Locally-Owned Wind Energy Feasibility Project

Final Report

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Summary

The purpose of the project was to determine the feasibility of farmer-initiated and owned wind energy developments in Minnesota. The project was done in collaboration with the Sustainable Energy for Economic Development project (SEED) and was carried out by staff of the Cooperative Development Services, the Minnesota Project, and the Union of Concerned Scientists.

The project included direct work with farmers in three areas of the state and in-depth research to determine the feasibility of their specific project interests. The project began with three outreach meetings, one in southwest Minnesota, one in the southeast and one in the northwestern part of the state. Full feasibility studies resulted for a 12 MW wind project on the Buffalo Ridge in southwest Minnesota and for 3 small, sub-40kw projects in southeast Minnesota.

The study found that the 12 MW wind project was feasible if certain criteria were met. The sub 40 kw projects were, at best, only marginally financially feasible on the identified sites.

One of the key research questions involved the appropriate legal structure for farmer-owned wind businesses. A Minnesota law passed in 1995 provided production incentive payments to small wind project of 2 MW or less owned by individuals or agricultural cooperatives. The law is important because farmers and other small investors do not have tax liabilities large enough to take full advantage of the federal tax credits offered for wind development. Research conducted through this project found that in most cases, a cooperative is an inappropriate legal structure for a wind business. Limited liability corporations (LLCs) and limited liability partnerships (LLP) were identified as two business forms that could be structured to accommodate local ownership, equitable decision-making and no taxation at the corporate level.

In addition, the project identified a number of opportunities and barriers to locally-owned wind development and identified next steps in making such projects possible.

Background on Wind Energy in Minnesota

The February issue of the Danish Windpower Monthly magazine says that "Minnesota has, for the meantime at least, become the centre of the US wind industry." The state is blessed with the combination of excellent wind resources, utilities that are buying wind power, an active environmental advocacy community, and an environmentally-aware public. At a time when development is stagnating in other parts of the United States due to uncertainty about the future shape of the electric utility industry, wind projects are being developed here.

Why the Interest in Local Ownership of Wind Projects

The SEED project, the vehicle for much of the renewable energy advocacy work being done in Minnesota, has the two goals of increasing the amount of renewable electricity generated in the state and encouraging rural economic development from renewables.

Advocates here have looked to northern Europe for possible windpower development models. Much of the wind power development there is being done in small clusters of wind turbines by cooperatives of farmers who own the windy land. Many Minnesota wind energy advocates, rural economic development professionals and farmers have long eyed this model with interest. Wouldn't wind development in rural Minnesota owned by farmers, business people and others who live in windy areas, keep more profits circulating in the local economy, they reasoned.

A 1996 study of the economic impacts of wind development in southwest Minnesota done by the Southwest Regional Development Commission confirmed this presumption. The study documented the benefits of local ownership to the local economy. Local investors would retain the return on investment and energy sales profits in the local economy, creating between 25 and 150 more jobs and adding $700,000 to $4.3 million in additional value added, over a large corporate wind farm model.

Minnesota lawmakers have shared the belief that rural areas in the state would benefit more from smaller, locally-owned wind projects, and have put a number of provisions in place over the years that support it. For example, wind projects under 2 MW are exempt from local property tax, and projects under 5 MW are exempt from state siting review, needing only local approval. Wind projects are also eligible for financing from several small agricultural loan programs. Finally, the Minnesota legislature had appropriated funding to the Sustainable Resources Center, another SEED partner, for a wind energy curriculum directed to farmers.

With these policy supports in place, it remained to see whether specific projects would be feasible, and what barriers, if any, remained to these smaller, locally-owned wind developments.

Background on the Project

The project had its roots in three renewable energy conferences held in rural Minnesota in the fall of 1995 and early winter of 1996. Over 150 local landowners, economic development professionals, state and local officials, and others attended the Wind Across the Prairie conference held in southwest Minnesota. Another 90 attended a similar conference held in southeastern Minnesota, and about 80 attended one in the

northwestern part of the state. The potential for local ownership of wind developments was discussed at each conference, and EG Nadeau of Cooperative Development Services spoke on the subject in southwest and northwest Minnesota. About 75 interested people in total signed up as interested in further pursuing the idea of local wind projects.

