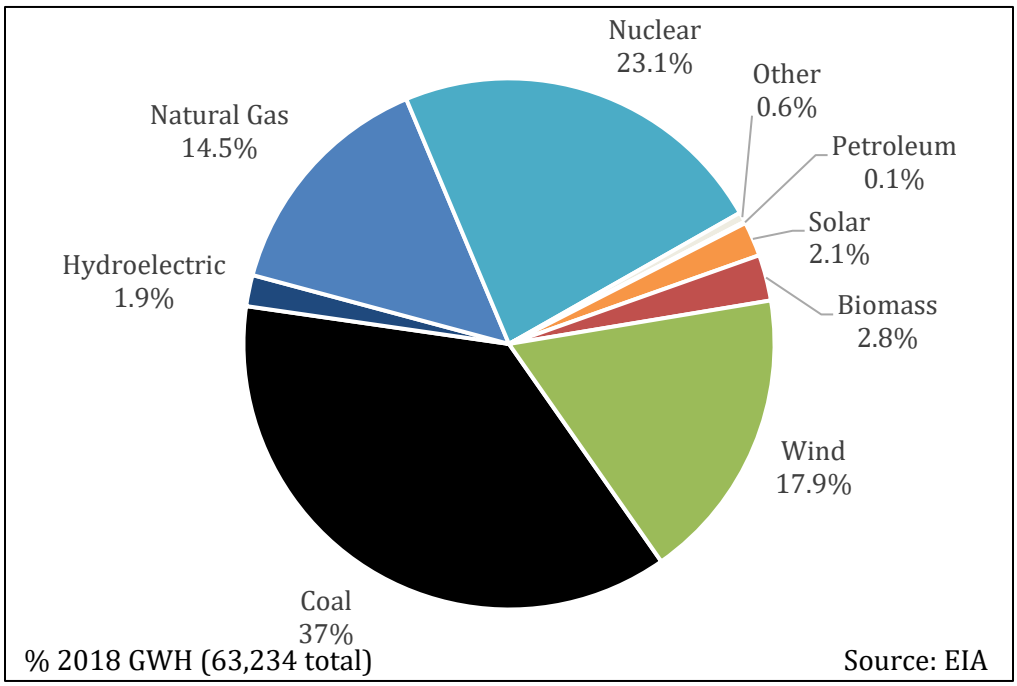
State Brief: Minnesota

BACKGROUND

Minnesota's Net Annual Electric Generation, 2018



% 2018 GWH (63,234 total) Source: EIA

Coal is the largest contributor to net electric generation in Minnesota. Coal's contribution has declined recently, falling from 53% in 2011 to 37% in 2018. The state's two nuclear power plants, Prairie Island and Monticello, typically produce a quarter of the state's electricity generation. The North Star State is ranked fourth in the nation for ethanol production and has the most E85 (an 85% ethanol and 15% gasoline mix) fueling stations in the nation.

Minnesota is a national leader in wind energy development, ranked among the top 10 states for both installed generating capacity and actual electric generation from wind. Solar energy has rapidly increased in the state since 2012, in-state solar capacity has increased to approximately 1,428 megawatts (MW). This is at least partially due to the success of Minnesota's community solar program. The 2020 U.S. Energy and Employment Report found that Minnesota has 447,518 traditional energy workers (1.6% of total state employment) and an additional 47,114 workers employed in energy efficiency.

The Governor appoints the five members of the bipartisan Minnesota Public Utilities Commission (MPUC), which regulates large electric and gas utilities and large energy facilities siting. Republicans control the state senate, Democrats control the state house, and Democratic Governor Tim Walz took office in January 2019.

