition scenarios, we looked to the International Energy Agency's (IEA) 2019 World Energy Outlook (WEO). We included the IEA's scenarios because they are recently updated and provide a comprehensive view of the global energy system backed up both by data and descriptive analysis of global trends in markets and policies. The scenarios included in the WEO do not offer predictions of future outcomes, nor do they chart the only pathway to achieve global climate ambitions. The purpose of the WEO is to explore possible futures — pathways that the energy sector could take to transition to different energy sources, the impact of policies and markets on energy supply and demand, and trends for global emissions of greenhouse gases. The WEO contains data and descriptions through 2040, with midpoint information also available for 2030.

To evaluate physical scenarios, we used data from the Representative Concentration Pathway scenarios, originally described by the Intergovernmental Panel on Climate Change and downscaled to regional levels in the United States through the Fourth National Climate Assessment (NCA4). The NCA4 is an authoritative assessment, produced every four years by the U.S. Global Change Research Program, to report to Congress and the President on the latest climate science and expected climate change impacts and mitigation or resilience options for different sectors of the economy and across ten regions of the United States.[2] It discusses climate impacts regionally by "downscaling" the global climate models to large, multi-state regions of the United States. In these scenarios, we are primarily evaluating midcentury impacts of climate change. Xcel Energy service territories relative to the NCA4 regions are shown in Figure 1. Downscaling in NCA4 is not sufficiently granular to predict risks to sub-state areas like Xcel Energy service territories, nor to particular Xcel Energy assets, but can help us consider how climate change may impact the overall regions where we operate.

Figure 1: Regions of the Fourth National Climate Assessment (NCA4) and Xcel Energy Territories



The Challenges of Climate Model Downscaling

For the physical risks drawn from climate scenarios, global climate models do not provide details of specific impacts to our system — especially event-driven impacts such as severe weather or wildfire. Current publicly available downscaling of physical climate models allows consideration of potential impacts in large, multi-state regions, but not sub-state areas like our utility service territories or specific assets such as a power plant. The physical scenarios describe how climate change may impact our regions and allow us to characterize acute and chronic risks as recommended in the TCFD guidance. However, these characterizations should not be interpreted as predicted impacts in our service territories or risks to particular Xcel Energy generation, transmission or distribution assets.

Describing the Scenario: Global Commitments

This scenario is meant to represent the path that the world is taking now based on current policy commitments that begin to limit greenhouse gas emissions and prioritize the development of clean energy resources. The commitments covered in this scenario have been made by countries in the Paris agreement, even if specific policies to implement them have not yet been adopted. These policies are expected to have a meaningful impact on the global trajectory of emissions but are insufficient to limit warming to below 2 degrees C. Note that this scenario is not business as usual; it does begin to bend the curve of emissions downwards.

Our View: Balancing the Transition and Physical Risks

The purpose of this scenario is to represent a pathway that includes a balance of transition and physical climate risks. This scenario models exposure to moderate levels of both transition and physical risks associated with climate change. While we do not intend this model to indicate the pathway that we are on today, there is value in analyzing our performance against a scenario that incorporates the need to both lower emissions and mitigate damage caused by higher warming. We still see challenges associated with using this scenario. While it does not model the impact of climate policies at a national level in the United States, we are already subject to carbon regulations in several jurisdictions that we serve that will affect the decisions we make about energy resources. Additionally, while we can use this scenario to evaluate the impacts of higher levels of warming on our electric and natural gas systems, as noted previously, there is a lack of publicly available downscaled climate data to conduct a more robust analysis of the impacts of climate change on our assets and operations.

Transition Scenario Components

The IEA's Stated Policies Scenario (STEPS) examines the implications of announced climate targets — the nationally determined contributions of countries participating in the Paris agreement — and existing energy policies on the supply and demand of energy. STEPS largely carries forward current and emerging trends in the energy industry. The scenario's purpose is to reflect the impacts of the choices that policy makers have made, but it does not assume future policy changes or major technological breakthroughs in the energy industry.

Total energy demand continues to grow modestly across the globe, with electric demand growth in the United States matching this trend. Increased energy efficiency slows the growth of energy demand globally even as economic growth continues on a steady path. In this scenario, renewable energy resources grow to become the largest source of electric generation in the United States by 2040, just barely edging out natural gas. Globally, solar PV becomes the largest source of installed generation capacity, and carbon-free resources account for just over half of installed capacity. The use of coal continues a gradual decline, while nuclear continues to provide roughly the same amount of carbon-free electric generation as today. Cost declines for batteries allow them to play a bigger role in managing the power grid.

Natural gas continues to play a role for a variety of uses. Natural gas distribution systems remain critical parts of delivering energy to consumers, with increased energy efficiency and some electrification of heating creating opportunities to reduce emissions from the use of natural gas in buildings and industrial processes. Other low-carbon fuels begin to become available but are not major factors in reducing emissions due to their costs. Electrification of transportation becomes more cost effective as batteries decline in price and, at the global scale, total demand for energy in transportation grows at a much slower pace than the overall demand for new vehicles. The use of oil to power passenger cars and the sale of cars with internal combustion engines both peak in the 2020s. Annual electric car sales increase to ten times the level of today's sales by 2030 and continue to grow another 50% by 2040.

The STEPS scenario falls short of the Paris agreement's temperature goals, resulting in temperature increases ranging from 2.7 C to 3.2 C. Annual increases in emissions slow, but do not peak, by 2040. Continued adoption of technologies such as wind, solar and electric vehicles help control emissions growth, but do not completely offset the effects of growing global demand for energy.

Physical Scenario Components

This scenario focuses on the NCA4's projection of climate impacts under the Representative Concentration Pathway (RCP) 4.5. This scenario assumes fossil fuel carbon emissions peak by midcentury then decrease, and projected temperature increases in this scenario roughly correspond to the temperature levels identified in the IEA Stated Policies Scenario.[3]

Under this scenario, the NCA4 models climate change impacts on the energy sector generally as well as across broad regions that contain Xcel Energy's service territories. These models are not predictions for our service territories or Xcel Energy assets due to the limitations of global climate-model downscaling discussed previously. Our descriptions of the NCA4 models in this section do not represent the national view provided in the NCA4 — they are only based on discussions of physical impacts in the NCA4 regions that encompass Xcel Energy's service territories: the Midwest, Northern Great Plains, Southwest and Southern Great Plains regions.

Chronic impacts could include long-term temperature increase; long-term reductions in water availability; increased drought and changes in snowpack amount and timing in some regions; increased annual precipitation in other regions; elevated surface water temperatures; and possible changes in wind patterns.

Acute impacts could include more frequent and intense precipitation potentially causing power outages, flooding of generation or other assets located on rivers, and possible fuel supply disruptions; more prolonged heat waves, increasing demand for electricity for air conditioning while potentially reducing efficiency of thermal generation and transmission; intense cold, snow or ice storms and polar vortex events potentially leading to power outages, low renewable generation, coal supply disruptions, and natural gas supply challenges due to competing use for home heating; and increased incidence of wildfires, leading to damage to transmission and distribution assets and increased costs for vegetation management.

