

**EXH. JJJ-8  
DOCKETS UE-22 \_\_\_/UG-22 \_\_\_  
2022 PSE GENERAL RATE CASE  
WITNESS: JOSHUA J. JACOBS**

**BEFORE THE  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,**

**Complainant,**

**v.**

**PUGET SOUND ENERGY,**

**Respondent.**

**Docket UE-22 \_\_\_  
Docket UG-22 \_\_\_**

**SEVENTH EXHIBIT (NONCONFIDENTIAL) TO THE  
PREFILED DIRECT TESTIMONY OF**

**JOSHUA J. JACOBS**

**ON BEHALF OF PUGET SOUND ENERGY**

**JANUARY 31, 2022**

# NET-ZERO VISION FOR NATURAL GAS



# TO OUR STAKEHOLDERS,

Xcel Energy has been a national leader in clean energy for more than 15 years—and today we are taking another giant step forward. We commit to net-zero emissions for our natural gas service by 2050—including a 25% reduction in greenhouse gas emissions by 2030.

Combined with our goals for delivering 100% carbon-free electricity by 2050 and enabling cleaner transportation through powering 1.5 million light-duty electric vehicles by 2030, Xcel Energy will continue its leadership position in the clean energy transition, for the company and our customers.

Most Xcel Energy customers rely on natural gas for heating their homes and businesses. It's a highly flexible and efficient fuel for millions of furnaces, boilers, water heaters, stoves and other appliances across the colder climates we serve in the Upper Midwest and Colorado. Natural gas remains the most affordable and flexible home and building heating option.

## Delivering reliable, affordable, sustainable energy remains essential to our mission.

In this report, we present our vision for providing net-zero natural gas service to customers by 2050 and the strategy for achieving that commitment. This includes a set of strong interim emission reduction targets for our gas business to make sure we deliver progress along the way.

### **Operating the cleanest natural gas delivery system possible**

We are accelerating our plans to reduce methane because the solutions for addressing this potent greenhouse gas exist today and offer the most cost-effective path to making a meaningful, near-term impact. By improving operations and using new technologies and processes for monitoring emissions and replacing equipment, we aim to operate a gas delivery system with net-zero methane emissions by 2030.

Similarly, we will require the same best practices from our natural gas suppliers. We are moving to purchase natural gas by the end of the decade only from suppliers with certified low methane emissions.

### **Offering customers solutions to drive carbon reductions**

As part of our strategy, we will (1) expand conservation programs, (2) encourage gas to electric appliance switching, and (3) offer low-carbon gas alternatives such as hydrogen and renewable natural gas.



- 1) For our residential, business, industrial and income-qualified customers, we currently offer 60 programs for using natural gas more efficiently. Expanding our conservation programs is an important first step to help customers manage their energy costs.
- 2) We will provide affordable and effective options for customers interested in advanced electric appliances, including grid-enabled smart electric water heaters, air source heat pumps, and working with developers on new all-electric communities.
- 3) In addition, we will offer low-carbon gas alternatives, such as hydrogen and renewable natural gas, for customers to reduce emissions while keeping their gas service.

### **Jump starting innovation**

By pursuing our goals, we can incentivize the development of new clean technologies and over time lower the cost of using them on a wider scale. Just as we were an early adopter of wind and solar power, helping to advance these technologies and lowering the cost, we can advance new building technologies and appliances and low-emission gas technologies.

We are launching pilot programs to test renewable natural gas, smart electric water heaters and air source heat pumps with customers, as well as testing both hydrogen production and blending of hydrogen in our natural gas system. Our focus on innovation also includes advancing technologies that enable carbon offsets and carbon capture because we will need these solutions to fully achieve net-zero emissions.

Delivering net-zero gas service by 2050 is an extremely challenging endeavor and will require a greater level of technology innovation compared to what is required from electricity, as well as customer adoption. Customer participation in this journey will be critical to its success. And maintaining reliability and affordability will be required to achieve our sustainability vision.

Our natural gas system is a valuable, shared asset in which we've all invested over many decades, and we plan to continue using it for decades to come. In fact, continuing the use of the existing gas infrastructure system will enable the clean energy future we all want as we plan to use it in new and different ways, by delivering low-carbon fuels and potentially providing large-scale energy storage. We recognize the continued use of natural gas includes some carbon emissions, which is why carbon offsets and capture technology are also part of the plan.

It will take all of us working together to make this vision a reality. We look forward to the ongoing collaboration and partnership that is essential to our success. I hope you will join us in this journey.

Sincerely,



Bob Frenzel  
President and CEO

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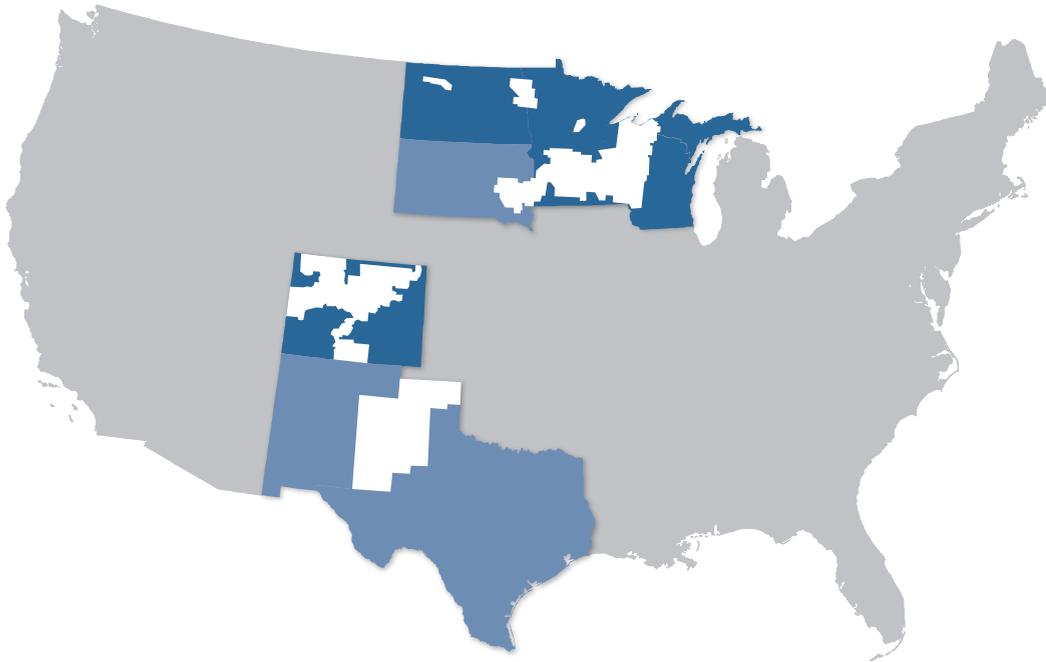
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## ABOUT US

Xcel Energy is a major U.S. electricity and natural gas company headquartered in Minneapolis. We provide a comprehensive portfolio of energy-related products and services to 3.7 million electricity customers across eight Western and Midwestern states, as well as natural gas service to 2.1 million customers in five of our states.