POLICY STRENGTHS AND OPPORTUNITIES

The National Renewable Energy Laboratory (NREL) developed the notion of "policy stacking,"[1] an important framework for policymakers to consider. The basic idea behind policy stacking is that there is an interdependency and a sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, market preparation policies; remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, market creation policies; create a market and/or signal state support for clean energy technologies. Tier 3, market expansion policies; create incentives and other programs in order to expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

For example, before financial incentives for combined heat and power (CHP) will be successful, there are two key considerations for deployment. First, having clear interconnection standards and favorable stand-by rates for

[1] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. https://www.nrel.gov/docs/fy13osti/56428.pdf

customers who opt to add CHP. In this example, states should adopt policies to address interconnection and stand-by rates before adopting financial incentive programs.

GRID MODERNIZATION

New digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers.

Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency.

Grid modernization will require a suite of state and federal policy changes to support advancements in grid technologies, grid management, and utility regulation.

In the most recent (2018) Grid Modernization Index, Minnesota ranked 10th overall for grid modernization efforts. The state's ranking improved 11 places from the previous year's Index, due largely to policy activity in 2018. The state performs strongly in customer engagement due to the dynamic pricing and demand response programs offered by the state's investor-owned utilities (IOUs). The Minnesota Department of Commerce's Energy and Policy Conservation Quadrennial Report and the state's 2025 Energy Action Plan both address grid modernization. The e21 Initiative is an ongoing collaborative stakeholder effort working to develop and implement policies to modernize the state's grid. Following several stakeholder meetings, the MPUC opened a proceeding in March 2016 to develop a framework for integrated distribution system planning. The planning process proposed by MPUC staff was approved in August 2018.

Minnesota's PUC ordered Northern States Power (doing business as Xcel Energy) to develop an Integrated Distribution Plan (IDP) for 2020-2029. The plan was approved and released November 1, 2019. The proposal includes expanding advanced metering infrastructure, expanded technology to reduce energy loss, and automated grid management technologies.

While Minnesota demonstrates leadership in this area, there are opportunities to develop policies to support in-state modernization efforts.

1. Require that utilities' integrated resource plans (IRPs) include plans to enhance cybersecurity, increase smart meter deployment and demand response and/or demand-side management (DSM) programs, and measure and report on the results of grid modernization efforts. While there is no statewide policy requiring smart meters in Minnesota, utilities have taken the lead in residential smart meter deployment.

2. Minnesota does not have clear state policies governing customer data access and privacy protections. To address this, policymakers could develop legislation or rules that, at minimum, do the following: clarify who owns the energy data associated with consumer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data possible. The state could establish customer access to energy data through the Green Button program, for example.

ENERGY STORAGE

Energy storage offers a unique opportunity to dynamically manage supply and demand while maximizing the value of grid resources. By deploying storage in strategic locations, utilities can more effectively manage their energy portfolios. First, storage provides management of intermittent demand – helping to flatten peak demand requirements for the utility. Second, the responsiveness of energy storage can allow the utility to implement voltage regulation and other ancillary services, which are useful for improving system efficiency. Third, storage can dispatch power to better integrate intermittent resources like renewable energy. Finally, energy storage can help the commercial sector avoid costly demand charges. As utilities around the country consider implementing or extending demand charges to other sectors, energy storage will become more relevant as a customer cost-saving investment.

The flexibility of battery storage, combined with advanced metering infrastructure, allows customers to control, for instance, how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to a number of economic and environmental gains.

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Two major trends have enabled increased deployment of energy storage: declining costs and technological advances. State planning and regulatory policies can help maximize these benefits by 1) establishing a framework for easy integration of energy storage into the grid and 2) establishing a marketplace that monetizes the benefits of energy storage for cost effective investment.

Minnesota is well positioned to grow its in-state energy storage capacity. When Xcel Energy completed its one-megawatt (MW) Wind-to-Battery project in Luverne in 2009, it was the first such project in the U.S. Xcel announced a $650 million energy storage pilot program that will run from 2023-2025. The Minnesota Energy Storage Alliance is an organization formed by interested stakeholders to expand the energy storage market in the Midwest. In 2017, Minnesota's largest retail electric cooperative, Connexus Energy, announced plans to construct the largest battery storage project in the state with a maximum capacity of 20 MW, which will support three solar facilities. Following a two-year study, the MPUC issued an order revising interconnection standards in May 2018. The standards are a result of a collaborative effort between MPUC, the Interstate Renewable Energy Council (IREC), Fresh Energy, and the Environmental Law and Policy Center. Energy storage is included as an eligible generation project in the standards.