Describing the Scenario: Global Ambitions

This scenario represents the global impacts of meeting the ambitions of the Paris agreement. It holds the increase in global average annual temperatures to 2 degrees C, with ambitions to keep temperatures to no greater than 1.5 degrees C, relative to preindustrial times. Though physical impacts of climate change are significantly less severe than under the Global Commitments Scenario, no part of the energy system is immune from transformational change that takes place over a short period of time.

Our View: Highlighting the Transition in a 2 degree C Scenario

TCFD specifically recommends that reporting organizations include a 2 degree C scenario — a global emissions scenario that would likely limit warming to 2 C or less above preindustrial average temperatures — within their analysis to best understand the exposure to and management of high levels of transition risks. We follow this directive through the inclusion of our Global Ambitions scenario. It is important to note that there are numerous other potential pathways that could accomplish the same goal using different policies and technologies and with different economic outcomes. This scenario describes one potential pathway for the world to achieve energy sustainability goals, not a set of necessary conditions that must be accomplished to help limit warming below 2 C. Several assumptions made in the IEA's Sustainable Development Scenario seem questionable based on our own experience, such as the lack of breakthrough energy technology developments and the assumption that the only option for policy makers to affect carbon policy is through a price on carbon emissions.

Transition Scenario Components

The IEA's Sustainable Development Scenario (SDS) examines a pathway consistent with key sustainable development goals in the energy sector, including the reduction of emissions consistent with the ambitions of the Paris agreement, universal access to energy, and improved air quality. Under this scenario, emissions quickly begin a downward turn and substantial reductions are achieved by 2040. These emissions reductions are expected to result in limiting warming to between 1.65 C and 1.8 C.

The SDS describes a radical transformation of the energy sector globally, with energy demand and emissions decoupled from global economic growth and prosperity. Energy efficiency becomes the largest source of emissions savings in this scenario.

While overall energy demand declines due to increased efficiency, electricity becomes the backbone of the energy system as low-carbon generation enables emissions reductions from other sectors of the economy. By 2040, carbon-free resources account for 85% of electric generation. Fossil fuels are not eliminated from the energy sector, but energy efficiency, renewable energy and even carbon capture combine to dramatically reduce emissions from power generation, transportation and industrial processes.

In the United States, renewable energy becomes the largest source of electric generation after 2030. Technologies including energy storage and demand response pair with natural gas to ensure that the electric system maintains the flexibility needed to manage high levels of wind and solar generation, but under this scenario the use of natural gas for balancing the electric grid peaks in the mid-2020s globally. The use of coal declines rapidly, with existing assets repurposed and retrofitted to generate cleaner energy using different fuels or capturing carbon emissions.

Natural gas use in buildings and industry continues to rise slightly through the 2030s but then declines due to increased efficiency and alternative fuels. Electrification and clean fuels such as renewable natural gas and hydrogen present opportunities to reduce emissions in industrial processes and buildings.

Large-scale electrification and increased efficiency of the transportation system drives down both energy consumption and emissions from vehicles. By 2040, electricity powers nearly 50% of passenger cars and most urban buses. Globally, energy used for transportation falls 40% even as the number of vehicles on the road increases by 45%. Alternative transportation fuels such as advanced biofuels and hydrogen also help drive down emissions.

Physical Scenario Components

This scenario focuses on the reduced warming and related physical impacts that could occur under the NCA4's lowest-emissions scenario, RCP 2.6. This scenario would require fossil fuel carbon emissions to have peaked already and to decline steeply in coming decades, reaching zero or net negative by around 2070. It roughly corresponds to the temperature levels identified in the IEA Sustainable Development Scenario.[4]

The NCA4 and its underlying scenario products do not provide the same comprehensive discussion and spatially explicit scenario products for the very low-emissions future that RCP 2.6 represents. However, we have pulled from the NCA4 selected information on RCP 2.6 in the same general categories of impacts that we discuss above for RCP 4.5.

Chronic impacts identified in the NCA4 under this scenario include long-term temperature increases. Over the next few decades, average annual temperatures in the United States are expected to rise regardless of future emissions scenarios, though the warming that takes place in this scenario is substantially lower than those identified in the Global Commitments scenario. Additionally, current broad national trends of increased annual precipitation that are already being experienced continue to grow, though there are notable regional differences. The Southwestern United States could see decreased annual precipitation as recent trends on water availability, drought and changes in snowpack melting would continue under this scenario.

Regarding acute impacts, the frequency and intensity of heavy precipitation events across the United States have increased more than average precipitation. This trend is expected to continue as warmer temperatures and increased evaporation rates lead to higher levels of water vapor in the atmosphere, with the largest increases occurring in the Northeast and Midwest.

SCENARIO ANALYSIS RESULTS

Through our corporate priorities and strategy, strong governance and oversight, and effective management, Xcel Energy has developed an approach to climate change that we expect to be resilient in the face of uncertainty. In this section, we describe our approaches to managing and mitigating the impacts that we could experience under each climate scenario and discuss the ways that our business could be affected.

Resilience in a Low-Carbon Transition

Delivering Clean Electricity: Emissions Reductions, Energy Mix and Efficiency

Our Approach

- We are working to reduce greenhouse gases that are emitted as we produce and distribute energy to our customers. Approximately 99% of greenhouse gases associated with our operations are carbon dioxide from the use of fossil fuels to generate electricity. Because of this, our clean energy strategy and long-term goals are primarily directed toward reducing carbon dioxide emissions from the electricity that serves our customers.

- In December 2018, we became the first major U.S. electricity company to announce an aspiration to provide customers with 100% carbon-free electricity by 2050. Our interim goal of reducing emissions 80% by 2030 remains one of the most stringent in the industry. Following that announcement, we achieved our largest one-year decline in carbon emissions in 2019, achieving a more than 10% reduction in emissions compared to 2018. From 2005 to 2019, we have reduced carbon emissions 44% from the electricity that serves customers and are more than halfway to our interim goal of reducing carbon emissions 80% by 2030.

- Our science-based goal was developed with input from climate modeling experts to evaluate how our vision relates to global temperature goals. These experts consulted the newest Intergovernmental Panel on Climate Change emission scenarios database and analyzed carbon emissions for the electric sector in industrialized countries, within the scenarios that have a high (66% or greater) probability of achieving the 2 C goal. Based on this expert analysis, our reduction targets are clearly consistent with — even on the low end of — the electric sector reductions in scenarios that achieve the international 2 C goal. This analysis further demonstrates that our emission trajectory is also consistent with the more aggressive 1.5 C goal.

- In order to properly evaluate the impact of our emissions, our resource planning processes in Minnesota, Colorado and New Mexico applies a carbon proxy to consider the costs and risks of potential carbon regulation and potential damages from climate change. This allows regulatory costs, and in some cases externality damages, to be considered in selecting resources.

