

**COMMUNITY-OWNED WIND POWER DEVELOPMENT:
THE CHALLENGE OF APPLYING THE EUROPEAN MODEL IN THE UNITED STATES,
AND HOW STATES ARE ADDRESSING THAT CHALLENGE**

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Introduction

Traveling through the Danish countryside, one cannot help but notice the myriad large, utility-scale wind turbines that dot the landscape, either singly or in small clusters of several turbines. This is clearly wind power development on a different scale from what one typically encounters in the United States, where a single wind farm might stretch on for miles and be sited far from load centers. In fact, it is an altogether different type of wind development and ownership model than typically found in the US: most of those Danish wind turbines are owned by one or more local residents, rather than by commercial investors, independent power producers, or utilities. And Denmark is not unique in this regard; “community wind power” has also played a large role in Germany, Sweden, and, to a lesser extent, the Netherlands and the United Kingdom.

While US farmers interested in developing wind power on their land have for years looked with envy upon their northern European counterparts, local or “community” wind ownership has nevertheless been slow to catch on in the US. This is in large part due to fundamental differences in the way that European and US governments have supported wind power at the national level (Bolinger 2001). For example, whereas the German government has created a “user-friendly” guaranteed, stable, and profitable market for wind power through so-called “feed-in” laws, the US government has recently supported wind power primarily through the tax code, via 5-year accelerated depreciation and the federal production tax credit (PTC). In order to benefit from these tax-based incentives, a wind project owner must have a substantial amount of tax liability, which simply is not the case with most farmers or other individuals who might otherwise be interested in owning a small commercial wind project. Hence, wind project ownership in the US has, for the last decade or more, been primarily limited to corporate owners with large “appetites” for tax credits, who naturally prefer the economies of scale afforded by large wind projects.

Local farmers, towns, schools, and individual investors are, however, beginning to invest in wind power. With the help of state policy and clean energy fund support, new federal incentives, and creative local wind developers who have devised ownership structures that maximize the value of both state and federal support, community wind power is beginning to take a foothold in parts of the US, in particular the upper Midwest. The purpose of this report is to describe that foothold, as well as the state support that helped to create it.

There are a number of reasons why states are becoming increasingly interested in community wind power. In rural Midwestern states such as Minnesota, Wisconsin, Iowa, and Illinois, community wind is seen as a way to help supplement and stabilize farmer income, and thereby contribute to the preservation of farming communities and the rural landscapes and values they create. In the Northeast, densely populated states such as Massachusetts are turning to community-scale wind development to increase not only the amount of wind power on the grid, but also the public’s knowledge, perception, and acceptance of wind power. In still other areas – such as the Pacific Northwest, which is already home to several large wind farms – states are simply responding to strong interest from local constituents who see community wind power as a way to take responsibility for, and mitigate the environmental impact of, electricity generation.

But what exactly is “community wind power”? Definitions vary widely, ranging from behind-the-meter installations to the Danish wind “cooperatives” to wind projects owned by municipal

utilities. Possible defining criteria include: project size (small vs. large projects); purpose (to offset end-use power consumption vs. to sell power to the grid); ownership (single local vs. multiple local vs. municipal utility vs. commercial owners); and interconnection (behind the meter vs. to the distribution grid vs. to the transmission grid).

For the purposes of this report, “community wind” is defined as *locally owned utility-scale wind development*,¹ on either the customer or utility side of the meter. This definition accommodates projects of various sizes (e.g., ranging from single utility-scale turbine installations at Iowa schools all the way up to the 100 MW Trimont project in Minnesota), single or multiple local owners, and perhaps even municipal utilities. In this report, however, municipal utility projects will only be mentioned if specifically funded by a state clean energy fund.

Within the confines of this definition, this report first describes state support for, and the status of, community wind in the upper Midwest, including Minnesota, Wisconsin, Iowa, and Illinois. The focus then shifts to the Northeast, where Massachusetts and, to a lesser extent, New York have recently funded community wind initiatives. The report concludes in the western US by briefly describing community wind-related work just getting underway in Oregon and Washington, as well as a few isolated projects in California, Idaho, and on tribal lands.

Minnesota

A combination of favorable state policies specifically targeting “small” (defined throughout this section as 2 MW or less) wind projects, a good wind resource, a largely rural agrarian population, motivated local wind developers, and active and well-organized advocacy groups have made Minnesota both the birthplace *and* current hotbed of community wind power in the United States. More than 100 MW of community wind projects are currently selling power to the grid in Minnesota. This section begins by describing the most important drivers of community wind in Minnesota, including:²

- Xcel Energy’s wind mandate,
- Minnesota’s renewable energy objective,
- Xcel Energy’s small wind tariff and standardized power purchase agreement,
- Minnesota’s 10-year production incentive of 1.5¢/kWh,
- Xcel Energy’s Renewable Development Fund,
- Minnesota Department of Commerce grants, and,

¹ For new projects, we define “utility-scale” to mean projects consisting of one or more turbines of 600 kW (currently the smallest turbine size offered by the major wind turbine manufacturers) or greater in nameplate capacity. We recognize, however, that some of the projects described in this report (and in particular in Iowa) are more than five years old, and that utility-scale wind turbine sizes have increased rapidly in recent years. For these older projects, we will not strictly adhere to the 600 kW threshold. We define “locally-owned” to mean that one or more members of the local community have a significant direct financial stake in the project, other than through land lease payments, tax revenue, or other payments in lieu of taxes.

² Though not included among the major drivers of community wind in Minnesota, it is worth noting that wind turbines, as well as materials used to manufacture, construct, install, repair, or replace them, are exempt from Minnesota sales tax. Wind projects are also exempt from paying Minnesota property tax, though in 2002, a production tax was implemented in lieu of the property tax. For projects between 250 kW and 2 MW, the production tax is 0.012¢/kWh (amounting to \$630/year for a 2 MW project operating at a 30% capacity factor), but may be reduced or perhaps eliminated by local governments wishing to encourage wind development.

- USDA Farm Bill grants.

This section concludes with a discussion of the current status of community wind in Minnesota, along with brief descriptions of some of the ownership models being employed.

