Minnesota's Leadership

in

Renewable Energy

December, 2004

The guiding principles of Minnesota's energy policy are:

- Reliability
- Low cost
- Environmentally superior

Renewable energy, especially from wind, has been, is and will become an increasingly important and valued Minnesota energy resource.

- Currently, 11% of electricity Minnesotans use comes from renewable energy.
- At least 20% of Minnesota's electricity will come from renewable energy in 2015.
- This makes Minnesota one of the nation's renewable energy leaders.

Renewable energy provides:

- Significant environmental benefits
    - Currently avoiding over 5 million tons greenhouse gases
    - Currently avoiding over 160 pounds of mercury
    - These environmental benefits will at least double in the next decade
- Community-Based Energy Development (C-BED) that benefits our rural economies
    - Landowners receiving valuable income
    - Local governments getting tax revenue
    - Development of local industries and jobs

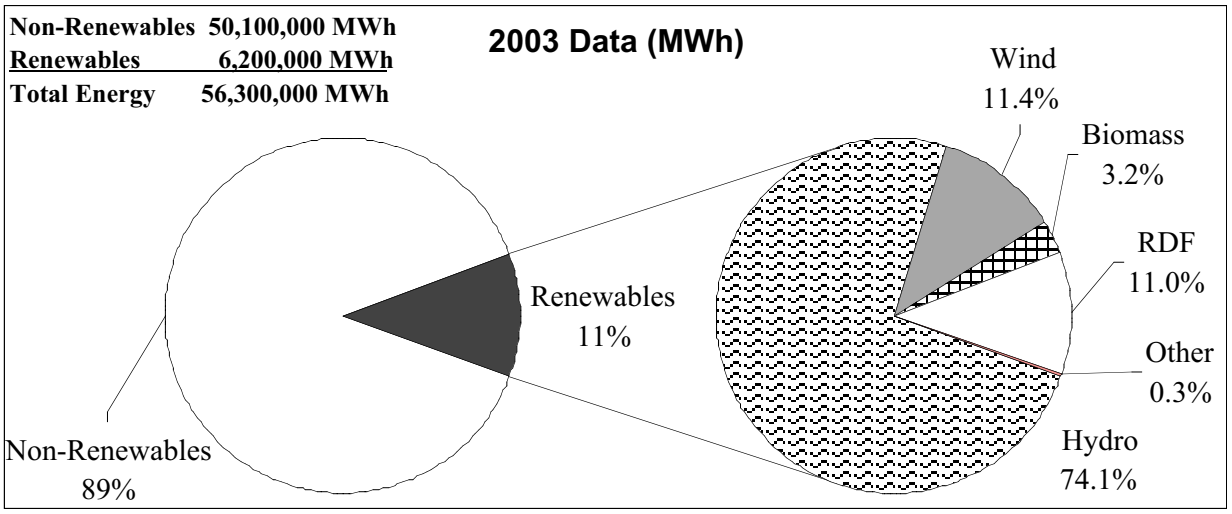
While Minnesota's programs and policies of financial support, mandates, renewable objectives, and R&D have been very successful, to expand the state's renewable electricity success and ensure renewable energy's place in the 21st century energy marketplace, the state must address:

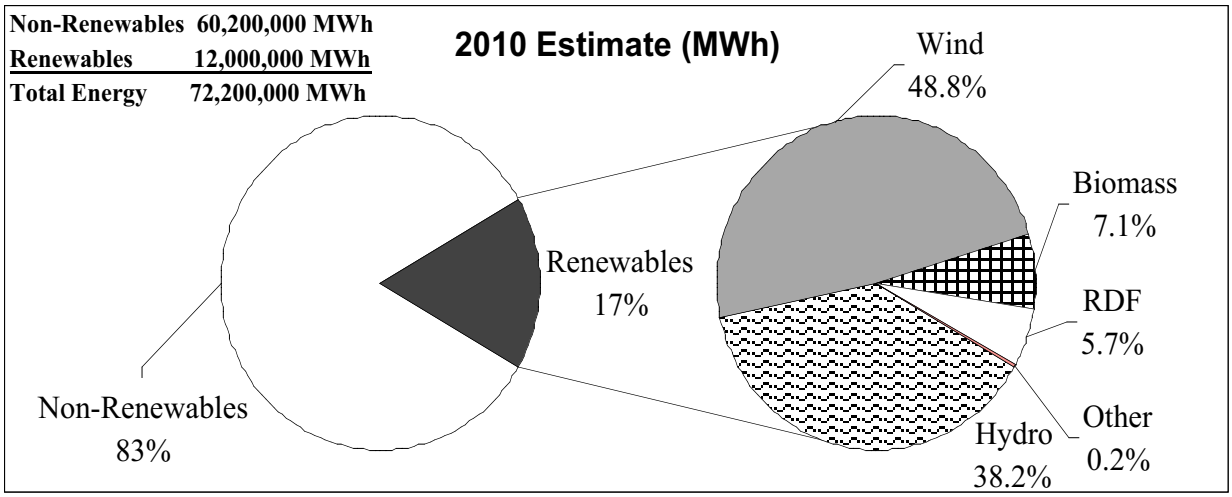
1. Inadequate transmission infrastructure, and
2. Barriers to community-based energy development.

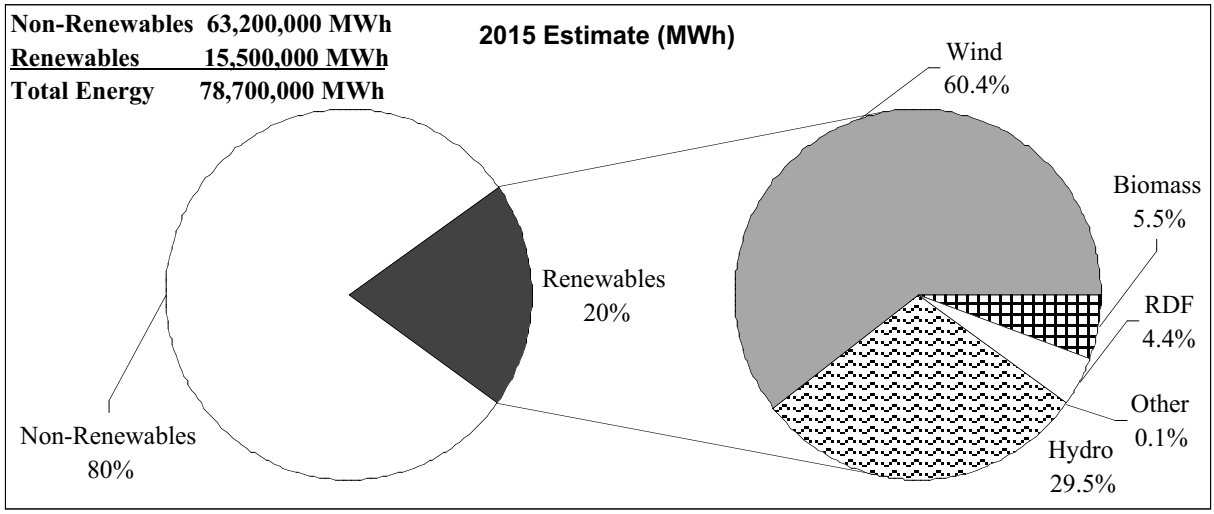
Minnesota can tackle inadequate transmission infrastructure by promoting investment, reducing regulatory barriers and establishing better regional planning.

Minnesota can deal with barriers to community-based energy development by supporting transmission access for renewable resources and addressing the high front-end capital costs for community wind developers.

Minnesota's growing use of renewable electricity







Upgrade the state's transmission system

Sufficient transmission lines are not located in the growing wind-resource areas and what lines exist are being used to full capacity. If the electricity from a renewable generator is prevented from getting to the user, the benefits are lost. Thus, to continue Minnesota's renewable energy leadership we need to upgrade the state's transmission system to address:

- Expansion of transmission capacity and availability
- Delays in interconnection studies & study queues
- Wind energy's integration into the system along with traditional and better understood energy sources.
- Variability studies of wind turbine power output and its impact on grid operation

Ways Minnesota can promote the upgrading of its transmission system are:

- Exempt transmission facilities from a certificate of need as long as those facilities will assist in the development and delivery of electricity from renewable generating facilities.
- Modify the certificate of need requirements for new transmission lines so that grid system benefits and needs are considered and become a priority.
- Permit the Public Utility Commission to give transmission owners and operators cost recovery certainty for investment in new transmission infrastructure that accommodates renewable energy generation.