- We are progressively increasing the share of renewable energy resources in our energy mix to reduce greenhouse gas emissions.
  - In 2019, renewable energy provided 25% of our energy supply. By 2030, we expect that share to increase to 60%, as we achieve our goal to reduce emissions 80%.
  - Under our Steel for Fuel growth strategy, we completed three new, company-owned wind farms in 2019 and expect to complete seven additional projects by early 2021 to take advantage of full production tax credits. Altogether, we will increase our wind ownership fivefold by the end of 2021 when our current wind expansion is complete.
  - By the end of 2019, we had 762 megawatts of large-scale, universal solar capacity and approximately 8,000 megawatts of wind capacity on our system.

- We have offered customer renewable choice programs since our initial roll out of the Windsource program in 1998. As of year-end 2019, more than 200,000 customers participated in our renewable choice programs, including 145,000 customers enrolled in programs backed by Xcel Energy renewable resources, demonstrating high engagement and satisfaction with these options.

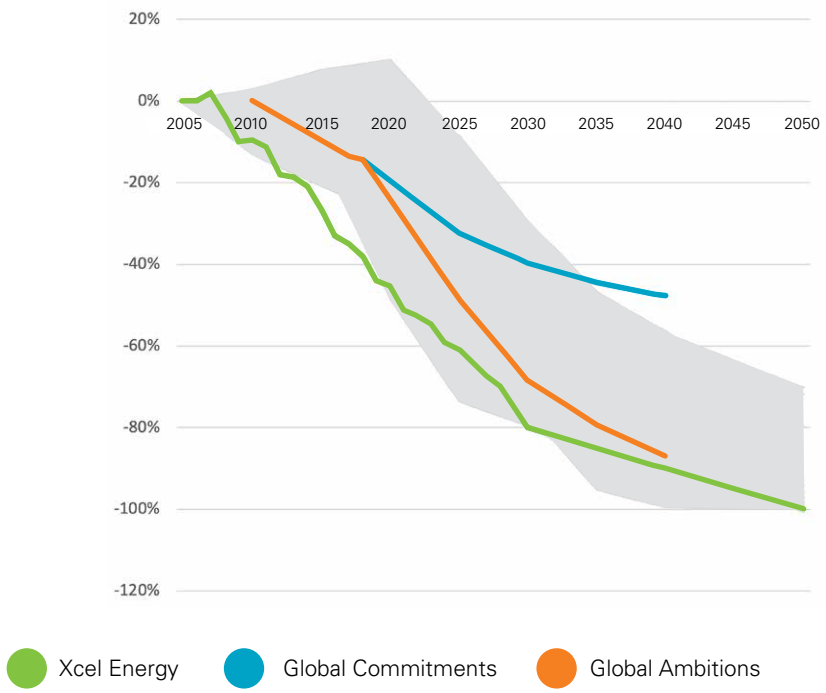
- In addition to transitioning to a low-carbon resource mix, we help customers decrease their energy use through a comprehensive portfolio of energy efficiency programs. In 2019, our customers completed 3.4 million projects to conserve electricity, saving nearly 1,300 gigawatt hours of electricity for the year, equivalent to powering 161,000 average homes.

Global Commitments	Global Ambitions
• Xcel Energy's clean energy strategy exceeds the emissions and energy mix metrics contained within this scenario. • While this scenario does not envision national policies to limit carbon emissions in the United States, Xcel Energy is subject to renewable energy or carbon reduction mandates in many of the states we serve. Public policy is not the only driver of our clean energy strategy — customers and communities have clear expectations that we continue to reduce emissions and increase the amount of renewable energy we deliver. • In several of the states we serve, our carbon goals were adopted into state climate legislation. By grounding our carbon goals in the climate science, we provide a pathway that helps guide policy makers seeking to enact rigorous, science-backed climate policies for the electric sector. • The steps that we take to achieve our 2030 carbon goal will result in an energy mix that relies more on carbon-free wind and solar and less on fossil fuels than this scenario's 2030 energy mix for the United States. Under our Steel for Fuel strategy, we are undertaking this transition while creating value for both our customers and shareholders. • Xcel Energy has ambitious goals to invest more than $2.5 billion in programs that help customers use energy more efficiently through 2030, and we expect that those efforts will continue beyond that timeframe. Our energy efficiency strategy has positioned us to cost-effectively help customers reduce energy usage and lower their bills. Our recent Upper Midwest Resource Plan includes additional energy efficiency commitments, further demonstrating our approach to helping customers save energy. We constantly evaluate emerging technologies and program models, looking for opportunities to expand our portfolio of energy solutions and anticipating evolving customer needs and interests. Beyond traditional energy efficiency, some of our customers and stakeholders are increasingly interested in technologies that support the electrification of energy end uses, such as EVs. We are closely monitoring other technologies that may offer opportunities for load management that will support more efficient use of the power grid.	• Xcel Energy's bold emissions reduction goals put us on a trajectory that is consistent with or greater than the steep emissions cuts modeled in this scenario. Not only are our goals consistent with this emissions trajectory, but the emissions reductions we have achieved substantially exceed the level of reductions identified in this scenario. • Our emissions reduction goals help mitigate the risks of climate laws and regulations. By grounding our goals in the climate science, we align our strategy with the same pathways that we believe policy makers will consider in adopting emissions reduction targets and implementing policies. • Our projected 2030 energy mix shows that our emissions reduction strategy does not rely on divesting fossil generation or attributing the emissions from electricity generated to serve our customers to other energy market participants. In 2030, we anticipate that our energy mix will contain substantially greater levels of carbon-free energy and smaller levels of fossil energy compared against this scenario's 2030 energy mix for the United States. • Our 2030 emissions reductions can be achieved using existing technologies. Beyond 2030, advanced zero-carbon technologies are key to achieving deep emissions cuts within the electric sector. However, this scenario assumes that no zero-emission generation breakthroughs will contribute to emissions reductions. Our technology strategy is designed to create policies that promote research and development, incentives and the "ecosystem" needed to advance new carbon-free generation technologies. • Across all sectors of the economy, using energy in a more efficient way is instrumental to achieve significant carbon emissions reductions in this scenario. Even though energy efficiency significantly reduces the total use of energy globally, there are still increases in demand for electricity as clean electric generation displaces other fuels. Xcel Energy's clean energy strategy, energy efficiency programs and EV strategy help support this approach. Even as cleaner electricity help displace emissions, parallel advances in other sectors, such as transportation and manufacturing, alongside increasingly clean electricity will be needed to meet the anticipated economy-wide reductions in energy use.

Carbon Dioxide Emissions

As discussed, Xcel Energy's emissions trajectory meets or exceeds the reductions identified in both the Global Commitments and Global Ambitions scenarios. Xcel Energy has already undertaken a comprehensive approach to evaluating our science-based carbon goal against emissions reduction pathways that are consistent with global climate aspirations. In our 2019 carbon report, Building a Carbon-free Future, we commissioned an analysis by experienced climate modelers at the University of Denver to compare our goals against a range of electric sector carbon dioxide emission scenarios consistent with limiting warming to both 2 C and 1.5 C. Figure 2 is reproduced from that report, showing results from this analysis of Xcel Energy's carbon goals against carbon dioxide emissions from the electric power sector in industrialized countries in a range of scenarios consistent with limiting warming to 2 C. We add two lines to the earlier figure that represent carbon dioxide emissions from the industrialized country electric sector in both the Global Commitments and Global Ambitions scenarios, showing that our emissions fall below both IEA scenarios as well.

