



# Renewable Electricity Mandates in Minnesota: Status and Impact

**John Bailey and David Morris**  
**Institute for Local Self-Reliance**

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Last year, the Minnesota legislature debated a proposal to establish a new statewide renewable electricity mandate. That debate will undoubtedly continue this session.

Most Minnesotans are unaware that a number of renewable electricity state mandates already exist, enacted either by the legislature or the Minnesota Public Utilities Commission (PUC).

This memo offers a brief overview of the existing renewable electricity mandates in Minnesota, and discusses the impact a proposed extension and expansion of these mandates might have. We invite comments and clarifications.<sup>1</sup>

In this analysis we assume all additional renewable electricity will be generated by wind, since very little biomass-generated electricity is planned between 2006-2015. We also assume a 2.5 percent annual increase in electricity consumption in Minnesota. Finally, we assume a 33 percent capacity factor for wind turbines.<sup>2</sup>

Under existing mandates, Xcel Energy, which sells about 50 percent of the state's electricity, must sell energy from about 1,730 MW of wind energy projects to its Minnesota customers by 2010. That represents an almost 1,000 MW increase over the 736 MW in operation or planned as of November 2005. Between 2010 and 2015 Xcel Energy must add another 766 MW of wind power.

If a mandate similar to the one proposed in the 2005 Minnesota legislative session were enacted, that is, for all utilities to generate 15 percent of their electricity from renewable resources by 2015 and 20 percent by 2020, Xcel would have to add an additional 686 MW in 2015 over its current mandate, and another 1050 MW between 2015 and 2020.<sup>3</sup>

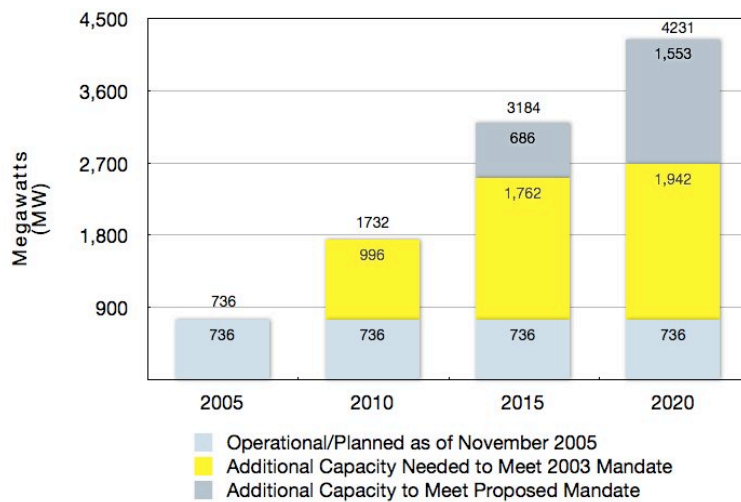
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<sup>1</sup> This memo is posted on our web site at <http://www.newrules.org/de/mnrenewable.html>. If revisions occur they will be noted. Corrections, comments and suggestions should be sent to John Bailey at [bailey@ilsr.org](mailto:bailey@ilsr.org). More information about C-BED is available at <http://www.c-bed.org/>. The percentage of C-BED projects would be higher if utilities were allowed to count non-wind, non-Minnesota renewable projects as part of their REO requirements.

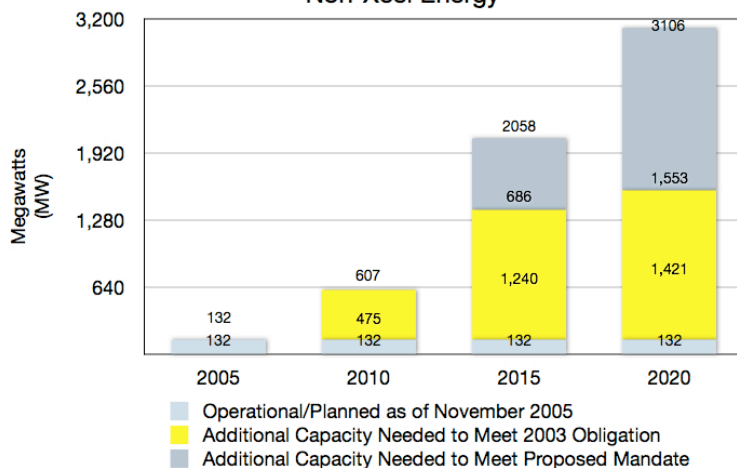
<sup>2</sup> To determine the electrical output of a given facility, multiply its rated capacity by the number of hours it will operate at that capacity during the year. The capacity factor for a coal-fired power plant is usually 60-80 percent while that of a wind turbine is usually 30-40 percent. A 1 MW wind turbine operating at 33 percent capacity factor will generate 1 MW\*.33\*8760 hours/yr = 2,891 MWhs/yr. A typical home uses 8 MWhs/yr.