Strengthen our community-based energy development policies.

Promoting renewable energy development, especially at the local community level, has significant benefits for Minnesota. Unfortunately, there are a number of structural problems that prevent the development of community-based renewable energy facilities. They include:

- Access to the transmission grid;
- Time and expense of the regulatory review process and interconnection studies;
- Availability of accurate wind data; and, perhaps most importantly,
- The high front-end capital costs for small operators;

Ways Minnesota can promote the development of community-based renewable energy facilities include:

- Authorize and direct the Public Utility Commission to develop a cost-neutral tariff that all utilities must provide for small wind developers which provides greater return during the project finance period and lower return after the project is fully paid.
- Create a regional renewable energy tradable credits program. Minnesota is currently leading the development of such a program for the region, with an eye toward potentially linking our regional program with others around the U.S. The creation of a trading program should lead to expanding the market for Minnesota's renewable energy to the region and the rest of the nation.
- Revise the integrated resource planning statutes to further encourage renewable energy generation sources in electric utility long-term planning processes.
- Work with the Midwest Independent System Operator (MISO) to streamline the study processes at MISO to limit study queues and mitigate project delays.
- Work with Minnesota's Congressional delegation and like-minded States to ensure that the federal wind production tax credit is funded on a continuous basis so that wind developers can assume its existence in their financial planning.
- Conduct further studies on:
    - How to accommodate and incorporate wind energy's variability into overall grid energy stability, and
    - Wind availability in more areas of the state at greater heights.

Questions and Background on Renewable Electricity Data

How is renewable energy defined?

The general definition of renewable energy is a source that can replenish itself within one human generation – on the order of 25 years. There is general consistency across states to include wind, solar, hydro and biomass. Some fuels that are considered renewable are waste fuel sources, such as mixed municipal solid waste. Qualifying renewable energy sources vary by state. For example, California and Hawaii include tidal energy and wave energy in their definition, while Pennsylvania includes coal-mine methane and coal waste.

The Department's renewable electricity calculations include all sources deemed renewable under Minnesota law: hydro facilities (including power from Manitoba Hydro), projects developed under Xcel's mandates, green pricing, and other renewable energy in production. As shown at the end of this section, Minnesota Law defines "renewable energy" in various ways (e.g. in the statutes for certificate of need, integrated resource planning, renewable energy objective, distributed generation, and Legislative Electric Energy Task Force). The data in the tables is intended to reflect the broadest definition of "renewable energy." (See page 12 for MN statutes 216B.1691,Subd.1; 216B.2411,Subd.1&2; 216B.2422,Subd.1; 216B.243,Subd.3a; 216C.051,Subd.7)

Where does the data come from?

The data for the 2003 table comes from actual amounts. The data for the 2010 and 2015 tables is derived from estimated amounts of renewable electricity produced in the region dedicated for use by Minnesota consumers. The estimate of future renewable energy is based on a forecast of future sales. The sales forecast comes from a linear trend-line based on historical (1970-2002) aggregate (all utility) data from the regional energy information system (REIS). The estimate is also based on expectations that utilities will fully meet the mandates and objectives currently set out in law.

What geographic areas are included?

Besides being produced in Minnesota, electricity used by Minnesotans is produced throughout the upper Midwest, including North and South Dakota, Iowa, Wisconsin and Manitoba, Canada. The data in the tables identify renewable energy that is known to be used by people in Minnesota; there is likely more renewable energy used in Minnesota that stems from wholesale transactions in the region. A regional trading system, as currently being developed, could help identify those transactions readily.

Why is the data calculated on a MWh basis?

