STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

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In the matter, on the Commission's own motion, to establish the Michigan Renewables Energy Program.	))))	Case No. U-12915

At the April 17, 2001 meeting of the Michigan Public Service Commission in Lansing, Michigan.

PRESENT: Hon. Laura Chappelle, Chairman
Hon. David A. Svanda, Commissioner
Hon. Robert B. Nelson, Commissioner

ORDER INITIATING COMMENT PROCEEDING

On June 5, 2000, Public Act 141 of 2000 (Act 141) took effect. Subsection 10r (6) provides:

> The commission shall establish the Michigan renewables energy program. The program shall be designed to inform customers in this state of the availability and value of using renewable energy generation and the potential of reduced pollution. The program shall also be designed to promote the use of existing renewable energy sources and encourage the development of new facilities.

MCL 460.10r(6); MSA 22.13(10r)(6).

On December 14, 2000, the Commission Staff (Staff) submitted a comprehensive proposal for the implementation of Subsection 10r(6). The Staff's proposal, which is attached to this order as Exhibit A (without attachments C-1, C-2, and C-3), indicates that renewable fuels currently account for less than 3 percent of Michigan's electric generation. However, the Staff believes that

renewable resource technologies have the potential to contribute significantly to electricity supply in a cost-effective and environmentally sound manner.

According to the Staff, the increased utilization of renewables in Michigan depends in large measure on the ability of the industry to contain costs and the elimination of other barriers to development, including burdensome utility interconnection procedures, the inability to maintain adequate fuel supplies, and the public's general lack of awareness of the benefits associated with renewable energy. The Staff suggests that these objectives could be furthered by a coordination of efforts with existing renewable energy projects in Michigan and through the integration of efforts to promote the use of renewables with other Act 141 initiatives, such as the customer education program being developed in Case No. U-12133.

The Staff also suggests creation of a new website that could be used to educate the public regarding renewable energy programs in Michigan and elsewhere. According to the Staff, the primary page of this website could be devoted to the Michigan Renewables Energy Program, with numerous links to other websites from across the country dealing with related topics. In addition, the Staff recommends creation of a renewable energy computer automated mailing list, which could provide information regarding federal and state agencies, organizations, and individuals interested in renewable energy issues.

In light of the statutory mandate, the Commission finds that a proceeding should be initiated to receive public comments regarding the Staff's December 14, 2000 proposal for implementation of the Michigan Renewables Energy Program. In particular, the Commission seeks comments regarding how the Staff's proposals may be designed and implemented through use of existing or new funding mechanisms and through coordination with educational programs. In addition, the Commission welcomes comments regarding how the performance of the Michigan Renewables

Energy Program should be measured. The Commission believes that the benefits of renewable energy detailed in the Staff's proposal (pollution reduction, supply diversity, and job creation) can be realized with a properly designed and implemented program.

All comments relating the Staff's December 14, 2000 proposal for implementation of the Michigan Renewables Energy Program should be filed by May 17, 2001. Reply comments should be filed by May 31, 2001.

The Commission FINDS that:

a. Jurisdiction is pursuant to 1991 PA 179, as amended, MCL 484.2101 et seq.; MSA 22.1469(101) et seq.; 1969 PA 306, as amended, MCL 24.201 et seq.; MSA 3.560(101) et seq.; and the Commission's Rules of Practice and Procedure, as amended, 1992 AACS, R 460.17101 et seq.

b. Comments related to the Staff's December 14, 2000 proposal for implementation of the Michigan Renewables Energy Program should be filed by May 17, 2001, and reply comments should be filed by May 31, 2001.

THEREFORE, IT IS ORDERED that comments related to the Commission Staff's December 14, 2000 proposal for implementation of the Michigan Renewables Energy Program should be filed by May 17, 2001, and reply comments should be filed by May 31, 2001. An original and 15 copies of any comments should be filed with the Executive Secretary, Michigan Public Service Commission, 6545 Mercantile Way, P.O. Box 30221, Lansing, Michigan 48909, and should reference Case No. U-12915.

The Commission reserves jurisdiction and may issue further orders as necessary.

MICHIGAN PUBLIC SERVICE COMMISSION

/s/ Laura Chappelle
Chairman

(SEAL)

/s/ David A. Svanda
Commissioner

/s/ Robert B. Nelson
Commissioner

By its action of April 17, 2001.

/s/ Dorothy Wideman
Its Executive Secretary

The Commission reserves jurisdiction and may issue further orders as necessary.