<sup>3</sup> 2005 Renewable Energy Standard Legislation, S.F. No. 1687 - <http://www.revisor.leg.state.mn.us/bin/bldbill.php?bill=S1687.1&session=ls84>

### Wind Energy Needed to Meet Existing and Proposed Mandates: *Xcel Energy*



### Wind Energy Needed to Meet Existing and Proposed Mandates: *Non-Xcel Energy*



Under current law, Minnesota utilities other than Xcel Energy operate under a renewable energy “obligation” (REO) rather than a direct mandate. Under their existing obligation, they must sell an additional 475 MW of wind power by 2010 over the 132 MW operational or planned as of November 2005. From 2010 to 2015 they would have to increase their wind power sales by 765 MW.

To translate megawatts into turbines, we could assume that 1 turbine generates 1 MW. Thus under existing mandates, Xcel would have to add another 1,000 turbines by 2010 and 750 turbines more between 2010 and 2015. Other utilities would have to add 475 turbines between 2005 and 2010 and 633 turbines more over the next five years.

In the 1990s, Minnesota introduced a producer incentive for locally owned wind energy projects under 2 MW.<sup>4</sup> These 10-year incentive payments have spurred the development of at least 200 MW of locally owned wind power as of February 2006. The incentive program was quickly oversubscribed and in 2005 an innovative approach was passed by the legislature that would eliminate the need for state wind energy production incentives.

The new approach, known as the Community Based Energy Development (C-BED) tariff, provides a built-in incentive as part of power purchase contracts that wind developers sign with utilities. The “incentive” is in the form of front-loaded contracts – higher payments for wind energy in the first 10 years and lower payments in the final years of the contract. This allows developers to make money and pay off their capital costs within the first 10 years of their contract without the need for a 10-year, state-level production payment.<sup>5</sup>

<sup>4</sup> Minnesota Statutes §216C.41 Renewable energy production incentive.  
<http://www.revisor.leg.state.mn.us/stats/216C/41.html>

<sup>5</sup> Minnesota Statutes §216B.1612 <http://www.revisor.leg.state.mn.us/stats/216B/1612.html> The tariff must have a rate schedule that allows for a rate up to a 2.7 cents per kilowatt hour net present value rate over the 20-year life of the power purchase agreement. The tariff must provide for a rate that is higher in the first ten years of the power purchase agreement than in the last ten years. The discount rate required to calculate the net present value must be the utility's normal discount rate used for its other business purposes.

Utilities filed their proposed tariffs to the Minnesota Public Utilities Commission in December 2005. As of February, all are still under regulatory review.

According to the Department of Commerce and members of the wind industry, as of February 2006 over 300 MW of C-BED projects are under negotiation with Xcel Energy alone. Another 500 MW of C-BED are reportedly nearing the negotiation stage. It is expected that non-Xcel utilities will enter into C-BED negotiations and each utility will likely have some C-BED projects in its portfolio in the future.

Governor Pawlenty has expressed his hope that 800 MW of C-BED projects will be operational by 2010. Given that as much as 1,300 MW of such projects were proposed as of late 2005, this seems quite an achievable objective. It means that C-BED projects would represent the majority, perhaps the vast majority, of new wind projects.<sup>6</sup>

## Some History and the Existing Situation

- ▶ In 1994, the Minnesota legislature must Xcel Energy to acquire 425 MW of wind energy by the end of 2002. In 1999 the PUC ordered Xcel to acquire an additional 400 MW of wind energy by 2011.<sup>7</sup>
- ▶ In 2001, the legislature established a voluntary renewable energy objective (REO) for all electric utilities serving Minnesota customers.<sup>8</sup> By 2005, 1 percent of each utility's annual electricity sales was expected to come from renewable energy sources. The goal increases 1 percent per year to a minimum of 10 percent by 2015. Note that the 1994 law's goals were measured in terms of capacity (e.g. MW) while the 2001 and 2003 laws' goals are measured in terms of energy (e.g. MWhs).
- ▶ Legislation enacted in 2003 converted the voluntary REO into a mandate for Minnesota's largest utility, Xcel