Addressing climate change is a priority for many of our customers, communities, investors and other stakeholders, and is a priority for us as well. More information on our clean energy strategy, corporate governance and risk management is available at [xcelenergy.com](http://xcelenergy.com) in our corporate reports, including Xcel Energy's Annual Report, Proxy Statement, Sustainability Report and Sustainability Summary (our EEL-AGA Environmental, Social, Governance and Sustainability Report).



## 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, changes in our generation portfolio, planned retirements, and planned capital investments and are identified in this document by the words "aim," "aspire," "assuming," "believe," "could," "expect," "may," and similar expressions. Actual results may vary materially. Factors that could cause actual results to differ materially include, but are not limited to: 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; 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, 2020 (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.

## Vision for Net-Zero Natural Gas Service

Xcel Energy is executing an ambitious environmental leadership strategy. Under our corporate priority to lead the clean energy transition, we were the first major U.S. power company in 2018 to announce a vision for delivering 100% carbon-free electricity by 2050, with an aggressive interim goal to reduce carbon emissions 80% by 2030 (from 2005 levels). We are making progress, having reduced carbon emissions 51% since 2005 from the electricity provided to customers as of 2020. Through ambitious energy resource plans, we have proposed pathways within our states for achieving our interim carbon reduction goal. Longer term, we have initiated and joined efforts to advance the policy and technology that are needed to deliver on our carbon-free vision for electricity by 2050.

In 2020, we expanded our clean energy vision to create a multiplier effect in the transportation sector, announcing a goal to power 1.5 million electric vehicles by 2030 in the places we serve. It is one example of how a clean power grid is the enabler of a low-carbon economy. By achieving this commitment by 2030, we expect to reduce 5 million tons of carbon each year from the transportation sector, the nation's largest source of greenhouse gas emissions.

Now, in 2021, we are committing to an even greater challenge, with a vision of providing net-zero gas service by 2050. This includes emissions from our natural gas operations, as well as the emissions from suppliers and customer gas use, which are outside our management. Our interim goals are to accelerate reductions in methane, achieving net-zero methane on the gas delivery system by 2030, and to reduce all greenhouse gas emissions associated with the supply, delivery and use of natural gas 25% by 2030 (from 2020 levels), as we aim for net-zero greenhouse gas emissions by 2050.

Our industry leading goals will drive emissions reductions across sectors of the economy that are the largest greenhouse gas emitters in the United States: electricity, transportation and natural gas use in buildings. Combined, they also put Xcel Energy on track to become a net-zero energy provider by 2050.

### **Where we aim to be**

Our strategy for natural gas will reduce methane and carbon dioxide emissions associated with the production, delivery and final use of natural gas in buildings.

- By 2030, our goal is to reduce greenhouse gas emissions 25% below 2020 levels, achieve net-zero methane emissions and exclusively purchase certified natural gas for gas distribution and power generation.
- By 2050, our vision is to deliver gas service to customers with net-zero emissions.

### **What's included in the goal**

There are two greenhouse gases that make up most emissions across the natural gas supply chain. Methane — a potent greenhouse gas—can be released during the production, transmission and distribution of natural gas. Carbon dioxide is emitted when natural gas is burned in equipment or appliances, such as furnaces and water heaters. Our goal covers emissions associated with the entire natural gas supply chain for procuring and delivering natural gas to customers and the combustion associated with customer use.

These emissions are split into three categories for purposes of driving emissions reductions:

1. Methane on our system (Scope 1): The only portion of emissions in our direct management are direct emissions associated with methane released from the Xcel Energy distribution and transmission system until it reaches the customer’s meter at a home or business.
2. Upstream Methane (Scope 3): Methane emissions that are outside of our management and associated with the production of natural gas. This category includes methane associated with natural gas that we purchase for generating electricity as well as serving natural gas customers.
3. Customer Carbon (Scope 3): Carbon dioxide emissions occur on the customer premise, and therefore, are owned by the customer and outside the management of the gas distribution company. This category includes residential and small commercial customers who need our help to successfully reduce emissions but excludes large customers that are required to report their own emissions to the Environmental Protection Agency as well as transport customers who purchase and use natural gas from another provider.

With this comprehensive supply chain approach, our natural gas strategy directly reduces emissions across multiple sectors, including oil and gas, electricity and buildings. Through the potential use of renewable natural gas, we can also indirectly help reduce emissions in waste and agriculture.

**Our plan to get there**

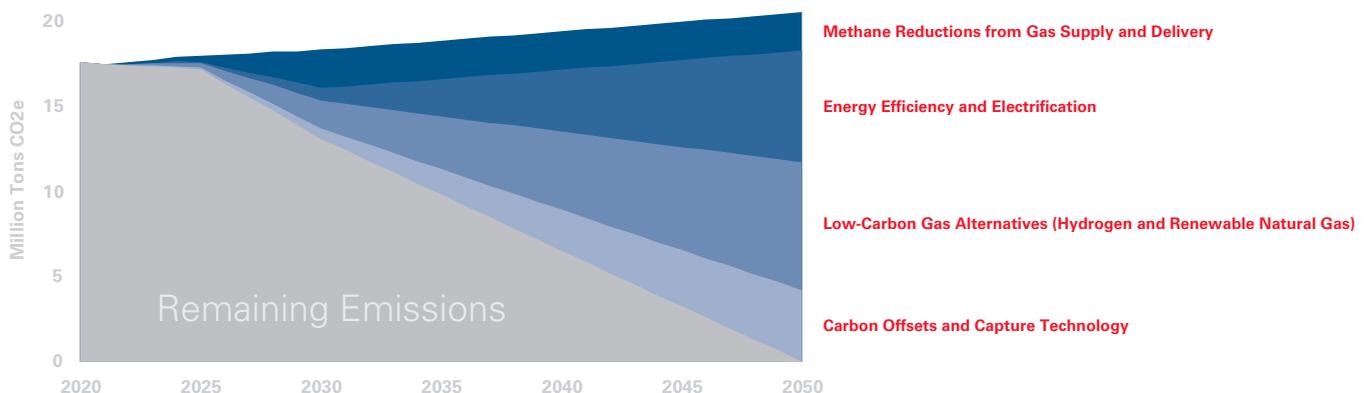
Our plan is not a single action or initiative. We will work with regulators to develop the most cost-effective and efficient plans in each of our states. Based on recent legislation passed in Colorado and Minnesota, we have a policy pathway to develop and propose detailed plans in those states. While the ultimate mix of measures will depend on 2030 market conditions, we do know our plans will include a variety of measures listed below.