Renewable electricity resources are reported as sales to ultimate consumers for 2003 in MWh as provided by the utilities. This means the Department's electricity figures are based on renewable energy actually being produced. Using figures for energy production rather than energy capacity provides a more appropriate representation of renewable energy since energy production figures:

- show how much renewable energy is actually being produced, rather than a planning number pertaining to the potential to produce energy;
- are consistent with how the Minnesota laws require the state's 10% Renewable Energy Objective be calculated;
- require fewer assumptions about how the facilities will be used in practice, and
- are easier to understand.

Is there a downside to calculating data on a MWh basis?

Basing the figures on energy production rather than capacity of renewable facilities does have some drawbacks. This approach may make comparing Minnesota's renewable electricity numbers to other states awkward, particularly when other states report their data based on the amount or capacity of renewable electricity that could be generated. Using production instead of capacity data may somewhat understate Minnesota's capacity to produce renewable energy since the amount of electricity a facility may actually produce could be lower than its maximum capacity. In addition, production varies over time because of the nature of wind levels or water flows. The best way to address this difference is to be aware of this fact when comparing the numbers.

How are wholesale purchasers handled?

There may be additional wholesale purchases from facilities using renewable fuel that are not explicitly identified. As such, the amount of renewable energy that is consumed by Minnesotans may be slightly understated in the figures.

What is the REO?

The Renewable Energy Objective, passed in 2001 and modified by the legislature in 2003, requires utilities to make a good faith effort to ensure that 10% of their generation mix is renewable by 2015. (See MN statute 216B.1691)

What kinds of renewable energy are Minnesotans expected to use in the future?

By 2015, it is expected that most renewable energy will come from wind resources. Hydro and other resources are also expected to be used.

Why is so much of the future renewable energy assumed to come from wind?

A significant component of wind energy development in Minnesota is the requirement for Xcel energy to develop 1,125 MW of wind by 2010. Moreover, wind energy has emerged as a cost competitive resource.

What effect does the REO have on the expected use of renewable energy in the future?

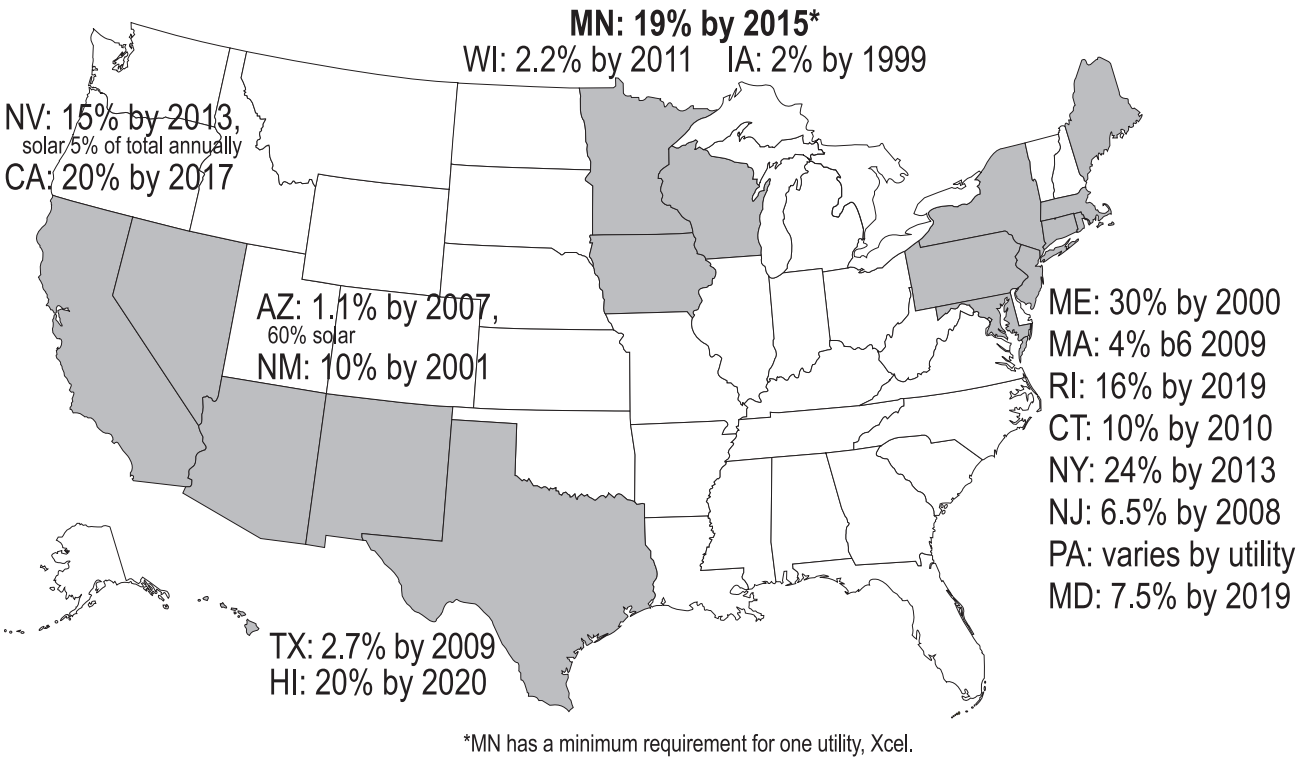
The REO is expected to approximately double the current amount of MWh produced by renewable energy.