## C-BED Features

C-BED projects may only be owned by a Minnesota resident, or a Minnesota limited liability corporation whose members are Minnesota residents, or a Minnesota nonprofit organization, or a Minnesota cooperative association other than a rural electric cooperative association or a generation and transmission cooperative, or a Minnesota political subdivision or local government other than a municipal electric utility or municipal power agency, or a tribal council.

A qualifying new C-BED project has the following characteristics: no single qualifying owner has more than 15 percent share of a C-BED project that consists of more than two turbines; or, for C-BED projects of one or two turbines, is owned entirely by one or more qualifying owners, with at least 51 percent of the total financial benefits over the life of the project flowing to qualifying owners; and has a resolution of support adopted by the county board of each county in which the project is to be located, or in the case of a project located within the boundaries of a reservation, the tribal council for that reservation.

<sup>6</sup> The percentage of C-BED projects would be higher if utilities were not allowed to count non-wind, non-Minnesota renewable projects as part of their REO requirements.

<sup>7</sup> The 1994 legislature also ordered Xcel to acquire 125 MW of biomass generated electricity by the end of 2002. That requirement was lowered to 110 MW in 2003. The biomass energy goal will likely be met by 2007. For further information on the biomass mandate see: Minnesota's Biomass Mandate: An Assessment, by David Morris, Institute for Local Self-Reliance, June 2005. <http://www.ilsr.org/biomass/mnbiomass.pdf>

<sup>8</sup> MN Sessions Laws 2001, Chapter 212, Article 8, Section 3 [S.F. 722]  
[http://www.revisor.leg.state.mn.us/bin/getpub.php?pubtype=SLAW\\_CHAP&year=2001&session\\_number=0&chapter=212](http://www.revisor.leg.state.mn.us/bin/getpub.php?pubtype=SLAW_CHAP&year=2001&session_number=0&chapter=212)  
The current version of the law is MN Statutes §216B.1691 – <http://www.revisor.leg.state.mn.us/stats/216B/1691.html>

Energy. Ten percent of Xcel Energy's retail sales must come from "eligible energy technologies"<sup>9</sup> by 2015. It must also acquire an additional 300 MW of wind energy (subject to conditions on size and ownership of projects). The REO proportion increases 1 percent per year, beginning in 2005 at 1 percent with the 10 percent goal required by 2015. Biomass energy (including RDF<sup>10</sup>) must contribute at least 1 percent of the REO energy by 2015.<sup>11</sup>

- ▶ In determining whether Xcel Energy has achieved its mandatory goals under the REO, all renewable energy mandated by the 1994 legislation or by order of the PUC prior to August 1, 2001 are excluded, as well as any hydropower projects above 60 MW, generation used to satisfy other renewable energy requirements/obligations, and renewable energy involved in green pricing programs.
- ▶ As of November 2005, about 610 MW of wind energy was operational in Minnesota. Another 100 MW was under construction. Another 160 MW was in the planning stages.<sup>12</sup> About 730 MW of the 870 MW of wind energy operational or planned is a result of Xcel Energy's 1994 and 1999 mandates. Electricity from these Xcel Energy wind projects cannot be counted toward the renewable energy totals required under the 2003 REO mandate.
- ▶ As of 2005, most utilities in the State had achieved their 2005 benchmark of 1 percent of their energy coming from eligible energy technologies. A few municipal utility associations have not.
- ▶ Xcel Energy currently generates nearly 2 percent of its electricity from "eligible energy technologies" without counting any wind energy resources. Xcel Energy has used its RDF facilities in Minnesota and Wisconsin and hydropower resources in Minnesota to satisfy its REO obligations.
- ▶ The existing mandate (and obligation) requires Minnesota utilities to generate about 2,340 MW of wind energy by 2010 and 3,870 by 2015. The new mandate would require Minnesota utilities to have about 2,340 MW of wind energy by 2010, 5,240 MW of wind by 2015 and add an additional 2,100 MW of wind between 2015 and 2020. This brings the total in 2020 to 7,340 MW, a twelve-fold increase from the wind power operational as of November 2005.
- ▶ At least two uncertainties exist regarding the amount of new renewable electricity that will actually have to be generated within Minnesota. The 2003 law allowed for the creation of a renewable energy credit trading system that is expected to cross state borders. The PUC will develop a formula for allocating how much renewable electricity generated by utilities outside the state but within their multi-state service territories can be counted toward the Minnesota REO.<sup>13</sup>