Approach	Strategic Reduction Opportunities
Reducing Methane Emissions from Production and Delivery	Purchasing natural gas with a certified low methane emissions rate
	Operational and pipe material changes to reduce emissions on our system
	Leak detection and repair
Reducing Use	Expanding energy efficiency
Beneficial Electrification	All-electric new builds
	Grid-integrated, managed electric water heaters
	Heat pump systems with natural gas backup for cooling and heating
	District geothermal and other emerging technologies
Lower Carbon Supply	Renewable natural gas
	Hydrogen
	Power to gas
Negative Emissions	Carbon offsets
	Direct air capture

As we determine the best mix of these strategies for emissions reductions purposes, our primary guideposts are affordability and reliability. While the magnitude and scale of each individual measure is unknown, we do plan to include a mix of both electrification and low-carbon gas alternatives. We anticipate some level of fossil gas will remain on the system given the need for that energy-dense critical resource, and we will need to use carbon offsets, carbon capture or other negative emissions to ensure emissions are offset elsewhere in the economy. Given the results of the climate science and the high costs of reductions from this sector, we believe net zero is a more affordable, reliable path for our customers rather than trying to eliminate a resource so critical to cold climates.

The illustrative vision below demonstrates one potential pathway our diverse mix of reduction measures can work together to achieve net-zero emissions. Working with energy consulting firm, E3, we will continue to explore the optimal size and magnitude of each measure as technology availability, cost and performance evolves.

## Illustrative Pathway to 2050



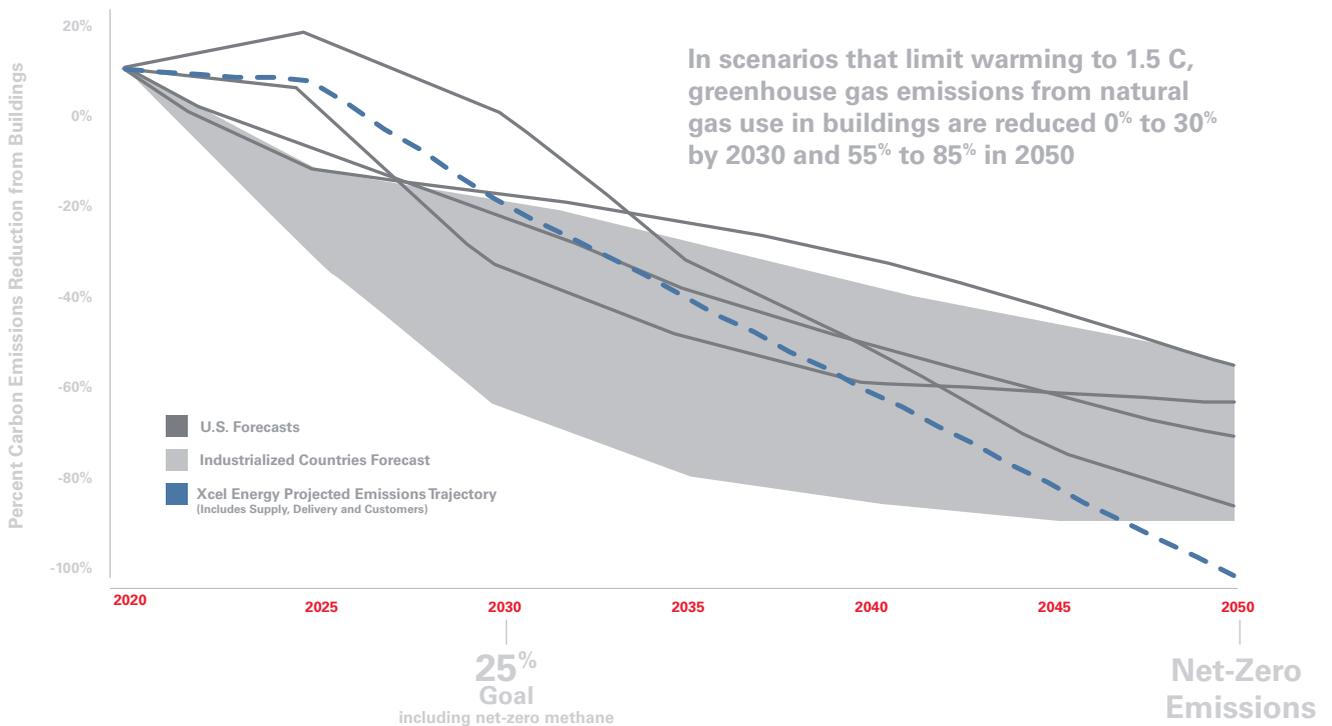
This illustration is an example of the potential paths Xcel Energy will take to achieve net-zero gas service by 2050; we will develop specific plans working with our states

## Grounded in the Climate Science

To test our strategy against the science, we engaged the same climate modeling expert who completed a study of our electric system and is a lead author for the Intergovernmental Panel on Climate Change (IPCC). [Dr. Brian O’Neill](#) and a team from Pacific Northwest National Laboratory evaluated the future use of natural gas in buildings in scenarios that are likely to achieve the current goal of the Paris climate agreement to limit global temperature increases to well below 2 degrees Celsius and the aspiration of 1.5 degrees Celsius.

The study demonstrates that the climate science indicates natural gas usage in buildings continues, even in scenarios that achieve the global temperature requirements of the Paris agreement and the aspiration of 1.5 C. Further, this scenario analysis concluded:

- There is continued but declining emissions from natural gas use in commercial and residential buildings in the United States through 2050 because deep retrofits of the building sector are more expensive than other mitigation strategies across the economy;
- Continued natural gas use spans a broad range of possible pathways depending largely upon deployment of negative emissions technologies; and
- Natural gas use in buildings is the last sector of the economy to eliminate carbon emissions, especially in colder states that are more dependent on natural gas for heating.



We have also conducted internal analysis of other key climate studies that further confirm these results. Both the International Energy Agency’s 2019 World Energy Outlook Sustainable Development Scenario (SDS)<sup>1</sup> and the 2018 IPCC Special Report<sup>2</sup> make clear that natural gas use continues as the world achieves the Paris agreement’s goal of limiting global temperature increase to 2 C above preindustrial levels and aspiration to limit this to 1.5 C. The IPCC report specifically states that “in pathways limiting global warming to 1.5 C with no or limited overshoot, the electricity share of energy demand in buildings would be about 55% to 75% in 2050 compared to 50% to 70% in 2050 for 2 C global warming.”