In the first special session of the 2019 session, Minnesota's policymakers enacted the 'Omnibus Jobs and Energy Bill' (HF2). The legislation includes provisions requiring the commissioner of commerce to conduct an energy storage cost-benefit analysis in order to quantify the value of adding storage to the grid; allowing utilities to file proposals with the MPUC to recover the costs associated with energy storage pilot projects; and requiring that utilities required to submit an IRP evaluate energy storage options during the planning process.

There are additional opportunities for developing supportive state policies:

1. Building on the study that will be conducted by Commerce, instruct utilities to evaluate the value of energy storage in multiple strategic locations across the utility system and consider a requirement to deploy storage where it will be cost effective, or identify the price point at which it will become cost effective.

2. Consider creating a mandatory energy storage procurement target or requirement for energy storage with a documented process for periodic review of progress towards that goal. Procurement targets can limit the amount of utility owned storage to be procured; require that a certain amount of storage be targeted to low-income customers; and create carve-outs for specific amounts of storage to be procured at the transmission, distribution, and customer levels. Procurement targets can jump-start market creation, spur fast learning, and guide the development of a regulatory framework.

3. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment for storage. These incentives can also be designed to decline as the value of storage becomes more readily monetized, and/or as the cost of storage decreases. Policymakers could allow utilities that provide storage incentives to customers to also recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This should signal to customers the value of leveraging storage while better aligning customer costs with system costs. Financing energy storage installations for commercial customers could help

reduce their demand charges. Policymakers might start first with a policy that provides grants to pilot projects, and/or that targets existing solar system owners. Financial incentives should be designed to ensure that the state meets other goals including emissions and peak demand reductions, and equitable access to clean energy.

MAINSTREAMING RENEWABLES

As the renewable energy industry matured, technology improved, and global production of generating equipment increased. Renewable energy is increasingly seen as the least cost, and lowest risk form of energy (excluding energy efficiency). A 2019 Bloomberg New Energy Finance report predicts that renewable resources will generate at least 60% of total global electricity and 43% of U.S. electricity by 2050. With increased deployment, utilities are learning more about how to integrate renewables effectively, investors are becoming more comfortable with the technologies, and building code officials are recognizing common standards and best practices. For these reasons, it is in the interest of policymakers to ensure that their states are well positioned to benefit from the transition to clean energy resources.

To reduce barriers to customer and utility participation in the renewable energy market, policymakers in Minnesota might consider several policy options.

Customer-Oriented Policies

1. Interconnection, Net Metering, and Streamlined Permitting – In general, customers want a clear, streamlined, affordable, and predictable process for connecting renewable energy systems to the grid. Minnesota is the only state to have adopted a Value-of-Solar Tariff (VOST) methodology that would replace the state's net metering policy. Instead of crediting customer-generators at the retail rate, a VOST would incorporate several measurable costs and benefits to the transmission and distribution system in its rate design, including fuel costs, line losses, ancillary services, and environmental impacts. Because no utilities have submitted a VOST to the MPUC for approval, the standard net metering tariff remains in place. The state allows aggregated net metering and IOUs are required to offer meter aggregation to their customers. The state recently updated statewide standards for streamlined permitting processes for small generating systems. The new interconnection rules fast track permitting for systems under 20 kilowatts (kW) and establish formal screening for "mid-size" systems. The state might also consider offering resources to support local governments that voluntarily implement a streamlined program, as Minneapolis and St. Paul have done. State incentives, such as tax credits, financial incentives, or loans can be tied to systems that are established within a designated streamlined permitting jurisdiction.