Xcel Energy's Wind Mandate

A significant driver of community wind development in Minnesota has been a growing legislative mandate that the state's largest utility, Xcel Energy (formerly known as Northern States Power), support the development of a certain amount of wind capacity in exchange for the ability to store nuclear waste at its Prairie Island nuclear facility. While only recent portions of this mandate are specifically set aside for small wind development, Xcel has been applying small wind purchases towards its overall mandate for several years now, making this an important driver for community wind.

The original 1994 mandate required Xcel to own or acquire power from 425 MW of wind capacity by the end of 2002 (Xcel met this goal, with 480 MW under contract at the end of 2002), and an additional 400 MW at the discretion and timeline of the Minnesota Public Utilities Commission (MPUC). In response to Xcel's 1998 integrated resource plan, the MPUC directed the company to acquire this additional 400 MW of wind by the end of 2012.

It soon became clear, however, that with transmission capacity between load centers and the wind-rich Buffalo Ridge area in the southwestern corner of the state already strained, meeting the 2012 mandate would require significant transmission upgrades. As a result (and through a multi-stakeholder effort), Xcel applied for, and in early 2003 the MPUC granted, a Certificate of Need to construct four new high-voltage transmission lines to the Buffalo Ridge area. At the same time, in order to prevent these new lines – which Xcel expected to complete in 2006 – from being underutilized until 2012, the MPUC moved the compliance date for the additional 400 MW of wind development forward by six years, to the end of 2006. More importantly for community wind, the MPUC also required that at least 60 of that 400 MW come from small, locally-owned, aggregated wind generation projects.

Xcel's wind mandate was increased yet again in May 2003, with an additional 300 MW of wind capacity required by 2010, this time in exchange for extended nuclear waste storage rights. Of this 300 MW, 100 MW must come from small wind projects of 2 MW or less (and that are *not* paid Minnesota's 1.5¢/kWh production incentive – more on this incentive below). With this latest addition, Xcel's aggregate wind mandate currently stands at 1,125 MW: 425 MW by 2002 (met), an additional 400 MW by 2006 (60 MW of which must be from two or more aggregations of projects that are 2 MW or less),³ and another 300 MW by 2010 (100 MW of which must be from projects of 2 MW or less).

Minnesota's Renewable Energy Objective

In 2001, the Minnesota legislature enacted a “renewable energy objective” for all utilities in the state. The objective, which utilities must make a *good faith effort* to meet, starts at 1% of retail sales from eligible renewables in 2005, and increases by 1% per year until reaching 10% in 2015.

³ Due to extended regulatory proceedings over the new transmission lines and the 60 MW of small wind required, it is possible that the deadline for this portion of the mandate will be extended by a year to the end of 2007.

Xcel's wind energy mandate, which at the time of enactment stood at 825 MW, may not be applied towards the objective.

In May 2003, the legislature amended the renewable energy objective to make it a *requirement* for Xcel Energy (while remaining an *objective* for all other utilities). Unlike its initial 825 MW wind mandate, however, the additional 300 MW of wind by 2010 that was added to Xcel's wind mandate in the same legislation (see previous section) can be applied towards the objective. Although Xcel is technically the only utility *required* to meet the objective, other Minnesota utilities appear to be making good faith efforts to comply.⁴

Xcel Energy's Small Wind Tariff and PPA

To facilitate its mandated purchase of wind generation from small wind projects (and at the direction of the MPUC), Xcel offers a standard "wind generation purchase agreement" as well as a "small distributed wind generation purchase tariff." The tariff is based on "the lowest offered market price of wind projects valued" by Xcel, and currently stands at a fixed nominal price of 3.3¢/kWh for up to twenty years. Standardized interconnection procedures and agreements are also being developed. These standardized purchase tariffs and agreements help to minimize transaction costs, which otherwise can be disproportionately damaging to small projects.

Minnesota's Production Incentive

A state cash production incentive of 1.5¢/kWh paid to small (2 MW or less) wind projects for the first 10 years of turbine operation has arguably been just as important as the combined impact of Xcel's wind mandate, small wind tariff, and standard purchase agreement in driving the development of community wind in Minnesota.⁵ Enacted in 1997, this incentive was originally financed through statutory appropriations from the state's general fund, and was limited to the first 100 MW of small wind capacity to apply. In May 2003, however, the legislature expanded the incentive to cover an additional 100 MW of small wind capacity, to be financed with \$4.5 million per year from Xcel Energy's Renewable Development Fund (more on this fund below).

In contrast to the initial 100 MW limit, which took more than five years to reach, the additional 100 MW was fully subscribed in *only six months*. Furthermore, as of late-January 2004, there were *more than 50 MW* of additional projects on a "waiting list" established at the time the program became fully subscribed in November 2003.⁶

While some have opined that the recent surge in reservations is attributable to a 2003 change in the legislation that made municipal utilities and electric cooperatives eligible for the incentive,

⁴ For example, the renewable energy objective was reportedly the primary motivation behind Great River Energy's 2003 solicitation for 100 MW of renewable energy by 2005. Great River selected the community-based 100 MW Trimont wind farm as the successful bidder; contract negotiations are ongoing.

⁵ Because the energy must be sold in order to qualify for this incentive, grid-supply projects have dominated the program. Net metered projects are eligible (there are currently around 40 net metered installations totaling 1.55 MW that receive the incentive), but the incentive is only paid on any net excess generation that is "sold" back to the utility, rendering it much less valuable than it is to grid-supply projects, whose entire output captures the incentive.