The SDS scenario finds that:

- Natural gas use grows globally into the late 2020s and still plays a role in 2050;
- Eliminating today's extensive natural gas networks could narrow the options for achieving future emissions reductions, and instead, electricity and natural gas systems can work in tandem to reduce emissions while continuing to deliver the energy that customers rely on to heat their homes; and
- Established natural gas networks can deliver as much as two times more energy than existing electric grids while also providing vital flexibility to maintain the reliability of energy delivery.

## What is Net Zero?

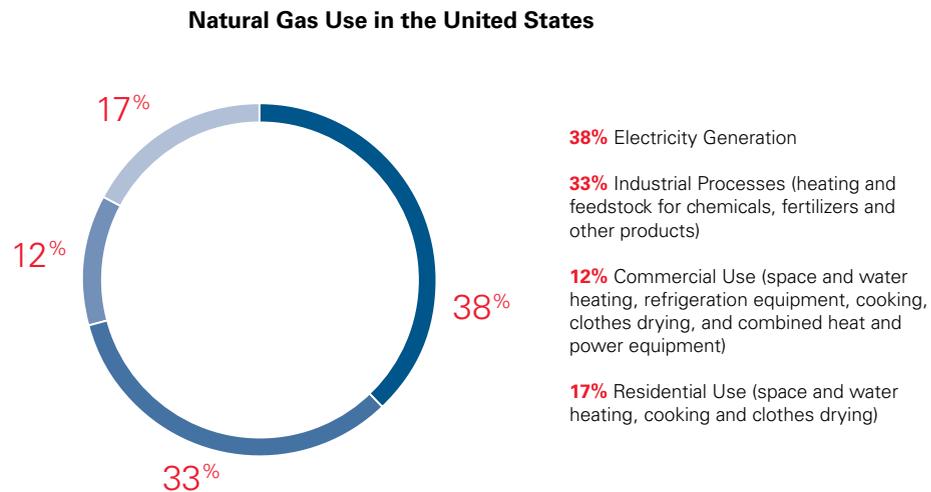
As defined by the Intergovernmental Panel on Climate Change, "net zero emissions are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period."<sup>3</sup>

To achieve net-zero gas service by 2050, we will implement direct reduction measures for the production, delivery and use of natural gas to the maximum extent possible. If those technologies are unable to deliver zero emissions within our timeframe, we will reduce the equivalent of any remaining emissions elsewhere, through negative emissions technologies such as carbon offsets, direct air capture or other technologies that become available to reach net zero, consistent with the science.



## Natural Gas is a Critical Energy Service

Natural gas continues to be demanded by customers across the country for a variety of uses and also by Xcel Energy customers. Throughout the United States, 75 million customers rely on natural gas to meet essential needs, such as space and water heating, cooking, clothes drying, vehicle fueling and industrial processes.<sup>4</sup> According to the Energy Information Administration, about half of the nation's homes use natural gas for heating. This includes 85% of Xcel Energy customers in parts of Colorado, Michigan, Minnesota, North Dakota and Wisconsin.<sup>5</sup> The chart below demonstrates the multitude of uses for natural gas across the United States.<sup>6</sup>



Natural gas is an energy workhorse. If we were to fully transition to an all electric system, we would have to grow our electricity generation and distribution peak capacity by at least 2 1/2 times and make significant changes to design an electric system that could meet the demands of our coldest days—temperatures at or below what we experienced (-28 F) during the 2019 polar vortex. On these days, wind and solar resources are less available than during summer months, thereby decreasing the ability to serve the load with renewable energy and likely driving the need to build out more generation that is available on-demand.

# THE NATURAL GAS SUPPLY CHAIN

Our distribution system is just one piece of a much larger natural gas supply chain that meets customer demand for natural gas.

## 1) Production

Producers identify resources and extract natural gas from underground deposits.

## 2) Processing

Natural gas is processed to remove impurities and stripped down to a composition that customers can safely use. While some limited processing is done in the field at the wellhead, natural gas is transported from the field through gathering pipelines to plants where larger scale processing takes place.

## 3) Transmission and Storage

Natural gas is transported from processing plants to consumer markets through an elaborate transmission pipeline system. Compressor stations located along the system compress natural gas to higher pressures, allowing more volume to travel through the pipelines and facilitating flow between locations.

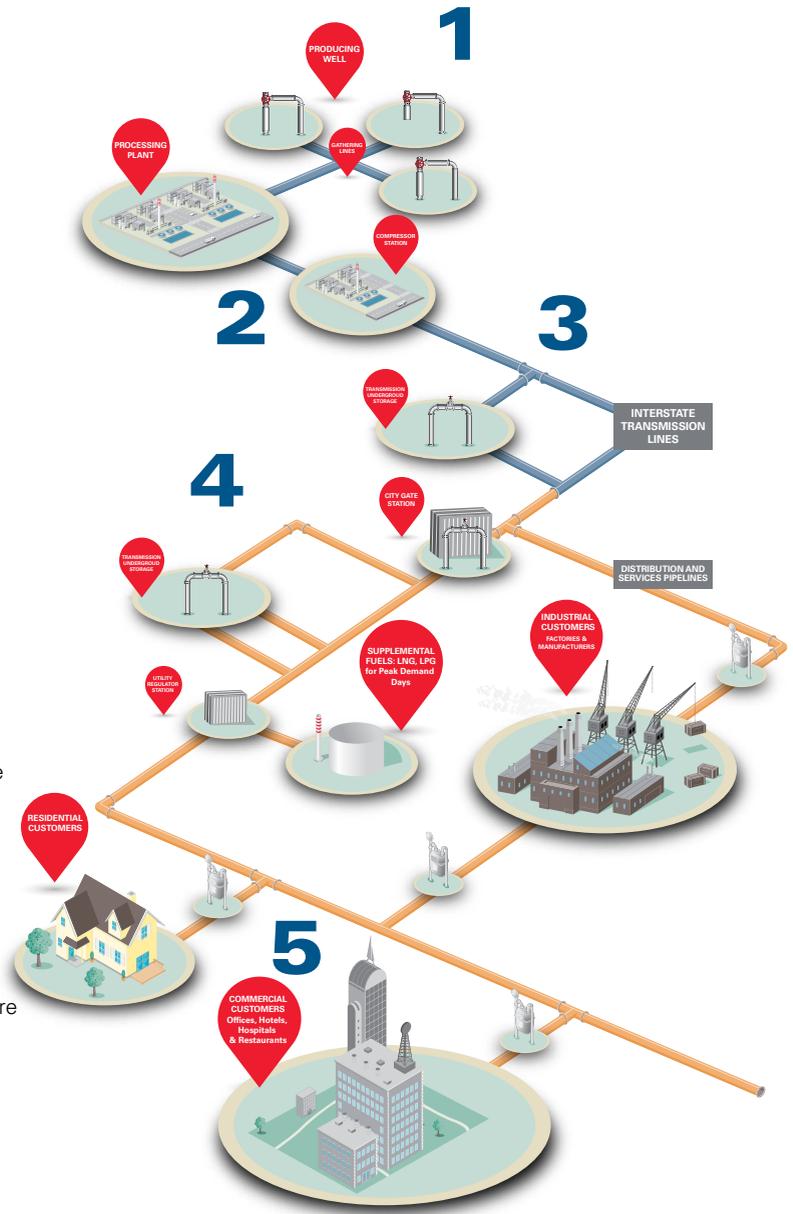
To balance production supply, which generally flows at a consistent rate throughout the year, and customer demand, which can vary dramatically hour to hour and season to season, natural gas is stored in underground fields throughout the country. These storage fields use depleted gas reservoirs, aquifers and salt caverns. On a smaller scale, natural gas can be stored as liquefied natural gas (LNG) and compressed natural gas (CNG).