2. Shared Renewables – Due to building and property attributes and ownership issues, many customers are unable to install renewable energy technologies where they live or work. Allowing shared, or community, renewable energy projects addresses these barriers. These projects have multiple owners or subscribers who pay for a portion of the project or the generation provided by the system. Minnesota currently offers tax credits to incentivize community-based energy developments (C-BEDs), and Xcel Energy has implemented one of the most robust community solar programs in the country. Since its launch in 2014, the program has grown considerably with 699 MW in operation as of May 2020. Xcel is required to purchase solar from community solar gardens no larger than one MW, and subscribers are compensated through the Solar Rewards Program.

   Low credit ratings often deter participation in renewable energy markets; this can affect low- and moderate-income (LMI) households' adoption of renewable energy solutions. Supportive policies for shared renewables can be designed to encourage participation by LMI households; this can increase adoption of renewable technologies and reduce energy costs. Low-income participation can be encouraged either through a percentage mandate for the overall annual contracted capacity, or by offering a higher rate of payment for the portion of shared solar capacity attributed to low-income customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program to provide recipients of assistance with participation in a shared renewable system.

   There are several additional policy options that Minnesota might consider to promote renewable energy uptake by LMI consumers. Generally, successful state policies should be tailored to these customers, be cost-effective and financially sustainable, have measurable performance indicators, and be flexible enough to allow later changes in design.

3. Corporate Procurement – Many Fortune 100 and 500 companies have established either climate goals or commitments to purchase renewable energy. Over the last five years, over 20 gigawatts (GW) of renewable contracts have been announced by corporate entities. This is leading policymakers to provide additional avenues for businesses to procure renewable energy. EDF Renewables has been active in securing power purchase agreements (PPAs). The latest 100 MW wind deal with Southern Minnesota Municipal Power Agency brought EDF's total procurement to 600 MW across multiple states. Walmart, with a goal to meet a 100% renewable energy target, announced that it would subscribe to 36 community solar projects in Minnesota. 3M entered into an agreement with Xcel energy to source 100% of its electricity for its headquarters from renewable energy. Xcel Energy filed for and received approval in 2019 to expand its renewable energy tariff program, Renewable Connect. Minnesota's policy allows companies to purchase renewable energy credits (RECs) or renewable energy through green tariffs, own shares in C-BEDs, and develop or lease onsite renewable energy projects. The products available in Minnesota meet five out of six of the Corporate Renewable Energy Buyers' Principles. To expand the corporate procurement market, the state could explore policies that maximize the emissions reductions potential of new renewable projects, such as a proximity requirement for renewable energy deliveries from electricity providers, or by providing bundled RECs specific to a renewable facility. In addition, it is prudent to incorporate corporate renewable purchase commitments into the IRPs that utilities submit to regulators to plan for resource needs over multiple decades. By integrating these renewable purchase commitments into the IRP process, regulators can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas (GHG) emissions and increase investments in clean energy resources. Minnesota's renewable energy standard (RES) sets minimum requirements for electricity generation from renewable resources at 31.5% for Xcel, 26.5% for other investor-owned utilities (IOUs), and 25% for all other utilities by 2025. The RES also includes a statewide target of 10% solar capacity by 2030. Great River Energy, the energy provider for more than two dozen distribution cooperatives in Minnesota, announced plans to get half of its electric generation from renewables by 2030. Great River achieved the state's 25% RPS seven years early. Minnesota Power just completed a 700 million transmission line connecting customers with hydropower produced in Canada. This line will allow the utility to provide 50% renewable energy by 2021. Rochester Public Utilities announced a 100% renewable energy by 2030 target.

Minnesota might see a clean peak standard as the next step in a progression from its existing RES. Clean peak standards aim to increase the share of clean energy resources used to meet peak demand and decrease energy bills over the long-term by reducing peak demand in the hours when energy costs are highest. These objectives can be met through different policy options including: planning and procurement requirements that focus on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units; incentives for clean energy resources delivered during peak times; and/or adopting a new clean peak standard that sets a target for clean energy deliveries during peak times.