MICHIGAN PUBLIC SERVICE COMMISSION

Chairman

Commissioner

Commissioner

By its action of April 17, 2001.

Its Executive Secretary

Exhibit A

Michigan Renewables Energy Program Proposal

Submitted by
Executive Secretary Division
Michigan Public Service Commission
Department of Consumer & Industry Services

December 14, 2000

Table of Contents

Executive Summary

On June 5, 2000, Michigan's new Customer Choice and Electricity Reliability Act, Public Act 141 of 2000 (Act 141), took effect. Section 10r (6) of Act 141 states:

> "The [Michigan Public Service] commission shall establish the Michigan renewables energy program. The program shall be designed to inform customers in this state of the availability and value of using renewable energy generation and the potential of reduced pollution. The program shall also be designed to promote the use of existing renewable energy sources and encourage the development of new facilities."

In addition to the development of a Michigan Renewables Energy Program, Act 141 includes numerous opportunities to promote and develop renewable energy resources.

Program Recommendation: This proposal highlights renewable energy resources related to Act 141 and government/utility activities, and establishes the framework for developing a comprehensive statewide effort.

Staff recommends proceeding with the development of a Michigan Renewables Energy Program that will inform customers and promote the use of renewable energy resources, and encourage the development of new facilities in Michigan. The Program could be designed and implemented through the utilization of existing or new funding mechanisms and education programs, and monitoring of successful renewable programs or opportunities.

Staff proposes looking at the possibility of utilizing low-income and energy efficiency funds if they become available through securitization savings. These funds could be used to encourage the development of new renewable energy resource facilities, and help diversify and offer more efficient electricity supplies in Michigan. Also, Staff proposes informing customers of the availability and value of using renewable energy resources, and the potential of reduced pollution through the advertising efforts included in the Statewide Customer Education Program proposed in Case No. U-12133.

Additionally, a Michigan Renewables Energy Web site and an automated electronic mailing list service could be developed to inform customers and promote renewable energy through existing MPSC resources. Staff would also continue to examine government and utility programs, MPSC cases, etc. to see what is going on, assess what we find, and take appropriate actions or make recommendations to the Commission on opportunities to inform customers and promote the use of renewable energy resources, and encourage the development of new facilities.

Background: Renewable energy resources are sources of electricity generation from solar, wind, biomass and small hydroelectric facilities, and also technologies that can offset the production of electricity from fossil fuels. These resources vary in their characteristics with the type of resource, but generally produce less pollution and can reduce waste, diversify a utility's electricity supply and help create jobs.

Today, renewables represent less than 3 percent of Michigan's electricity generation, mostly by means of relatively large biomass and hydro facilities. Renewable resource technologies have the potential to contribute significantly to electricity supplies in a cost-effective and environmentally sound manner.

Renewables Energy Electric Generating Technologies Growth in Michigan (In Megawatts)

Technology	*Potential Growth*	*Developed Capacity*
Biomass	***3,135***	***481***
Solar	***Large***	***0.077***
Wind	***7,460***	***0.657***
Hydro	***389***	***451****

*Excludes Ludington pumped storage facility – over 1,800 MW.

Various issues must be considered to develop new renewable energy facilities in Michigan. Not only are economic issues important, but other barriers to development and use and opportunities to eliminate these barriers also need to be addressed. Several barriers to developing renewable energy resources identified by industry representatives and renewable energy literature are:

- ▼ Utility interconnection issues. Fair distribution and transmission interconnection standards, rules, and practices are needed.
- ▼ Maintaining a reliable supply of renewable energy system products.
- ▼ Lack of awareness and information for customers about the availability of renewable energy system products.
- ▼ Lack of value placed on public benefits (reduced pollution and greater energy diversity) of renewables.

Additional barriers are identified in the proposal.

Other states have developed programs and policies to help promote renewable energy and reduce barriers to developing renewable resources. A few key programs are: 1) System Benefits Charge – a small charge levied on generation or distribution companies or customers for use of the transmission or distribution system, and 2) Net Metering Rules – allows customers to interconnect and feed surplus power back into the grid during periods when generation exceeds a customer's own use and only pay for net electricity used over an entire month or year. These rules make it easier and more affordable for customers to generate their own power from renewable energy sources. The state programs and policies are discussed in more detail within the proposal.

