Renewable Energy

Some of the best wind and solar resources in the U.S. are right in our backyard — and Xcel Energy is making the most of them.

From the Upper Midwest through the Great Plains to the Southwest, wind and sunshine fuel more than 11,000 megawatts of installed wind capacity on our system and more than 3,100 megawatts of large-scale and distributed solar capacity. It all adds up to clean energy and cost savings for customers.

Over the last two decades, Xcel Energy has built a solid reputation as a renewable energy leader. We're one of 12 electric utilities to make the Smart Electric Power Alliance's 2023 Utility Transformation Leaderboard, recognized as companies to emulate in the clean energy transition. Under landmark clean energy plans in Colorado and Minnesota, we expect to add 10,000 more megawatts of renewables over the next decade.

Battery energy storage is the next frontier to capture as much dispatchable capacity as we can from our investment in renewable generation. In 2023, Xcel Energy will add our first two large battery storage systems in Colorado and return the Cabin Creek pumped-hydro storage facility to full service after a multi-year overhaul. We've also announced a partnership with Form Energy to build two 10 megawatt/100 MWh storage facilities on coal plant sites.

We anticipate renewable resources will produce nearly 70% of our electricity by 2030. Customers who want more — including communities and businesses that have pledged to run on 100% clean energy — can choose from an expanding list of voluntary options. And all our customers benefit from avoided fuel costs and renewable tax credits, which saved about $3 billion over the last five years from our owned wind farms.

Governance

The Finance Committee of the board of directors oversees major investments, including wind and solar energy projects. Within the company, the chief financial officer is responsible for developing and financing renewable projects and contracting for purchased power. The chief operating officer is responsible for constructing and operating the company's renewable resources. Both officers report to the CEO.

LEARN MORE

Xcel Energy's Renewable Choice Programs in the Product and Service Innovation Brief

Biodiversity and Land Use Brief

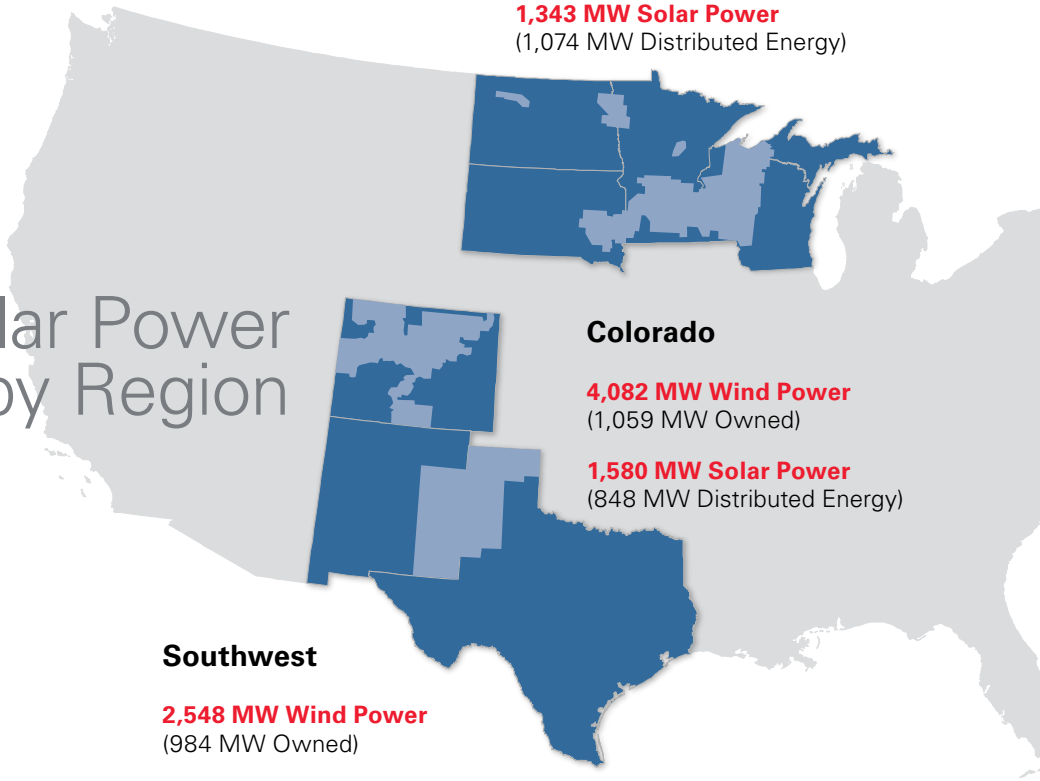
Leading the Clean Energy Transition Brief