PATHWAYS TO A LOW CARBON FUTURE

The international scientific community has determined that steep and rapid reductions in global greenhouse gas (GHG) emissions are needed to avoid the worst impacts of global warming and climate change. Federal and state policy interventions are necessary to transform our energy systems and rapidly reduce GHG emissions in the U.S. In general, effective policies will:

1) Establish performance standards and place enforceable limits on carbon pollution;
2) Provide financial incentives for individuals, businesses, and industry to choose clean energy and greatly improve energy efficiency;
3) Spur public and private investment in clean energy infrastructure, including investment in advanced transportation systems for the movement of people and goods; and
4) Provide funding for research, development, and demonstration of technologies that will underpin the de-carbonization of the U.S. economy.

Minnesota's utilities have taken the lead in setting clean energy goals (discussed above). In addition, Xcel Energy plans to reduce its emissions to 80% below 2005 levels by 2030 and to achieve 100% carbon-free electricity by 2050. The Next Generation Energy Act of 2007 established statewide GHG emission reduction goals of 15% by 2015, 30% by 2025, and 80% by 2050, based on 2005 levels. To compliment this activity, Minnesota's policymakers might consider the following:

1. Cap-and-Trade / Cap-and-Invest – These policies place enforceable limits on carbon emissions that cannot be exceeded by regulated entities without penalty. Emissions allowances are allocated or sold to companies by the state and sources must hold an allowance for each ton of carbon they emit in a given year. Emissions caps and available allowances are reduced every year, requiring that industries reduce their emissions or pay higher market prices for available allowances. States might choose to invest the revenue associated with emissions allowances in renewable energy, public transportation, zero-emission vehicles, environmental restoration, sustainable agriculture, recycling, and other actions.

   States might consider joining an existing program like the Western Climate Initiative (WCI) or the Regional Greenhouse Gas Initiative (RGGI), as joining an established network can remove administrative barriers to entry.

2. Carbon Tax – Carbon taxes impose a price on each ton of carbon emitted and are levied on the purchase and use of fossil fuels by business and industry. That cost is subsequently reflected in consumer prices. If carbon taxes are levied at a high rate, they will discourage the use of GHG emitting resources and technologies, encouraging a market switch to new technology. Alternatively, carbon taxes can be set at a lower rate, which will have a limited impact on market behavior, but the revenue can be substantial and that revenue can be invested in energy efficiency and emission reduction technologies which will result in lower emissions. States considering this option might examine British Columbia's existing tax structure or the federal proposals from the Citizen's Climate Lobby and the Climate Leadership Council.

3. Emissions Performance Standards – Transportation sources now emit more GHGs than any other sector, and rapid reductions from all types of vehicles, engines, and equipment is critical to achieving carbon reduction goals. The Low Carbon Fuel Standard (LCFS) implemented by both Oregon and California is another example of a flexible, market-based approach to regulating carbon emissions at the state level. LCFSs regulate the carbon intensity of transportation fuel in order to reduce the use of petroleum-based fuels and promote investment in low-carbon options (electrification, biofuels, hydrogen, etc.). The market mechanism LCFSs use is a crediting system where each fuel type is assigned a carbon intensity (CI) score. The allowable CI score is decreased yearly, requiring a switch to lower CI fuels. Entities who provide fuel below the regulated CI score earn credits. These credits can be sold to providers who operate at a deficit (above the mandated CI score), creating a market incentive for investment in cleaner fuels

ELECTRIFICATION OF THE TRANSPORTATION SECTOR

Bloomberg New Energy Finance estimates that 58% of all new passenger vehicle sales will be electric by 2040 and that price parity with conventional vehicles will be met for most segments in the mid-2020s. Therefore, a key part of building a modernized grid involves designing infrastructure that will facilitate easy connection of electric vehicles (EVs) to the grid. One of the most important barriers to increased adoption of EVs is the consumer's awareness of the availability of EV charging stations. Ultimately, drivers want to be sure that their car will get them where they need to go. Another important barrier to increased adoption of EVs is their higher up-front cost as compared to similar conventionally fueled vehicles. The good news is that both supportive policies for developing charging infrastructure and technological advancements have eased range anxiety.

