MINNPOST

How smart is alternative energy?

By Don Jacobson | 08/12/14

Illustration by Chris Winn

Minnesota is often hailed by environmentalists, government leaders and utility executives for its commitment to renewable energy—and for good reason: Among states with at least 4 million residents, Minnesota ranks No. 1 per capita in the generation and consumption of wind, solar and biomass energy.

The state's lead in switching to cleaner electrical production also is well timed, given President Barack Obama's recently issued plan for the nation's coal-fired power plants to reduce greenhouse gas emissions 30 percent by 2030. Minnesota touts one of the toughest "renewable portfolio standards" in the country and recently set a new, first-in-the-nation mandate to increase its use of solar power.

But will that progress pay off for Minnesota's economy as well as its air quality? Investing in new technologies is expensive, and new methods of producing power still generate far less output than a traditional natural gas or coal-fired power plant. As such, could it be that the state's focus on clean energy will inadvertently lock in higher electricity prices than those businesses can find elsewhere?

Clean energy is already leading to rate hikes in Minnesota. The state's largest electric utility, Xcel Energy, is seeking a $291 million, 10.4 percent rate over a two-year period ($192.7 million in 2014 and $98.5 million in 2015)—the largest percentage rate increase ever requested by the utility. If approved, it would be Xcel's sixth rate increase in eight years. More than 25 percent of this rate hike's second-year "step increase," or about $27.5 million, would go to offset the capital costs of a major acquisition of wind farms in Minnesota and North Dakota meant to help the utility meet its state-mandated goal of deriving at least 30 percent of its revenue from renewables by 2020.

While business leaders remain skeptical about the "true costs" of adding wind power capacity, Xcel (which already is the country's No. 1 wind-power producer) says the rate hike is a necessary capital investment in clean energy that will produce lower rates over time. The utility notes the costs of producing wind power have plummeted in comparison with those of fossil fuels, making for substantial fuel cost savings estimated at $225 million over 20 years, and allowing it to integrate a huge 750-megawatt wind-power addition while actually reducing base rates over the long haul.

Such savings appear to be fairly small, however. Xcel says that because of the added wind resources, average base rates would decrease a bit each year and by 2024 would be nearly 1.5-tenths of a cent per kilowatt-hour lower than today. Thus, 10 years from now an energy-intensive business such as a data center that consumes 870,000 kilowatt-hours of electricity in a year at an average of 6 cents per kWh (about $52,200 annually) would pay about $1,300 less per year. In the meantime, well over 2,200 gigawatt-hours of electricity produced from fossil fuel plants would be displaced, the utility says.

The long-term benefits to the state and its business community are real, clean energy advocates assert: In addition to reducing greenhouse gases, wind and solar energy serve as a hedge against the rising regulatory costs of coal and the price volatility of natural gas. The changes in the state's power generation techniques are no doubt costly; the goal, however, is to make such changes—required by regulations, laws and the need to decommission two nuclear power plants—as affordable as possible and in the end, keep electricity affordable.

Minnesota's lead

Obama's June announcement of his goal to cut greenhouse gas emissions from coal-fired power plants 30 percent by 2030 was met with predictions of economic shock, staggering job losses and higher power costs from some coal-dependent states.

Minnesota likewise is no stranger to coal-fired electricity: Some 46 percent of the state's supply comes from coal shipped in from Wyoming and Montana, much of which is burned at Xcel's enormous 2,400-megawatt Sherco plant in Becker. If the U.S. Environmental Protection Agency's "Clean Power Plan" ultimately is adopted, Minnesota could be required to reduce its carbon emissions by a hefty 40 percent over the next 16 years, certainly no small task.

Yet far from provoking the panic or outrage seen in some states, the president's bid to grapple with climate change was met with relative calm here. In fact, it is translating into the latest opportunity for state leaders and utilities to tout their clean energy advantages over competitors, as the center of gravity on energy issues shifts from a politically gridlocked Washington to state capitols.