Figure 2: Xcel Energy's Carbon Emissions Reduction Trajectory Compared to the Scenarios

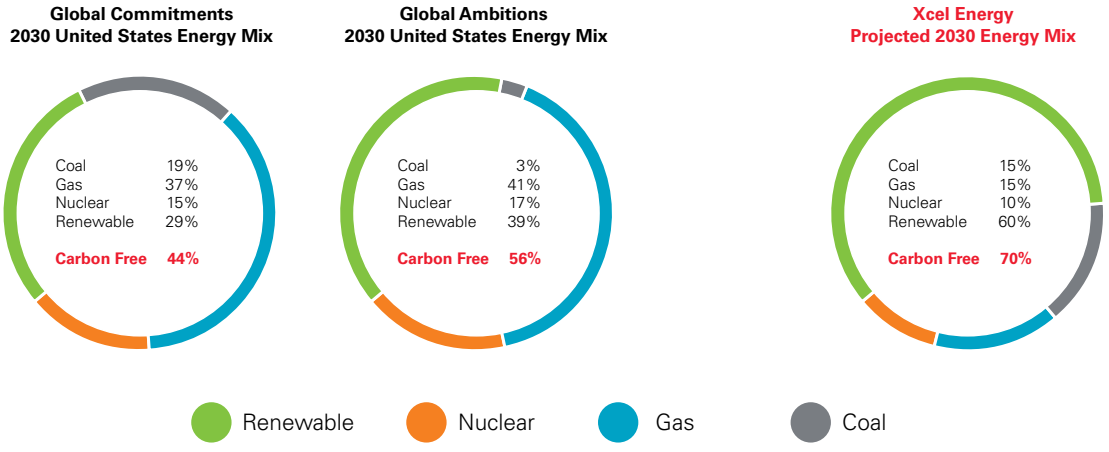


Energy Mix

To reach our 2030 carbon goal, we have started to work with regulators and stakeholders engaged in our state resource planning processes. In 2019, we proposed the Upper Midwest Energy Plan that would close our remaining coal units early, shutting down all the units in the region by 2030. It would also extend the use of nuclear energy at the Monticello plant and significantly add more wind and solar power, as well as firm capacity resources, such as natural gas or possibly storage. Through the end of 2019 into early 2020, we updated our planning model and worked with stakeholders and resubmitted a revised plan for the Upper Midwest in June 2020, based on input we received. We expect to make similar proposals in Colorado and New Mexico in 2021 as the energy planning processes in these states get underway.

Figure 3 shows a potential scenario for Xcel Energy's 2030 energy mix that is consistent with our 80% carbon reduction goal. We anticipate that these projections could change as we continue to develop our new state resource planning proposals. When compared against the United States energy mix modeled in both the Global Ambitions and Global Commitments scenarios, we expect to deliver substantially higher amounts of carbon-free electricity and lower amounts of fossil electricity. As previously discussed, these plans are based on core principles of maintaining reliability and affordability for our customers. Beyond 2030, Xcel Energy's continuing progress on both emissions reductions and transitioning our energy mix away from resources that emit carbon relies on technological innovation that can deliver reliable, cost-effective energy.

Figure 3: 2030 Energy Mix



Climate Policy and Technology Innovation

The Global Ambitions scenario provides a useful point of comparison to Xcel Energy's carbon reduction vision and allows us to evaluate how well aligned our strategy is with a global emissions scenario that would limit warming to approximately 2 C. As demonstrated in this report, our company-level strategy compares favorably with the SDS in terms of energy mix, emissions, electrification and other key metrics. It illustrates how our system can evolve to position Xcel Energy for the expected transition and physical risks and take full advantage of transition opportunities.

Two key features of the SDS, however, fundamentally diverge from our vision of how clean energy policy can best lay the groundwork for a 100% carbon-free electricity system by 2050. The SDS largely relies on current technologies, assuming no technology breakthroughs by 2040, and it assumes a relatively high carbon price is in place globally to drive reductions. Xcel Energy disagrees with these assumptions. Our own experience with renewable energy and other technologies demonstrates that clean energy technology breakthroughs have happened even in the absence of a carbon price. It seems unlikely that no technology breakthroughs will occur in the next 20 years.

In announcing our industry-leading carbon vision in 2018, we made clear that existing technologies — wind, solar, short-term storage, existing nuclear, natural gas and flexible demand — are sufficient to reduce carbon emissions 80% by 2030. Our aspiration to provide 100% carbon-free electricity by 2050 will require new zero-carbon dispatchable generation and long-duration energy storage technologies. Any policy with a goal of carbon-free electricity by midcentury must include research and development, commercialization, tax incentives and permitting mechanisms

for such technologies, and we are actively working with utility and nongovernmental partners to evaluate these technologies and put in place the policy frameworks to ensure they are commercially available at scale beyond 2030. An economy-wide carbon tax at the level contemplated in the SDS would not only do little to promote new technology, it could also impose punishing cost impacts on customers at a time of extraordinary economic hardship. We estimate a tax of $40 per ton of carbon dioxide — relatively high when compared against current carbon market prices in the United States, but less than one-third the level contemplated in the SDS — could impose incremental costs of about $2 billion a year on Xcel Energy's customers while doing little to speed development of new technology.

A better approach, which is increasingly being proposed at the state and federal levels in the United States, is a technology-neutral Clean Energy Standard that targets 100% carbon-free electricity by 2050. This standard includes compliance flexibilities, safeguards to control customer costs, and mechanisms to achieve carbon reductions in sectors other than electricity. It also incorporates comprehensive technology research and development, financing and tax incentive mechanisms to commercialize the zero-carbon dispatchable generation and long-duration energy storage technologies needed to eliminate the last 10%-20% of carbon emissions from the electric sector. Such a policy, while driving to the same ultimate goal, can maintain reliable and affordable electricity and enable the electric sector to be an engine of carbon reductions in other sectors.

Natural Gas Distribution

Our Approach
• The natural gas distribution system is one part of a complex natural gas supply chain that delivers natural gas for customers for a variety of end uses, both residential (cooking, space and water heating) and commercial and industrial applications. While our natural gas operations are a smaller portion of our business compared to electricity, we remain equally committed to reducing emissions associated with our natural gas system.
• Today, there is not a low-cost substitute for the reliable energy that natural gas provides to customers, particularly during periods of extreme temperatures in the cold climates that we serve. Given this challenge, the natural gas system and our distribution business requires a different approach from electricity to achieve cost-effective emission reductions.
• Our strategy for the natural gas business seeks to reduce greenhouse gas emissions across the natural gas supply chain by operating the cleanest natural gas distribution system possible while maintaining affordability, helping customers reduce their emissions, and working with upstream suppliers.
• Through our strategy, we can start building the technology and market to drive emission reductions across the entire supply chain. We are proceeding systematically to identify pilot projects and customer driven technology opportunities that enable us to understand available technologies.
• As a natural gas and electric provider, Xcel Energy is well positioned to help customers find the right energy source for them, maximizing energy value while reducing emissions.
• While Xcel Energy does not produce natural gas, we can leverage our purchasing power to call on natural gas suppliers and marketers to enhance transparency of their methane emissions footprints and implement best practices to minimize those emissions.