Sustainability Report Data Summary

Xcel Energy Carbon Intensities Info Sheet

Renewable resources produced **40%** of our energy in 2022

Wind and Solar Power Capacity by Region



Upper Midwest

4,515 MW Wind Power
(2,352 MW Owned)

1,343 MW Solar Power
(1,074 MW Distributed Energy)

Colorado

4,082 MW Wind Power
(1,059 MW Owned)

1,580 MW Solar Power
(848 MW Distributed Energy)

Southwest

2,548 MW Wind Power
(984 MW Owned)

212 MW Solar Power
(20 MW Distributed Energy)

Wind Repowering Projects

As our power purchase agreements expire over the next decade, we are seeking opportunities to buy and repower older wind farms. In the past year, Xcel Energy acquired two such projects in Minnesota: the 20-megawatt Rock Aetna project, completed in 2022, and 100-megawatt Northern Wind project, completed in January 2023.

We're also upgrading turbine components, including blades, at four company-owned wind farms under our plan to help fuel Minnesota's economic recovery from the COVID-19 pandemic. Upon completion of the upgrades, we expect the average annual energy output of the farms to increase approximately 20%, compared to previous levels.

The projects include:

- 200-megawatt Nobles Wind Farm (repowering completed 2022).
- 100-megawatt Grand Meadow–Ben Fowke Wind Energy Center (completion expected in 2023).
- 150-megawatt Border Winds Wind Farm (estimated completion 2025).
- 200-megawatt Pleasant Valley Wind Farm (estimated completion 2025).

The repowering projects are projected to save customers about $160 million in energy costs over the next 25 years and create up to 700 local, union construction jobs in addition to indirect jobs provided by suppliers. They will also provide landowners and local governments more than $9 million in annual lease and property tax payments.

NOTEWORTHY

Decommissioning Wind Farms

Xcel Energy's most recent wind projects, installed between 2017 and early 2022, are expected to operate 35 years. As we replace components and consider repowering opportunities for older wind farms, we are committed to the responsible disposal, reuse and recycling of wind turbine components associated with our projects.

According to industry estimates, up to nearly 95% of wind turbine parts are recyclable:

- Nacelles, tower sections and internal gearing contain metal that can be recycled.
- Concrete from foundations can be removed, ground and reused.
- Oil from wind turbines can be removed and reused or recycled.
- Turbine blades, which are made of mixed materials including fiberglass, are challenging to recycle. If recycling options are unavailable or cost-prohibitive, blades are typically cut into sections and disposed as construction waste.

In 2022, two repowering projects in Minnesota successfully recycled 603 turbine blades weighing approximately 4,188 tons. That material was reused as alternative fuel in cement kilns, with the resulting ash used to make cement.

Technology and recycling opportunities are always changing, and we work with industry groups to explore ways to sustainably reuse currently non-recyclable materials. As new opportunities develop, we will evaluate and incorporate them into our recycling programs.

Expanding our Portfolio of Large-scale Solar Projects and Storage

Currently, all large-scale solar power on Xcel Energy's system is contracted through power purchase agreements, but that is changing as we plan to own the Sherco solar project and compete to build new solar projects in our Colorado and Minnesota resource plans approved in 2022.

Our 2018 Colorado Energy Plan called for the purchase of nearly 775 megawatts of solar power and 225 megawatts of storage. The 200-megawatt Sun Mountain Solar Project in Pueblo County began operating in December 2022, and the following projects will come online by mid-2023:

- Neptune Solar Project in Pueblo County (325 megawatts, plus 125 megawatts of storage).
- Thunder Wolf Solar Project in Pueblo County (248 megawatts, plus 100 megawatts of storage).

We've also proposed to purchase power from the 100-megawatt Apple River Solar project for our Upper Midwest system. Located in Polk County, Wisconsin, the project will be one of the largest solar installations in the state and is expected to come online the end of 2025.