RENEWABLE ELECTRICITY GENERATION PER CAPITA

State	Population (millions)	Gigawatt hours from renewable	Kilowatts
Minnesota	5.3	1,078	203.2
Colorado	5.0	661	131.4
Texas	25.1	3,197	127.4
Illinois	12.8	1,278	99.8
Washington	6.7	657	97.8
Indiana	6.5	478	73.8
California	37.3	2,520	67.7
Wisconsin	5.7	325	57.1
Michigan	9.9	538	54.5
Alabama	4.8	259	54.2

SOURCE: U.S. ENERGY INFORMATION AGENCY, NOV. 2013.

Making that point, the Clean Power Plan itself prominently cites Minnesota's Emissions Reduction Rider, a law that allows utilities to recover the costs of cleaning up or replacing existing coal-fired plants through incentives, as an example of how states can work with power producers to meet the new standards.

Minnesota has long envisioned a future with reduced coal-fired electricity generation. It already has one of the most aggressive "renewable portfolio standards" in the country—back in 2007, the Legislature mandated that Xcel Energy derive at least 30 percent of its sales from renewables by 2020, while other investor-owned utilities must meet a 25 percent standard by 2025. Xcel says it's on target not only to meet but exceed the standard.

The state has reason for optimism that it can tap wind, solar and biomass for a significant part of its power needs in a future with a reduced role for coal and the eventual retirement of its two nuclear power stations at Prairie Island and Monticello, whose licenses expire in the 2030s. According to the National Renewable Energy Laboratory, Minnesota has the 12th-best wind resource in the United States, with the potential to produce more than 489,000 megawatts at a height of 80 meters. By last year, the state was deriving 15.7 percent of its electricity from wind, the fourth-best in the country. Its 2,987 megawatts of installed capacity—enough to power 840,000 homes—ranks seventh nationally.

But perhaps most impressively, Twin Cities Business research shows that Minnesota is unique in its combination of large population and renewable energy use. Besides the state's top ranking in per-capita generation and consumption, Minnesota was the leader in generation, at 203.2 kilowatt-hours per capita as measured in November, easily outpacing second-place Colorado at 131.4 kilowatt-hours per capita.

By the per-capita measure, small-population states with significant installed wind resources, such as North Dakota (at 909.2 kilowatt-hours per capita) and Wyoming (821.4) are the national leaders. But nearly all of North Dakota's wind generation capacity is shipped to Minnesota, so if counted as part of Minnesota's totals, the state tops out at a whopping 314.5 kilowatt-hours of generation per capita.

Minnesota is also a healthy leader among big-population states in per-capita consumption of power generated from wind, solar and biomass, at 41.9 million Btu in 2012. If North Dakota's generation is added to the total, it bumps Minnesota's level up to 56.3 million Btu per capita, easily topping second-place Alabama's 36.9 million.

2,400
The number of 1-megawatt solar arrays over 12,000 acres needed to replace the coal-fired Sherco power plant.

1,000
The number of 2.4-megawatt wind turbines (over more than 800 acres) that would be necessary to replace the coal-fired Sherco power plant.

Wind power changes the landscape

Although the first state laws encouraging alternative energy and energy efficiency came way back the 1980s, most Minnesotans first noticed the march into alternative energy after 2007, when Gov. Tim Pawlenty signed into law what was then the country's strongest renewable energy standard, along with a commitment to reduce greenhouse gas emissions to 80 percent of 2005 levels by 2050. Some 5,000 megawatts of renewable energy will be needed to meet that standard.

Soon thereafter, electric utilities such as Xcel, Great River Energy and Minnesota Power began generating much higher levels of electricity from the wind turbine farms that are now so eye-catching, especially in southwestern Minnesota, where the 450-turbine Buffalo Ridge Wind Farm can generate up to 300 megawatts of power.

The quick ramp-up is indicative of a consensus about renewable energy in the state, according to Joe Sullivan, a regional policy manager for Wind on the Wires, a St. Paul-based wind power advocate for the construction of transmission lines to deliver the new energy to cities.

"Minnesota, in terms of the acceptance of renewable energy by the business community, utilities, regulators and political leaders, is very, very good," says Sullivan, a former lobbyist on power issues for rural Minnesota cities. "You see pockets of opposition here and there, but mostly everyone has internalized that renewables, while still a niche player, are a critical part of the overall energy system. Xcel, for instance, sees wind as a valuable part of its resource mix. They've internalized it into their culture."