Global Commitments	Global Ambitions
• Under this scenario, natural gas demand grows significantly, but levels off by the mid-2030s. Xcel Energy is well positioned to meet any continued growth of natural gas customers and maintain the system thereafter. • Opportunities to support customer interest in low-carbon products such as renewable natural gas or hydrogen blending may be limited by cost pressures. A voluntary program approach would help protect customers from higher costs. • We continue to invest in programs that allow customers to save money and reduce emissions by using natural gas more efficiently. Electrification may play a more limited role in managing natural gas use in this scenario. Xcel Energy will continue to develop voluntary programs and products that allow us to move at the pace of technology and demand. • Continued demand growth for traditional natural gas in this scenario highlights the importance of working with producers to minimize the environmental footprint of the current natural gas supply chain. Xcel Energy's strategy includes leveraging our purchasing power to influence our suppliers to reduce methane emissions, minimizing the future impact of delivered natural gas.	• This scenario shows that natural gas is still used globally to meet building heating demand beyond 2040 and confirms that natural gas systems deliver vital energy security to customers. • In this scenario, the natural gas system delivers a variety of fuels, blending traditional natural gas with higher levels of renewable natural gas and hydrogen. Xcel Energy is well positioned to follow this trajectory as we continue to maintain the natural gas system and proactively explore options for new low-carbon resources to reduce the impact of the remaining natural gas system. • The scenario also contemplates that the expansion of "net-zero" buildings may weaken the case for new buildings reliant on natural gas. As an electric and natural gas utility, Xcel Energy is well positioned to serve changing customer preferences and balance the delivery of energy through two systems. We are piloting all-electric new construction programs, which can give us the experience to manage the right technologies and designs if this trend continues. • Combining beneficial electrification with the most efficient natural gas system keeps options open to reduce emissions and minimize energy security risks by allowing the two systems to work together.

Electric Transportation

Our Approach

- While EVs create a significant opportunity for drivers and fleet operators to save on fuel and other costs, barriers exist to wider-scale adoption, such as customer awareness, high up-front costs and the availability of charging infrastructure. We are helping overcome these barriers by developing new services, piloting them, and then rolling out our most successful ideas to customers on a broader scale.

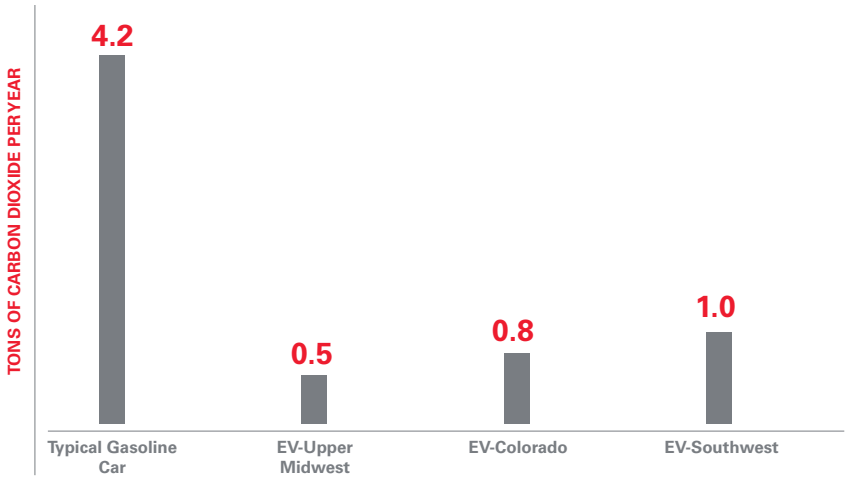
- We are well positioned to support our customers and communities and to work with EV stakeholders to facilitate this change and ensure it truly benefits customers, the environment and the power grid we all rely upon.

- Through our electric vehicle strategy, we are focused on:
  - Raising awareness and increasing access to information on the benefits of EVs
  - Helping reduce the up-front costs of infrastructure needed to charge EVs
  - Establishing time-varying rates and smart charging technologies to ensure that EVs can charge as much as possible on low-cost, low-carbon energy

- Our portfolio of innovative pilots and programs for EVs focuses on home charging, public charging and fleet operations. Highlights include:
  - Our Colorado Transportation Electrification Plan (TEP) proposes over $100 million investment in EV programs for residential customers, multi-unit dwellings, commercial fleet, workplace and public charging, and new partnerships.
  - In Minnesota, our TEP comprises the Midwest's largest portfolio of EV pilots and programs, including $25 million for light-duty vehicles and bus fleets and public charging, as well as EV subscription service pilots. We also proposed an economic relief and recovery package that proposes an additional $150 million for bus and vehicle rebates, public charging infrastructure, and accelerating electrification of Xcel Energy's own fleet.
  - Our Wisconsin residential EV home charging service and commercial charging infrastructure pilots are approved, and we are filing a TEP in New Mexico to support residential, low-income and public charging.

- EVs that charge overnight during off-peak hours cost less than the equivalent of $1 per gallon of gasoline and their carbon emissions are already substantially lower than existing gasoline- and diesel-powered vehicles. The carbon avoidance relative to conventional vehicles will continue to grow as the carbon intensity of the electricity that fuels EVs declines through our resource plans. Figure 4 shows per-vehicle carbon dioxide avoidance for our three operating regions. This means our EV programs will help remove several times more carbon dioxide from the transportation sector compared to the increased carbon dioxide emissions from our system due to electrifying this load. Transportation is currently the highest-emitting sector in the United States.

Figure 4: Comparison of Carbon Dioxide Emissions for EVs Charged on Xcel Energy Systems in 2030



- Many of the states we serve have adopted policies to promote the adoption of EVs, including tax incentives, vehicle mandates, and policies to promote charging infrastructure. These policies and programs enable our customers to choose EVs over gasoline-powered cars at higher adoption rates than the national average.

- Based on existing policies and economics, EV adoption in major metropolitan areas of Xcel Energy's service territories outpaced both U.S. and global averages in 2018. As we evaluate future EV adoption, key uncertainties for our forecasts include battery prices, U.S. policies on vehicle fuel efficiency standards, the availability of new electric vehicle offerings, and impacts on the vehicle market from the COVID-19 pandemic.

Global Commitments	Global Ambitions
• Under this scenario, global EV adoption rates lag our long-term forecasts for EV purchases by our customers. • EV adoption rates in our service territories have surpassed global adoption rates due to customer preferences and state policy incentives, and we anticipate that trend would continue even under this scenario. • Our forecasted EV adoption levels do not depend on substantial additional policy support. Even without coordinated policies to promote electric transportation, we anticipate that our customers will continue to switch to EVs ahead of global trends. • Our incremental approach to infrastructure deployment and customer program development, which relies on regulatory approval of our projects and programs, can mitigate the risk that we would make investments to serve EV demand that does not materialize.	• This scenario models a substantial transformation of the transportation sector. Xcel Energy is well positioned to meet customer demand under this scenario while delivering additional benefits from our 2050 carbon goal to further reduce carbon emissions from the transportation sector. • Meeting the energy demand for this level of transportation electrification could require substantial investment in the power grid and charging infrastructure and is expected to increase electric sales. • Global EV adoption rates in this scenario are roughly consistent with our forecasts for customer EV adoption through 2030 and 2040. • Our strategy includes time-varying rates and smart charging that can help mitigate the potential emissions impacts from charging EVs and help customers use low-cost, low-carbon electricity.