Minnesota offers a handful of incentives to support EVs and EV supply equipment (EVSE). Grants are available for the installation of EVSE along Minnesota's roadways, and state policy requires that utilities offer EV charging tariffs. Some utilities in the state also offer incentives to customers. In 2018, Xcel Energy received MPUC approval to launch a smart-charger pilot program for residential customers. Minnesota requires an additional $75 registration fee for EVs, which might dis-incentivize purchases.

There are policy opportunities to further encourage and prepare for increased market penetration of EVs.

1. EV and EV Supply Equipment (EVSE) Financing and Financial Incentives – Providing financial incentives and innovative financing options can help spur greater market penetration of EVs. Sales, property, and income tax credits are some of the simplest methods for addressing high up-front costs of EVs and EVSE. While sales tax credits are typically applied at the time of purchase, property and income tax credits may do less to address upfront cost barriers as the credit is not applied at the time of purchase.[2] States have adopted other financial incentives including low-interest loans, vouchers, and rebates. A handful of states qualify EVSE under their property assessed clean energy (PACE) programs. A simple solution is to increase and expand existing tax credits to incentivize commercial, publicly available charging stations.

2. Charging Infrastructure Plan – Locating charging infrastructure is different from locating conventional fueling stations. While some drivers will need to charge more quickly, others will refuel when they are parked for longer periods of time, for example when shopping, eating at a restaurant, or going to work. Charging infrastructure plans should attempt to pair the appropriate level of charging (level 2 or direct current fast charging) with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop an infrastructure plan through a stakeholder process. States with existing registration fees for EVs could use a portion of this revenue to fund charging infrastructure development efforts, as Washington has done.

3. Parking Infrastructure Requirements – In tandem with the development of a statewide plan, legislation could set requirements for EV parking infrastructure. Some states have adopted permitting standards for parking lots. Hawaii, for instance, requires that for every 100 parking spaces, there must be at least one EV charging space. States and local governments are also updating building standards and codes to require that new buildings are EV ready, meaning that all conduit and wiring are able to accommodate EVSE. States can also implement programs to provide parking incentives for owners of EVs. Typically, these programs provide access to carpool parking, preferential spaces, reduced fees, and/or access to charging stations.

NEWS

- July 26, 2020: Minnesota Energy Planning Initiative Helps Colleges Reach Carbon-Neutral Goals
- July 7, 2020: In Minnesota, Community Solar Maintains Growth Despite Challenges
- July 2, 2020: Utility Efficiency Programs Offer Model to Merge Climate, Racial Justice Solutions
- June 19, 2020: Minnesota Power Aims to Triple Solar Energy Portfolio with $40M Investment
- June 19, 2020: Xcel to Speed Up $3B in Clean Energy Spending in Response to Minnesota Prompt on COVID-19 Recovery
- June 9, 2020: Rural Minnesota Energy Board Announces Financing Tools for Energy Efficiency Improvements
- May 21, 2020: For Clean Energy Groups, Solar Rebate Funds are Legislative Consolation Prize
- April 2, 2020: Minnesota Makes Dramatic Decarbonization Progress, New Factsheet Reveals