Indeed, after initially resisting calls to diversify from coal and nuclear power in the 1980s, Minneapolis-based Northern States Power Co., now a subsidiary of Xcel, changed tack and sailed into

renewable waters. Now it touts its status as the No. 1 wind-power producer in the county. Dave Sparby, president and CEO of Xcel's NSP subsidiary, says the utility's roots in renewable energy go all the way back to its Wisconsin hydroelectric dams built at the turn of the 20th century.

"Providing clean energy is part of the mission of the company," he says. "Plus, we've just got the fact that Minnesota, together with some of the surrounding states, provides us with this great wind resource."

Cool cash or hot air?

Xcel took a big step last year when it received permission from the Public Utilities Commission to purchase 750 megawatts of wind power from projects near Windom and Austin, and two more in North Dakota —enough to power 310,000 homes while boosting the utility's Midwest wind capacity by more than 40 percent. All four are set to be in service by the end of next year.

The deal came at a time when the cost to produce alternative energy is plummeting: In 2011, electricity generated from large-scale wind farms was available for $30 per megawatt-hour compared with $61 to $87 per megawatt-hour from new natural-gas-fired power plants.

Since the state has no fossil fuel resources of its own, Minnesotans pay $13 billion annually for out-of-state and imported oil, coal and natural gas—almost equivalent to their entire yearly tax burden. Xcel's Sparby says that because of wind power's cost-effectiveness, the rate hike is a wise investment for Minnesota businesses.

Wind vs. Natural Gas

Cost per Megawatt Hour

Natural-gas-fired plant
$61 to $87

Wind generation
$30

Source: Lazard's levelized cost of Energy analysis, 2013

"For some, it's as simple as they believe it's the right thing to do," he says. "Other companies value renewable energy because their own customers want to do business with companies that have strong sustainable practices, including clean energy and energy conservation." State and local economic development officials, meanwhile, can use the utility's commitment to clean, renewable energy as a "competitive advantage of locating in this area," he says.

But electricity rate hikes are generally perceived by business as a negative, and the Minnesota Chamber of Commerce has its doubts that wind-power generation is as cost-efficient as advertised. In PUC testimony last year, the business group cited higher-than-anticipated costs with earlier Xcel wind projects and the new transmission lines needed, and is seeking ratepayer protections from cost overruns. The situation, the chamber said, is resulting in the "erosion of Minnesota's competitive electric rates."

The Minnesota Department of Commerce represents ratepayers before the PUC. Commerce Commissioner Mike Rothman says he's determined to keep energy costs affordable, even as the state encourages the implementation of clean energy, and in June recommended that Xcel's rate increase be pared down by 60 percent, from $291 million to $117 million. He says it's possible for the state to both capitalize on its prime position in renewable energy and to keep rates affordable. "We've been ahead of the curve and we need to stay ahead of the curve," he says.

As prices for renewables come down, Rothman says, the state needs to have policies and infrastructure in place to take advantage of its status. He cites Minnesota's selection as one of three states to participate in a National Governors Association program to encourage the growth of clean energy industries. Under that effort, funded by the federal government and a clean energy trade group, Minnesota will get help from a panoply of experts from across the country on how to develop and market its clean technology sector.

What motivates us? "In Minnesota, I think what has really been behind the effort to turn the corner from a fossil- fuel-dependent economy is that we grew up with a great environment," Rothman says. "We treasure our 15,000 lakes and our natural resources. We're really proud stewards of that."

Why solar is heating up

Solar energy has long played second (or even third) fiddle to wind power and biomass in Minnesota's alternative energy scene—after all, we're not Arizona or southern California. However, the state does receive 23 percent more sun on average than Germany, the world leader in the installation of photovoltaic (PV) panels.

The situation changed dramatically last year when the Legislature passed a new mandate on solar generation, as well as another measure meant to spawn a new era of "community solar gardens" across the state.