⁶ At present the only hope for wait-listed projects is that an approved project will forfeit its right to the incentive (projects not completed within 18 months of reserving the incentive risk losing their place in the queue), or that the incentive will eventually be extended to cover additional capacity (an extension would require new legislation).

the numbers do not support such a contention: municipal utilities account for only 8.9 MW of the total 200 MW (no electric cooperatives have participated).⁷

Perhaps a more likely explanation for the quick pace of reservations is that local developers have, in the past year or two, developed and implemented viable ownership structures (more on these structures below) that allow these small projects to capture not only the Minnesota production incentive, but also the federal production tax credit (PTC). With several highly publicized (and more importantly, replicable) examples of profitable “farmer-owned” wind projects now up and running, these developers have captured the rural public’s attention and imagination, pushing community wind development past a “tipping point” of sorts.⁸

Xcel Energy’s Renewable Development Fund

Also resulting from the 1994 Prairie Island legislation, Xcel’s Renewable Development Fund (RDF) benefits community wind power in at least two ways. First, to date the fund has released two solicitations – one in 2001, and another in late 2003 – seeking to fund innovative renewable energy projects. Among the winners of the first solicitation were a proposal involving three 1.8 MW wind projects with a community investment component, as well as a proposal for a 900 kW turbine to be sited behind the meter at the new Pipestone-Jasper School (Wiser 2002).⁹ Proposals for the second solicitation were due on March 16, 2004. To qualify for this second round, wind projects must be 2 MW or less in size, should demonstrate some “novel concept, approach, setting, or application,” and cannot also receive Minnesota’s 10-year 1.5¢/kWh production incentive (which should not be an issue, unless the production incentive is extended). Moreover, wind projects funded through RDF solicitations may not be applied towards Xcel’s initial 825 MW wind mandate, but can be counted towards the most recent 300 MW addition to the mandate, as well as Minnesota’s renewable energy obligation.

Second, in May 2003 the legislature nearly doubled the amount of Xcel’s annual contribution to the RDF, and at the same time required that \$6 million/year (through 2017) of RDF funds be used for renewable energy production incentives, \$4.5 million of which would be dedicated to small wind. This funding enabled the previously mentioned 100 MW extension of the 1.5¢/kWh production incentive.

⁷ In contrast to this recent broadening of eligibility to include municipal utilities and electric cooperatives, over the years eligibility rules have typically grown more restrictive. For example, for the first 2.5 years of the program, any wind project of 2 MW or less qualified for the incentive, regardless of who owned it. The rules were then amended to specify that only certain types of entities (e.g., farmers, non-profits, agricultural landowners) were eligible for the incentive.

⁸ Just as it did for larger projects, the scheduled expiration of the PTC at the end of 2003 no doubt also created some sense of urgency to complete any community wind projects that were in the development pipeline. Two-thirds of the projects that reserved Minnesota production incentives under the second 100 MW tranche, however, have not yet been built, and were likely too early in the development process to envision completion in 2003. Thus, the PTC’s expiration at the end of 2003 does not appear to have been the major cause of the rush to reserve production incentives.

⁹ The three 1.8 MW projects will reportedly be interconnected to different distribution substations in Southwest Minnesota, and will incorporate a community investment component allowing local citizens to earn a return on the projects without having turbines sited on their land. These three projects have not yet been built, but have secured Minnesota’s 10-year production incentive of 1.5¢/kWh, in addition to the RDF grant of \$900,000. The Pipestone-Jasper school project, which received an RDF grant of \$752,835, was ultimately down-sized to a 750 kW turbine installed in 2003.

Minnesota Department of Commerce Grants

In the fall of 2003, the Minnesota Department of Commerce State Energy Office made \$300,000 of oil overcharge funds available through a competitive solicitation to fund up to two community wind projects of at least 750 kW in size. The solicitation sought to geographically diversify wind development in the state by placing restrictions on where eligible projects could be sited. In early 2004, two projects were selected from a pool of eight applicants and awarded \$150,000 grants. The University of Minnesota-Morris West Central Research and Outreach Center plans to erect two 950 kW turbines, while a partnership between the Northfield school district and Carleton College will result in the installation of two contiguously sited, yet separately owned 1.65 MW turbines.¹⁰

USDA Farm Bill Grants

In August 2003 the United States Department of Agriculture (USDA) announced that it had awarded \$21.2 million in grants to 113 renewable energy and energy efficiency projects located in 24 states. The awards came from Section 9006 of the 2002 Farm Bill, the first farm bill ever to include an energy component.¹¹ Although these are federal – not state of Minnesota – grants, they are included here because Minnesota dominated the “large” wind category, capturing 16 of the 25 grants, or \$3.9 of the \$7.2 million awarded to “large” wind projects.¹² At least 14 of these projects also successfully reserved Minnesota’s 1.5¢/kWh 10-year production incentive before it was fully subscribed in November 2003.

Results

In combination, the many policies, programs, and incentives described above should eventually lead to *at least 460 MW* of “community wind” in Minnesota:¹³

- 200 MW of small wind projects (i.e., projects that are, at least nominally, 2 MW or less in size¹⁴) that receive the 1.5¢/kWh production incentive;

¹⁰ The partnership hopes to capitalize on the economies of scale from a shared site, yet each turbine will be separately owned and interconnected because the college and school district are two distinct entities (and so that each project might qualify for the state’s 1.5¢/kWh production incentive for wind projects of 2 MW or less). Both projects plan to sell their output to Xcel under the small wind tariff.

¹¹ Due to time constraints, the fiscal year 2003 Farm Bill funding was made available through a one-time Notice of Funding Availability, which provided up to \$23 million in grants to enable agricultural producers or rural small businesses to purchase renewable energy systems or improve their energy efficiency. Grants were limited to 25% of eligible project costs (with a maximum grant of \$500,000), and the applicant was required to demonstrate financial need. Section 9006 has again been fully funded with \$23 million for fiscal year 2004, and the USDA is currently working to develop a proposed regulation that will outline how Section 9006 funding will be administered not only this year, but also in future years. Information on Section 9006 can be found at www.rurdev.usda.gov/rbs/farmbill/index.html, and Windustry also provides Farm Bill information at www.windustry.com/resources/farmbill.htm.

¹² Few of these projects are truly “large” by today’s standards; most involve only one or two turbines. The label “large” is simply intended to differentiate these utility-scale projects from much smaller (e.g., 10 kW) wind projects that were also funded under Section 9006. The remaining nine large wind grants were distributed among seven states, including Iowa (2 grants), Idaho (1), Illinois (2), Massachusetts (1), New York (1), Texas (1), and Virginia (1). A few of these other grants are mentioned later.

¹³ Not all of this capacity strictly meets our definition of community wind (e.g., see footnotes 15 and 17).

¹⁴ In some instances, what would otherwise be considered a much larger project (based on contiguous turbine siting, and/or related ownership) has been legally sub-divided into a number of smaller projects of 2 MW less in order to capture the Minnesota production incentive. While the incentive legislation contains provisions to guard against this

- an additional 60 MW of aggregated small projects by 2006 (or more realistically, 2007) as part of Xcel’s transmission upgrade;
- another 100 MW of small projects by 2010 as part of Xcel’s wind mandate; and
- the 100 MW Trimont project, which Great River Energy plans to apply towards Minnesota’s renewable energy objective.

