Strategies for Protecting and Increasing the Delivery of Renewable Electricity

Before and After Restructuring in Minnesota, Iowa, Wisconsin, and Illinois

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Executive Summary

Green renewable energy is gaining recognition as we become increasingly aware of the health problems, environmental destruction, and other impacts that result from the pollution caused by our energy use. Renewable electricity provides an important way to reduce environmental emissions from electricity produced to meet this energy consumption. The cost of producing renewable electricity continues to fall so it clearly has the potential to play a growing role in electric generation and emission reduction. The question is how this growing role can be fostered.

There basically are four mechanisms to increase the delivery of renewable electricity:

- Legislative mandates
- Regulatory mandates
- Changing the way environmental regulation is implemented so that it recognizes and rewards the environmental benefits of energy efficiency and renewable energy
- Increased delivery driven by consumer demand (Market-based strategies for expanding use of renewable generation and reduced emission energy)

All four ways are available before and after electric utility restructuring although restructuring may change how they are implemented.

Legislative and regulatory mandates can be used to require increased renewable electricity before and after restructuring. These mandates can take a variety of forms. These forms include construction mandates, construction approval requirements, generation portfolio standards and public benefits charges. These four mandates would all increase the delivery on renewable generation and reduced emission energy in different ways and to varying degrees depending on the requirements of each mandate.

Environmental regulations can also be changed so that the environmental benefits of energy efficiency and renewable energy are both recognized and rewarded. This can be accomplished by setting aside enough allowances to reward all emission reductions delivered each year by energy efficiency and renewable energy projects by non-emitters. This would provide increased incentives for energy efficiency and renewable energy. The Cleaner and Greener[sm] Principles propose that this be done for all pollutant reduction programs along with giving emission reduction credit for early energy efficiency and renewable actions implemented 1990 or later and reporting emission reduction using the multiple pollutant emission reduction reporting system. This makes it easy for energy efficiency and renewable energy projects by non-emitters to claim all the emission reduction they deliver.

Choosing to change how environmental emission reduction regulations are implemented so that the wealth distribution created by the distribution of allowances is used to reward increased energy efficiency and renewable energy can be implemented at any time before or after deregulation.

The increased delivery of renewable generation can also be driven by consumer demand. This approach uses market-based strategies for expanding the use of renewable generation and reduced

emission energy.

Customers who want their energy to come from sources with lower emissions can choose renewable energy or other cleaner energy options through a green pricing program. Green pricing provide consumers with an opportunity to directly influence resource decision making with their purchasing decisions. This provides an additional mechanism for encouraging energy resource choices with lower environmental impacts beyond existing mechanisms of regulation and legislation.

Where deregulation has created full retail competition the availability of green pricing programs will depend on the potential size of this market segment and the interest of potential providers of green pricing products. With full retail competition the prices for green pricing programs will be set by the competitive marketplace.

Where deregulation has not yet created full retail competition, the availability, variety, and pricing of green pricing products will depend on the decisions of the utilities and the utility regulators. These decisions about what will be allowed, what will be required, and what products will cost will be made through the traditional regulatory process. Green pricing is an additional mechanism for achieving renewable and environmental objects. It is not a substitute for regulation and legislation.

Surveys indicate that consumers say they are willing to pay extra for cleaner energy. Program successes will be influenced by the amount and quality of marketing done to promote the purchase of cleaner energy options. The cost of the offerings will also affect consumer demand for green pricing products. What the actual impact of green pricing will be is unknown at this time.

There are differences in the level of current green pricing activities in the four states. Several utilities and cooperatives in both Minnesota and Wisconsin offer green pricing programs to their residential customers. There are no green pricing programs currently being offered by utilities in Illinois or Iowa. Illinois still does not have large enough renewable resources to build green pricing offerings. In Iowa there has been controversy over creating green pricing programs based on existing or mandated wind power.

For green pricing to have a positive effect on the environment, consumers need to have assurance that they know what they are buying. Customers will require good information in order to make clean energy purchasing decisions both before and after electric utility restructuring. Consumers can acquire this information through two complementary approaches, disclosure and certification.

Disclosure requires that all sellers of electricity disclose the sources of the energy sold and the environmental emissions caused by the production of this electricity. Mandated disclosure for electricity is being considered as an option in many state utility industry restructuring processes. Disclosure of both the energy sources and their associated emissions impacts per kWh of electricity would allow consumers to more readily make environmental comparisons between electricity suppliers.

The other approach is a market-based policy of establishing certification programs that electric service

providers can voluntarily use to differentiate their products from the products of other service providers. Voluntary certification programs set standards that service providers must meet before they are allowed to claim that their products are certified as meeting a certain level of greenness by that certifying organization.

Maintaining Past Renewable Achievements

The achievements in renewable energy development in Iowa and Minnesota are strong compared to other states. This can be attributed to many things including bold legislative initiatives, public support and a strong resources base. Legislative mandates have aided the growth of the wind industry in both states and the biomass industry in Minnesota.

In states like Iowa and Minnesota, where there have been significant achievements in increasing the delivery of renewable energy under the current regulated monopoly utility system, there is concern that these achievements be maintained and that growth continue through any changes in the approach to regulation or market changes that may occur.

For each of the legislative or regulatory mechanisms for increasing the delivery of renewable electricity except the portfolio standard, the past achievements can be preserved by specifying that the renewables must be new to count toward the requirement. For the portfolio standard the past achievements can be maintained by setting the required percentage of renewables higher than the percentage represented by the past achievements.

Maintaining past renewable achievements under changed environmental emission regulations could be accomplished by using allowances to reward only the non-emitters that reduce emissions by implementing energy efficiency and renewable projects. This would not reward renewable electricity mandated for utilities by legislation or regulation.

Maintaining past renewable achievements can also be preserved under green pricing mechanisms. In states where significant amounts of renewables have been mandated by law or regulation, green pricing raises the issue of whether or not the output of mandated renewable projects should be included in green pricing offerings. Past renewables achieved by regulatory or legislative mandate can be preserved by a legislative or regulatory requirement that renewable generation mandated by legislation or regulation cannot be sold in green pricing programs. Another approach would be to require a minimum standard for new renewables that a supplier would need to meet through a certification process.

The mechanisms to increase the delivery of renewable electricity and to preserve past renewables achievements are available. There is also polling data showing broad public support for environmental improvement. The hard part is finding the right combination of mechanisms and coalitions to get them implemented.

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Strategies for Protecting and Increasing the Delivery of Renewable Electricity Before and After Restructuring in Minnesota, Iowa, Wisconsin, and Illinois

Section 1: Introduction

Renewable electricity provides an important way to reduce environmental emissions from electricity production. The cost of producing renewable electricity continues to fall so it clearly has the potential to play a growing role in electric generation and emission reduction. The question is how this growing role can be fostered.