Since the Renewable Energy Objective is not a mandate (except for Xcel Energy), why does the Department expect that the levels set in the REO will be fully met?

There are three primary reasons:

1. Commercial-scale wind generation has proven to be a competitively priced energy source. In addition, measures are being taken to make small-scale, community-based wind generation more competitive in the energy marketplace.
2. Resources are currently being devoted to studying the impact of intermittent and variable wind generation on the operation of the electric grid. These studies are focused on finding ways to mitigate or compensate for this variability in order to integrate much larger amounts of wind energy successfully into the system without jeopardizing grid reliability.
3. The REO statute was firmed up during the 2003 Legislative session to allow the creation and development of a renewable energy tracking and trading program which further expands the potential market for renewable energy. Provisions were also put into the REO statute requiring vigorous and active policy compliance oversight, standards for testing compliance and reporting to the legislature on compliance.

Minnesota is among the leading states in electricity generated from renewable *fuels*



*MN has a minimum requirement for one utility, Xcel.

According to the Union of Concerned Scientists: http://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=47

Minnesota's renewable electricity leadership has significant environmental benefits!

The production of electricity using renewable fuels has and will continue to have significant environmental benefits by replacing coal, the dominant electricity generating fuel. Annually, Minnesota's current 11% renewable electricity generation avoids over 5 million tons of carbon dioxide and 160 pounds of mercury emissions. In 2015, when at least 20% of the state's electricity is from renewable fuels, 12.7 million tons of carbon dioxide and 418 pounds of mercury will be avoided.

	2003 Renewables	**Added Renewables**	**2015 Renewables**
MWh	6,195,395	9,337,890	15,533,285
Avoided CO2 tons	5,080,224	7,657,070	12,737,294
Avoided SOx tons	12,391	18,676	31,067
Avoided NOx tons	10,445	17,058	27,503
Avoided Hg lbs	163	255	418

Assumptions:

carbon dioxide: 1640 lbs/MWh
sulfur oxides: 5.98 lbs/MWh
nitrogen oxides: 3.93 lbs/MWh
mercury: 0.0000283 lbs/MWh

Minnesota's renewable electricity leadership has significant economic benefits!

Supplemental Income for Farmers

- Estimated cost per turbine is $1-2 million, depending on size, with a typical life expectancy of 20 - 30 years. Once the turbines are fully paid for, profits to farmers who own and operate one or two turbines can reach $100,000 per year or more, depending on the electricity contract and level of electricity production. Some farmers have contracts with Xcel for 25 years.
- According to the trade organization Windustry, farmers in Southern Minnesota who choose only to lease their land to wind developers receive annually between $2,500 to $5,000 per turbine.
- A 2003 study by the National Wind Coordinating Committee estimated that land owners in Lincoln County, Minnesota, receive total net annual revenue of more than $500,000 from land leased and purchased by wind energy developers.