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<sup>9</sup> "Eligible energy technology" means: solar; wind; hydroelectric with a capacity of less than 60 megawatts; hydrogen, provided that after January 1, 2010, the hydrogen must be generated from the other resources listed here; or biomass, which includes an energy recovery facility used to capture the heat value of mixed municipal solid waste or refuse-derived fuel from mixed municipal solid waste as a primary fuel.

<sup>10</sup> Refuse Derived Fuel consists of shredded organic solid wastes.

<sup>11</sup> The biomass provision also applies to all other Minnesota utilities as part of their voluntary REO.

<sup>12</sup> American Wind Energy Association. <http://www.awea.org/projects/minnesota.html>

<sup>13</sup> MN Renewable Energy Objective Reports, Dept. of Commerce, January 15, 2005. Online at <http://www.state.mn.us/portal/mn/jsp/content.do?subchannel=-536881736&programid=536905966&sc3=null&sc2=-536887792&id=-536881351&agency=Commerce>

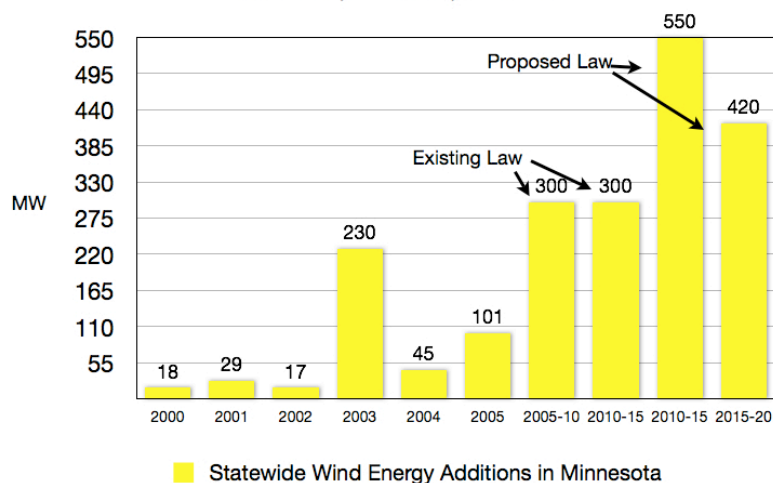
## Commentary

The preceding analysis leads us to several conclusions.

### **1. To build sufficient wind energy capacity rapidly enough to meet the existing or proposed mandates will require a much more aggressive effort than in the past.**

The chart below shows the actual annual additions of wind energy capacity in Minnesota from 2000 to 2005 and the annual additions that would be needed to meet the existing and proposed renewable energy mandates.

**Actual Wind Energy Additions in Minnesota: 2000-2005**  
**Annual Additions Required Under Existing and Proposed Mandates:**  
**2005-10; 2010-15; 2015-20**



The average annual increase during the 2000-2005 period was 75 MW. The peak increase was 230 MW, in 2003. To meet the existing goals of the REO, Minnesota utilities will need to add, on average, 300 MW per year between 2005 and 2015. This is 50 percent more than was installed in 2003 and three times more than was installed in 2005. If the proposed RES mandate is enacted, 550 MW of wind power will have to be installed each year from 2010 to 2015, almost three times more than was installed in the previous peak year.