Based on that high level of interest, Cooperative Development Services and the Minnesota Project secured funding from the McKnight Foundation to work further with these groups of farmers and other local residents to develop actual feasibility studies for locally-owned wind projects in each region of the state. Mike Tennis with Union of Concerned Scientists provided invaluable technical assistance to the project.

Outcome in Southwest Minnesota

After several meetings, a group of ten interested farm families and a local economic development professional coalesced. All lived or owned land near Lake Benton, on the north end of the Buffalo Ridge. The Buffalo Ridge, a 1800-1900 foot elevation ridge cutting diagonally across the southwest corner of the state, is the windiest area in Minnesota. Several large-scale wind farms are currently under development in the area. Many of the farmers are well informed about wind, having sold wind easements to wind developers or to Northern States Power Company (NSP), the utility buying the power from the wind projects.

The group was interested in developing a wind project, with the intent of selling power to NSP. NSP is mandated to develop 425 MW of wind energy through a 1994 agreement with the Minnesota legislature. While NSP is going out to bid for most of its windpower acquisitions, it negotiates for power from projects under 12 MW outside of the bid process. The farmers discussed projects of various sizes, but preferred to study a project as close to 12 MW as possible to maximize the wind potential of their land.

The feasibility study was completed for a 12 MW wind project. The feasibility study shows that the project, as proposed, is feasible providing certain conditions are met. The most important conditions are price paid for the power and interest rate. The farmers were interested in continuing to pursue windpower development and at the conclusion of the project, they were in the process of interviewing developers, with the intention of partnering with a wind developer to put together one or several wind projects.

The study was ultimately completed using a traditional model of landowners receiving royalty payments in exchange for use of their land rather than being equity owners of the wind project. This was because of the many barriers to small investors as equity partners. Chief among them was the discovery that the Minnesota production payment could not be used for the project as the law was written at the time of the study. The law has since been amended to increase availability. Additional barriers are discussed below in a later section.

Outcome in Southeast Minnesota

A group of seven interested farmers and landowners attended an initial meeting held in southeast Minnesota. They were primarily interested in small-scale, sub 40 kw, wind turbines to generate power for use on the farm or homestead. In general, southeast Minnesota does not have high enough wind speeds for commercial wind development.

Three of the families were interested enough to carry through on preliminary feasibility studies based on their sites. The wind projects were not economical or were only marginally financially feasible in each case. All sites produced losses or were about break-even propositions over a 20 year period. None of the three families were interested in going forward at this time based on the results of the analysis of wind speeds and economics of their land.

Outcome in Northwest Minnesota

An initial meeting in Detroit Lakes, in northwest Minnesota was poorly attended, in part because of the excellent haying weather in the region that day. The representative of the Farmers Union and Board member of the area Resource Conservation and Development district who did attend believed that farmers in the region were not well educated about wind development. No wind development has taken place in the area yet, though there are parts of the region with high enough wind speeds for commercial development. Some wind monitoring has been done, but the results have been private and not widely disseminated. With the area utilities expressing no interest in wind, it is not surprising that farmers have not thought much about how they might "harvest the wind."

The group in attendance believed that the best course of action would be to work with rural electric cooperatives to encourage investment in windpower. The group pointed out that since the cooperatives are member-owned, they will respond to the interest of members.
Project researchers agreed with those attending the meeting that the first step in the region would need to be advocacy work with utilities to create a market for windpower, farmer-owned or otherwise. In the absence of an interested group of farmers, no feasibility study was done in northwest Minnesota.