## 4) Distribution

Xcel Energy operates a distribution system that delivers natural gas to customers. The interconnection point between the interstate transmission system and distribution system is commonly referred to as the "city-gate." Distribution systems are generally comprised of smaller diameter pipelines operating at lower pressures compared to transmission systems. They also include compressor stations and storage.

## 5) Customers

Millions of customers use natural gas to fuel their essential heating, cooking, transportation and other needs.



## Xcel Energy Resources for Serving Customers

- Xcel Energy is the nation's 10th largest natural gas provider, based on customers, serving 2.1 million homes, businesses and industrial users.
- Xcel Energy does not produce natural gas but purchases about 580 Bcf of natural gas per year from 58 producers or marketers.
- With more than 35,600 miles of distribution pipelines, our primary business is delivering natural gas to customers.
- We own nearly 2,200 miles of transmission pipelines and 16 compressor stations.

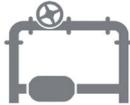


# Strategies to Reduce Emissions Across the Supply Chain

While our 2050 net-zero vision for gas and interim goals are new, we are building on an established, comprehensive strategy to reduce emissions across the supply chain. We strive to operate the cleanest natural gas delivery system possible, while influencing our suppliers to do their part and helping customers reduce their emissions associated with natural gas use.

Our Sustainability Report and the chart below demonstrates some of our long-standing engagements and efforts across the supply chain.

## Long-standing Engagements to Address Emissions Across the Natural Gas Supply Chain

METHANE EMISSIONS		CARBON EMISSIONS
Producers and Suppliers	Xcel Energy System	Customers
		
<b>Purchase gas with low emissions</b>	<b>Reduce system emissions</b>	<b>Enable new technology</b>
Require reporting transparency and disclosure	Invest \$1.4 billion in ongoing upgrades, keeping our methane emissions rate below 0.2%	Increase conservation
Pilot purchases of natural gas from suppliers with low methane emissions	Continue reductions through EPA Natural Gas STAR and Methane Challenge	Launch voluntary programs for all-electric zero-carbon new communities, smart water heaters, combination cooling-heating
Support ONE Future goal to limit the industry's methane emissions to 1% or less by 2025	Pursue renewable natural gas and hydrogen blending	Offer customers a low-carbon gas choice

### Purchasing natural gas with certified low methane emissions

As a natural gas distribution company, we depend on suppliers for the natural gas we deliver to customers. While we do not manage our suppliers' activities, we can use our relationships and purchasing to influence suppliers to improve transparency and adopt best practices for reducing methane emissions. We have discussed with our suppliers ways to enhance disclosure and transparency or emissions within the complicated framework of markets that deliver gas to our systems. Our work to date can be found in the Sustainability Report, under [Leading the Clean Energy Transition](#).

With our new goal, we are committing that by 2030 all the natural gas we purchase will be produced with the lowest methane emission rate possible. As a conservative estimate, our current supply is purchased at approximately a 1% emissions rate per throughput,<sup>7</sup> equating to about 3 million short tons (MST) for both our natural gas and electric businesses. By 2030, we aspire for the emissions intensity of our natural gas purchases to be well below the national average, at approximately 0.25%. We expect that the methane intensity of our supply in 2030 will be third-party certified and that emission sources will be directly measured or continuously monitored.

### **Operating the cleanest natural gas delivery system possible**

Methane from our gas delivery system is a very small portion of the emissions from the whole natural gas system on a CO<sub>2</sub>e basis, but our system is the one part of the supply chain that is directly and fully under our management, and we must do our part. We have consistently executed on operational updates, including pipeline replacements, to reduce the methane on our system and have engaged in leading stakeholder groups to push ourselves to improve disclosure and reduction practices, including participating in EPA's voluntary Natural Gas Star and Methane Challenge programs, and ONE Future. Under our ONE future commitment, we are keeping our methane emissions intensity below 0.22%. More information about our previous work can be found in our [Sustainability Report](#).

A net-zero distribution system by 2030 will require new technology to detect, measure and mitigate emissions along with improved management practices. We will base success on a thorough inventory of our emissions, giving our stakeholders assurance that all emissions are in fact being addressed. We will implement as many direct reduction measures as affordable and possible, but there may be a limit to how much methane we can eliminate. As such, we are focused on a net-zero goal, meaning we may need to purchase carbon offsets to hit our 2030 target.

### **Project Canary Certified Natural Gas (CNG) Pilot Program**

In May of 2021, Xcel Energy announced its first purchase of certified natural gas for the distribution system in Colorado.

- The gas methane intensity is certified and monitored by Project Canary and produced by Crestone Resources.
- Xcel Energy began this pilot in June of 2021 and has been purchasing a small volume of gas from Crestone that has been certified by Project Canary to have low methane intensity (<0.25%).
- The pilot currently provides enough natural gas to heat about 20,000 homes per day and will continue through winter of 2022.
- The Colorado School of Mines will conduct a third-party assessment of the avoided methane emissions associated with this natural gas procurement.



### **Empowering customers to reduce their carbon emissions through voluntary programs**

Our customer strategy starts by leveraging existing opportunities using affordable and reliable technologies available today and then driving new technology progress over time. We encourage participation in voluntary customer options to allow customers to manage their emissions and energy use at the timeline that makes sense for them.