OTHER RESOURCES

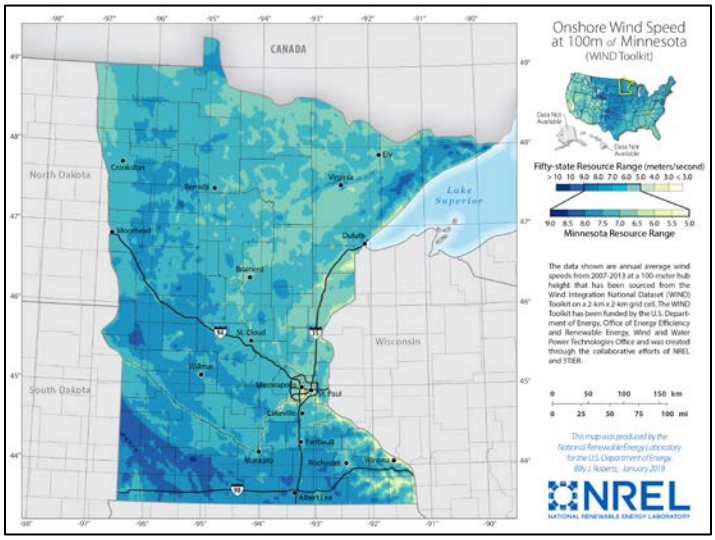
- Minnesota Department of Commerce Clean Energy: https://mn.gov/commerce/consumers/your-home/energy-info/
- Clean Energy Economy Minnesota: http://www.cleanenergyeconomymn.org/
- U.S Energy Information Administration, Minnesota: https://www.eia.gov/state/?sid=MN
- The Database of State Incentives for Renewables and Efficiency, Minnesota https://programs.dsireusa.org/system/program?fromSir=0&state=MN
- The American Council for an Energy-Efficient Economy, Minnesota: https://database.aceee.org/state/minnesota
- U.S. Department of Energy's Alternative Fuels Data Center, Minnesota: https://www.afdc.energy.gov/states/mn
- SPOT for Clean Energy, Minnesota: https://spotforcleanenergy.org/state/minnesota/

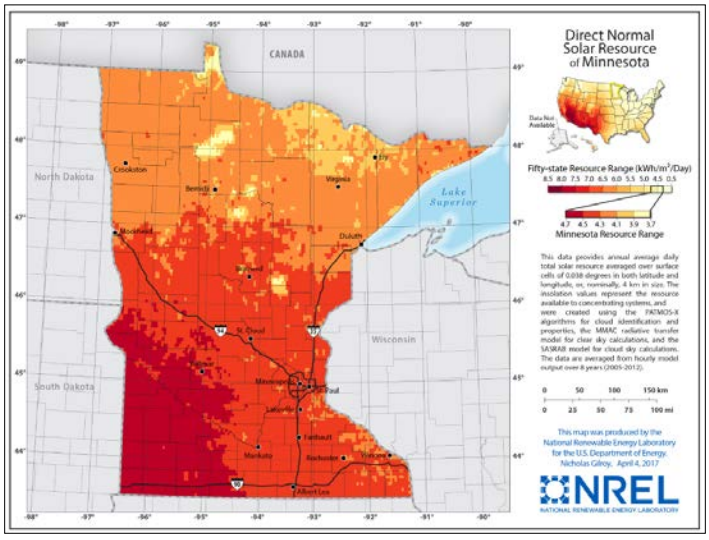
[2] A study by the Congressional Budget Office however suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles.

- American Wind Energy Association (AWEA): https://www.awea.org/resources/fact-sheets/state-facts-sheets
- National Renewable Energy Laboratory Biomass Maps: https://www.nrel.gov/gis/biomass.html
- The Rocky Mountain Institute, From Gas to Grid – Building Charging Infrastructure to Power Electric Vehicle Demand: https://rmi.org/wp-content/uploads/2017/10/RMI-From-Gas-To-Grid.pdf
- The GridWise Alliance, EVs - Driving Adoption, Capturing Benefits: http://gridwise.org/evs-driving-adoption-capturing-benefits/
- The Regulatory Assistance Project, Performance-Based Regulation: https://www.raponline.org/event/performance-based-regulation-the-power-of-outcomes-part-1/
- The Interstate Renewable Energy Council, A Playbook for Modernizing the Distribution Grid, Volume 1: https://irecusa.org/publications/a-playbook-for-modernizing-the-distribution-grid-volume-1/

MINNESOTA'S WIND AND SOLAR RESOURCES

WIND https://windexchange.energy.gov/states/mn





Our Resources

CNEE Homepage: https://cnee.colostate.edu/

The SPOT for Clean Energy: https://spotforcleanenergy.org/

The Advanced Energy Legislation (AEL) Tracker: https://www.aeltracker.org/

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