Appropriate Legal Structure for Farmer-Owned Wind Businesses

In Minnesota and perhaps elsewhere, when people talk about the idea of wind businesses owned by farmers or other local investors, they commonly talk about wind cooperatives. There has been a cooperative renaissance of sorts in the upper Midwest in the past twenty years, and farmers are members of many different value-added agricultural cooperatives. They value the principles of democratic control and benefits tied to usage that are central to cooperatives. Plus, the Danish models of farmer-owned wind projects are cooperatives. Finally, cooperatives have the advantage that profits are not taxed at the corporate level.

We now understand that an agricultural cooperative is an unlikely, if not impossible, legal structure. There are some serious limitations on the use of a cooperative legal

structure for a wind business. In the context of developing the feasibility studies, we consulted with co-op attorneys, Dave Swanson, with Doherty Rumble and Butler, George Benson with McDermott Will and Emery, and William O'Connor with Beren, Rosenberg and O'Connor and with a co-op CPA, Ed Hahn with Clifton Gunderson LLC. All of them made the same similar assessment(s).

Here is why. Cooperatives are based on member patronage. In a consumer cooperative, members buy goods or services from the cooperative. In a marketing cooperative, members bring a product to the cooperative which is then pooled with others' and sold. There is no simple way to measure patronage in the most likely wind businesses in Minnesota. The most likely scenario is that farmers and other investors in southwestern or northwestern Minnesota pool money, build a wind turbine, and sell the power to NSP. Since the farmers don't buy power from NSP, there are no directly traceable goods or services bought from or sold to the wind business by members and thus no straightforward way to calculate patronage.

The lawyers and CPA suggested that there are other situations where a cooperative could work. For instance a number of farmers who each owned a wind turbine, could form a cooperative to market the power. Unfortunately, this is unlikely because of the high capital cost of wind turbines. The wind businesses envisioned by most involve farmers pooling their resources.

A second possible co-op scenario is similar to that used in Denmark. If the power from the wind turbines is sold to the same utility from which the members buy power, then patronage could be assigned based on each member's electric usage. Investment in the wind cooperative could be limited to some multiple of a member's actual electric usage. Unfortunately, this scenario is also unlikely in Minnesota since farmers buy their power from rural electric cooperatives, but the most likely wind power market is NSP. Using this approach would probably require an amendment to Minnesota's cooperative statutes allowing for wind cooperative patronage to be calculated on the basis of electric supply and usage across the power grid rather than on the basis of buying and selling from specific companies.

Of course, an existing rural electric cooperative could own and operate wind turbines or buy wind power for sale to its members. Also, an existing agricultural cooperative, say an ethanol cooperative, could purchase a wind turbine, but revenues from the sale of the power would most likely not be tax-exempt.

Our advisors suggested that limited liability companies or a limited liability partnerships were two good alternatives to the cooperative legal structure. Both offer the same tax benefits -- no income tax at the corporate level -- and both can be run democratically by a one member one vote model. However, there may also be other appropriate business structures for locally-owned wind companies.

Overall Assessment - Opportunities for Locally-Owned Wind Energy Projects

- Wind resources
  The upper Midwest, including Minnesota, has some of the best wind resources in the United States. The Union of Concerned Scientists in the study, Powering the Midwest, was one of the first to pinpoint the Buffalo Ridge as the best Minnesota wind resource area. The area also has excellent access to transmission lines. As a result, the first utility scale wind development is being done on the Ridge, first in Lincoln County and then in Pipestone County. There is also potential for commercial wind development further south along the Ridge in Murray and Nobles Counties. Wind resource assessment by the MN Department of Public Service and research by UCS show good wind resources in much of the southwest and western parts of the state. There appears to be potential for at least some commercial development in parts of northwest Minnesota where good wind speeds are matched with close power line access.
- Utility Markets Exist
  In addition to excellent wind resources, the state has utilities that are developing wind power. With utilities buying electricity from wind, small developers can hope to sell power at more than the avoided cost mandated by PURPA, making it possible to contemplate exploring wind development.