There basically are four ways to increase the delivery of renewable electricity: legislative mandates, regulatory mandates, changing the way environmental regulation is implemented so that it recognizes and rewards the environmental benefits of energy efficiency and renewable energy, and increased delivery driven by consumer demand. All four ways are available before and after electric utility restructuring although restructuring may change how they are implemented.

In states where there have been significant achievements in increasing the delivery of renewable energy under the current regulated monopoly utility system, there is concern that these achievements be maintained and that growth continue through any changes in the approach to regulation or market changes that may occur.

This report addresses these issues by examining:

- How renewable electricity is addressed in the current regulatory processes in each state
- The renewable electricity achievements in each state to date
- Concerns about maintaining the renewable electricity achievements to date
- Strategies available to increase the delivery of renewable electricity before and after restructuring and for preserving current renewables achievements

Section 2: How Renewable Electricity is Addressed in the Current Regulatory Processes in each State

Each state has a body of statutes and regulations that guide the planning and siting of electric facilities and the regulation of electric service providers. The specifics of these statutes and regulation and the opportunities they provide for increasing the delivery of renewable electricity vary from state to state. The specifics for Iowa, Illinois, Minnesota, and Wisconsin are described below.

Minnesota

The State of Minnesota has an extensive body of statutes and regulations in place to encourage the use of alternative sources of energy in the state. It is unclear if these statutes would be protected in a deregulated environment.

The cornerstone statute in Minnesota for encouraging renewable energy is MN Statute, section 216B.O3 which directs the Public Utilities Commission (PUC or Commission) to set reasonable rates, which is not only on a lowest cost basis, but encourages the use of energy efficiency and renewable energy. There are also now more specific provisions of law that have been used to develop renewables. Section 216B.164 sets avoided costs for renewables and establishes net metering for small generators.

Resource planning for electricity is governed by section 216B.2422 and rules chapter 7843. This has led to three main outcomes related to renewables:

1. A renewable preference was created for all new capacity in Minnesota where a utility must demonstrate that it is in the public interest for any addition to not be provided from renewable resources;
2. In their resource plans, utilities must demonstrate a "least cost plan for meeting 50 and 75 percent of all new and refurbished capacity needs through a combination of conservation and renewable energy resources;”
3. Requires that the Commission quantify environmental costs of generation and use these costs in the resource planning and certificate of need processes.

The certificate of need (CON) process was created by statute section 216B.243 and is governed by rules chapter 7849. The thrust of this law requires that proposed large generation facilities (>80 MW; >50 MW for gas and oil-fired turbines) and large transmission lines get approval from the Environmental Quality Board (EQB) prior to construction, with the opportunity for public input. Utilities must demonstrate that the capacity cannot be met through demand-side management (DSM) or renewable energy sources (see subdivision 3a).

The Wind Power Siting Act is part of the Power Plant Siting Act at statute section 116C.52 and rule chapter 203-S.F. No. 1076. This exempts wind generation sites from the standard plant siting requirements and streamlines the process.

The question of transmission for renewables has not been directly addressed by statute, but the localized and distributed generation of renewable energy reduces the need for new transmission infrastructure.

There have also been several pieces of legislation that have been enacted into law that mandate Northern States Power (NSP) to operate or purchase renewable energy capacity. Statute 216B.2423 requires NSP to operate or purchase 225 MW of installed capacity generated by wind energy conversion systems by the end of 1998 and an additional 200 MW by the end of 2002. Statute 216B.2424 requires a total of 125 MW of biomass generation capacity to be operational by the end of 2002. The MN PUC also voted in January of 1999 to require NSP to proceed with an additional 400 MW of wind power generation over the next 10-15 years as a cost-effective alternative to fossil fuel electric generation. In their filings to the MN PUC, the MN SEED Coalition and Izaak Walton League effectively argued that over time wind power is the least-cost option.

In addition to these mandates NSP, which operated the Prairie Island nuclear plant must make annual payments of $500,000 for each dry cask containing nuclear waste to be used for the "development of renewable energy sources." The administration and use of these development funds is still under discussion. Currently, there are seven casks on the island, representing an annual payment of $3.5 million into the fund. NSP has authorization to have up to 17 casks total, which represents a large potential source of funding for renewables development.

The three primary agencies involved in developing, implementing and administering the state's energy policy are the Public Utilities Commission, Department of Public Service (DPS) and the Office of the Attorney General (OAG). The Environmental Quality Board (EQB) also holds some responsibilities. The Commission is charged with regulatory authority over electric service in the state, as discussed above and included in statutes. They are a quasi-judicial body in situations that require dispute resolution.

The DPS is the general public's chief advocate and primary source of information. The public includes communities, individuals and the regulated industry. The energy division enforces state statutes and policies and advocates for the public interest before the PUC. The DPS also is the primary developer of energy policy for the state. They produce a Quadrennial Report which puts forth that policy (excerpts are included).

The OAG's Residential and Small Business Utilities Division is responsible for providing attorneys, when necessary, to both the PUC and the DPS. In addition, the OAG also advocates on the side of residential users and small businesses. The EQB is charged with evaluating the environmental consequences of certificate of need requests.

The public also has a role in formulating the policy that is implemented. The resource plans of utilities are public information (except what is defined as proprietary information) before the plan is approved by the Commission. Legal challenges that may result from a disputed resource plan allow for additional public input before an administrative law judge. The public is also able to

comment on the Quadrennial Report prepared by the DPS.

Further details on other financial and regulatory policies can be found in the Database of State Incentives for Renewable Energy (DSIRE) state incentive file.

Iowa

There are two primary statutes in Iowa that deal with renewable energy resources, and several other provisions and programs that also promote renewables. The Alternative Energy Law is Code of Iowa 476.41-476.45, which requires the state's investor-owned utilities (IOUs) to purchase 105 MW of renewable energy. This is further summarized in the DSIRE file. Net metering is provided for in Administrative Code Section 199-15.11. This applies to all customer classes and requires the net excess generation to be purchased by utilities at avoided cost, up to a maximum of 105 MW.

There are also other financial and regulatory policies which are summarized in the DSIRE state incentive file.

The Iowa Utilities Board (IUB), the Department of Natural Resource's Energy Bureau (DNR) and the Office of the Consumer Advocate (OCA) are the primary agencies that address energy policy in the state. The IUB is the regulatory body that sets rates and reviews issues of quality of service.

The Energy Bureau's mission is to "assist Iowans to adopt energy efficiency and to use renewable energy resources by partnering with utilities, federal government, public associations, financiers and others. [They] work to implement all energy projects which are both environmentally and economically sound." The bureau provides data on issues to the IUB and also comments on and makes recommendations to the board on new regulations or policy changes. The DNR also puts out a Comprehensive Energy Plan every two years (excerpts are included). There are also occasions where the bureau will lobby the IUB on specific policy issues. Additionally, it is the goal of the Energy Bureau to have 10 percent of Iowa 's energy needs met by renewable resources by 2015 (1998 Comprehensive Energy Plan).