Renewable Resources in Michigan: The primary challenge to greater utilization of renewable energy resources is cost and interconnection standards in the electric industry. Increased utilization

in Michigan is expected when the cost to develop renewable facilities is deemed economical and regulatory and technical issues are resolved. This proposal includes a description of each renewable resource and details the capacity of each type of utility facility, the environmental impact of the resource, and the opportunities and barriers to developing that specific resource.

Michigan Efforts to Promote Renewables: There are many examples of renewable energy project efforts operating in Michigan. The proposal discusses 11 Michigan projects, predominantly utility and government-sponsored programs, that are connected to the utility grid. Many more projects exist, but are not listed, such as solar homes, off-grid small wind generators, etc. By drawing on the experience of these profiled projects and others, renewables may be developed further in Michigan.

Program Recommendation

On June 5, 2000, Michigan's new Customer Choice and Electricity Reliability Act, Public Act 141 of 2000 (Act 141), took effect. Section 10r (6) of Act 141 states:

> "The [Michigan Public Service] commission shall establish the Michigan renewables energy program. The program shall be designed to inform customers in this state of the availability and value of using renewable energy generation and the potential of reduced pollution. The program shall also be designed to promote the use of existing renewable energy sources and encourage the development of new facilities."

In addition to the development of a Michigan Renewables Energy Program, Act 141 includes numerous opportunities to promote and develop renewable energy resources. These options are in Sections 10a (2) and (6), 10b (1), (2) and (3), 10d (6), 10e (1), 10q (4), 10r (1), (2) and (3), 10v and 10w of the law. Among other things, the sections require licensing of all alternative electric suppliers; opportunities for self-service power and providers to own, construct or operate electric distribution facilities or electric meter equipment; unbundling of utility rates; rates, terms and conditions of electric service that promotes the development of new generation, transmission and distribution technologies; reliable and competitive rates for all customers; a low-income and energy efficiency fund; connection of merchant plants to the transmission and distribution systems; standards for all disclosures, explanations or sales information disseminated by a person selling electric service; a requirement that suppliers disclose fuel mix and emissions of sulfur dioxide, carbon dioxide, and oxides of nitrogen; a customer education program; posting of disclosure information on the MPSC Web site; larger utilities to file a plan detailing measures to expand the available transmission capability by at least 2000 megawatts (MW); and investor-owned electric utilities to either join a Federal Energy Regulatory Commission (FERC)-approved multi-state regional or independent transmission system organization, or divest their interests in their transmission facilities to independent transmission owners.

This proposal highlights renewable energy resources related to Act 141 and government/utility activities, and establishes the framework for developing a comprehensive statewide effort.

Program Design

Staff recommends proceeding with the development of a Michigan Renewables Energy Program that will inform customers and promote the use of renewable energy resources, and encourage the development of new facilities in Michigan. The Program could be designed and implemented through the utilization of existing or new funding mechanisms and education programs, and monitoring of successful renewable energy programs or opportunities. For example, the

Department of Consumer & Industry Services' Energy Office is currently involved in several renewable energy projects. Staff suggests, therefore, coordinating Program activities with this office.

Staff proposes looking at the possibility of utilizing low-income and energy efficiency funds if they become available through securitization savings. These funds could be used to encourage the development of new renewable energy facilities, and help diversify and offer more efficient electricity supplies in Michigan.

Additionally, Staff proposes informing customers of the availability and value of using renewable energy resources, and the potential of reduced pollution through the proposed and existing education programs and resources listed below:

Statewide Customer Education Program

An opportunity for promoting renewables energy might be to include information on renewables in the $26.7 million Statewide Customer Education Program advertising campaign proposed in Case No. U-12133. Section 10r (2) of Act 141 requires the establishment of funding for a statewide education program. The research efforts outlined in the education plan could easily be revised to include telephone survey questions related to customer interest in renewable energy and the need for education or information on renewables. The education program also intends to implement a statewide mass media campaign and a call center. The inclusion of renewables energy in the campaign would provide a more effective and efficient way to reach customers. A portion of the statewide education fund could be dedicated to the Michigan Renewables Energy Program goals. Also, Section 10a (6) of Act 141 opens up important renewable energy opportunities by not prohibiting self-service power. The Michigan renewable energy education program could provide case studies and education opportunities for self-service power.

Michigan Renewables Energy Web Site

A Michigan Renewables Energy Web site could be developed by using existing MPSC resources to promote/distribute renewable energy materials and information, and link to other renewable sites. Other sites might include the Department of Consumer & Industry Services' Energy Office, Great Lakes Renewable Energy Association (GLREA), Center for Renewable Energy & Sustainable Technology, U. S. Department of Energy (DOE), American Solar Energy Society, American Wind Energy Association, and many others.