  Most of the activity is the result of the legislative mandate that Northern States Power company develop 425 MW of wind energy as a part of the agreement allowing the company to store spent radioactive fuel in above ground casks at its Prairie Island nuclear plant. The company has 25 MW now in operation, another 100 MW under contract with groundbreaking planned in the spring of 1997. Bids have closed on the second 100 MW. The legislative mandate requires the final 200 MW to be operational by 2002. An additional 400 MW is mandated if wind power is shown to be the least-cost option.

  NSP is procuring the majority of the windpower through a competitive bidding process, 100 MW at a time. This process has only been accessible to large, experienced wind energy companies because of the pre-development work required and the high capital costs of large projects. The fact that NSP is also accepting proposals on projects smaller than 12 MW on a negotiated basis presents opportunities for smaller wind developers. The company has adopted this expedited process, with the approval of the Public Utilities Commission, to allow smaller projects and smaller developers to participate in the wind development.

  Other state utilities have voluntarily expressed some interest in windpower as well. Dakota Electric, a rural electric cooperative, has submitted a proposal to the Public Utilities Commission to sell wind power to its customers on a "green pricing" basis. Power would be provided by Cooperative Power, the generation cooperative. To date, 10 of the 17 CP members are planning on offering the power to their customers. CP will be buying power from a wind developer. Since rural electric cooperatives are member-owned, farmers may have additional leverage when trying to sell to them.

The municipal utilities are also tentatively exploring windpower options. The Minnesota Municipal Utility Association, in cooperation with the Izaak Walton League Midwest Office, is in the midst of a study of wind energy, "Wind on the Wires." The study is building on a windpower feasibility study done by the Iowa municipal utility association. The Minnesota study is examining both technical concerns of bringing intermittent wind power on line and looking at innovative ways of financing that could encourage local investment in the projects.

In addition, large farm operations, businesses or public buildings could be markets for windpower.

- Farmers are Interested
  A 1995 survey done by the Minnesota Project and the Clean Water Fund found significant support for wind energy development and much interest in owning wind energy. Of the 435 surveys sent to farmers in western Minnesota and eastern South and North Dakota, 149 were returned. Over 98% of respondents favored wind development. In addition, 92% believed that renewable energy development could be a significant part of rural economic development. Seventy-two percent of respondents said that they are or might be interested in forming a wind energy cooperative or owning their own on-farm wind turbine.
- Minnesota Law Supports Local Ownership
  - Net Billing Provisions - Ready markets exist for electricity from very small, sub-40 kw, wind projects because Minnesota law contains a net billing provision that requires utilities to buy back power from these projects at retail rate. This provision allows farmers, homeowners, and small businesses to use the electricity grid like a battery system, balancing out times the wind mill is generating unneeded electricity with times it is not running.
  - Production Payment - As of 1996, Minnesota law contained a provision giving a 1.5 cent per kwh production payment wind projects that are 2 MW or smaller and are owned by individuals or cooperatives that are 51% owned by people living in the same county as the wind project or in a contiguous county. The rational for the payment is that farmers and other small investors are not able to use the federal tax credit because their tax liability is not large enough. The state subsidy levels the playing field for small investors. Research done in the context of this project discovered that cooperatives would only rarely be an appropriate legal structure for a wind business.

    This law was revised in the 1997 legislative session to open eligibility to projects owned by individuals, Minnesota small businesses, nonprofits, and Indian tribes.

  - Property Tax Exemption - Minnesota law exempts wind projects that are 2 MW or smaller from county and local property taxes in order to encourage these small, farmer or locally-owned projects.