The OCA has the responsibility of being the "consumer's voice" in the energy policy process. If an issue is not in the public interest as the office analyzes it, they will oppose the action before the IUB. An example of this was the OCA's opposition to the proposal before the IUB to rescind the net metering code. The OCA has also been involved with the contracting of wind facilities to fulfil the 105 MW mandate from the Alternative Energy Law. An employee of the OCA has stated that a sufficient number of contracts have been signed to reach the 105 MW mandate.

The role of the public is not well defined by statute, but it can have an impact on decisions by the IUB. In the recent case where IOUs were trying to rescind the net metering provision of the administrative code there was significant public opposition and the issue was dropped. There are also public hearings before the IUB related to upcoming rulings.

Wisconsin

The recently enacted Reliability Act (1997 WI Act 204) liberalized the process for gaining Public Service Commission approval for new power plants built in the state, including those which use renewable energy sources. Compared with the regulatory requirements of years past, today's renewable energy developers face a considerably simplified and streamlined review process, which should accelerate the development of the state's renewable power sources.

Before the Reliability Act was passed, no utility could propose building a new power plant greater than 12 MW unless it had already identified the need for new capacity in its long-range supply plans. Previously, planning approval for new capacity would occur only after the conclusion of a lengthy contested case proceeding called the Advance Plan, in which the Commission weighed different resource options before selecting what it considered to be the lowest cost plan for meeting new load requirements. Only upon receiving planning approval from the Commission could a utility then, under the old rules, proceed with submitting an application to build a power plant at a specific location.

Lawmakers believed that the cumbersome nature of the Advance Plan discouraged utilities from pursuing new projects. From the clean energy perspective, the approved methods for determining the lowest-cost resources failed to reflect the positive environmental attributes and market appeal of renewable technologies. In eliminating the Advance Plan, the Reliability Act permits both utility and nonutility generators to propose new generating plants without burdening them with the requirement of demonstrating that the project fits the Commission's definition of "least-cost."

Under the old rules, any entity proposing to build a power plant greater than 12 MW needed to acquire a Certificate of Convenience and Public Necessity (CPCN), triggering a review process that most renewable energy developers would regard as being fraught with risks and complexity. To encourage the development of smaller-scale power projects, the Reliability Act raised the CPCN threshold to 100 MW. Renewable energy developers no longer need to scale down projects below the 12 MW threshold to avoid a CPCN proceeding. For utility-owned projects under 100 MW whose cost will equal or exceed $5 million, the only approval needed from the Commission is a Certificate of Authority (CA), which is considerably less taxing to obtain than a CPCN. Projects under $5 million (such as WEPCO's initial wind project) do not require a CA. Independent power producers do not need Commission approval to build projects less than 100 MW.

However, economic constraints and other siting concerns will continue to exert a limiting effect on the size of renewable power projects. It is highly doubtful that the Commission will entertain a proposal greater than 20 MW renewable in the foreseeable future.

The Reliability Act also directed eastern Wisconsin utilities to acquire, by December 31, 2000, 50 MW of new renewable generating capacity, all of which must be located in Wisconsin. Two of the utilities--Wisconsin Electric Power and Alliant--have issued RFP's to acquire their share of that capacity. Much of that generating capacity is expected to be owned by non-utility generators or

unregulated affiliates of utility holding companies. The other two utilities affected by that requirement, Wisconsin Public Service Corporation and Madison Gas & Electric, are proceeding with plans to construct windpower plants financed with their own capital.

In a departure from standard utility practice, both MG&E and WPS decided against acquiring the land they need through eminent domain, which they can legally invoke for these projects. Instead, they negotiated with landowners to acquire the right to construct wind turbines through negotiated leases. In forsaking their condemnation authority, MG&E and WPS needed to obtain conditional use permits from towns or counties before construction can begin. It is too early in the process to judge whether this approach can effectively avoid siting disputes.

To sum up, the Reliability Act improved the prospects for siting renewable generators in Wisconsin in three specific ways. First, it eliminated the Advance Plan, which subjected renewable technologies to economic tests that tended to understate their value and overstate their costs. Second, it raised the CPCN threshold from 12 MW to 100 MW. Third, it mandated a 50 MW investment in new renewable generating capacity in Wisconsin.

Illinois

Non utility generators do not need to obtain a Certificate of Convenience in order to build a power plant in Illinois, irrespective of fuel type. Utilities still need a CPCN before constructing a new power plant. (Presumably that requirement would end once the incumbent utility ceases to be a legal monopoly.) It is the general perception in Illinois that the incumbent utilities are no longer interested in building new power plants.

In 1997 the state of Illinois adopted a law (the Electric Service Customer Choice and Rate Relief Law) overhauling the structure of the electric utility industry and establishing a transition to a more competitive system. By 2002 all retail customers will have the ability to purchase electricity from sources other than the incumbent utility. The law also mandates a 15% residential rate cut for residential customers in August 1998, to be followed by an addition 5% reduction in 2002. However, customers that switch providers will have to pay a competitive transition charge to their old monopoly provider, eliminating most or all of the potential savings from selecting a lower-cost provider.

Unlike restructuring laws in Connecticut and Massachusetts, the Illinois law does not impose minimum renewable energy content requirements on electricity sales. It does establish a very limited funding mechanism to support energy efficiency programs and renewable energy development. Of the $8 million to be collected annually through an access fee on customers bills, $5 million will be spent on renewable energy and $3 million on energy efficiency. According to the Environmental Law and Policy Center, while legislative leaders have pledged to increase funding levels for clean energy, they have not yet followed through on their promise.

Section 3: The Renewable Electricity Achievements Made in Each State to Date

The achievements in renewable energy development in Iowa and Minnesota are strong compared to other states. This can be attributed to many things including bold legislative initiatives, public support and a strong resources base. Legislative mandates have aided the growth of the wind industry in both states and the biomass industry in Minnesota.

The most current data on capacity and contracts signed from the American Wind Energy Association (AWEA) is enclosed. In addition, an analysis of wind and PV performance in Minnesota and Wisconsin is included. In Iowa, there has been significant activity during the summer of 1998 in implementing new wind capacity and therefore capacity and new contracts may change significantly. The OCA helped to coordinate some of the new projects; they do not have a comprehensive list on new contract sites. There should be further information available soon.

With a combined total of about 550 MW in capacity, renewable power generation in Wisconsin accounts for about a 5% share of the state's generating capacity and a 4% of electricity production. Hydro's share of that total amounts to almost 450 MW, with biomass (wood-fired steam plants) and landfill gas accounting for the remainder. The 1.2 MW DePere wind project, the first utility-scale windpower project in the state, was placed into service February of 1998. The recently enacted Reliability Act has mandated a 50 MW investment in new renewable generating capacity in Wisconsin.