In our southwest region, Xcel Energy plans to propose new company-owned solar facilities to be located at Cunningham Generating Station near Hobbs, New Mexico, and Plant X Generating Station near Earth, Texas. Two solar plants at the Cunningham site would have a combined capacity of 268 megawatts and the Plant X facility would be 150 megawatts. Locating the facilities at these locations supports the existing workforce and host communities while saving customers money by using existing grid connections. The new solar facilities will be proposed to regulators later in 2023 and could be in service between 2026 and 2027, if approved.

NOTEWORTHY

Sherco Solar Project

Ground was broken in April 2023 on Xcel Energy's Sherco Solar Project, which will create the largest single solar energy resource in Minnesota on approximately 3,250 acres near the Sherburne County (Sherco) coal-fueled power plant in Becker, Minnesota.

Two solar phases were approved by Minnesota regulators in 2022, replacing most of the capacity from the first coal unit retiring at the Sherco plant in 2023. The third phase, proposed in 2023, would bring the complex to 710 megawatts — enough to power 150,000 Minnesota homes with energy fueled by the sun to keep bills low.

Sherco Solar will take advantage of existing transmission assets and skilled labor, providing a just transition to the Becker community with well-paid union jobs over the next three years. It's also the first host site for the State of Minnesota's new Workforce Training and Development pilot program, which will provide hands-on construction skills training for under-represented communities. About 75 people will enter the Xcel Energy program in 2023.

Xcel Energy will build, own and operate the project. Sherco Solar is expected to provide $240 million in local benefits, including landowner payments, state and local property taxes, and production taxes over its 35-year life.

Integrating Wind and Solar Power

Major growth in our wind and solar capacity has fundamentally changed the way we operate. We've set multiple system records for delivering wind and solar power. During fall and spring 2022, we recorded hours when wind and solar energy produced 90% or more of our electricity as well as entire days when these resources produced about 80% of our power.

We've continued to improve system operations and create the ability to reliably increase the use of renewables.

Our operational improvements include:

- **Investing in transmission:** We're improving and adding new transmission facilities to reduce congestion, increase regional reliability and create new capacity for delivering more wind and solar energy to customers.
- **Developing energy storage:** Large-scale battery and other long-duration storage projects allow us to store excess renewable energy and provide dispatchable capacity during periods when wind and solar generation are low.
- **Using control equipment:** We use set-point controls for wind and solar farms in combination with automatic controls on thermal units. This enables renewable generation to operate at peak levels and reduces fossil fuel generation.
- **Increasing the flexibility of our dispatchable power plant fleet:** Lower-carbon natural gas plants are now the primary dispatchable resource for backing up and integrating renewable energy. We've upgraded instrumentation and software and made other improvements, such as negotiating more flexible agreements with natural gas suppliers, that enable us to operate the system more reliably and help manage customer costs.
- **Cycling baseload plants offline and reducing minimum generation levels:** We operate our coal and nuclear units to accommodate more renewable generation, ramping the units down to reduce fuel use and emissions.
- **Adjusting planned maintenance:** We now plan transmission and plant maintenance outages to navigate reliability needs and take advantage of times of year when wind and solar production are lowest.
- **Winterizing wind turbines:** All the wind turbines Xcel Energy owns across its three regions are outfitted with cold weather turbine packages that support operations down to -22 F (-30 C).

Regional Energy Markets

Larger regional power grid operators and energy markets offer greater flexibility to add more wind and solar power. They can provide renewable resource diversity on neighboring systems and help displace thermal generation with renewables more economically.

In the Upper Midwest, Xcel Energy belongs to the Midcontinent Independent System Operator, a non-profit, member-based organization that operates the power grid across all or parts of 15 states. Xcel Energy's operations in Texas and New Mexico participate in the Southwest Power Pool, a regional transmission organization covering parts of the central U.S.

In Colorado, Xcel Energy continues to explore participation in a larger regional energy market. Along with other energy providers in the state, we joined the Western Energy Imbalance Service Market operated by SPP in early 2023. An energy imbalance market is a real-time market in which generation from multiple providers is dispatched at the lowest possible cost to reliably serve customer demand in the region. It's a short- to mid-term move that will provide cost savings to customers and improve operational efficiencies while we evaluate a longer-term, broader market structure to integrate wind and solar energy and maintain system reliability.