    - Other SEED Initiatives - The SEED Coalition was successful in several other legislative initiatives in 1997 designed to help encourage small wind projects. They include sales tax exemption for wind turbines, wind equipment, and photvoltaics, a pilot loan program for farmers, and requiring a standard power purchase contract for small projects.
- Possible Local Capital
  The Southwest Regional Development Commission study of the economic impact of wind development in southwest Minnesota included interviews with area bankers. The study reports that area bankers were generally positive about dispersed wind development in the region. Further, area banks could handle $200,000,000 in dispersed generation projects over a five year time span. However, bankers also expressed an interest in results of a pilot project, which would give them more information about project costs and operations.
- Information and Education Available
  There is an excellent information resource available to farmers. One of the SEED partner organizations, the Sustainable Resources Center, has developed a wind curriculum called Windustry TM aimed at farmers who are interested in learning more about harvesting the wind. The curriculum was developed with funding from the Legislative Committee on Minnesota Resources. A first training session held in January was attended by 40 rural educators, extension agents, vo-tech instructors and rural economic development professionals who will be offering the class around the state. The first class was offered in Pipestone in April and was attended by several farmers involved in the feasibility study.

  There are several other fairly new resources also available. The Izaak Walton League has a short book titled Landowner's Guide to Wind Energy, which describes wind development options for owners of windy land. In addition, the Minnesota Extension service has several new wind energy fact sheets and the Minnesota Department of Agriculture has a new fact sheet for owners of CRP land.

Barriers to Locally Owned Wind Projects

- Getting the Policy Supports Right
  The first critical barrier is getting the policy supports right. There was much confusion about the Minnesota production payment -- whether cooperatives were an appropriate legal structure and how the state Department of Public Service planned on administering the program. This made it extremely difficult for people considering using the subsidy to decide how to proceed. A critical question remains about whether a wind project could receive both the state production payment and the federal tax credit. The SEED Coalition believes that the policies now being worked on (sales tax exemption, loan program, and simplified power purchase contract) will be important steps forward. However, additional policy research will likely be needed to assess the impact of these new policies, and to research and develop others.

- Difficulty Raising Local Equity
  Barriers to raising local capital for a wind project proved to be significant, so significant that it did not make sense to structure the project with local equity in the feasibility study. The first barrier proved to be that wind projects provide a return on investment primarily in the form of tax credits and tax write-offs. One wind developer gave the example that for one of their projects, the equity partner has a rate of return of roughly 18% after taxes and 0 - 3% before taxes. Using the federal tax credit wind projects are an investment that is only suitable for people or companies with large tax liabilities. The Minnesota production payment will help to make wind projects an investment that a small investor could consider.

  A number of other problems with raising local capital were also raised over the course of this project. First, it is much more time consuming, and possibly more costly, to raise large amounts of money a few dollars at a time from small investors than in one lump sum from a large equity investor or venture capital.

  Second, it was repeatedly pointed out that many projects are competing for farmer's investment dollars in southwest Minnesota. Ethanol projects, large hog projects, and other value-added cooperatives all depend on farmer equity. Most of these are businesses that are quite familiar to farmers. Wind energy, on the other hand, is new, is risky, and has had few actual successes in the region. Almost all of the wind projects there have been troubled in some way, ranging from technical problems to outright bankruptcy.

  Since most farmers, at least those on the more marginal land of the Buffalo Ridge, are not wealthy, most people we worked with thought that raising local equity might be hard at this point. Many felt that one or two really successful wind projects in the region would make it easier.

- Difficulty in Securing Local Debt Capital
  There are two potential barriers pertaining to securing local debt capital. The first is the willingness of local or regional banks to lend to wind projects. While banks interviewed through the Southwest Regional Development Commission study expressed interest, they also expressed skepticism and interest in having one or more successful model projects in the region before making a commitment. The second concern is interest rate. Wind developers consulted as a part of the southwest feasibility study thought that they could secure financing at 9 1/2%, probably from a foreign bank with experience with wind projects. The local bank that we consulted was able to offer an interest rate in the 10 1/2 to 11% range, even with an FMHA guarantee. Interest rate is one of the key factors that can make or break a wind project because of the high up-front capital cost of the equipment. The project considered in this feasibility study would not be feasible at this interest rate.
- Lack of a Model
  There is no model in Minnesota or elsewhere in the United States that we have found for farmer-initiated or farmer-owned commercial scale wind development.