### **Reducing Natural Gas Use**

We will work continuously with customers to ensure they have access to the most efficient options and to drive the market toward more advanced solutions. Energy efficiency improvements are achieved through a combination of sophisticated equipment controls, more efficient equipment and building envelope upgrades.

Whether through traditional approaches such as building weatherization or emerging solutions, energy efficiency will play a critically important role in both achieving our emissions goals and managing the cost of the energy transition. We are long-recognized leaders in energy efficiency, and already offer 60 programs across our service areas that help customers reduce emissions in their homes and businesses. We will continue to work with our customers, regulators and others to expand these programs and drive simultaneous emission reductions and cost savings. We will also develop both enhanced and entirely new offerings that help customers meet their energy needs in the cleanest, least-cost manner possible without compromising the safe and reliable service they expect and deserve.

### **Beneficial Electrification**

While electrification reduces natural gas customers' emissions, we want to maintain customers' ability to select the fuel that best meets their needs. Maintaining a voluntary approach allows us to work collaboratively with our customers to avoid the negative impacts of an overly aggressive approach to electrification, such as high costs, significant power grid build-out, equity concerns, and in some cases higher emissions. We can also ensure all electrification measures meet the emerging definitions of beneficial electrification: reduce emissions, keep customer bills low and optimize use of the power grid.

We continue to build on our comprehensive energy efficiency programs, which now include electrification, and support the development of new policy pathways for electrification planning. Among the technologies and programs that we believe have the potential to play important roles are:

- All-electric new community design
- Grid-enabled electric heat pump water heaters
- Air source heat pumps and combination heating and cooling solutions (as partial replacement for combustion-based systems)
- District geothermal heating

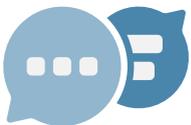
We plan to develop and scale these programs as we learn more about customer adoption, as technology improves and as the market develops. Success will require active participation from many diverse stakeholders, including our customers, policymakers, advocates and others.

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### **Accelerating Heat Pump Adoption through Workforce Development**

With the advent of newly approved fuel switching and the 2021-2022 Colorado Demand Side Management Plan with beneficial electrification rebate offerings, engagement with HVAC (heating and cooling) contractors began. Selling a heat pump instead of an air conditioner, so it can be used to heat a home most of the time as well as cool a home, is a paradigm shift from decades of traditional HVAC contractors' business practices. Xcel Energy has hosted heat pump webinars to residential HVAC contractors and their distributors or manufacturers on a variety of topics, as well as to residential trade allies to help them learn heat pump-specific sales and marketing best practices.

In addition, Xcel Energy, the Colorado Energy Office, the cities of Denver and Boulder, three other Colorado utilities, and two industry groups, all members of the Beneficial Electrification League of Colorado (BEL-CO), hosted a heat pump webinar for HVAC distributors and manufacturers. This powerful 20-minute video version built the case for the inevitability of heat pump adoption.



## **Colorado: Customer Electrification Pilot Programs**

### **Air Source Heat Pump Demonstration**

To confirm equipment capability and customer satisfaction, Xcel Energy is conducting a two-phase, three-year Air Source Heat Pump Demonstration pilot, funded through an estimated \$1.5 million from the company's demand side management budget.

- During Phase 1, Xcel Energy will test cold climate air source heat pumps in a climate-controlled National Renewable Energy Laboratory (NREL) facility in Boulder, Colorado.
- In Phase 2, cold climate air source heat pumps will be installed in approximately 40 existing residential buildings throughout the greater Denver Metro and Summit County areas.

### **All-electric New Community Developments**

To confirm equipment capability and customer satisfaction, Xcel Energy is conducting a two-phase, three-year Air Source Heat Pump Demonstration pilot, funded through an estimated \$1.5 million from the company's demand side management budget.

Building on long-standing programs to provide efficiency rebates for new homes, such as Energy STAR New Homes in Colorado, we are exploring whether it is possible to promote the development of all-electric communities as part of our demand side management programs.

- Through comprehensive planning, we may be able to identify opportunities to avoid expensive investments in gas extensions, especially in rural or mountain communities.
- By starting early in the design process, we can also work to ensure the new homes are built with the proper insulation, weatherization practices, and electric service in mind to allow electric heating options to work more efficiently and allow customers to buy the right electric appliances from the start.

### **Smart Water Heater Demand Management Program**

The Smart Water Heater demand management program, launched in Colorado in early 2021, allows Xcel Energy to control enrolled heat pump water heaters to maximize the use of low-cost renewable energy and reduce peak system demand.

- Xcel Energy will be able to raise the temperature of the water in the tank above the normal setpoint when high levels of renewable (and low cost) energy are available on the power grid.
- Warmer water in the tank allows the water heater to deliver more hot water later in the day when less renewable energy is available on the power grid. Using mixing valves, customers will still always receive the same temperature water when they turn on the faucet.
- The Smart Water Heaters will also reduce peak load on the power grid when electric demand is highest, for example on hot summer afternoons.

Once approved, a similar program will be launched in Minnesota. Xcel Energy is adapting to current conditions as the industry continues to experience production delays for water heater control modules.

### **Minnesota: Residential HVAC Optimization Pilot**

Xcel Energy has proposed a Residential HVAC Optimization Pilot in Minnesota as part of our recent Load Flexibility Petition filing. It includes the following fuel switching and optimization measures:

- Standard electric resistance water heater to smart(er) heat pump water heater (HPWH)
- Gas water heater to smart HPWH
- Gas furnace to standard air source heat pump (ASHP) with gas backup
- Gas furnace to cold climate ASHP with gas backup
- Gas furnace to ground source heat pump (GSHP) with no gas backup necessary

The pilot will encourage customers to install HPWH and ASHP equipment by offering a monthly electric bill credit (rather than the traditional rebate) to reduce the impact of increased electric consumption. The pilot combines both fuel switching and water heater demand response. For HPWH, the incentives are higher if customers also enroll in a load shifting program to control their loads during times of peak demand and shift their loads to times of lower demand and lower generation cost, which often coincide with times of higher wind resource availability. The proposed pilot is awaiting action from the Minnesota Public Utilities Commission.

### **Delivering Lower Carbon Gas**

Allowing alternative fuel supply options helps customers reduce their carbon footprints without replacing heating systems or other appliances. To achieve the desired emissions benefits of alternative fuel use, the associated environmental attributes must be verified, tracked and attributed to customers.