As of late January 2004, roughly 132 MW of this 460 MW had been built, and at least another 68 MW was likely (presuming imminent extension of the federal PTC) to come online before mid-2005 under Minnesota’s production incentive (which requires that projects be built within 18 months after reserving the incentive).

While many, but not all, of the projects that have been built are locally owned (and therefore fit within our definition of “community wind”), only a few of them are owned by multiple local investors who each purchase one or more shares in the project (i.e., the “multiple local owner” or “European” model). The majority of the rest of the projects are financed either through traditional commercial avenues,¹⁵ individual personal wealth,¹⁶ or what is known as a “flip” structure, whereby a tax-motivated corporate investor passively owns most or all of the project for the first 10 years, and then “flips” the ownership of the project to the local investor(s) thereafter.¹⁷

Of these various ownership structures, commercially financed projects do not conform to our definition of community wind, while projects financed through individual personal wealth (which *do* qualify as community wind under our definition) represent a model that is most likely not widely replicable. That leaves the “multiple local owner” and “flip” structures, which are the most interesting from a community wind perspective, since they enable local individuals to participate in the ownership of a commercial wind project without undue capital outlay. Both of these structures will be briefly discussed below.

But first, any discussion of community wind ownership structures needs to be placed in the context of federal support for wind power, which, as mentioned in the introduction to this report, has come primarily from the production tax credit (PTC), as well as 5-year accelerated

sort of gaming, developers and project owners have devised a number of creative ways to effectively bypass such provisions while remaining within the letter of the law.

¹⁵ For example, Northern Alternative Energy packaged together and financed approximately 30 MW of small wind projects in Minnesota with \$25 million in debt from the now-defunct ABB Energy Capital. ENEL North America, a subsidiary of the large Italian utility, owns a majority stake in the projects.

¹⁶ For example, Garwin McNeilus is a wealthy Minnesotan who has reportedly used his savings to develop and own at least 19 wind projects (totaling 34.5 MW) that have been funded by the Minnesota production incentive to date. McNeilus donates a portion of the proceeds from at least six of these projects to organizations that provide support for underprivileged children in developing countries around the world.

¹⁷ The relative proportions of the various financing/ownership structures employed among the 132 MW of projects that have been built under Minnesota’s production incentive to date are roughly as follows: commercial (40%), individual personal wealth (26%), flip (22%), municipal utilities (7%), multiple local owners (3%), and school projects (<1%). Including the additional 68 MW of projects in the queue (i.e., to get to the 200 MW total), the relative proportions shift to roughly 29%, 17%, 39%, 4%, 8%, and 2%, respectively, reflecting a likely increase in “flips” and projects financed by multiple local owners. Note that only those projects financed through individual personal wealth, flips, multiple local owners, and schools fit within our definition of community wind; such projects total roughly 52% of the 132 MW of built capacity, and roughly 65% of the total 200 MW.

depreciation. Obviously, these tax-based incentives are only available to project owners with tax liability, a fact that handicaps ownership structures involving non-taxable entities such as cooperatives or non-profits. While there is another federal incentive – the Renewable Energy Production Incentive, or REPI – intended to provide a similar amount of value as the PTC to non-taxable entities, funding for the REPI is limited and subject to annual congressional appropriations (as opposed to the PTC, which requires no cash outlay and is guaranteed for 10 years), rendering it of significantly less worth than the PTC.¹⁸ Furthermore, even if non-taxable entities are able to capture the REPI, they still cannot benefit from accelerated depreciation.

In part as a result of these federal incentives, the “wind cooperatives” that one typically associates with northern Europe are not a financially attractive model in the United States.¹⁹ A more promising vehicle appears to be a limited liability corporation (LLC), which combines the single taxation of a partnership (i.e., income from the LLC is reported solely on the individual investors’ tax returns) with the limited liability of a corporation, and is also sufficiently flexible to serve as an investment vehicle organized according to cooperative principles. In this way, an LLC can offer many of the benefits of a cooperative, without the associated restrictions.

While the LLC vehicle is readily available, the investors that form the LLC must still have tax appetite in order to benefit from the PTC and accelerated depreciation. In fact, if investment in a community wind LLC is considered a *passive* investment (as it presumably would be for most investors not involved in the day-to-day management of the project), then the investor must have other *passive* forms of income (e.g., rental income, but *not* interest and dividend income) against which to claim the PTC. This passive/active distinction further limits the universe of potential community wind investors, and has given rise to at least two innovative community wind ownership structures in Minnesota: (1) an LLC comprised of multiple local investors, each with sufficient passive tax appetite (i.e., the “multiple local owner” model mentioned above), and (2) an LLC comprised of a single local investor (e.g., a farmer) with insufficient tax appetite, and a tax-motivated corporate investor who effectively owns the project (at least financially) during the period of tax benefits (i.e., the first ten years), and then surrenders financial control to the local investor thereafter (i.e., the “flip” structure mentioned above).

At present, the only working examples of the first model – an LLC comprised of multiple local investors with sufficient passive tax appetite – are the Minwind I & II projects (see Windustry 2002). Each project consists of two turbines totaling 1.9 MW, so as to qualify for Minnesota’s 1.5¢/kWh production incentive. The two projects reportedly cost a total of \$3.6 million, 70% of which was financed through loans from a local bank, while the remaining 30% was raised through the sale of project shares (at \$5,000/share). The LLC agreement specifies that 85% of each project’s shares must be farmer-owned, and no single person can own more than 15% of a

¹⁸ It should be noted that both the federal PTC and the REPI expired in 2003. The wind industry, however, expects that both incentives will be reauthorized in the near future.