In addition to the above-mentioned sites, the DOE's National Renewable Energy Laboratory hosts an extensive Web site that includes a Michigan-specific section that could be expanded to incorporate additional Michigan information. A primary page could be set up for the Michigan Renewables Energy Program as one vehicle to promote renewable energy, and this page could simply serve as a directory page for appropriate links to renewable energy resources on the Web.

The Energy Office and its Biomass Energy Program, Midwest Renewable Energy Association, GLREA, and the National Renewable Energy Laboratory could ensure that resources are identified and information is included on the existing Web site in support of the Act 141 requirement. This approach could be more effective than creating an independent Web site in response to requirements of Act 141.

Section 10a (2) of Act 141 requires licensing for alternative electric suppliers. The Michigan Renewables Energy Program Web site could include a directory of suppliers that identifies if the supplier offers renewable energy sources. Section 10r (1) and (3) requires establishing disclosure standards to provide detailed information on electric service generation sources, including renewables. Customers could use this information in comparing power supply options. As required by Act 141, the information must be posted on the MPSC Web site, and could be linked to the Michigan Renewables Energy Program Web site.

Section 10q (4) of Act 141 allows self-service power providers to own, construct or operate electric distribution facilities or electric meter equipment for the purpose of providing or using self-service power. The Michigan Renewables Energy Program Web site could help consumers understand available options.

Renewable Energy Automated Electronic Mailing List Service

A renewable energy computer automated mailing list could be developed that includes federal and state agencies, organizations, and individuals interested in renewable energy issues. The MPSC, Energy Office, or another group could take the lead to develop and maintain the e-mail distribution list to be used as a resource to communicate, outreach, and share information on renewable energy.

Staff would also continue to examine government and utility programs, MPSC cases, etc. to see what is going on, assess what we find, and take appropriate actions or make appropriate recommendations to the Commission on opportunities to inform customers and promote the use of renewable energy sources, and encourage the development of new renewable energy facilities in Michigan.

Organization of the Report

The next section provides background information on the benefits, potential for reduced pollution and growth, customer research, potential barriers, and other states' promotion of renewable energy resources. The last two sections report on viable renewable energy in Michigan related to solar, wind, hydro and biomass resources; the environmental impact of renewable resource systems; opportunities and barriers to the development of each renewable resource; several renewable project efforts underway; and provides insights on the project experiences in Michigan.

Background

Renewable energy resources are sources of electricity generation from solar, wind, biomass and small hydroelectric facilities, and also technologies that can offset the production of electricity from fossil fuels; for example, by providing light, hot water, and space heating and cooling. These resources are often referred to as "green power" options. A resource is called renewable if it can be naturally replenished and if its rate of use does not exceed its rate of replenishment. In general, renewables have lower emissions than non-renewables and conserve natural resources. Renewable energy resources often use fuel sources that are essentially free (such as the sun or wind) or relatively inexpensive (such as waste from forestry, agricultural, or other biomass).

Renewable energy resources take a variety of forms. Electricity from renewables can be interconnected with the electric grid or can stand alone, independent of the grid. Renewable energy sources can take the form of large, centralized facilities, similar to conventional fossil fuel plants, but usually on a much smaller scale, or they can be small, decentralized, and dispersed throughout a utility's system. The renewable resource can be owned and operated by a regulated electric utility, by a non-utility generator, or an end-use customer.

Benefits of Renewable Energy Resources

The benefits of using renewable energy resources vary in their characteristics with the type of resource, but generally fall into three categories:

- ▼ Renewable energy sources can reduce pollution.
- ▼ Renewable energy sources diversify a utility's electricity supply.
- ▼ Renewable energy sources can help create jobs and improve industrial competitiveness.

Alan Nogee, of the Union of Concerned Scientists, stated in his testimony before a Senate Committee on Energy and Natural Resources on April 13, 2000, some of the benefits of renewables:

> "Renewables also diversify our energy resource portfolio, reducing exposure to energy supply interruptions and price volatility which can affect the entire economy. They provide additional options for customers, which will increase customer satisfaction with retail choice, and provide additional competition with fossil and nuclear generators, which can help restrain fuel price increases."