Utilities own most of the state's renewable generators. Almost 80% of the hydro generation in Wisconsin is owned by private utilities, municipal utilities, and rural electric cooperatives. Northern State Power owns two wood-fired power plants in the state, with a combined capacity of about 70 MW. The wind turbines at DePere are owned by a consortium of eastern Wisconsin utilities. Landfill gas is the only renewable technology in which nonutility producers (mainly municipalities and counties) predominate.

Because the Reliability Act explicitly permits the recovery of the full costs of the renewable capacity mandated by the law, the threat of early closure due to industry restructuring should not apply to this group of generators.

According to *Powering the Midwest*, a 1993 report published by the Union of Concerned Scientists, Illinois has nearly 55 MW of renewable generating capacity, producing an estimated 400 million kWh annually. As a percentage of the 140 billion kilowatt-hours produced each year by Illinois power plants, renewable energy sources account for 0.3% of total generation. About 60% of the renewable electricity is produced by hydroelectric generators, while methane combustion from landfills accounts for the much of the remainder. There is one utility-scale wind machine operating in Illinois, a 225 kW Vestas unit located near the now-closed Zion Nuclear Power Plant.

In a 1995 Public Citizen report measuring renewable energy consumption by state, Illinois was ranked 43rd in total renewable electric kilowatt-hours produced, 48th in percentage of state generation supplied by renewable resources, and 47th in renewable electric generation per capita.

There are no examples of utility green power programs operating in Illinois. The absence of green power offerings at the retail level virtually assures minimal development activity in the near-term. Whatever new renewable generation that comes on-line in Illinois, including low-cost hydro, will likely serve out-of- state renewable energy providers, such as Wisconsin Electric or Indianapolis Power & Light.

With its fertile soils and abundant rainfall, Illinois could support significant levels of biomass energy production. Whether using energy crops like switchgrass, agricultural residues, or livestock waste, biomass stacks up as the lowest-cost renewable energy option in Illinois.

The wind resource in Illinois is not likely to attract much development interest in the near-term. While a few sites in northwestern Illinois may have a strong enough resource to merit small-scale cluster developments, wind energy development in Illinois, given today's economic realities, would be at best a marginal proposition. It would be far cheaper to import wind power from Iowa, Minnesota, and even Wisconsin than to generate electricity at an Illinois wind farm.

Survey of Renewable Electricity Activities by Type in Illinois, Iowa, Minnesota, and Wisconsin

Wind Energy

Wind Resource

The performance of a wind energy conversion system depends on a wide variety of equipment, operation and wind resource factors. While inefficiencies of the wind system components will degrade the overall system performance, siting variations can cause reductions in performance that are orders of magnitude greater than component inefficiencies. A recent report from a wind energy installation in Vermont, for instance, indicated that the wind power available at one end of a string of six turbines was 60% greater than at the other end [1]. To a large extent, the variability is a direct result of the sensitivity of the power in the wind to the wind speed. The power of the wind is a function of the cube of the velocity. Therefore, a 6 m/s wind compared to a 5.5 m/s wind -- just a 9% increase in wind speed -- will have 30% greater wind power. Of course, the increased power directly relates to increased electricity produced and increased revenue.

The wind resource for electric power production across Minnesota and Wisconsin varies from excellent to very poor. The best area in Minnesota is along the Buffalo Ridge in the southwestern part of the state [2] [3], and in Wisconsin it appears that the prime spots for wind power production are along the Niagara Escarpment east and northeast of Lake Winnebago and on the south rim of Lake Superior [3] [4].

While wind speeds are the easiest parameter to measure, the power density in the wind (watts per

square meter of area perpendicular to the wind), which includes the effects of the wind speed, altitude and temperature, provides a more accurate representation of the wind resource. Mean annual wind power densities in southwestern Minnesota at 30 meters above the ground range from 350 to 400 W/m^2yr [2] [5], while the better sites in Wisconsin have mean power densities at 30 meters up to 250 W/m^2yr [6][7].

Wind speeds are lower at ground level than at higher elevations, due to the ground surface roughness slowing the air flow. Though costs of the tower and installation increase with taller towers, the increased power available at higher elevations frequently justify the increased costs. All new installations of utility-scale turbines in the northern Plains states are being installed on at least 50 meter towers, with many at 60 meters or above. A wind turbine installed on a 60 meter tower in eastern Wisconsin, for instance, will experience mean power densities comparable to those at 30 meters along the Buffalo Ridge in Minnesota. Likewise, a turbine installed at 60 meters on the Buffalo Ridge would encounter some of the best wind power densities anywhere in the U.S. (Class 6) [8].

Turbine Performance

The previous discussion indicates many of the factors relevant to wind turbine siting, yet actual performance depends upon many additional factors, such as turbine selection, cold weather operation, accessibility of service personnel, utility system reliability, etc. Rather than evaluating the potential impact of each of these factors on system performance, it is more instructive to examine the performance of wind power projects which are currently operating or under development in the region.

A conventional expression for the relative productivity of an electricity generating facility is "capacity factor, " which is the ratio of amount of electricity produced annually versus the amount of electricity which would have been produced if the facility had been operating at peak capacity every minute of year. This index allows comparison of various types of power generation which have a fixed maximum power capacity, such as coal-fired, gas-fired or nuclear powered plants. However, "capacity factor" has less value in comparing the productivity of various wind turbines. Typically, wind turbine generators are rated at a wind speed determined by the manufacturer (which, is not standardized between manufacturers). At wind speeds greater than the rated speed, the turbine typically produces power at approximately the peak capacity until the "cut out wind speed", at which the turbine brakes and shuts down to avoid damage from the high wind. The turbine generating capacity may vary 10% or even 20% from the rated capacity over its high operating range (between rated power and cut out speed). Furthermore, a turbine manufacturer may use a single size (capacity) generator with turbine blades which may vary by as much as 20% in swept area.

Considering the variables particular to wind power generation, many experts support the use of a separate index to compare wind generated electricity-- area-specific energy production. This index is the ratio of electricity produced annually by the wind turbine to the swept area of the rotor. Such an index incorporates variations in generator capacities, system efficiencies, and operation and maintenance procedures, as well as wind regimes and installation heights. The area-specific

energy production index is expressed as electricity produced annually per unit of swept area, kilowatt hours per square meter per year, kWh/m^2yr.

The first installation of advanced technology wind turbines in the Northern Plains region began in 1994 with the Kenetech 25 MW project in southwestern Minnesota. That project used 73 of the Kenetech 33KVS turbines with a 33 meter blade diameter on a 34 meter tower. According to published reports; the project produced 57.4 GWh of electricity [during the] second year of operation (the project experienced significant difficulties with start-up in its first year), or about 918 kWh/m^2yr [9].