¹⁹ In fact, despite their reputation as such, very few European community wind projects are legally organized as cooperatives. Most Danish community wind projects, for example, are structured as partnerships (Bolinger 2001). Besides the tax issue, another hurdle relating to cooperatives involves the concept of “patronage” – i.e., cooperative members benefit based on how much they *use* the cooperative, rather than how much they have *invested* in it. Unless investment in a community wind project can somehow be tied to use of the wind power – which is challenging given the nature of electricity and how it is delivered over the grid – it is difficult to document patronage.

project's shares. The equity required to finance both projects (i.e., ~\$1.1 million) was reportedly raised from among 66 investors in just 12 days, with each investor cognizant of the passive income limitations on the PTC and investing accordingly. With the federal PTC, Minnesota's production incentive, and a 15-year power purchase agreement with Alliant Energy, Minwind investors can reportedly expect to earn an average annual return of 17% over the project's life. Interest in the first two Minwind projects was so strong that there are currently seven additional 1.65 MW projects – Minwind III-IX – in development. Each of these seven projects will receive the Minnesota production incentive, as well as a USDA grant of \$178,201.

In part because they require far less coordination than the Minwind model,²⁰ “flip” structures are relatively more common in Minnesota. Pioneered by local developer Dan Juhl, the flip structure is, in some ways, tailor-made to fit within the legal requirements of the state's 1.5¢/kWh production incentive. For example, during the first 10 years of the project, the farmer owns (at least in a financial sense) as little as 1% of the project, yet retains 51% voting rights in order to comply with a legislative requirement that the project be at least 51% owned by certain entities (tax-motivated corporate equity investors not necessarily among them) in order to qualify for the incentive. During this initial 10-year period, the only income the farmer earns from the project is a small “management fee,” calculated as some percentage of the project's gross revenue. The tax-motivated corporate equity investor, meanwhile, benefits from the PTC, accelerated depreciation, power sales revenue, and Minnesota's production incentive (less O&M expense and debt service). Once the equity investor has met its return hurdle – typically at the end of year 10, when the PTC ends – ownership in the project flips and the equity investor drops out of the project, leaving the local farmer with a debt-free wind project. Roughly 30 MW of small wind projects in Minnesota have been financed in this manner to date, with many more such projects in development.

In addition to the Minwind and flip models, there are two other “ownership” structures evolving in Minnesota that deserve mention. The first involves ownership by a school district, where the project is financed through either a loan or a municipal bond issuance, and sells power to Xcel under the small wind tariff. The Northfield school district is currently pursuing this model.²¹

The second relates to the proposed 100 MW Trimont wind project, which was conceived by an LLC consisting of 45 local landowners and investors who undertook most of the pre-development. Recently, the local LLC has brought in a subsidiary of PPM Energy to develop, construct, own, and operate the project for the duration of its lifetime. This transfer of control did not occur through a sale, however. Instead, the local investors have effectively granted the project to PPM in exchange for a secured interest in the project's success (i.e., a percentage of

²⁰ While “flips” have typically involved a single farmer or farm family, a number of unrelated farmers could conceivably form an LLC and bring in a tax-motivated investor to flip the project to them. There are two possible reasons for going this route. First, spreading out the local investment in this manner would reduce each farmer's capital contribution (and risk). Second, it could be that a group of farmers may collectively have some passive income, but not enough to fully utilize the tax benefits of the project, in which case the tax-motivated investor would make up the difference (i.e., a hybrid between a Minwind-style LLC and a flip structure).

²¹ While Carleton College plans to install a 1.65 MW wind turbine at the same site as Northfield's proposed installation, Carleton will pay cash for its turbine (out of its endowment), which may not be a widely replicable model. As mentioned earlier, the Pipestone-Jasper school district also has a wind turbine, though nearly all of that project was financed through a grant from Xcel's RDF.

gross revenue). If all goes well, this arrangement will prove to be more lucrative to the local investors than an outright sale would have been. This emerging model, which combines the economies of scale from a large project, the credibility and expertise of a large wind developer, and community “owners” who can deliver community acceptance of the project (along with associated transmission development), is reportedly garnering much attention in the Midwest.

Wisconsin

Community wind is just beginning to take root in Wisconsin, which lacks not only the superior wind resource of its neighbor to the west, but also the broad range of policies and incentives supporting smaller wind projects in Minnesota.

In 2003, *Wisconsin Focus on Energy* (the state’s clean energy fund) funded Cooperative Development Services of Madison to develop, with assistance from a group of stakeholders, a generic and replicable business plan for community wind projects in Wisconsin. The resulting “Wisconsin Community Based Windpower Project Business Plan” is a thoroughly researched and detailed reference document describing a variation on the “flip” structures employed in Minnesota.

In the proposed model, a group of local investors with limited or no tax appetite pool enough capital (through sales of \$5,000 shares) into an LLC to cover 20% of the total costs of a 3 MW wind project. The LLC “loans” this amount to a tax-motivated corporate investor, who in turn contributes another 30% of total project costs in the form of equity, and borrows the remaining 50% from a commercial lender, resulting in a debt/equity ratio of 70%/30% for the project as a whole. The corporate investor owns the project for the first ten years and benefits from the federal PTC and accelerated depreciation, as well as revenue from the sale of power and tradable renewable certificates (assumed to provide 3.5¢/kWh and 1.0¢/kWh, respectively). At the same time, it services the project’s debt, repaying the entire 10-year commercial loan, as well as interest – but not principal – on the loan from the local LLC.²² At the end of the tenth year, with its minimum return hurdle met, the corporate investor simply drops out of the project, retaining the LLC’s loan principal as payment for the turbine. At this point, the local LLC assumes ownership of the project, which is now free of debt, and therefore quite profitable.

This structure differs from the flip structures most commonly employed in Minnesota in two ways. First, the local LLC is comprised of a group of local investors, rather than a single farmer. Second, the local LLC’s capital contribution is structured as a loan, and the income it receives over the first 10 years therefore comes in the form of interest rather than a project management fee.

Accompanying financial analysis (as amended by the author) of the Wisconsin model reveals that, even with no state incentives and reasonable cost and revenue assumptions, the corporation’s after-tax internal rate of return (IRR) is roughly 14%, while the LLC investor can expect around 8% (pre-tax). Such returns may be sufficient to attract both types of investors. With the business plan recently completed, the stakeholder group continues to meet and is now

²² These limited, though steady, interest payments provide the sole source of income to the local LLC over the initial 10-year period of corporate ownership.

focusing its efforts on marketing and outreach activities, in the hopes of identifying a local champion to put the plan into action.