Job Creation:

- The wind power plant near Lake Benton, Minnesota, is the second largest employer in the town after the school district, according to Windustry. During its construction, Lake Benton I employed approximately 200 people, with 50 full time jobs.
- In Minnesota, a company in the small town of Porter (SMI & Hydraulics) has been building wind turbine towers for the last few years. This is one of the most important segments of the company and it is expected to grow.
- Several hundred people are employed in the wind energy component manufacturing sector just across the Minnesota border at LM Glasfiber (a wind turbine blade manufacturer in Grand Forks) and DMI Industries (a tower manufacturer in West Fargo). As the wind industry continues to grow it is anticipated that wind energy companies will seek to bring additional manufacturing facilities to the Midwest. In addition, existing companies will develop new products to serve the wind industry.

Business Development

- Several companies have been created in Minnesota to support the wind power industry. Among them, a company called Minwind, initially formed by a group of nearly 70 farmers who have built four wind turbines. Minwind is in the process of building seven more large wind turbines. There are now more than 200 farmers involved.
- Following President Bush's signing of the PTC bill in September of 2004, Great River Energy, Minnesota's second largest utility, announced plans to purchase the output of a 100-megawatt wind project in southwestern Minnesota. The project is scheduled to deliver energy to Great River Energy in 2005 to meet a portion of the energy needs of 29,000 cooperative members and fulfill part of Great River Energy's Renewable Energy Objective.

Increased Tax Revenues

- According to Windustry, property payments from wind power projects generally range from one to three percent of the project's value.
- Lincoln and Pipestone counties have received substantial tax revenues from the wind power projects in Buffalo Ridge. The counties received approximately $1.2 million in tax revenues in 2000.
- An article by Windustry indicated that laws passed in 2002 make it possible for a 100-megawatt wind plant to generate approximately $370,000 in annual tax revenue for the duration of the project.

Minnesota policies and programs promote the generation of electricity from renewable fuels

Minnesota's renewable electricity leadership stems from three types of very successful programs and policies designed to promote the generation of electricity from renewable fuels:

1. Financial support
2. Mandates, Requirements and Objectives
3. Research and Development of renewable technologies.

Financial Support

- State wind production incentive payment of $0.015/kWh - limited to projects with less than 2MW of nameplate capacity with a program limit of 200 MW.
- Federal Production Tax Incentive $0.015/kWh tax incentive adjusted for inflation (currently $0.018/kWh).
- Accelerated depreciation
- LCMR Community wind rebates (2 active @ $150,000; 2 anticipated @ $200,000)
- Net metering (retail & average retail rates) for sub 40 kW systems
- Low-interest loan programs available to farmers developing renewable energy projects through the MN Department of Agriculture's Rural Finance Authority
- State sales tax exemption (Wind & Photovoltaics)
- State property tax exemption
- State production tax exemption for projects sited in Job Opportunity Building Zones (JOBZ).
- Xcel Renewable Development Fund
- MN Public utilities that have met their renewable energy objectives may spend 5 percent of CIP funds to construct renewable energy electric generation facilities.
- Green Power Premiums
- Federal Renewable Energy Production Incentive (REPI) - annually appropriated payment program (versus tax incentive) that mirrors federal PTC for non-taxable entities (Note: currently unavailable for new projects)
- USDA 9006 funding (competitive) - $23 million FY04; MN has been successful at receiving significant portion in both years offered
- USDA Value Added Grant Program - $13.2 million FY04

Mandates, Requirements and Objectives

- **Wind**: Xcel is required to acquire 1,125 MW of wind capacity (425, 400, 300 MW increments). At least 100 MW must consist of projects with nameplate capacities 2 MW or less.
- **Biomass:** Xcel energy is required to acquire 110 MW of biomass capacity
- **Renewable Energy Objective:** Utilities (IOU, G&T Cooperatives, and municipal power agencies) must make a "good faith effort" to generate or purchase electricity from renewable resources to account for 1 percent of total sales in 2005, and 10 percent by 2015. Xcel energy is required to meet this objective.
- **Integrated Resource Planning:** The Public Utilities Commission is prohibited from approving a new or refurbished nonrenewable energy facility unless the utility has demonstrated that a renewable energy facility is not in the public interest.