In 1995, Micon U.S. (now NEG-Micon) installed a turbine (produced in their Hutchinson, MN facility) just outside Allendorf in northwest Iowa, along the southern reaches of the Buffalo Ridge. It is a 600 kW, M1500 turbine with a 43 meter diameter blade set on a 45 meter tower. In its first year, it produced about 1.6 million kWh, or about 1033 kWh/m^2yr [10].

Because of Iowa's renewables law, Alliant is contracting for 85 MW of wind power near Storm Lake, 42 MW near Clam Lake, 10.5 MW at Sibley and 1.2 MW from the Allendorf installation. MidAmerican will be supplied by a 112.5 MW windfarm near Storm Lake, the world's largest single wind power installation. the windfarm is being built and will be owned by Enron, with all power going to MidAmerican under a 20 year exclusive contract. All of these projects will be online before June 1999.

Iowa municipal utilities in Cedar Falls, Westfield, Ellsworth, Fonda, Esterville, Montezuma, and Algona have invested in a 2.3 MW windfarm near Algona. The cost of the power should be 3 to 3.5 cents per kilowatt-hour or 2.2 cents for the first ten years if the federal Renewable Energy Production Incentive is received.

Construction of the largest single wind power plant in the world was completed in southwestern Minnesota along the Buffalo Ridge in July of 1998. It has a total capacity of 107.25 MW, comprised of 143 Zond Z-48 turbines on 51 meter towers (for a 53 meter hub height). Enron Wind Corporation (the owners of Zond, Inc.) conducted detailed site monitoring to determine the wind resource prior to installation. Based on generalized projections they have publicized (in which they equate the projected performance to the number of homes served or barrels of oil required to produce an equivalent amount of electricity), the entire project is expected to produce 300 million kWh of electricity per year, which equates to 1160 kWh/m^2yr [11].

Other Wind Power Offerings

Construction of three wind turbines was completed in December, 1998 near Chandler, Minnesota. The three wind turbines generate 2 MW of electricity and are said to be the tallest turbines in the nation reaching more than 206 feet in the air. Approximately one-third of the wind power will go to Cooperative Power (part of Great River Energy), a generation and transmission cooperative based in Eden Prairie, MN. They will offer wind power to customers at a $2 premium per 100-kWh block with the help of the state production incentive. To date, 13 of CPA's member cooperatives including Dakota Electric offer the Wellspring product to their customers. Dairyland

Power Cooperative and United Power Association (also part of Great River Energy) will each purchase one-third of the remaining balance.

Dairyland Power Cooperative is offering wind power from a single turbine on the Buffalo Ridge in southwest Minnesota to its customers (Wisconsin accounts for half of its load) at a premium of $3/100 kWh/month. This turbine is one of three to be constructed by an independent power producer for two Upper Midwest cooperatives, Dairyland and Green River Energy (Cooperative Power and United Power) as part of the Wellspring Renewable Energy project. The turbines were placed in service at the end of 1998. Because the project's size is under 2 MW, it qualifies for a 1.5 cents/kWh tax credit recently enacted in Minnesota.

Moorhead Public Service awarded a bid for a 750 kW wind turbine to NEG Micon as part of Moorhead's Capture The Wind™ program [21]. Groundbreaking began in the fall of 1998 with electricity production scheduled to begin in June of 1999. NEG Micon was the low qualified bid ($667,000) for the project under-bidding Vestas-American Wind Technology ($709,586). Both bids were under earlier estimated turbine costs of $713,500.

There are two projects in Wisconsin from which performance data can be estimated. Early in 1998, the eastern Wisconsin utilities, under a directive from the Public Service Commission of Wisconsin, brought two Tacke, 600 kW turbines on line. They are located along the Niagara Escarpment just southeast of DePere, Wisconsin. To compensate for the modest wind regime, the turbines were installed on 60 meter towers. At the increased height, the utilities expect to generate 3.2 million kWh per year, for a total of 963 kWh/m^{2}yr [12].

Two more Wisconsin projects met local land use approvals in November of 1998. The first project, which will be operational by June 1999, will be owned by Madison Gas and Electric (MG&E) in a customer-supported project. The $14.5 million project will use seventeen Vestas V-47 turbines - each producing 660 kW of peak power for a total of 11.2 MW. The project will be located between the townships of Lincoln and Red River in Kewaunee County. MG&E expects to generate between 25 and 30 million kWh per year at either site or about 930 kWh/m^{2}yr [13].

Wisconsin Public Service Corporation will install 14 of the Vestas V-47 turbines within a few miles of the MG&E project. They are seeking approval to locate an additional two turbines in the same area. Together these two projects will generate between 40 and 50 million killowatt-hours of emission-free electricity annually, enough to power 8,000 homes.

Performance Summary

<u>Buffalo Ridge</u>

Zond, northwest of Lake Benton	1160 kWh/m^{2}yr
Micon, near Allendorf	1033 kWh/m^{2}yr
Kenetech, southwest of Lake Benton	918 kWh/m^{2}yr

Niagara Escarpment

Tacke, southwest of DePere	963 kWh/m^2yr
Vestas, along Niagara escarpment	930 kWh/m^2yr

Solar Electric Energy (Photovoltaics)

Solar Energy Resource and Performance

Though solar irradiation (energy delivered to the earth's surface by the sun) varies geographically, it varies much less dramatically than wind energy. In fact, according to the U.S. Department of Energy, a photovoltaic panel (flat plate, south-facing, slope = latitude) placed anywhere in the lower 48 states of the U.S. will produce at least half the electricity annually as that panel would produce at the very best site in the country [17].

Regionally, photovoltaic production decreases along a line from southwestern Minnesota (where a system would produce 190 kWh/m^2yr) to northeastern Wisconsin (where 170 kWh/m^2yr would be produced). The estimate for southwestern Minnesota was corroborated by research conducted by the Minnesota Department of Public Service in which they measured solar energy gain in 1994 and 1995 at Ruthton, along the Buffalo Ridge in southwestern Minnesota. They projected the energy production of a one megawatt flat plate photovoltaic array for the two year period at 189.6 kWh/m^2 [18].

As solar energy arrives predominantly as direct radiation from the sun, maximum access to the energy source is achieved by avoiding shading on the south-facing (or tracking) solar panel throughout the solar day and seasons.

The proximity of other obstructions, such as forests or houses, is irrelevant (assuming they do not provide shading to the panel), in sharp contrast to siting wind energy systems. Consequently, photovoltaic systems are ideal for either exposed, remote sites or residential applications in single family housing developments (multi-family residences and apartment buildings may have constrained solar collection space available relative to the load of the facility) .

Biomass-Wood

Among wood-fired generation options, co-firing at existing utility fossil units shapes up to be the lowest-cost application for wood. Co-firing costs should not vary significantly from one state to the next.