Meanwhile, independently of the business plan, two privately but locally-owned utility-scale wind projects have secured all necessary permits, and are now awaiting extension of the federal PTC before signing power purchase agreements. Eden Renewable Energy LLC plans to build two 1.65 MW turbines in the town of Eden, while Addison Wind Energy LLC envisions building a single 1.65 MW turbine on a portion of the site of FPL Energy's formerly proposed 30 MW wind project.²³ Both projects are modeled after the "flip" structures used in Minnesota, where an outside tax-motivated equity investor owns most or all of the project for the first ten years, and then turns the project over to a local owner.

Iowa

Community wind projects in Iowa have been dominated by utility-scale behind-the-meter installations, primarily at public schools. Currently, eight schools host ten wind turbines ranging in size from 50 kW up to 750 kW, with a combined capacity of 3.6 MW. In addition to Iowa's strong wind resource, two main factors have historically converged to create a favorable environment for this particular model.²⁴

First, Iowa's 1993 statewide net metering (called "net billing" in Iowa) law is unusual in that it does not specify a limit on the size of eligible generators. While legal challenges from the state's investor-owned utilities have resulted in recent changes to net billing practices (more on this below), at least historically, the lack of a size limit has enabled the use of utility-scale wind turbines in net metered applications. Excess generation (i.e., generation that exceeds current load) has historically been "banked" with the utility, and if not used by the end of the month, sold to the utility at its avoided cost. In conjunction with single-part tariffs (i.e., just an energy charge, with no separate demand or standby charges) for many non-residential customers,²⁵ net billing has historically enabled schools and other medium to large end-users to essentially eliminate their monthly electricity bills, resulting in savings of roughly 8¢/kWh (the retail rate) for all generation up to total consumption, and revenue of 2¢/kWh (the utility's avoided cost) for

²³ FPL abandoned its Addison project in early 2001 following considerable local turmoil that paralyzed town government and ultimately culminated in the town of Addison's decision to impose onerous setback requirements on each turbine.

²⁴ It should be noted that the environment is favorable not only to wind at schools, but also to wind at private commercial facilities. There are, however, only a few utility-scale wind turbines sited at commercial facilities in Iowa: Schafer Systems, Inc. installed a 225 kW wind turbine behind the meter in 1995, while the Story County Hospital installed a 250 kW turbine in 1993 (in addition, a radio station and a truckstop each host 65 kW wind turbines).

²⁵ A two-part tariff that includes a demand (i.e., per maximum kW) charge as well as an energy (i.e., per kWh) charge would reduce the attractiveness of a behind-the-meter wind project, unless the diurnal and seasonal wind production profile closely matched the customer's load profile (i.e., unless the wind power consistently reduced not only the customer's energy consumption, but also maximum demand). While such a tight match between production and load is unlikely to occur in most cases, even if it did exist, standby charges (i.e., charges based on any shortfall of actual demand below contractual demand) might then apply. For these reasons, an intermittent generator such as a wind turbine will fare best in a behind-the-meter application under a single-part tariff based solely on energy consumption (and not demand). It is not uncommon for commercial and industrial customers in Iowa to have the choice of either a single- or two-part tariff.

any net excess generation. In addition, net excess generation at schools has historically earned the federal REPI, which stood at 1.8¢/kWh before expiring in late 2003.

Second, in many cases turbine owners need not produce any up-front cash, making wind projects a budget-neutral (or even budget-positive) investment. Iowa's Alternate Energy Revolving Loan Program (AERLP) enables customers served by investor-owned utilities to borrow *the full cost* of a wind turbine project at attractive interest rates. The AERLP, which was created in 1996 and funded with a total of \$5.9 million through a 3-year surcharge on the in-state electricity sales of Iowa's investor-owned utilities, will provide half of the required loan (up to \$250,000) *at 0% interest* for terms not exceeding 20 years. The AERLP requires that the remainder of the loan (i.e., half or more of total financing) come from a private lending institution of the applicant's choice, thereby ensuring that the project passes not only technical due diligence (performed by the AERLP), but also financial due diligence (performed by the private lending institution). If the applicant is a public or non-profit entity, it can satisfy the AERLP's private lending requirement by working with the Iowa Energy Bank, which operates under the Department of Natural Resources to help qualifying energy projects negotiate low interest loans through private lenders.

The end result is that Iowa schools have been able to borrow up to \$800,000 to completely finance the installation of a utility-scale (e.g., 750 kW) wind turbine at blended interest rates of just 3-4%. In combination with net billing, this low rate of interest has in some cases created immediate positive cash flow, allowing loans to be repaid in just 4-6 years (Windustry 2003, ICLEI, Wind 2003). Five of the eight school districts with wind turbines have financed their projects in this manner.²⁶

While attractive loan programs and net billing policies have made Iowa fertile ground for school-based wind development in the past, the outlook for this type of development going forward is less rosy. In late 2001, MidAmerican – the state's largest utility – reached a settlement with stakeholders over its multi-year legal challenge to Iowa's net billing law. The settlement included limiting the capacity from net-metered generators to 500 kW,²⁷ and rolling any net excess generation (from the 500 kW net metered portion of a project) forward indefinitely from month to month, with no obligation to ever pay for it. In early 2002, the Iowa Utilities Board granted MidAmerican a waiver implementing these changes. The state's other major utility – Interstate Power & Light Company (IP&L) – received a similar waiver in January 2004.

With the 500 kW net billing size limit now in place, making the economics of a school-based wind turbine work is likely to become more of a challenge. Presuming that the utility will not be willing to pay much for power in excess of 500 kW, it will most likely be in a school's best interest to install a turbine sized under this threshold. There are, however, very few utility-scale turbines being built in this size range (100-500 kW) today. Moreover, smaller turbines typically

²⁶ Two of the remaining three school districts installed their turbines prior to the inception of the AERLP, while the third district received its two wind turbines from a local benefactor.

²⁷ Importantly, the 500 kW limit specifies the maximum amount of *capacity* that will be net metered at any one location, and does not limit the maximum size of the *generator* to be net metered. In other words, a customer that installs a 750 kW wind turbine can still be on a net metering tariff, but only the first 500 kW of power from the turbine will be net metered (any excess power will be sold to MidAmerican through standard or PURPA contracts).

cost more per kW (and per kWh) than larger turbines, and are therefore less economical. On the positive side, less capital is required to finance a smaller turbine, meaning that a larger proportion of the total loan can be financed at 0% interest through the AERLP.