Potential for Reduced Pollution from Renewable Energy

According to the U.S. Environmental Protection Agency, the electricity industry is a major

contributor to air pollution, responsible for 66 percent of U.S. sulfur dioxide air emissions, 39 percent of nitrogen oxide emissions, 36 percent of man-made carbon dioxide emissions, and 21 percent of mercury emissions.

Act 141 encourages change for electric generation in Michigan and development and use of renewables. In the 1960s and 1970s, Michigan primarily used coal to generate electricity, and in the 1980s and 1990s, nuclear power was used to generate 16-30 percent of Michigan's electric needs.[1] Now, with the changing electric industry, the time may be right for considering renewable energy as an alternative resource to conventional generation.

Clean renewable energy resources, notably solar and wind, represent an attractive and often publicly acceptable option for reducing air emissions. Although biomass energy resources are not pollution free, they emit little or no sulfur dioxide. Also, when biomass fuel supplies and generating facilities are managed conscientiously, they may produce little, if any, net greenhouse gas emissions.

Potential for Renewable Energy Growth

Today, renewables represent less than 3 percent of Michigan's electricity generation, mostly by means of relatively large biomass and hydroelectric facilities. Renewable resource technologies have the potential to contribute significantly to electricity supplies in a cost-effective and environmentally sound manner, both as supply and demand management options. The most comprehensive study to date, the Union of Concerned Scientists' (UCS) *Powering the Midwest* (1993), provided a broad brush analysis of renewable energy potential in the state of Michigan. Many of the UCS assumptions were controversial, but the broad nature of the report's findings is generally supported: Michigan has a large untapped potential for renewable energy systems to contribute to the state's overall energy needs.

Many kinds of renewable energy technologies are undergoing rapid development toward commercialization. In some cases, they may already be fully competitive with the cost, efficiency, and convenience of fossil fuels. In recent years, wind and solar options have been experiencing technological improvement and growth in worldwide sales. According to industry reports, wind energy is a $2 billion per year business worldwide, expanding at a rate of 25 percent per year. In the United States, however, wind power provides less than 1 percent of total electricity.[2] Government reports indicate solar energy sales doubled in the U.S. from 1996 to 1999.[3] As technologies mature and sales increase, economies of mass production are expected to reduce costs, leading to larger

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[1]Source: U.S. Department of Energy, Energy Information Administration, State Energy Data Report 1997, September 1999, p. 166.

[2]Source: Flavin, Christopher, and Dunn, Seth, Rising Sun, Gathering Winds: Policies to Stabilize the Climate and Strengthen Economies, November 1997.

[3]Source: U.S. DOE, Energy Information Administration, Form EIA-63B, "Annual Photovoltaic Module/Cell Manufacturers Survey, 1999.

markets. Shell Oil Company forecasters expect renewable resources to provide 5-10 percent of the world's energy needs by the year 2025 and 50 percent by 2050.[4] The federal government and various agencies and independent organizations have estimated future growth of renewable energy in Michigan as shown on the following table.[5]

Renewables Energy Electric Generating Technologies Growth in Michigan
(In Megawatts)

Technology	*Potential Growth*	*Developed Capacity*
Biomass	***3,135***	***481***
Solar	***Large***	***0.077***
Wind	***7,460***	***0.657***
Hydro	***389***	***451****

*Excludes Ludington pumped storage facility – over 1,800 MW.

Customer Research

Michigan consumers need good information about products they are offered when purchasing electricity or using renewable energy supplies or devices in their homes or businesses. A program designed to promote the use of renewable energy resources must first find out what customers know about renewables, inform them of its availability, and educate them on how to choose. Customers need specific education on what renewables are, why they are important, and what opportunities are available, etc. This objective can only be met by a well-planned educational program that provides customers with the awareness and education needed.

The National Renewable Energy Laboratory's report *"Willingness to Pay for Electricity from Renewable Resources: A Review of Utility Market Research"* (Farhar, 1999) concluded from 14 surveys that customers favor renewable energy sources but tend to know very little about them; customers prefer renewable sources of electricity and the majority are willing to pay an incremental amount more for it; an average of 70 percent stated a willingness to pay at least $5 per month for

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[4]Source: Shell, The Royal Dutch/Shell Group of Companies;
Web site: http://134.146.1.138/royal-en/content/0,5028,25551-51054,00.html.