Wisconsin Electric is actively investigating the installation of a wood-fired boiler at its Valley plant. As a cogeneration plant, Valley produces both steam and electricity; electricity production is less than the rated capacity of the generator. Production declines significantly in cold weather, as more of the steam is used for district heating. Adding a wood-fired unit there would result in more electricity production, especially in winter. Now that landfilling is no longer an acceptable disposal option for disposing urban wood waste and residues from wood products manufacturers, Wisconsin Electric could avail itself of growing supplies of low-cost wood residues in southeast

Wisconsin. One of Wisconsin Electric's sources of power for its Energy for Tomorrow program is a Duluth plant that has a co-firing system. It seems reasonable to use the power production costs there, in the vicinity of 3.3 cents/kWh, as a benchmark for the Valley project, should it go forward.

Wood fuel (and paper sludge) can also be fed into stand-alone nonutility-owned generators or cogeneration systems producing electricity and steam. Stand-alone wood generation is a more expensive option than co-firing. These systems involve proven technologies; one can be built in time to satisfy the 50 MW renewable capacity set-aside on eastern Wisconsin utilities.

Advanced biomass systems, such as Whole Tree energy systems, energy crops like switchgrass, and biomass gasification, are still several years away from being commercially available generation options.

Landfill Gas

Methane recovery from landfills is a recognized renewable energy source. Typically, there exists between 10 to 15 years' worth of economically recoverable methane in a landfill. As compared with other renewable fuels, generating electricity from landfill sources of methane is an inexpensive option. Dane County began producing electricity from a 1 MW generator installed at its Rodefeld landfill last fall, receiving about 2.8 cents/kWh. However, Dane County is of the view that MG&E's current buyback rate does not provide enough economic incentive to continue production beyond another year. It recently submitted a proposal to sell this power to Wisconsin Electric's Energy for Tomorrow program at slightly above 3 cents/kWh. At that rate, Dane County has indicated that it would operate its methane recovery system as long as supplies from the Rodefeld landfill last.

Hydro Power

Like landfill gas, hydro is a relatively low-cost source of renewable electricity. While the development potential for hydro in Wisconsin has largely been realized, there are still locations within the state where existing capacity can be increased or where abandoned sites can refurbished and brought back on-line. Estimates of the potential for expanding hydro production in Wisconsin range from 20 - 50 MW. Many hydro generators are facing a costly relicensing process; it may not make sense for some of them to continue production at their existing facilities unless capacity is increased and output is sold into a Green power program. For these kinds of units, power generation costs will range from 3 to 5 cents/kWh.

Hydropower is available from other states and Canada, which has the capability of producing for export bulk power from large hydro systems owned and operated by provincial utilities. For a variety of reasons, RENEW and others support a size limitation on hydropower generators seeking to sell electricity into a Green Power program here in Wisconsin. In California, the size limit applying to hydro generators is 30 MW, a standard that Green-e has adopted in certifying renewable power options.

Farm Digesters

Growing controversy over animal waste disposal, coupled with advances in the engineering of anaerobic digestion systems, could produce a niche application for methane generation on Wisconsin farms. Efforts have begun to site a demonstration of a new animal waste-to-methane energy conversion system, including a 0.5 MW generator, at a large Wisconsin farm. The company seeking to market this system, called Anergen, envisions selling the power from this energy system at 6.5 cents/kWh.

Section 4: Concerns About Preserving Renewables Achievements

There are many concerns about the restructuring of the electric industry expressed by advocacy groups and government agencies in both Minnesota and Iowa. In Minnesota, there has been an extensive dialogue among consumer groups, government agencies, advocacy groups, cooperatives and investor-owned utilities about how to approach deregulation in a uniquely Minnesota fashion. The process has been facilitated through the PUC's Electric Competition Work Group. In Docket No. E-999/CI-95-135, the Work Group established 16 principles and eight action steps under which they would work. Principle 11 calls for "environmental improvement" and Principle 13 asks for a "diverse portfolio of energy resources." (For further information see the ME3 web site at www.me3.org/projects/dereg/)

The positions of many organizations and agencies are represented by their comments to the PUC, DPS and the IUB.

The Potential for Declining Renewable Capacity

Despite forecasting a steadily increasing load from 1997 to 2006, the utilities' most recent Advance Plan filings (with the exception of NSP's plans) forecast little change in output from renewable generation sources. As they were filed before the Reliability Act was enacted, they do not reflect the 50 MW renewable energy mandate imposed on eastern Wisconsin utilities.

NSP's plans contain discussion of declining renewable capacity due to anticipated restrictions on that utility's ability to operate their Chippewa River hydro plants as peaking units. If the Federal Energy Regulatory Agency Commission, which has relicensing authority over these hydroelectric generators, requires NSP to operate them as run-of-the-river units, the capacity rating could be reduced by as much as 140 MW (they are rated currently as 190 MW). These changes, NSP claims, would also result in lost production annually of up to 174 million kWh. The relicensing question casts a great deal of uncertainty over attempts to estimate the baseline level for renewable generation in the future.

The amount of biomass fuels (wood and RDF) to be co-fired at NSP's French Island and Bayfront plants may decline as well, the company's AP8 documents indicate.

Some of the smaller, more marginal renewable generating units currently operating could face early closure as a result of economic pressures. The costs associated with relicensing hydro generators may not justify continued production at certain locations. Buyback rates remain extremely low for independent power producers, and could potentially sink further as more generating capacity is built to strengthen Wisconsin's electric grid. Even landfill gas generation, the least expensive renewable technology available, is not immune to this pressure. These regulatory uncertainties will continue to erode the economic viability of smaller generators.

Section 5: Strategies for Increasing the Delivery of Renewable Electricity Before and After Restructuring and Maintaining Renewable Achievements

There basically four ways to increase the delivery of renewable electricity: legislative mandates, regulatory mandates, changing the way environmental regulation is implemented so that it recognizes and rewards the environmental benefits of energy efficiency and renewable energy implemented by non-emitters, and increased delivery driven by consumer demand. All four ways are available before and after electric utility restructuring although restructuring may change how they are implemented.

1. Legislative Mandates / Regulatory Mandates

These are described together because while the processes of creating these mandates is different, the affect on the electric service providers is similar. Also the exact boundaries between what actions require legislation and what actions can be accomplished by regulation vary from state to state.

Legislative and regulatory mandates can be used to require increased renewable electricity before and after restructuring. These mandates can take a variety of forms:

(1) Construction Mandates
For example: Each electricity provider in the state shall acquire through ownership of contract a specified amount of new renewable electric generation each year starting in a specified year.

(2) Construction Approval Requirements
For example: To receive construction approval each package of new generation proposed for construction must produce electricity at an emissions below specified levels for specified types of emissions. This will promote renewables if the emissions levels are set low enough so that some renewables must be included in the requested generation package.

For example: Approve sufficient new generation to meet the states electricity needs, however select which generation project to approve on a competitive basis based on emissions rates.