The state adopted a solar electricity standard of 1.5 percent of retail electricity sales by the end of 2020, a mandate limited to investor-owned utilities such as Xcel and Duluth-based Minnesota Power. The goal is to obtain 10 percent of the state's entire retail electricity sales from solar by 2030. Xcel says it will need about 300 megawatts of solar capacity to meet the requirement, and is considering a proposal from Edina-based Geronimo Energy to build large solar arrays on properties adjacent to Xcel substations.

At the same time, the Legislature adopted the solar garden measure, under which residents for the first time can receive credit on their electricity bills (for up to 25 years) by subscribing (for up to $1,000) to large solar arrays located away from their homes, to help increase the number of users .

In February, Minnesota Community Solar, a private company set up to develop such arrays, announced that its first Minneapolis solar installation—to be built atop Northern Sun Merchandising at 2916 E. Lake St.—was fully subscribed.

Xcel was directed to develop and administer a community solar plan to be approved by the PUC, but negotiations between the utility and developers on how the process will be administered are still being ironed out. An initial plan submitted by Xcel in March was rejected by the PUC a month later. In its ruling, the regulatory panel ordered the utility to make it easier for community solar gardens to succeed.

For instance, it rejected the utility's proposal to limit the development of the gardens to no more than 2.5 megawatts per quarter; required processing developer applications on a first-ready, first-served basis; required that subscribers' bills be credited at the full retail rate and that surplus credits roll over from month to month; and that the utility buy any unsubscribed energy produced by the community arrays.

Another sticking point was how the value of the solar energy produced is calculated. As part of the 2013 package, the Legislature passed a first-in-the-nation "value of solar" law, under which utilities are encouraged, but not required, to pay solar producers a credit based on a transparent formula that captures the "societal value" of solar production and emissions reductions rather than the going retail rate, which has been used in Minnesota since 1983 but has been criticized as an artificial cap on solar development.

After long negotiations, the PUC this spring developed a formula on how to determine the value of solar price, but Xcel wants to use the "applicable retail rate," a credit that is essentially a variation on the status quo.

"Neither price right now is probably high enough to make financing community solar gardens work," says John Farrell, an energy researcher for the Institute for Local Self-Reliance. "The law says we should be using value of solar for the community gardens, so the question now is whether we're going to follow through on that or not."

Can hydroelectric make a comeback?

The oldest form of renewable energy is hydroelectric power, generated from water rushing through power turbines at dams. Minnesota generated 561,000 megawatt-hours of electricity from 32 hydro generating stations in 2012, just 1.1 percent of Minnesota's total production, according to the National Hydropower Association.

There are very few large-scale opportunities remaining in the state to develop hydropower—the most viable sites have been tapped long ago, mainly in northern Minnesota early in the last century.

The use of hydropower to meet Minnesota's renewable energy standards has come mainly through importation of hydro from Canada. For instance, Duluth-based Minnesota Power this year applied for permission to build a 220-mile high-voltage transmission line across the Iron Range to supply electricity from a dam to be built by Manitoba Hydro along Canada's Nelson River.

Meanwhile, recent in-state ideas for increased hydropower have concentrated on setting up small-scale generation projects on underutilized and formerly decommissioned dams. For instance, in 1987 the firm North American Hydro retrofitted the decommissioned Byllesby Dam on the Cannon River in Dakota County to provide 2.2 megawatts (total capacity) of renewable energy.

But a similar proposal by Crown Hydro to establish a hydroelectric plant adjacent to St. Anthony Falls in Minneapolis has encountered fierce resistance from the city's park board since the company first obtained a federal license in 1999; it remains in limbo. City officials say the project could endanger significant public investments in transforming the historic downtown riverfront into a visitor attraction and magnet for housing, because water diverted to hydroelectricity could dry up the falls during hot summer days.

Though hydro will never amount to more than a drop in the bucket of the state's future clean energy production, the good news is that wind and solar are exiting the realm of theoretical solutions to become meaningful and relevant contributors to the state's energy mix. If cost issues can continue to be addressed, a state without a single fossil fuel resource may continue to lead the country in defining a sustainable energy future.

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