Illinois

The Illinois Clean Energy Community Foundation (ILCECF) has supported two community wind projects to date. In 2002, the ILCECF awarded a \$20,000 grant to the Bureau Valley School District to undertake a \$25,000 wind project feasibility study. With the completed study confirming feasibility, in 2003 the ILCECF followed this seed grant with a \$331,678 construction grant to build a 750 kW wind turbine on school property. This grant represents roughly 35% of the estimated cost of building the project. The turbine will be installed behind the meter, where it will offset current load and sell any excess power to Illinois Power at its avoided costs. With extension of the federal PTC not crucial to this public sector project, the district is planning for a summer 2004 completion. This project also responded to the Illinois Renewable Energy Resources Program's (RERP) December 2003 solicitation for grant funding, and is awaiting word on that front.

Also in 2003, the ILCECF awarded \$175,000, in the form of an advance purchase of ten years' worth of tradable renewable certificates (TRCs), to a 1.65 MW wind project to be owned by the Illinois Rural Electric Cooperative. The award was structured in this manner because the ILCECF is only able to award *grants* to federally recognized tax-exempt charitable and educational organizations, or state and local governmental entities, but can *purchase* TRCs or other services from other types of entities (including electric cooperatives). The ILCECF plans to retire the TRCs, and the cooperative will simply sell the wind power to cooperative members as part of the supply mix. In addition to ILCECF support, this project has also received a Section 9006 Farm Bill grant of \$438,544, plus a \$250,000 grant from the Illinois RERP's December 2003 solicitation for small renewable projects. Thus, in aggregate, this project has received \$863,544 in up-front funding – enough to pay for roughly half of total project costs.

Listed among its 2004 funding priorities, the ILCECF includes “Policy development and demonstration projects to support growth in community- and utility-scale wind or solar power generation.” The first round of grant applications were due in mid-January, and from that pool of applicants it is likely that the ILCECF will fund a three-year statewide wind resource monitoring project with the ability to monitor 16 sites per year (i.e., 48 sites total), and targeting locations where communities have expressed interest in wind development. The ILCECF also hopes to award additional construction grants to one or more community wind projects in 2004.

Massachusetts

In September 2003, the Massachusetts Technology Collaborative (MTC), which administers the state's Renewable Energy Trust Fund, launched a \$4 million “Community Wind Collaborative” (“the collaborative”). The collaborative was conceived out of the sharp contrast between the highly publicized debate over the proposed 420 MW offshore Cape Wind project, and the tremendous community support for Hull Municipal Light's single 660 kW turbine on the rim of Boston Harbor. Notwithstanding the potential merits of the Cape Wind project, in a state (and

region) that has to date experienced very little wind power development, projects of the scale seen at Hull provide a less divisive introduction to modern utility-scale wind power. Yet such small projects are often not sufficiently lucrative to attract the interest of a typical commercial wind project developer. Seeking to fill this gap, MTC launched the community wind collaborative to provide pre-development and development services for such projects, with the goal of not only increasing the capacity of wind power in the state, but at the same time nurturing a positive perception of wind power throughout local communities statewide.

Any city or town in Massachusetts with a sufficient wind resource is eligible to participate in the collaborative.²⁸ MTC has developed (through TrueWind Solutions) detailed wind resource maps for each of the state's 351 cities and towns, upon which it has overlaid other maps showing all municipal- and state-owned property. Those cities or towns that have class 4 or higher wind resources on publicly-owned land – i.e., 119 of the state's 351 municipalities – are considered prime candidates for participation in the collaborative.²⁹

MTC has identified seven phases of development that it will support through the collaborative:

- 1) Project conceptualization and site identification,
- 2) Wind measurement and monitoring,
- 3) Feasibility analysis (both technical and economic),
- 4) Public outreach and feedback,
- 5) Project financing,
- 6) Project construction, and
- 7) Project operation and maintenance.

At present, MTC will provide – at no cost to the local community – technical expertise and resources to help eligible cities and towns proceed through the first four phases. To that end, in late December 2003 MTC released a “Request for Proposals from Technical Consultants” to establish a pool of qualified consultants able to assist MTC and communities in carrying out the pre-development and development activities embedded in phases 1-4. Responses to the RFP were due in late February 2004.

If, after completing phase 4, a wind project proves to be feasible and the community is interested in proceeding, MTC will support development phases 5-7 primarily through its Preferred Partner Program, which will offer communities access to bundled equipment, construction, and extended O&M packages at favorable prices (and low transaction costs). A solicitation for preferred partners is forthcoming in the near future.³⁰

²⁸ MTC may also work with municipal light plants (i.e., municipal utilities) such as Hull, though likely at a lower level of engagement and support, since municipal utilities do not pay into the Renewable Energy Trust Fund.

²⁹ Communities with class 3 wind resources will also be considered, though MTC notes that the estimated economics of class 3 projects border on being prohibitive. MTC hopes that communities with insufficient wind resources to develop their own local projects will consider partnering with other communities that do develop projects, either as partial investors (e.g., through an LLC arrangement) or as long-term buyers of power and/or tradable renewable certificates.

³⁰ As currently planned, this solicitation will not offer financial incentives to entice preferred partner participation. Instead, preferred partners are expected to benefit from having access to a captive market. For example, for wind turbines in excess of 500 kW, MTC envisions contracting with a single preferred partner that will then have the market more or less all to itself.

While participation in the collaborative is limited to municipalities, MTC does not rule out the possibility that a municipality may bring in a private entity to develop and own the project. For example, rather than finance and own the project itself, a municipality could decide to proceed through phases 5-7 by: (1) allowing a limited liability company (LLC) to finance the project through the sale of shares to the local community (e.g., the Minwind model, described under Minnesota); or perhaps even (2) allowing a private wind developer/owner to construct and own the project. Hence, while the focus on phases 1-4 is on municipalities and publicly owned land, it is not a foregone conclusion that projects developed through the collaborative will be municipal-owned (though, until the federal PTC is re-authorized, tax-free municipal financing will be hard to beat).