Is this doable? Yes, but based on experience in Minnesota to date, there will have to be considerably more effort by project developers and utilities to put wind energy projects in the ground.<sup>14</sup>

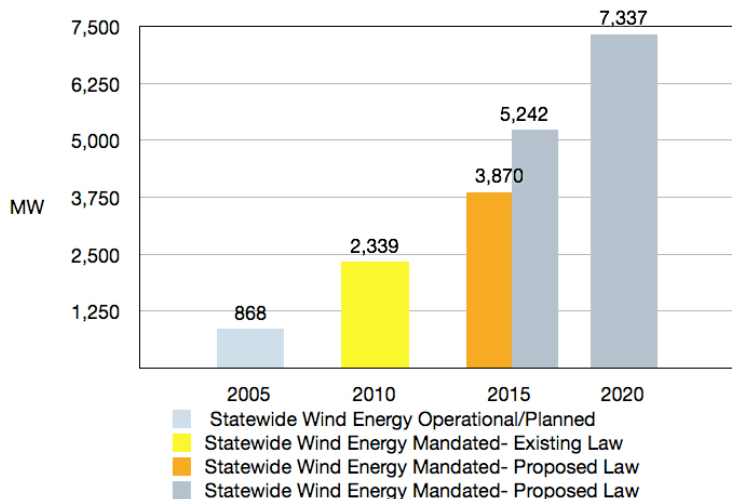
### **2. If anticipated C-BED projects materialize, Minnesota's renewable electricity program will be a locally-owned initiative, at least for the next 5 years.**

While a minimum amount of renewable electricity is mandated under Minnesota law, the law does not mandate that the electricity come from locally owned facilities. Nevertheless, at this moment it appears that locally owned, community-based wind energy projects will represent more than 60 percent of all new renewable electricity coming on-line between 2005 and 2010. This would mean that more than \$1.2 billion would be invested in locally owned wind projects in the next 5 years. For comparative purposes, this is more than has been invested in all farmer-owned ethanol refineries in Minnesota.

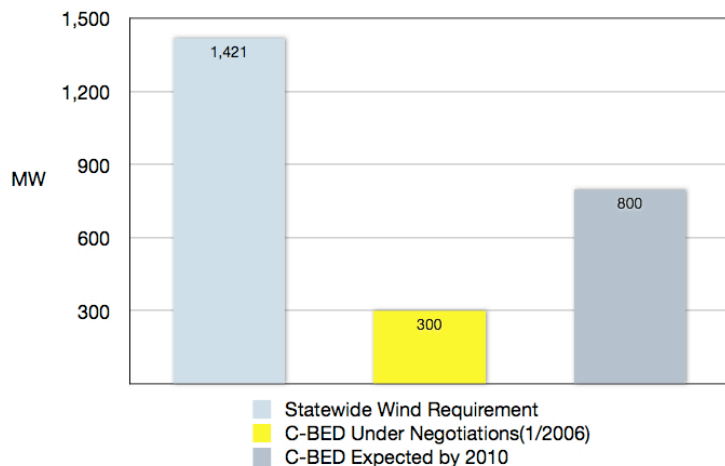
<sup>14</sup> Data for chart from American Wind Energy Association, <http://www.awea.org/projects/minnesota.html>

**3. Future wind energy projects will be much more widely dispersed geographically than existing installations and will provide important empirical evidence about how much additional wind power can be harnessed in Minnesota without building new high voltage transmission lines.**

**Statewide Wind Energy Output 2005-2020  
Required by Existing and Proposed Mandates**



**Minnesota Wind Energy Mandate and Anticipated  
C-BED Projects by 2010**



Existing wind installations are highly concentrated in a very small geographical area in southwestern Minnesota along the Buffalo Ridge. At present transmission capacity along Buffalo Ridge is severely constrained. It appears that virtually all the planned C-BED projects will be in other areas of Minnesota. Indeed, in its proposed C-BED tariff, Xcel Energy proposes, "In an effort to support the distribution of wind power projects throughout the state, we will look at project location to exclude projects located in Minnesota counties that have more than 150 MW of nameplate wind generation currently under sale to Xcel Energy. Transmission limitations in southwestern Minnesota lead us to restrict the amount of additional wind to be located in that area. At present we believe this will eliminate projects in Lincoln, Murray and Pipestone counties."

In the near term, new C-BED projects likely will connect to existing transmission networks. Studies are underway to examine the potential of the existing transmission system to absorb large amounts of wind energy across the state. The new C-BED projects, especially if, as expected, the total capacity exceeds 800 MW, will provide empirical information about whether Minnesota can meet its existing renewable electric mandates, or perhaps even its proposed mandates, without building new high voltage transmission lines.



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