In spring 2023, we agreed to join Phase 1 of SPP's proposed Markets+ initiative to participate in the service design. Markets+ seeks to expand on WEIS by providing a centralized day-ahead and real-time energy market for the West. We expect to decide whether to continue participating after an extensive review of the final design.

Compliance with State Renewable and Clean Energy Standards

Even as state requirements continue to evolve, Xcel Energy remains committed to surpass established standards beyond 2030 in the states we serve. We continuously optimize our compliance strategy with increased target requirements based on each state's legislation.

State	2022	Next Increase	Notes
Colorado Renewable Energy Standard	30%	30% indefinitely	30% of retail sales by 2020, with 3% from distributed generation, including at least 1.5% from retail net-metered DG resources and up to 1.5% from wholesale DG resources (defined as resources ≤30 megawatts located in Colorado and not customer sited).
Michigan Renewable Portfolio Standard	15%	—	Goal of 35% by 2025.
Minnesota Renewable Portfolio Standard	30% + 1.5% Solar	10% solar goal by 2030; 55% by 2035 80% carbon-free electricity by 2030	Minnesota RPS is 30% of retail sales in 2020, plus 1.5% from solar, with at least 10% of that from on-site solar 40 kW or less; RPS increases to 55% by 2035. Carbon-Free Standard is 80% by 2030, 90% by 2035 and 100% by 2040.
New Mexico Renewable Portfolio Standard	20%	40% by 2025	The New Mexico Energy Transition Act increases future RPS. In addition to the immediate goals, it sets a standard of 40% by 2025, 50% by 2030, 80% by 2040 and then 100% carbon-free electricity by 2045; under the rule, the Public Regulation Commission must consider the safe and reliable operation of the system and the prevention of unreasonable costs.
North Dakota Renewable and Recycled Energy Objective	—	Voluntary	No RPS Requirement for North Dakota.
South Dakota Renewable, Recycled and Conserved Energy Objective	10%	Voluntary	No RPS Requirement for South Dakota.
Texas Renewable Generation Requirement	Statewide RPS Goal	10,000 MW of renewable capacity statewide by 2025 (goal achieved) and non-wind goal of 500MW	Xcel Energy's final RPS is approximately 3% of the statewide RPS goal each year.
Wisconsin Renewable Portfolio Standard	12.89%	—	—

Renewable Energy Credits

Xcel Energy uses RECs to comply with state renewable energy standards throughout our service areas. A renewable energy certificate or credit is created for every generated megawatt hour of renewable electricity. RECs are the unit of compliance for state renewable energy standards and some voluntary buyers' sustainability goals. They are tracked in national REC registries, which are approved by our state public utilities commissions.

We carefully track our REC ownership and comply with the rules and best practices around renewable energy claims. Only parties that own and retire RECs can claim to use the renewable energy, according to the Federal Trade Commission. Renewable energy that is disaggregated or unbundled from its associated REC can retain its value to be used for compliance with environmental regulations. In reporting progress against our carbon reduction goals, our company uses actual carbon emissions from energy provided to our customers, independent of whether there was a REC associated with that energy.

Xcel Energy's policy is to manage its RECs to best serve its customers, comply with renewable and carbon emissions requirements, and avoid regulatory penalties for customers. In some of the states we serve, regulatory penalties are applied to RECs not sold within their established shelf life. As of July 2021, we stopped initiating the sale of RECs generated from our portfolio, unless it is necessary to avoid such penalties on a state-by-state basis or the RECs are transferred to or retained by customers as part of voluntary programs or contractual service arrangements.

To help customers achieve their voluntary and incremental sustainability goals, RECs that accrue in excess of state standards may be transferred for a fee to Xcel Energy customers (through program offerings or wholesale contracts). The company will retire RECs on behalf of these customers or require retirement of RECs post-transfer to avoid double-counting concerns. We continue to provide a residual mix carbon emission intensity metric by operating system, which reflects RECs we have retired on behalf of or transferred to certain customers, and RECs sold to avoid regulatory penalties. The residual mix carbon emission intensity also reflects energy purchased through any power purchase agreement where we do not purchase the associated REC.