MTC envisions that the collaborative will result in projects that sell power to the grid, as well as those sited behind the meter.³¹ Both types of projects present their own economic challenges. If the past is any indication of future trends, grid supply projects may have difficulty finding creditworthy long-term purchasers of power and tradable renewable certificates (TRCs), and may have to instead rely on shorter term contracts or other forms of long-term price support such as MTC's Green Power Partnership Program.³² Behind-the-meter installations, meanwhile, will likely not receive the benefits of net metering (which is limited to 60 kW in Massachusetts), and may even face standby charges.³³ Furthermore, because suitable project sites are likely to be relatively scarce in Massachusetts, MTC hopes that behind-the-meter projects will utilize as large of a turbine as is technically feasible, even if it means that a substantial fraction of total generation is fed back into the grid at spot market prices. Because it is not driven by economic considerations, this "over-build" strategy will likely hurt the economics of a behind-the-meter installation.

Although the collaborative has only been operative for a few months, it has made good progress to date. Forty communities have expressed interest in the collaborative and are at various stages of project development. Wind monitoring (i.e., phase 2 of the 7-phase development process), conducted by the University of Massachusetts' Renewable Energy Resource Laboratory, is already underway in six communities, and an additional four meteorological towers will be installed by June 2004. A pool of technical consultants should be on retainer by the end of March to begin feasibility analyses and outreach (phases 3 and 4), and MTC anticipates that three feasibility studies will be underway by July 2004. Finally, the preferred partnership solicitation (applicable to phases 5-7) will be issued shortly.

³¹ For example, a number of communities are specifically looking to co-site wind projects with municipal waste water treatment facilities or water pumping and treatment projects.

³² For more information on this program, which provides price risk insurance to project developers, see Fitzgerald et al. (2003).

³³ NSTAR, one of the state's largest investor-owned utilities serving communities in eastern Massachusetts and wind-rich Cape Cod, has recently filed for approval of a standby tariff. MTC is hoping to negotiate an exemption for municipalities with renewable generation.

New York

In the fall of 2003, the New York State Energy Research and Development Authority (NYSERDA) released Program Opportunity Notice Number 796 (PON 796), “Financial Assistance for Communities to Facilitate Wind Power Plant Projects.” PON 796 made a total of \$250,000 available (via up to five \$50,000 co-funded grants) to public or municipal entities to undertake “local initiatives that will increase community knowledge of wind power and create favorable conditions for the development of wind power facilities in the affected community within a reasonable time frame.” Eligible activities included (but were not limited to) one or more of the following: “(1) identifying and creating zones where wind development is encouraged as an acceptable land use; (2) organizing land owners on promising tracts of land for the purpose of negotiating land use rights; (3) organizing community-based wind power cooperatives; (4) educating the public about wind development; and (5) assessing wind resources.”

The third activity listed above – organizing community-based wind power cooperatives – relates specifically to community wind as defined in this report. It is apparent from the other eligible activities listed, however, that the primary purpose of PON 796 was to prepare communities for the onslaught of commercial wind development likely to result from New York’s impending renewables portfolio standard (RPS),³⁴ rather than to specifically foster community wind development as defined here. Nevertheless, one of the proposals submitted to NYSERDA did incorporate some development work aimed at creating a wind power cooperative. This proposal, along with one other, are currently being pursued by NYSERDA, which also plans to develop a more top-down approach to providing technical wind-related assistance to communities in the future.

Western United States

There are a number of community wind-related efforts or individual projects either planned or underway in the Northwest and California.

Oregon and Washington

There are not yet any community wind projects in Oregon or Washington, but that is changing.³⁵ The Energy Trust of Oregon (Energy Trust) indicates that it plans to roll out a program to support community wind development later this year, while several other groups have joined forces to explore how to better support this form of wind power development. Working cooperatively, the Energy Trust, A World Institute for Sustainable Humanity, and Washington State’s Department of Community, Trade and Economic Development are commissioning a set of analyses to guide local investment. The Energy Trust intends to use the results to guide

³⁴ For example, there are approximately 800 MW of wind projects currently in the New York ISO’s interconnection queue.

³⁵ For example, a group of 23 landowners known as the Summit Ridge Landowners Group has received a USDA value-added product market development grant of \$85,900 to conduct a feasibility study and develop a business plan for developing a utility-scale wind project on their land. Also, although it is below the size threshold used to define community wind in this report, *Our Wind Coop* is a Northwest-based program to support, through various financial arrangements, the installation of 10 kW net-metered wind turbines on farms and ranches in the Northwest. For more information, see www.ourwind.org.

program development. First steps include better defining local economic benefits; identifying regional market barriers and the lessons learned from efforts in other states; and commissioning an integrated analysis of the ownership structures and related business models that one might employ for a community wind project. Business models and ownership structures that will be examined include cooperatives, LLCs (with and without tax appetite), behind-the-meter installations, aggregate net metering, and town-owned projects. These structures will be evaluated on a relative basis, both qualitatively and through financial modeling, to determine which models, if any, make sense in Oregon and Washington, and how much financial support might be required. This work is just getting underway, and will be completed by summer 2004.

California

The Palmdale Water District plans to install a wind turbine as large as 1 MW behind the meter at its water treatment plant on Lake Palmdale. This project will take advantage of California's generous 1 MW size limit on net metered projects, as well as the California Public Utility Commission's Self Generation Program, which will pay 50% of the project's total cost. After a somewhat contentious permitting process, the District board approved the project in October 2003.

Idaho

In Idaho, the Schwendiman family plans to build a 3 MW wind project (two 1.5 MW turbines) on its ranchlands, and has received a \$500,000 USDA Section 9006 grant towards one of the turbines. Power from this privately owned project would reportedly be sold to Utah Power, a subsidiary of Pacificorp.

Tribal Turbines

A number of utility-scale wind projects are either on line or in development on Native American tribal lands in Idaho, Montana, and North and South Dakota.³⁶ The largest and most recent project to come on line is the 750 kW turbine at the Rosebud Sioux Reservation (in South Dakota), which began generating power in February 2003. This behind-the-meter project was financed through a combination of a DOE grant, a USDA loan, and an advance purchase of the project's tradable renewable certificates (TRCs) by NativeEnergy, a green power marketer in Vermont that is re-selling the Rosebud TRCs to individual and corporate buyers across the United States.

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³⁶ For more information on tribal wind projects, see www.eere.energy.gov/windpoweringamerica/native_american_case_studies.html.

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