In the course of the feasibility study, farmers and wind developers raised a number of questions - some that challenged our original presumptions - that could not be answered in this phase of the work. Most likely some models will be developed as projects are developed. However, there may still be questions that must be answered on a case-by-case basis.

The first was whether individual farmers or landowners would earn a better rate of return as equity partners in wind projects or by receiving royalty payments. Even with the Minnesota production payment, some farmers and some wind developers suggested that farmers would benefit more by working with a developer who passed some of the production payment on to the farmer in the form of an increased royalty payment, say 10% or more. This could be preferable to an equity position, where a part of the rate of return would still be in tax savings. The answer to this may well be a matter of each individual's tax situation.

Farmers wondered whether and how they could use their land or wind rights as equity in the deal. Those without cash to invest saw this as the only way to buy an equity position. Developers agreed that it was possible, but the value of the resource in a deal was not really determined.

The best size of project came into question after the feasibility study was complete, and as farmers interviewed wind developers. If the production payment became available, smaller, 2 MW or less, projects looked attractive. However, this was balanced by concern that an individual's wind resource would not be fully used. Most of the farmers wanted as many turbines as possible on their land, and the 2 MW cap did not allow that. These trade-offs were not fully explored.

- Lack of Technical Support
  It became clear through the southwest feasibility study that farmers will not be able to develop wind businesses on their own. There are simply too many unanswered questions, and technical expertise needed that is outside of most farmer's experience.

  The traditional institutions that support farmers in developing value-added businesses do not have or are just developing expertise in wind. Neither the University of Minnesota, nor the Minnesota Agricultural Utilization Research Institute, nor Extension stepped up to the plate to help with this project. All are traditional sources of help. For some it is not a part of their mission, others are learning and feeling out an appropriate role. Local and regional economic development staff were interested, but learning along with everyone else.

  Wind developers emerged in this project as the most likely source of technical support and the southwest farmers hope to find a company with which to work. The wind developer will most likely be working on speculation, however, and so are an unlikely source of help for people who are in the early stages of trying to

figure out whether they have a resource that can be developed and how they should best proceed.

Most likely technical assistance providers in southwest Minnesota will likely be local and regional economic development staff and agencies and possibly vo-tech staff. All are likely to need additional funding to take on this new area of development.

- It's Never Been Done Before - First Project Requires More Time and Resources
  The first of its kind always takes more time and resources. The first few farmer-owned or farmer-initiated wind projects will be no exception to this rule. While new models are being created and technical assistance providers and wind developers are building expertise, more resources will be needed to make these projects possible.
- Utility Expectations
  A visit with staff at Northern States Power made it clear that there are a number of different agreements that must be developed between the wind developer and the utility before a project is a go. One is the power purchase agreement, others involve engineering specifications and grid interconnections. Both consulting lawyers and engineers are commonly involved. Unless the process is simplified, most farmers will not be able to negotiate these agreements without assistance. In addition, larger projects involve a state siting process, with an environmental assessment. Wind turbine equipment manufacturers will of course provide much assistance, but even so, it seems unlikely that many farmers would be able to negotiate the needed utility agreements for even one utility-scale turbine without assistance given the current complexity of the process.
- Existing Wind Leases
  Many of the farmers living on or near the north end of the Buffalo Ridge have already sold wind easements to wind developers or to NSP. This limits their ability to develop their land on their own. Surprisingly, the project found that it does not always preclude the possibility. NSP is willing to contribute land they have under lease to a wind project from which they would be buying power. Naturally, there is a cost to the project for this. In effect, the farmer has to buy back his wind rights. Other developers have also indicated that they might be willing to release a farmer from a wind lease.

Next Steps

This project began with the goal of increasing the economic benefits of windpower development to the farmers who own windy land and to the rural communities hosting the wind development. It presumed that local ownership of wind developments was the way to achieve that goal. As the project is wrapped up, it is less clear that that is the only answer. It may be that if landowners are well informed and take the initiative, they can see greater benefits.