Resilience in a Changing Environment

In this section, we highlight the potential effects that Xcel Energy could experience based on the changes to the physical environment described in the NCA4's RCP 4.5 scenario. We describe our management approach to minimize costs and the damage and disruption from changes we have already experienced.

We primarily focus on analyzing the physical impacts of climate change described in the Global Commitments scenario. Our evaluation of the NCA4 shows that generally the difference in impacts between the two scenarios is mainly in magnitude. That is, the impacts identified in the RCP 4.5 scenario are of the same character as those described in the RCP 2.6 scenario, but there is the potential for higher frequencies and a higher likelihood of severe impacts.

While we understand that stakeholders want to ensure our operations will be resilient across different levels of warming, for the purposes of this disclosure, it is most relevant to discuss how we would manage and mitigate physical risks in the higher warming scenario. Under lower levels of warming, managing the physical impacts of climate change are expected to be similar to approaches under higher warming, but we would expect to incur lower costs and require less intense effort.

Acute Impacts

Severe Weather and Extreme Temperatures

Potential Effects of a Changing Environment:

Increased incidence and intensity of severe weather events characterized in the NCA4 could negatively impact Xcel Energy's operations by increasing the cost of maintaining safe and reliable service for our customers and may require additional operational or design changes to prevent or repair damages. While this scenario does describe more frequent and more intense severe weather, we note that these risks are all localized and event-driven, and predicting the timing, location and character of these events in the future is not possible using the level of detail provided by current downscaling of global climate models.

Severe Weather Events

Within the regions we serve, severe weather events typically include thunderstorms with heavy precipitation that can cause flooding and high winds that can down trees, high winds without precipitation, and occasionally tornados. If Xcel Energy were to be exposed to higher frequency and more intense thunderstorms, heavy downpours and flooding could impact the company's operations and increase the cost of providing service to our customers.[5]

Heavy precipitation could present a variety of unique threats, depending on where exactly the event occurs. Across our service territories, increased flooding risk could disrupt electric generation, transmission and distribution systems and even natural gas pipelines. Additionally, these types of heavy precipitation and flooding events could disrupt supply chain infrastructure necessary for the delivery of fuel for generation and various other bulk materials. For example, supply chain impacts have been observed across the company due to railway infrastructure or pipeline infrastructure damage due to flooding; these could impact our operations even though we do not own those assets, and they are not located within our service territories.

In the Upper Midwest, flooding is primarily considered to be a risk for existing generation assets. Given the proximity of some generation assets to the Mississippi River and other low-lying areas that could be negatively impacted by river levels, the temporary shutdown of a generation facility and mitigation efforts to fortify a perimeter around a generation facility from rising water would be expected. Additionally, high precipitation in specific watershed areas could put strain on numerous small dams and hydro generation facilities that are located throughout the Upper Midwest region.

In the mountainous terrain of Colorado, heavy precipitation can cause a variety of serious conditions ranging from flooding of low-lying areas, significantly increasing stream flow rates with increased erosion and debris in rapidly flowing rivers, the increased potential for landslides, and potential for increased stress on equipment and dams related to hydroelectric generation in the region. The combination of heavy precipitation, steep slopes and the velocity of water from mountainous areas presents a unique set of circumstances for our operations in Colorado. The risk of potential damage to underground facilities, both pipelines and buried cable, as well as some above ground facilities is higher due to the impacts of flooding in this terrain.

Within our Southwestern service territory, this scenario generally trends toward drier conditions. However, in very specific and acute cases of heavy precipitation or flooding, severe weather could briefly disrupt electric generation, transmission and distribution systems and could temporarily disrupt key supply chain infrastructure that we rely on for fuel or other materials.

If Xcel Energy were to be subject to an increased incidence of high wind, these types of events could pose a direct threat for damaging overhead transmission and distribution lines. The increased intensity of storms and frequency of more powerful winds is also of concern for the company's wind generation facilities. Extreme winds could result in significant damage to wind turbines or result in forced shutdowns of wind generation facilities to protect these assets when extreme conditions occur. Like high wind impacts, many of the same assets exposed to the risk of high wind damage are also exposed to an increased possibility of damage due to tornados. A direct hit from a tornado would be expected to potentially cause damage to generation assets, electric transmission steel structures and overhead distribution lines, and the time required for repair or reconstruction for such damage could be significant.

Extreme Heat

Periods of extreme heat for a duration or intensity that is far outside historical climate norms could negatively impact Xcel Energy's operations and could require more costly mitigation measures to ensure that we are able to continue delivering energy to customers. Such an event could increase demand for electricity, requiring us to rely on high-cost generation assets to meet demand. Extreme heat events could also increase stress on our transmission and distribution systems with the potential to cause outages. Extreme heat could also impact generation output if it coincides with drought conditions that severely restrict water availability for cooling purposes, potentially resulting in a temporary shutdown.

Extreme Cold

Periods of extreme cold for a duration or intensity that is far outside historical climate norms could negatively impact Xcel Energy's operations and could require more costly mitigation measures to ensure that we are able to continue delivering energy to customers. Given the expansive and diverse geography of our service territories, it is not expected that a cold temperature event would impact all service territories simultaneously, resulting in localized, temporary impacts.

Extreme cold events are expected to drive a significant increase in demand for natural gas used to heat homes and businesses, which could stress our natural gas distribution system and potentially disrupt service that customers rely on. Extreme cold periods that include snow and ice accumulations could also affect the electric transmission and distribution systems resulting in damage and outages. Extreme cold could also have an impact on our electric generation assets. While our materials and equipment are designed to withstand extreme cold conditions, power plant operations could be negatively affected by extreme cold and these events could result in disruptions to our fuel supply. Extreme cold events can impact the operation of our renewable resources and can result in a significant loss of generation from wind and solar, requiring additional firm generating capacity to maintain reliable service during these events. Extreme cold when combined with precipitation and wind can have an impact on the electric transmission and distribution systems.

An extreme cold weather event could severely restrict the availability of natural gas available on transmission pipelines and natural gas directly used for residential heating demand, which could restrict the ability to generate electricity with natural gas. Depending on the location of the extreme cold temperature event, it could also occur in areas that might negatively impact natural gas production in a way that temporarily limits availability and increases the cost of natural gas.

Our Management Approach:

Xcel Energy has a long history of delivering reliable service and effective storm response in the communities we serve. We have been exposed to varying severe weather risks including extreme storm events causing high winds, tornados and flooding, as well as periods of intense heat or cold. From these experiences, we applied lessons learned from past events to improve upon the design, construction and operation of our assets. We carefully consider the implications of severe weather when siting, designing, engineering and operating assets to withstand numerous physical risks and temperature extremes. We anticipate that conservative engineering design assumptions along with periodic system hardening and effective storm preparation and response efforts can mitigate exposure to extreme weather impacts.