We anticipate these gas alternatives will include a mix of renewable natural gas from sources such as landfills, animal farms and wastewater treatment facilities, along with hydrogen produced from carbon-free electricity. In addition to displacing fossil natural gas from our system, renewable natural gas has an added benefit of avoided methane emissions from these sources. For example, dairies that are not currently capturing methane for an end use can produce renewable natural gas, avoiding harmful methane emissions and providing a low-carbon gas for Xcel Energy's customer use. Hydrogen can be produced using renewable or nuclear electricity on the electric system and then injected into the natural gas system, reducing the carbon intensity of natural gas supplied to our customers and potentially turning the natural gas system into a large energy storage system for wind and solar power.

### **Minnesota: Carbon-Free Hydrogen Production Demonstration**

Xcel Energy is partnering with Idaho National Laboratory to install a pilot-scale electrolyzer that will produce hydrogen at our Prairie Island Nuclear Power Plant in Minnesota.

- Funding is supported by a \$10.5 million grant from the Department of Energy (DOE).
- The pilot is anticipated to be in service in 2023.
- It will demonstrate the ability to use on-site electricity generated at nuclear plants to create hydrogen without emitting greenhouse gas emissions and will help moderate nuclear plant electricity output to accommodate increasing, variable amounts of renewable generation output to the power grid.

### **Participation in the HyBlend Multi-Utility Research**

Xcel Energy is participating in a research pilot led by the National Renewable Energy Lab (NREL) and Gas Technology Institute to address the technical barriers associated with blending hydrogen in natural gas infrastructure, called HyBlend.

- This two-year pilot will start in fall of 2021 with \$15 million in funding contributed by the Department of Energy Office of Energy Efficiency and Renewable Energy and 20 participating utilities.
- The pilot will use expertise from utilities, research consortia, academia and national labs to determine if hydrogen can be safely blended in existing natural gas systems to reduce the carbon intensity of fuel delivered to customers.
- It is anticipated that some of the demonstration pilots could occur in Colorado due to proximity to NREL.

### **Colorado: Renewable Natural Gas Customer Pilot**

As part of the Colorado Renewable Energy Standard plan, Xcel Energy will propose a voluntary customer program where, for a monthly price premium, a customer could reduce the carbon intensity of their natural gas use with a combination of renewable natural gas and carbon offsets. If approval is received, the program is expected to be offered to residential and small commercial customers beginning in 2022.

### **Hydrogen Blending Pilots for Electric Generation and Gas System**

Across our service area, we are looking for investment opportunities in green hydrogen, subject to technical, economic and regulatory considerations.

- We are evaluating more than a dozen early-stage pipeline hydrogen projects.
- These projects consider green hydrogen blending for use in natural gas electric generation facilities, injection into the gas distribution system for delivery to customers, or both.
- We are also considering opportunities to pair hydrogen production with on-site solar and/or wind where possible.

### **Carbon Offsets and Direct Air Capture**

Given the real technology barriers to achieving affordable reductions in this sector, offsets might be required in the short-term and carbon capture in the long-term as an important tool to achieving our vision.

A carbon offset is a reduction in emissions of carbon dioxide or other greenhouse gases made to compensate for emissions elsewhere. One carbon offset represents one metric ton of carbon dioxide equivalent (CO<sub>2</sub>e) avoided or sequestered.<sup>9</sup> In any use of offsets, we will ensure the offsets meet specific minimum requirements such as being additional to business-as-usual practices, permanent, conservatively quantified, not claimed by more than one entity to compensate for emissions, and calculated based on sound, peer-reviewed methodologies and equations. In addition, we will prioritize offsets that are derived from projects that deliver local or regional jobs and other benefits such as improved resiliency, air quality and health outcomes, and projects that represent sustainable development activities in line with climate solidarity principles that consider potential risks to local and indigenous populations. The carbon offsets furthermore need to be issued and retired by an established and reputable carbon offset registry.<sup>9</sup>

The pathway to 2050 is even more uncertain and we see the need to develop all potential pathways to get there including the potential use of carbon capture technologies, such as direct air capture. As discussed, the climate science suggests that natural gas will continue to be used to meet critical customer needs long into the future and carbon capture or negative emissions technologies will be required if the sector is to go beyond those required emissions reductions. While direct air capture is expensive today, we believe these technologies will be necessary to fully achieve a net-zero goal in the building sector.

## Tracking and Reporting our Progress

Xcel Energy maintains transparent, public reporting of greenhouse gas emissions from our electricity and natural gas businesses. We compile our greenhouse gas measurements based on federal, state and voluntary reporting protocols. We are also a founding member of The Climate Registry (TCR), a nonprofit organization established to develop a consistent standard for measuring and reporting greenhouse gas emissions. Under TCR's general reporting protocol, we have reported and obtained third-party verification of our greenhouse gas emissions from both our electricity and natural gas operations going back to 2005.

For the natural gas system, our emissions are largely covered by EPA's Greenhouse Gas Reporting Protocol. Under this program, we report methane emissions from our natural gas operations. Starting in 2022, we plan to perform additional voluntary reporting using the Natural Gas Sustainability Initiative Methane Intensity Protocol and ONE Future. These voluntary reporting programs go beyond the requirements of the EPA Greenhouse Gas Reporting Protocol by including additional emissions sources and sources below the EPA reporting threshold.

We make adjustments to EPA customer emissions to account for weather and which customers are included in state policy. We will be working with regulators to refine this approach.

In addition to the EPA and voluntary reporting programs, we are working to develop a comprehensive inventory for the methane on our distribution system based on direct measurement of emissions and system specific emission factors. The inventory will provide increased transparency relative to existing EPA reporting and capture emission reductions from management practices and technologies we are implementing on our system. We estimate customer emissions using weather normalized throughput data at an average combustion emissions rate.

We exclude large customers and transport customers, pursuant to state policy, and ensure our values are aligned with EPA reported values. As this is an emerging area of greenhouse gas accounting, we will be working with regulators to refine this approach.

## Driving Change: Recent Policies Enacted in our States

In Colorado, the Clean Heat Standard (SB2021-264) was recently adopted along with a suite of supportive policies addressing emissions from buildings. The Clean Heat Standard requires that natural gas service providers submit plans to the public utilities commission to achieve greenhouse gas reduction targets of 4% by 2025 and 22% by 2030 from a 2015 baseline. Plans may include a comprehensive range of measures including beneficial electrification, gas DSM, renewable natural gas, hydrogen and recovered methane from coalbeds, wastewater, solid waste and pyrolysis. The bill provides for a 2.5% annual bill impact protection for customers. In addition, the natural gas provider may bring forward renewable natural gas and hydrogen projects eligible for cost recovery. Importantly, the bill also requires the public utilities commission lift the prohibition on providing rebates for customers to switch from natural gas to electricity, allowing more programs for beneficial electrification. The plans are due in August of 2023 and the public utilities commission has already initiated work to establish the rules for evaluation.