(3) Generation Portfolio Standards
For example: Require all electricity providers to have mix of generation that includes a specified percentage of renewable generation. Increasing the required percentage of renewable generation over time

(4) Public Benefits Charges
For Example: Collect a wires charge from all electricity delivered to customers equaling a

specified amount per kWh. Use these funds to acquire through an independently managed competitive process the measured and monitored delivery of energy efficiency and renewable electricity.

Maintaining Past Renewable Achievements Under these Legislative or Regulatory Mechanisms

For each of these mechanisms for increasing the delivery of renewable electricity except the portfolio standard, the past achievements can be preserved by specifying that the renewables must be new to count toward the requirement. For the portfolio standard the past achievements can be maintained by setting the required percentage of renewables higher than the percentage represented by the past achievements.

2. Changing the Way Environmental Emission Regulations are Implemented

Current emission regulations as they are implemented fail to reward a vast majority of the individuals and organizations that implement energy efficiency and renewable energy projects. Under the current approach to environmental regulation, environmental regulators reward only pollutors for their emission reductions. When regulators set emissions caps they in effect create permission slips (or allowances) for emissions up to that level. By requiring that all emitters have sufficient allowances at the end of each year to cover all their emissions during the year, the regulators have required that their environmental objective for the affected pollutant be achieved.

This leaves the environmental regulators with one remaining decision, how to distribute the emission permission slips they have created. The distribution of these allowances is a wealth distribution. The allowances are valuable things and how they are distributed determines who gets the money.

The regulators could distribute these allowances in a variety of ways. The regulators could:

1. Distribute the allowances on a per capita basis to all the citizens of the state who in turn could sell them into the market place which would put the money in the pocket of the public,
2. Sell all these allowances through an auction and put the proceeds of the auction into the state's treasury to support any good purpose like buying the measures and verified delivery of energy efficiency and renewable energy ,
3. Set aside some of the allowances to reward the non-emitters that reduce emissions by implementing energy efficiency and renewable projects,
4. Give away all of allowances to the emitters.

Surprisingly, environmental regulators to date have chosen Option 4 which gives away all the allowances to the emitters.

Selling all the allowances in the marketplace and using the proceeds to buy measured and verified delivery energy efficiency and renewable energy would provide an additional way to

encourage increased delivery of both energy efficiency and renewable energy.

Setting aside enough allowances to reward all emission reductions delivered each year by energy efficiency and renewable energy would also provide increased incentives for energy efficiency and renewable energy. The Cleaner and Greener[sm] Principles propose that this be done for all pollutant reduction programs along with: giving emission reduction credit for early energy efficiency and renewable actions implemented 1990 or later, and reporting emission reduction using the multiple pollutant emission reduction reporting system so that it is easy for energy efficiency and renewable energy projects by non-emitters to claim all the emission reduction they deliver [22]. More information about the Cleaner and Greener[sm] Principles is available on the Cleaner and Greener web site: www.cleanereandgreener.org. Choosing to change how environmental emission reduction regulations are implemented so that the wealth distribution created by the distribution of allowances is used to reward increased energy efficiency and renewable energy can be implemented at any time before or after deregulation.

Maintaining Past Renewable Achievements Under Changed Environmental Emission Regulations

Maintaining past renewable achievements could be accomplished by using allowances to reward only the non-emitters that reduce emissions by implementing energy efficiency and renewable projects. This would not reward renewable electricity mandated for utilities by legislation or regulation.

3. Increased Delivery Driven by Consumer Demand (Market-Based Strategies for Expanding Use of Renewable Generation and Reduced Emission Energy)

Green Pricing Activities and Issues

Green pricing provide consumers with an opportunity to directly influence resource decision making with their purchasing decisions. This provides an additional mechanism for encouraging energy resource choices with lower environmental impacts beyond existing mechanisms of regulation and legislation. This adds a third leg to the current two legged stool for reducing the environmental impacts of energy use.

Customers who want their energy to come from sources with lower emissions can choose renewable energy or other cleaner energy options through a green pricing program.

Where deregulation has created full retail competition the availability of green pricing programs will depend on the potential size of this market segment and the interest of potential providers of green pricing products. Where deregulation has created full retail competition the prices for green pricing programs will be set by the competitive marketplace.

Where deregulation has not yet created full retail competition, the availability, variety, and pricing of green pricing products will depend on the decisions of the utilities and the utility regulators. These decisions about what will be allowed, what will be required, and what

products will cost will be made through the traditional regulatory process.

Green pricing is an additional mechanism for achieving renewable and environmental objects. It is not a substitute for regulation and legislation.

The Current Green Pricing Activities in 4 States

Illinois

No green pricing programs are currently being offered by utilities in Illinois. The 1997 law restructuring the Illinois utility industry will allow competitive retail electric service offerings to retail electric customers by 2002. However, customers that switch suppliers will need to pay a transition charge that will prevent them from saving significant amounts by switching to lower cost suppliers.

Iowa

No Iowa utilities are currently offering green pricing to their customers.

Minnesota

The Cooperative Power Assoc. (now Green River Energy) Wellspring Renewable Energy Program offers wind power to customers with the help of the state production incentive. To date, 13 of CPA's member cooperatives and Dakota Electric offer the Wellspring product to their customers and will purchase nearly one-third of the wind power. Dairyland Power Cooperative and United Power Assoc. (also Green Power Energy) will purchase the balance for their customers. Moorhead Public Service is offering wind energy to its members. The one-third of customer electricity that now comes from coal will be replaced by wind, while the remaining two thirds will remain hydropower. The Northern States Power, EnergyWise Solar Advantage Program installs 2 kW residential PVs on MN customer rooftops. NSP pays for and installs the systems with help from the U.S. Department of Energy and the Utility PhotoVoltaic Group.

Wisconsin

All the major utilities in Wisconsin have or plan to have green pricing offering for their customers. Wisconsin Electric Power offers a mix (mainly hydro with wind and biomass) of renewable energy as part of the Energy For Tomorrow Program. Madison Gas & Electric plans to offer 100% wind blocks to customers. Dairyland Power's affiliated coops in Wisconsin also offer wind power to their customers. Wisconsin Public Services Corporation (WPS) customers can contribute to the Solar Wise for Schools Program.

Green Pricing Issues

Green pricing provide consumers with an opportunity to directly influence resource decision making with their purchasing decisions. This provides an additional mechanism for encouraging less pollution resource choices, beyond existing mechanisms of regulation and legislation. There are a number of issues that are raised about green pricing.

How much will the impact be?
Since green pricing gives customers the choice of cleaner energy options, the level of the impacts of green pricing will depend on the consumer preferences expressed in the marketplace. These consumer preferences will be influenced by the amount and quality of marketing done to promote the purchase of cleaner energy options. The cost of the offerings will also affect consumer demand for green pricing products. Surveys indicate the consumers say they are willing to pay extra for cleaner energy. What the actual impact of green pricing will be is unknown at this time.