We continually invest to strengthen and modernize our infrastructure. This includes the plants, power lines, pipelines and other systems that serve customers. This also includes upgrading technology and diversifying our energy supply to ensure a reliable mix of resources for managing energy cost and environmental impact while making sure we do not depend too heavily on any one resource. As we decide where to invest, we consider projects that provide the greatest value and meet the diverse interests of stakeholders, including customers, communities, regulators, policy makers and investors.

Over the next five years, we will invest $1.4 billion in our Advanced Grid program. Our investments will further improve security, reliability and reduce outage restoration times for customers, while at the same time, enabling new options and opportunities for increased efficiency savings.

We are focused on successfully managing major storm events, responding quickly and providing information to customers as we restore service. We also can rely on mutual assistance from other utilities if our operations are disrupted by severe weather events.

Wildfire

Potential Effects of a Changing Environment:
Climate is a major determinant on vegetation composition and productivity which directly affects the type, amount and structure of fuel available for fires. Climate also impacts overall fuel moisture and the potential length of fire seasons. In addition, higher temperatures, lower snowpack and earlier snowmelt in mountainous regions can dramatically impact the frequency and extent of wildfires or even alter the typical fire season. Increased incidence and severity of wildfires, resulting in larger burn areas, could have a substantial impact on Xcel Energy's operations by disrupting service to our customers and damaging company assets.

Most of our company's large generation assets are situated in areas less prone to wildfires or these facilities have significant defensible space and fire suppression capabilities to mitigate or fully prevent wildfire damage. Within the mountainous and heavily forested areas of our Colorado service territory a large wildfire could pose a direct physical threat to above-ground assets of both the electric transmission and distribution systems as well as the natural gas system. Depending on the specific location of a wildfire, the wildfire could impact the operation of our natural gas system and repairs or inspection might be required on above ground assets. If electric or natural gas infrastructure are damaged in rugged terrain with difficult access, the restoration time to repair the damaged assets could be considerable. Similarly, large grass fires within our Southwestern service territory due to drought conditions could result in fire damage to overhead electric equipment and cause outages for customers.

Our Management Approach:
As part of our commitment to safety, Xcel Energy has developed a fire risk mitigation program designed to help protect lives, homes and property from the threat of wildfire. We recognize that wildfires pose a significant threat to our customers and communities as a whole, and we are proactively taking steps to minimize ignition risks associated with operating our system.

We have established a cross-functional Wildfire Mitigation Team that works to accelerate inspections in identified Wildfire Risk Zones — and conduct new and enhanced inspections on equipment — to identify potential safety concerns. To strengthen our system, we are making strategic investments and improvements to bolster the power grid, build resilience and increase situational awareness to enhance the region's ability to respond to wildfires. While most of the work is taking place in Colorado, it could be expanded to other states as needed. We worked proactively with our Colorado regulators to seek approval of our investment plan for wildfire safety, prevention and mitigation efforts.

For a utility company that operates in semi-arid regions, vegetation management is critically important to managing the risks associated with wildfire. Xcel Energy's Vegetation Management department manages millions of trees across more than 47,000 miles of distribution right of way and more than 20,000 miles of transmission right of way throughout our service territories. We use industry best practices to help achieve our vegetation management goals in an environmentally sensitive, socially responsible and cost-effective manner. This includes Integrated Vegetation Management, which encompasses a progressive system of information gathering and helps us develop compliant solutions for controlling vegetation near electric and natural gas facilities.

Proactive Policies to Manage Wildfire Risk

Xcel Energy works with policy makers to ensure that we can protect our business from damage caused by natural disasters. Based on our advocacy, Section 8630 of the 2018 Farm Bill created a pilot program to encourage the United States Forest Service to partner with the private sector to voluntarily conduct vegetation management projects on a proactive basis to better protect utility infrastructure from potential passing wildfires. Participants in the program are responsible for project costs and are subject to a number of safety and environmental requirements. This section also caps liability in the event of a fire resulting from the participant's operations while conducting the pilot work. This provision is critical to the entire purpose of the pilot, which is to encourage a utility to conduct forest health and infrastructure protection work outside of its right of way in diseased, dry forests at risk of wildfire. This legislation was carefully negotiated and had bipartisan support among the U.S. House, Senate and Trump administration.

Chronic

Changes in Temperature

Potential Effects of a Changing Environment:

Higher average temperatures could potentially impact Xcel Energy by increasing demand for electricity for cooling and lowering demand for natural gas for space heating. If increased average temperatures drive increased demand for cooling, peak demand could rise which could require us to develop additional peak generating capacity and additional transmission and distribution capacity to meet demand. Higher average temperatures could impact the thermal efficiency of our fossil power plants and the efficiency of the transmission and distribution system, which would also require additional capacity to ensure that customer demand is met.

Our Management Approach:

Xcel Energy's resource planning process is designed to manage capital-intensive investments over decades-long time horizons. Through this regulated process, the company evaluates a range of scenarios and stress tests its energy portfolio against important variables, including fuel prices, renewable energy and storage costs, transmission constraints and other relevant factors. We use load forecasts to account for changing weather patterns, a key variable in explaining actual and forecasted loads. Load forecast sensitivities can also ensure our energy portfolio is sufficient to meet different needs created by electrification, which is likely to become more prevalent in a carbon constrained future.

Drought

Potential Effects of a Changing Environment:

Increased incidence and severity of drought in the Southwest and Southern Great Plains described in the NCA4 could negatively affect Xcel Energy's power generation assets by reducing the availability of water. Our hydroelectric generators in Colorado could see reduced output caused by lower stream flows during time of drought, but these generators only represent a small portion of our generation portfolio.

Our fossil power generation assets rely on water for operation and cooling. As described below, we proactively manage our water resources to ensure that we have secured adequate supply needed to operate our power plants. Additionally, we expect that our generation fleet transition will substantially reduce our use of water for electric generation. Based on these factors, we do not anticipate that additional water stress would have substantially negative impacts on our fossil generation plants over the short and medium terms.

Our Management Approach:

As we rely less on coal and more on wind and solar power, we can reduce water use. With global and regional concerns over future water resources, protecting water quality and conservation are increasingly greater priorities for us. Our thermal generating plants require water to cool equipment and power steam turbines that produce electricity, while our hydroelectric plants use the power of water to generate electricity. Since 2005, we have reduced our water consumption by 23% from the electricity we own and purchase.

In the more arid regions where we operate, carefully managing our water supply is especially important given challenges we face in dry years and concerns over drought. Because of this, we have strategic water resource plans to forecast, model and manage our water needs in these regions for decades to come. Our strategic water resource plans are updated annually to reflect our current operational requirements, local climate conditions and water use. Throughout the year, we conduct a variety of activities to accurately predict and plan for future water supplies, including forecasting plant water requirements based on anticipated electric generation, accounting for the water we need and use, and monitoring snowpack reports. We also study stream flow forecasts, seasonal climate projections and changes to the Ogallala aquifer, the primary aquifer that underlies much of the region in Texas and New Mexico that we serve.