There are a number of next steps in moving towards more locally-owned or locally-initiated wind developments.

1. Policy changes to ensure a growing market for renewable energy
   Wind energy development in general is threatened by pending deregulation of the electric industry. As of March 1997, Nancy Rader of the American Wind Energy Association estimated that almost 80% of the wind projects originally planned in the United States have been cancelled or put on hold. Policy will have to be crafted that will ensure that the transition to renewable energy continues in a deregulated industry. This work is on both the state and national level.
2. Policy changes to support locally-owned and farmer-owned wind developments
   Minnesota does have some policies designed to support local ownership. These can be clarified and strengthened.
3. Work with utilities to promote renewables
   Utilities are the present markets for renewables. More utilities will have to purchase more renewable power to increase markets in today's electric industry.
4. Look ahead to future opportunities
   In a deregulated environment, it may be possible to market directly to some consumers, and under that scenario independent power producers may have different opportunities and challenges.
5. Develop one or more projects
   We need to have one or ideally several farmer-initiated and farmer-owned wind projects up and running before all the questions will be answered. The next step for this project and these farmers is to move ahead. Ideally they and others like them will be able to do so with additional support in recognition of the fact that new ideas take more resources.
6. Funding for Technical Support
   The technical support needed by these farmers and others like them will take funding.
7. More in-depth research
   More in-depth research may be needed on certain specific questions. European models may provide some answers.
8. More education for farmers, local educators, lenders, and others
   The Windustry curriculum is an excellent first start. The class will need to be available, supported, updated, and the audience expanded. Additional simpler resources should be developed and be more easily accessible through traditional service providers.
9. Resource information more available to farmers
   Increased information about wind resources would greatly assist farmers in decision-making about what makes sense for them.

References

1. *Economic Impact Analysis of Windpower Development in Southwest Minnesota*, prepared by DanMar and Associates for the Southwest Regional Development Commission, September, 1996.

2. *Powering the Midwest*, Michael Brower, Michael Tennis, Eric Denzler, and Mark Kaplan of the Union of Concerned Scientists, 1993.
3. *Minnesota Wind Resource Assessment Program Report*, Minnesota Department of Public Service, 1994.
4. *Landowner's Guide to Wind Energy in the Upper Midwest*, Nancy Lange and Bill Grant of the Izaak Walton League, 1995.
5. *Harvesting the Wind: An Assessment of Farmer Interest in Wind Energy For Economic Development*, Loni Kemp, Lola Schoenrich, Lori Lanphere, for the Minnesota Project and the Clean Water Fund, 1995.
6. Harvest the Wind, Windustry TM Wind Energy Curriculum, Sustainable Resources Center, 1997.

SEED Project -- Sustainable Energy for Economic Development

Sustainable Energy for Economic Development Project, SEED The SEED project is working to encourage the development of renewable energy resources in Minnesota and to ensure that rural communities receive the greatest possible economic benefit from the development. The project is a joint effort of four organizations: Minnesotans for an Energy Efficient Economy, the Minnesota Project, Clean Water Fund, and the Sustainable Resources Center. The SEED work includes a Coalition of 18 groups, about half rural economic development organizations and half urban energy advocacy and environmental groups. The SEED Coalition top priorities in 1997 are protecting renewables in the deregulation of electric utilities and promoting local ownership of wind development.

Cooperative Development Services

Cooperative Development Services (CDS) is a non-profit organization that provides professional business development and planning services to cooperatives and communities in the Upper Midwest. Since its start in 1985, CDS has conducted hundreds of cooperative, community and economic development projects in areas as diverse as housing, child care, business, environment, agriculture, and the arts.

Minnesota Project

The Minnesota Project is a private, nonprofit center for rural community development and public policy. The mission centers on the intersection of rural issues and environmental concerns, and includes program work in sustainable agriculture, river and groundwater protection, and sustainable community development.

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