What is being sold?
For green pricing to have a positive effect on the environment, consumers need to have assurance that they know what they are buying. Customers will require good information in order to make clean energy purchasing decisions both before and after electric utility restructuring. Consumers can acquire this information through two complementary approaches, disclosure and certification [23].

Disclosure
One approach based on regulation or legislation is instituting a requirement that all sellers of electricity disclose the sources of the energy sold and the environmental emissions caused by the production of this electricity. Mandated disclosure for electricity is being considered as an option in many state utility industry restructuring processes. To be the most effective, disclosure requirements should include uniform labeling by all suppliers. Disclosure of both the energy sources and their associated emissions impacts per kWh of electricity would allow consumers to more readily make environmental comparisons between electricity suppliers.

Certification
The other approach is a market-based policy of establishing certification programs that electric service providers can voluntarily use to differentiate their products from the products of other service providers. Voluntary certification programs set standards that service providers must meet before they are allowed to claim that their products are certified as meeting a certain level of greenness by that certifying organization. An example of a voluntary certification program is the Green-e certification by the Center for Resource Solutions.

Setting the Prices for Green Pricing Products
Where deregulation has not yet created full retail competition the prices for green pricing programs will be set through the traditional regulatory process. Where deregulation has created full retail competition the prices for green pricing programs will be set by the competitive market place.

Maintaining Past Renewable Achievements Under a Green Pricing Mechanism
In states where significant amounts of renewables have been mandated by law or regulation, green pricing raises the issue of whether or not the output of mandated renewable projects should be included in green pricing offerings. Past renewables achieved by regulatory or legislative mandate can be preserved by a legislative or regulatory requirement that renewable

generation mandated by legislation or regulation cannot be sold in green pricing programs. Another approach would be to require a minimum standard for new renewables that a supplier would need to meet through a certification process.

Section 6: Conclusions

Renewable electricity provides an important way to reduce environmental emissions from electricity production. The cost of producing renewable electricity continues to fall so it clearly has the potential to play a growing role in electric generation and emission reduction. The question is how this growing role can be fostered.

There basically are four mechanisms that can be used to increase the delivery of renewable electricity: legislative mandates, regulatory mandates, changing the way environmental regulation is implemented so that it recognizes and rewards the environmental benefits of energy efficiency and renewable energy implemented by non-emitters, and increased delivery driven by consumer demand. All four ways are available before and after electric utility restructuring although restructuring may change how they are implemented. This report identified a variety of ways that these four mechanisms can be used to increase the delivery of renewable energy.

In states where there have been significant achievements in increasing the delivery of renewable energy under the current regulated monopoly utility system, there is concern that these achievements be maintained and that growth continue through any changes in the approach to regulation or market changes that may occur. Minnesota and Iowa fall strongly in this category.

For each of the four mechanisms that can be used to increase the delivery of renewable energy, this report identified how past renewable electricity achievements can be maintained.

So the mechanisms to increase the delivery of renewable electricity and to preserve past renewables achievements are available. There is also polling data showing broad public support for environmental improvement. The hard part is finding the right combination of mechanisms and coalitions to get them implemented.

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Additional Resources

The Department of Energy's Energy Efficiency and Renewable Energy Network (EREN) has a green pricing resource guide at http://www.eren.doe.gov/greenpower/gp guide/.
The Natural Resources Defense Council web site at: http://www.nrdc.org/howto/encagp.html.
There is a Green Electricity Certification site at: http://www.green-e.org/.
The Union of Concerned Scientists web site at: http://www.ucsusa.org/energy/
The Minnesotans for an Energy Efficiency Economy (ME3) at:
http://www.me3.org/projects/dereg/nonmn.html

Attachment 1: Specifics About the Promotion of Renewable Electricity in Wisconsin

If customer demand in Wisconsin is presently too limited and undeveloped by itself to expand the market share for renewable energy sources, then public policy prescriptions will be needed to make up the difference. Many in the state government accept the notion that policy measures are needed to build up a renewable energy marketplace, as evidenced by their support for the Reliability Act's renewable set-aside. But the policy prescription in the Reliability Act, while a powerful tonic, has a limited lifespan. What happens after December 31, 2000, when the mandate's effect comes to an end, is an open question that needs to be answered.

Indeed, the Legislature still has to make some fundamentally important decisions on a variety of public interest concerns that have come to be known as "public benefits." As this issue has been framed elsewhere, public benefits encompasses three specific agenda items: (1) preserving low-income support programs, (2) establishing a new system for funding and delivering energy efficiency services, and, more often than not, (3) increasing the market share of renewable power sources. Recognizing the importance of these issues, the Legislature recently formed a Legislative Council Study Committee to address utility public benefits.

Of the various renewable energy policy prescriptions that have been proposed in the context of industry restructuring, the renewable portfolio standard (RPS) has the most political currency at this juncture. In essence a minimum content requirement on sellers of electricity, those states that have enacted an RPS have either sought to prevent backsliding (as in Maine) or to expand market share in an incremental fashion (as in Connecticut, Massachusetts, and Nevada). Providers can comply with the standard either by generating the requisite amount of renewable electricity themselves, by buying the renewable electricity from someone else, or by purchasing renewable energy credits from producers that have exceeded the standard. This approach creates a competitor-neutral environment in which providers are given the flexibility to comply with the standard using whatever appears to be the lowest cost option.

Unlike the 50 MW set-aside in the Reliability Act, an RPS cannot specify where the renewable electricity can or cannot come from. Minnesota-based wind generators and Michigan-based biomass generators have as much right to sell their power into the Wisconsin market as do Wisconsin-based hydro generators. While an RPS for Wisconsin would stimulate development opportunities through much of the Upper Midwest, Wisconsin renewable energy developers run the risk of being priced out of the market by low-cost out-of-state sources of renewable power.

It should be noted that some electricity providers are likely to respond to an RPS by breaking out the renewable fraction and selling it at a higher price, leaving the price of "non-green" electricity unchanged. What that means is that the cost of an RPS as reflected in a typical bill will depend substantially on how that green power is marketed. The more green power that is sold as an environmentally preferred premium product, the less that has to be absorbed by other customers. The ability to differentiate green power from ordinary electricity could help renewable proponents sell the RPS to the Wisconsin Legislature. Indeed, from the standpoint of the Legislature, the fact that MG&E and WEPCO already had plans to sell renewable power through green power

programs made the 50 MW set-aside an easier provision to swallow.

While differential pricing will make an RPS less onerous to price-sensitive customers, particularly in the commercial and industrial sectors, there are limits to how much green power a utility or an electric provider can sell at a premium.

In the final days of the 1998 session, Senator Brian Burke of Milwaukee introduced a public benefits bill (S.B. 517) which included an RPS. The bill, which will certainly be reintroduced next year, essentially would double the amount of renewable generating capacity reserved for Wisconsin by 2010. It is supported by the same coalition of interests that succeeded in passing reliability legislation largely on its terms.