We acquire water for our thermal and hydroelectric plants through water rights and other agreements. Our integrated portfolio of water supply resources includes owned or self-supplied water rights, reservoir storage, groundwater rights and other supplies, such as municipal and recycled water supplies. We own water supplies dedicated for our own use, and in Colorado, these water rights are available depending on regional water supply conditions in accordance with the state's prior appropriation system. Our portfolio also includes water from geographically diverse areas, including water imported from other basins. This diversity is critical for maintaining a resilient, reliable water supply in the arid, climatically variable Western United States.

We have expended significant resources to improve our water supply and the resiliency of our systems. Other suppliers that we do business with have responded similarly, taking steps to improve their water supplies and adopt drought response plans for ensuring they meet their municipal and industrial water supply obligations. Finally, we use recycled water or treated municipal effluent where available and feasible, including at the Cherokee, Harrington, Jones and Nichols plants. The practice minimizes the competition between water needs for power generation and needs for environmental, recreational, municipal or other industrial uses. Recycled water use has the added benefit of increasing the reliability of our water supply because it is nearly drought proof and preserves billions of gallons of fresh water.

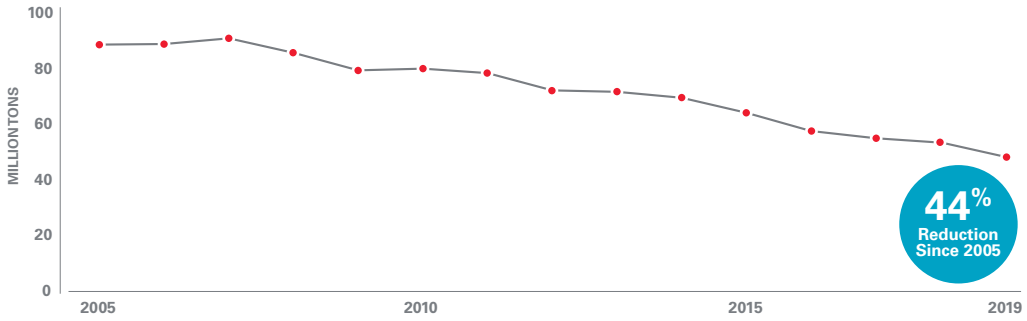
One notable situation is with our Tolk Generating Plant in Texas. Since Tolk began operating in the 1980s, it has relied on groundwater from the Ogallala Aquifer which is in permanent decline primarily because of agricultural use. Because the water table has dropped significantly over the years, it is putting increasing pressure on our water wells. Extensive monitoring and careful modeling show that the groundwater levels from the aquifer are projected to decline to the point that we are unable to operate the plant beyond 2032. It is a unique situation within our generating plant fleet. In 2019, we started reducing the operation of Tolk's two units to minimum load during off-peak times to conserve water and will continue this through 2020. Beginning in 2021, the plant will be idled during off-peak winter months through 2032, when we plan to retire Tolk, pending regulatory approval.

REPORTING AND MEASURING PROGRESS: METRICS

Xcel Energy supports timely, transparent public reporting of carbon dioxide and other greenhouse gas emissions to track our progress toward achieving our goals. We annually disclose these metrics in our Corporate Responsibility Report Performance Summary and in our Environmental, Social, Governance and Sustainability Report that follows industry templates from the Edison Electric Institute and American Gas Association.

For our electric business, the primary metric we use to track progress is the total carbon dioxide emitted from electricity used to serve customers, including both owned and purchased power. By incorporating owned and purchased power, we measure nearly all the emissions associated with delivering our product to customers. We also include associated metrics, such as energy mix, capacity and carbon intensity.

Xcel Energy Carbon Dioxide Emissions from Electricity Serving Customers (Owned and Purchased Generation)



For our natural gas business, we track our methane emissions on both a carbon dioxide equivalent basis and on an intensity basis. We also provide other system information such as the total throughput and miles of pipe by material type.

Our comprehensive greenhouse gas reporting, from all parts of our business, is based on The Climate Registry and its Electric Power Sector Protocol, which aligns with the World Resources Institute and ISO 14000 series standards. We annually register and publicly disclose our externally verified greenhouse gas emissions on The Climate Registry's website.

CONCLUSION

For more than 15 years, Xcel Energy has reported on its progress to reduce carbon emissions and address the risk of climate change. TCFD's recommended climate disclosure framework provides another opportunity to demonstrate our commitment to transparency by concisely disclosing relevant information to investors and other interested stakeholders. We view this report as an important step in our ongoing dialogue about our climate strategy with these audiences.

In this report, we strived to incorporate the best available climate science to evaluate our future. We anticipate that this will be an iterative process. In the future, we plan to explore the use of more precise and accurate downscaled climate data, expanding the breadth of scenarios considered, and potentially using composite scenarios to better capture the range of uncertainty that exists under different potential societal approaches to managing climate change.

What we confirmed through this initial climate scenario analysis is that Xcel Energy's corporate strategy is robust to future low-carbon transition risks, resilient to the potential physical impacts of climate change, and taking advantage of investment opportunities in the low-carbon transition for the long-term. Our industry-leading carbon commitment and corporate strategic priorities are pushing us to pursue a rapid transformation of the energy that we deliver to customers, and we are leading the utility industry toward a lower emissions future. We are also making investments needed to maintain the safe, reliable and affordable energy service that customers depend on as the environment changes. Our focus on these fundamental issues helps ensure that for the long term we can continue delivering value to customers and investors alike.

NOTES

1 See https://climateleadershipconference.org/2020-climate-leadership-award-winners/.

2 NCA4, About this Report. https://nca2018.globalchange.gov/chapter/front-matter-about/.

3 Under the RCP4.5 emissions trajectory, global average temperature is projected to increase by 0.9 C-2.4 C relative to the recent historical period of 1986-2015. While the NCA4 discusses temperature increase relative to 1986-2015, Paris agreement goals and the data contained in the IEA scenarios are relative to preindustrial global average temperatures. According to the NCA4 (https://nca2018.globalchange.gov/chapter/2/, Figure 2.2), "Limiting the rise in global average temperature to less than 1.2°C relative to 1986–2015 is approximately equivalent to 2°C or less relative to preindustrial temperatures, consistent with the aim of the Paris Agreement." Under RCP4.5, an increase of 0.9 C – 2.4 C relative to 1986-2015 would correspond to about 0.8 C larger increase relative to preindustrial.

4 See footnote 3 above. Under RCP 2.6, global annual average temperature increases could be limited to 0.2 C – 1.5 C relative to 1986–2015; this would correspond to about 0.8 C larger increase relative to preindustrial.

5 According to NCA4, "Extreme events such as tornadoes and severe thunderstorms occur over much shorter time periods and smaller areas than other extreme phenomena such as heat waves, droughts, and even tropical cyclones. This makes it difficult to detect trends and develop future projections… scientific understanding is not yet detailed enough to confidently project the direction and magnitude of future change." https://nca2018.globalchange.gov/chapter/2/.