Fact sheet:

Wind Energy Presents Opportunities for Minnesota

Wind energy installations have grown significantly in the U.S. over the past 25 years, increasing wind power generating capacity from 2.4 gigawatts (GW) in 2000 to 150.1 GW in April 2024.[1] While Minnesota has been experiencing the benefits of wind energy since its first wind farm was built in 1994, there is further potential for the state to leverage the industry's growth.

In 2023, wind energy accounted for more than three-fourths of Minnesota's renewable generation and 25% of the state's total net generation.[2] Minnesota was among the top 10 states with the largest share of in-state generation from wind.[3]

- The U.S. added 6,500 megawatts (MW) of new utility-scale, land-based wind power capacity in 2023.[4] Minnesota ranked eighth in the nation in wind capacity and accounted for more than 3% of the U.S. total.[5]
- Minnesota ranks 19th among states for total energy consumed per capita.[6]
- Of the state-permitted wind facilities in Minnesota as of 2022, 4,184 MW of wind projects were in operation, with an additional 340 MW accounting for projects under construction.[7]
- The U.S. Wind Turbine Database reported that, as of February 2025, 2,735 wind turbines are in Minnesota, amounting to 4,826 MW of capacity and 130 projects.[8]
- The industry employs nearly 126,000 Americans across all 50 states, including 20,000 wind manufacturing jobs at more than 450 facilities.[9]
- Wind turbine technician is the fastest growing job in the country, expected to increase by 44% over the next decade.[10] In 2023, wind energy job growth increased by 3.7% in Minnesota.[11]

Sources

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Costs

In 2024, the levelized cost of energy (LCOE), or the average cost of generating a unit of electricity taking into account costs incurred during construction, operation, and maintenance for land-based wind, was among the cheapest rates, ranging between $27 and $73. Comparably, the LCOE for coal was one of the highest, ranging from $69 to $169 per unit.[12]

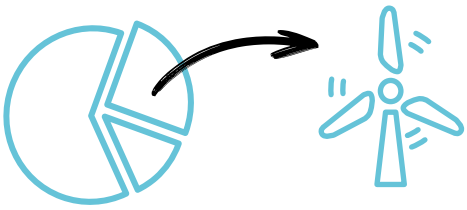
Wind turbines continue to grow in size and power, contributing to more efficient systems. The average nameplate capacity, or the amount of power the project is capable of producing, of newly installed land-based wind turbines in the U.S. in 2023 was 3.4 MW, up 5% from the previous year.[13] Higher capacity means fewer turbines are needed to generate the same amount of energy, leading to lower costs.

Strong policies encourage wind growth in Minnesota

Minnesota has been intentional in building its energy resilience through the passage of strong energy standards meant to strengthen the grid and lower energy costs for consumers.

Mandatory renewable energy portfolio standard

Initially enacted in 2007, Minnesota's mandatory renewable energy portfolio standard requires electricity providers—with the exception of the state's largest utility, Xcel Energy—to generate or procure at least 25% of their electricity retail sales from eligible renewable sources by 2025.[14] This standard promises significant economic benefits, including lower electricity costs, job creation, and a more reliable energy system. According to a 2024 report by Clean Energy Economy Minnesota, the state's clean energy industry employs more than 61,000 workers, contributing billions of dollars to the economy each year.[15]



2040 carbon-free electricity law

- In 2023, Minnesota's Legislature raised the renewable energy standard with a clean electricity law that commits all utilities to providing their Minnesota customers with 100% carbon-free electricity by 2040, with reporting on benchmarks required every five years.[16]
- This law advances the state's efforts to reduce greenhouse gas emissions, generate local employment opportunities in the clean energy sector, and address environmental justice by protecting the health of communities near waste-to-energy facilities, like the Hennepin Energy Recovery Center in Minneapolis.[17]
- The carbon-free electricity law contains measures to streamline the siting and routing process for solar energy systems, creating a simpler path to connecting new energy projects to the electric grid.[18]

Sources, continued

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Curtailment and congestion is costing communities

Wind power curtailment rates refer to the percentage of electricity production from wind turbines intentionally reduced, or curtailed, below what the turbines could otherwise produce. Across the U.S., there are seven Independent System Operators (ISOs) and Regional Transmission Operators (RTOs) that manage the electricity grid in their respective regions. In 2023, the national wind power curtailment rates averaged 4.6% across the seven ISOs and RTOs, with variations by region. Curtailment involves intentionally reducing wind energy production to balance supply and demand to maintain grid stability. Among all the ISOs and RTOs, the Midcontinent Independent Service Operators (MISO), the transmission network in which Minnesota operates, had one of the highest curtailment rates at 3.2%.[19]

Congestion on the transmission grid costs Minnesota communities when the infrastructure cannot support the amount of energy being generated. Congestion refers to a situation in which the electricity grid lacks sufficient transmission capacity to effectively transport large amounts of wind power generated in a particular area, leading to limitations on how much wind energy can be delivered to where it is needed.

Wind farms pay tax revenue to the communities that host them based on how much energy they produce. In 2021, some townships in the Buffalo Ridge area saw a more than 50% reduction in wind energy production and associated tax revenue.[20] More than $1 million in revenue was lost among three rural counties, and another $700,000 was lost among 15 more.[21]

Sources, continued

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Wind expansion hinges on investment in transmission

The U.S. added 5.1 GW of utility scale wind capacity in 2024, but annual capacity additions fell by 23% compared to 2023.[22] Developers across the U.S. expect to build 9.2 GW of new capacity in 2025, with two thirds of that already under construction or complete and awaiting final commercial operation. If all projects reach completion—which is not guaranteed—capacity would grow by 79% in 2025.[23] However, transmission congestion and inadequate capacity to transmit energy may stall the growth of Minnesota's wind energy industry.

Inadequate transmission capacity

The 2023 Biennial Transmission Projects Report identified 164 present and foreseeable inadequacies across Minnesota,[24] an increase from the 103 transmission inadequacies identified in the 2021 report.[25]

Permitting process delays

The average time from application acceptance to permit issuance for wind energy by the Minnesota Public Utilities Commission is 358 days.[26]

Growing wind projects queue

Wind projects slated to produce 4,132 GW of electricity are awaiting approval to connect to the MISO network's transmission grid.[27]

Conclusion

Wind energy presents economic and environmental benefits to Minnesotans, including energy cost savings, job opportunities, revenue for farmers and ranchers, and contributions to the local tax base.[28] Addressing permitting process delays and making investments in transmission infrastructure will help alleviate bottlenecks for new connections, allowing Minnesotans to take full advantage of wind energy.

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