Similarly, Minnesota developed a flexible and forward-looking approach in the passage of the Energy Conservation and Optimization (ECO) Act and the Natural Gas Innovation Act (NGIA). ECO represents the most comprehensive overhaul to Minnesota's energy efficiency framework since 2007. In addition to retaining the historic focus on energy efficiency as a core goal for customer-funded programs, the bill also creates a technology-neutral, efficiency-focused framework for allowing fuel switching, creating opportunities to achieve significant emission reductions at the customer point of use. The NGIA allows natural gas providers to file innovation plans to begin reducing emissions from their natural gas service through additional efficiency, electrification, district energy, renewable natural gas, and green hydrogen. This bill includes cost cap provisions of 2% increases to protect customers. While NGIA does not specify an emissions target, it creates the pathway for natural gas service providers to evaluate, submit and gain approval for emissions reductions pathways for customers.

In Wisconsin, the Governor's Task Force on Climate Change and the Public Service Commission of Wisconsin's Zero Carbon Investigation explored options to begin reducing carbon emissions from natural gas use through efficiency and electrification. Recommendations included increasing energy use reduction goals and funding for the statewide energy efficiency program, Focus on Energy, and aligning energy efficiency programs and offerings to align with carbon reduction goals.

Our vision is consistent with these new policies as we seek the common outcome of delivering emissions reductions while maintaining affordability and reliability. These policies set an important foundation for a regulatory pathway to cost recovery on new and emerging emissions reduction activities, thereby, creating an avenue for us to implement a low-carbon vision for natural gas delivery and use. We are excited to work with our regulators to develop plans and finalize the complex policies and regulations needed for success.

### **Policy enabling the transition**

While state policies established a much-needed process to consider long-term natural gas emissions reductions, additional policy is needed to drive continued technology development and incorporate all possible solutions to this large-scale transition. We see the need for policy to drive emissions reductions across three areas:

- Affordable and reliable heat service
- Technology Innovation
- Customer choice and engagement

### **Affordable and Reliable Heat Service**

We can only move at a pace that enables us to continue providing reliable energy to customers. Except for energy efficiency, the technologies currently available to reduce emissions from direct use of natural gas come at a premium. In addition to driving innovation to bring these costs down, we will need to closely manage the costs and pursue voluntary options to avoid a transition that is too rapid or costly for customers. We will only pilot and scale those programs that make the most economic sense for our customers. Our initial focus is on our methane emissions and certified natural gas purchases, which are the lowest cost emissions reductions available today.

Energy reliability is a fundamental requirement. We know the amount of energy that natural gas provides is not easily replaced by renewable electricity or other sources, and because of this, natural gas will remain a fundamental service for customers well into the future.

### **Technology Innovation**

The electric power industry has made significant advancements in technology, from the remarkable story of wind and solar over the last 20 years to the current focus on carbon-free, 24/7 technology with the Carbon-Free Technology Initiative<sup>10</sup> and EPRI Low-Carbon Resources Initiative.<sup>11</sup> To the extent heating load is converted to the electric system, carbon-free dispatchable generation will be critical to ensuring we can accommodate new load without increasing electric emissions.

We need the same innovation, even more expeditiously, for the natural gas system. A focus on research, development and deployment is needed to advance a wide variety of technologies to reduce emissions from the use of natural gas, including:

- Continuous emissions monitoring to measure and reduce emissions from the production, processing and distribution of natural gas
- Low-carbon supply, such as renewable natural gas, hydrogen and ammonia, to reduce the carbon intensity of current end uses and, ultimately, transform the natural gas system into a provider of long-duration energy storage
- Appliance innovation including both natural gas and electric options that can communicate with the power grid
- New forms of carbon offsets and carbon capture, such as direct air capture technologies

### **Enabling Customer Choice and Engagement**

As stewards of both the gas and electric grids, two of the economy's greatest physical assets, we are best positioned to transition our energy systems into a low carbon future given our visibility into our system and our obligations to identify the lowest cost resources and serve all customers equitably.

As this transition gets underway, we see the need for policy to enable regulatory structures that support beneficial electrification, certified natural gas, and the judicious use of carbon offsets among other strategies. This will require the right incentives for innovation and piloting of a portfolio of clean energy strategies.

Policy will need to reflect the need for programs and incentives for customers to manage their own emissions. This includes ensuring energy efficiency policies are aligned with carbon reductions as outcomes, fast-tracking regulatory approval of new customer program offerings and rewarding gas distribution company innovation in advanced building codes and practices. Finally, emissions reductions achieved through these voluntary customer programs must be applied toward the achievement goals tied to state policies such as Colorado's Clean Heat Standard and Minnesota's NGIA.

## **Conclusion**

Our vision for the future is that the natural gas distribution system will continue to be one of our nation's most valuable assets, for both delivering heat and enabling a low-carbon economy. By integrating new forms of energy such as hydrogen and renewable natural gas, the natural gas distribution system enables emissions reductions in the building sector and other sectors, such as agriculture and electricity.

Continued investments will be required to maintain the safety and integrity of this valuable energy asset and to meet customer demand. Meanwhile, the entire supply chain must find emissions reductions opportunities across the board. We are well on our way to implementing a comprehensive strategy that will:

- Leverage buying power upstream
- Operate the most efficient distribution system possible
- Empower our customers to manage their emissions

Our vision will not happen overnight, and it will not happen alone. As described by Bob Frenzel, Xcel Energy's president and CEO, it will take all of us working together. We hope you will join us in our net-zero vision for Natural Gas.

## References and Notes

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- 3 <https://www.ipcc.ch/sr15/chapter/glossary/>.
- 4 Natural Gas, The Facts. American Gas Association. 2019. <https://www.aga.org/contentassets/03db82d44079403c9bfe7328a004d5ca/2019-natural-gas-facts.pdf>
- 5 2015 Residential Energy Consumption Survey. Energy information Administration. 2017. <https://www.eia.gov/todayinenergy/detail.php?id=30672>; Xcel Energy values are based on internal survey of customers
- 6 U.S. Environmental Protection Agency 2015 Residential Energy Consumption Survey
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- 8 See for example Factsheet\_Carbon-Offset-Project-Types-and-Categories.pdf (forest-trends.org).
- 9 Eligible carbon offset registries include: American Carbon Registry, Climate Action Reserve, Gold Standard, and Verified Carbon Standard.
- 10 <https://www.carbonfreetech.org/Pages/default.aspx>.
- 11 <https://www.gti.energy/hydrogen-technology-center/focus-areas/low-carbon-resources-initiative/>.