Minnesota policies and programs continued:

Research

- Approximately $20 million for the establishment of the Initiative for Renewable Energy and the Environment (IREE) to develop bio-based and other renewable resources and processes.
- Xcel Energy must contribute $16 million annually to fund renewable energy research and development through the Renewable Development Fund.
- The Department of Commerce Wind Resource Assessment Project has collected data from monitoring towers and existing wind turbines since 1982. This data is provided to potential wind energy developers and used to develop GIS-based maps of the state's wind resource.

Statutory Definitions of Renewable Energy

216B.1691 Renewable energy objectives.

Subdivision 1. **Definitions.** (a) Unless otherwise specified in law, "eligible energy technology" means an energy technology that: (1) generates electricity from the following **renewable** energy sources: solar; wind; hydroelectric with a capacity of less than 60 megawatts; hydrogen, provided that after January 1, 2010, the hydrogen must be generated from the resources listed in this clause; or biomass, which includes an energy recovery facility used to capture the heat value of mixed municipal solid waste or refuse-derived fuel from mixed municipal solid waste as a primary fuel;

216B.2411 Distributed energy resources.

Subdivision 1. **Generation projects**. (a) Any municipality or rural electric association providing electric service and subject to section 216B.241 that is meeting the objectives under section 216B.1691 may, and each public utility may, use five percent of the total amount to be spent on energy conservation improvements under section 216B.241, on: (1) projects in Minnesota to construct an electric generating facility that utilizes eligible **renewable** energy sources as defined in subdivision 2, such as methane or other combustible gases derived from the processing of plant or animal wastes, biomass fuels such as short-rotation woody or fibrous agricultural crops, or other **renewable** fuel, as its primary fuel source…

Subd. 2. **Definitions**. (a) For the purposes of this section, the terms defined in this subdivision and section 216B.241, subdivision 1, have the meanings given them. (b) "Eligible **renewable** energy sources" means fuels and technologies to generate electricity through the use of any of the resources listed in section 216B.1691, subdivision 1, paragraph (a), clause (1), except that the term "biomass" has the meaning provided under paragraph (c). (c) "Biomass" includes: (1) methane or other combustible gases derived from the processing of plant or animal material; (2) alternative fuels derived from soybean and other agricultural plant oils or animal fats; (3) combustion of barley hulls, corn, soy-based products, or other agricultural products; (4) wood residue from the wood products industry in Minnesota or other wood products such as short-rotation woody or fibrous agricultural crops; and (5) landfill gas, mixed municipal solid waste, and refuse-derived fuel from mixed municipal solid waste.

216B.2422 Resource planning; renewable energy.

Subdivision 1. **Definitions.** (a) For purposes of this section, the terms defined in this subdivision have the meanings given them.

(c) "**Renewable** energy" means electricity generated through use of any of the following resources:
(1) wind;
(2) solar;
(3) geothermal;
(4) hydro;
(5) trees or other vegetation; or
(6) landfill gas.

216B.243 Certificate of need for large energy facility.

Subd. 3a. **Use of renewable resource.** The commission may not issue a certificate of need under this section for a large energy facility that generates electric power by means of a nonrenewable energy source, or that transmits electric power generated by means of a nonrenewable energy source, unless the applicant for the certificate has demonstrated to the commission's satisfaction that it has explored the possibility of generating power by means of renewable energy sources and has demonstrated that the alternative selected is less expensive (including environmental costs) than power generated by a renewable energy source. For purposes of this subdivision, "**renewable** energy source" includes hydro, wind, solar, and geothermal energy and the use of trees or other vegetation as fuel.

216C.051 Legislative Electric Energy Task Force.

Subd. 7. Guidelines; preferred electric generation sources; definitions.

(c) The following energy sources for generating electric power distributed in the state, listed in their descending order of preference, based on minimizing long-term negative environmental, social, and economic burdens imposed by the specific energy sources, are: (1) wind and solar; (2) biomass and low-head or refurbished hydropower; (3) decomposition gases produced by solid waste management facilities, natural gas-fired cogeneration, and waste materials or byproducts combined with natural gas;

(f) For the purposes of this section, "preferred" or "**renewable**" energy sources are those described in paragraph (c), clauses (1) to (3), and "subordinate" or "traditional" energy sources are those described in paragraph (c), clauses (4) and (5).