[5]Source: Union of Concerned Scientists, Biomass Energy, Cambridge, MA, 1994, p. 55;
American Wind Energy Association, Wind Project Data Base for Michigan, November 1, 1999,
URL: www.awea.org/projects/michigan.html;
Conner, Alison M., and Francfort, James E., Idaho National Engineering and Environmental Laboratory, U.S. Hydropower Resource Assessment for Michigan, Idaho Falls, ID, 1998, p. 2;
U.S. Department of Energy, Renewable Electric Plant Information System, National Renewable Energy Laboratory, June 29, 1998, URL: www.eren.doe.gov/repis/;
U.S. Department of the Interior, Bureau of Reclamation, The Role of Hydropower Development in the U.S. Energy Equation, January 1, 1999, URL: http://borworld.usbr.gov/power/edu/hydrole.htm.

electricity from renewable sources; and a majority of utility customers want their utility companies to develop new renewable sources of electricity.

Examples of these findings include the Traverse City Light & Power Wind Project in which approximately 200 homes pay a $7.58 increase in their monthly bills, and the Detroit Edison Solar*Currents*® Program in which nearly 200 subscribing customers pay $6.59 per month for 100 Watts of solar service.

Potential Barriers to Promoting Renewables

Various issues must be considered to develop new renewable energy facilities in Michigan. Not only are economic issues important, but other barriers to development and use and opportunities to eliminate these barriers also need to be addressed. Some of the barriers to developing renewable energy resources identified by industry representatives and renewable energy literature are as follows:

- ▼ Property tax assessments based on installation cost rather than on the value of the power produced, which places renewable energy systems at a disadvantage due to their high capital cost.
- ▼ Utility interconnection issues. Fair distribution and transmission interconnection standards, rules, and practices are needed (see Attachment A).
- ▼ Lack of an infrastructure or certification of qualified renewable energy systems installers.
- ▼ Lack of knowledgeable code inspectors for renewable energy installations.
- ▼ Lack of accurate and detailed information about renewable energy resources in Michigan; for example, detailed wind atlases.
- ▼ High cost and financing costs of some renewable energy technologies.
- ▼ Maintaining a reliable supply of renewable energy system products.
- ▼ Lack of awareness and information by customers about the availability of renewable energy system products.
- ▼ Lack of competitive cost advantage against entrenched industries.
- ▼ Lack of value placed on the public benefits (reduced pollution and greater energy diversity) of renewables.

Other States' Promotion of Renewable Energy Resources

During the past few years, interest in using new renewable energy sources has grown in many states. Most states have made commitments as part of a package to restructure the electricity industry to help clean up the environment while increasing competition. As the Union of Concerned Scientists concluded:

> "While states have used a variety of approaches to increase renewables, state electricity standards and funds have been the most important policies for creating long-lasting markets and providing measurable commitments to renewables development. Other approaches – such as net metering, disclosure of fuel sources and emissions, and encouraging customer choice of renewable electricity – have also been important

in overcoming particular market barriers to increasing renewables."

The following list contains some of the other states' regulatory programs and policies developed to help promote renewable energy and reduce barriers to developing renewable resources.[6]

Renewable Electricity Portfolio Standard and Set-Asides for New Generation
These standards ensured that a minimum percentage or fixed amount of electricity will be produced from renewable energy sources. About 10 states, including Connecticut, Maine, Massachusetts, Pennsylvania, and Wisconsin, have some version of these in place. Most of these states also have electric restructuring legislation in place.

System Benefits Charge/Public Benefit Charge
These charges generally refer to a small charge levied on generation or distribution companies or their customers for use of the transmission or distribution system. These funds support renewable electricity development. There are about 17 states, including California, Illinois, New York, and Pennsylvania, with these types of funds.

Net Metering Rules
Net metering allows customers to interconnect and feed surplus power back into the grid during periods when generation exceeds a customer's own use and only pay for net electricity used over an entire month or year. This policy makes it easier and more affordable for customers to generate their own power from renewable energy sources. More than 30 states have net metering; some of these states are Illinois, Montana, New York, Ohio, Pennsylvania, Virginia, and Wisconsin.

Disclosure and Certification
More than 10 states (including Michigan, California, Illinois, New Hampshire, Pennsylvania, and Texas) require electric suppliers to disclose standard information to all customers on the fuel sources used to produce the electricity they sell. Also, some of these states require independent certification of the supply resources used when suppliers make a green claim regarding the electricity they sell.

Line Extension Analysis and Policies
About four states (Arizona, Colorado, New Mexico, and Texas) require that when an electric power line extension is requested, information on renewable energy alternatives is to be analyzed and provided to the requesting customer. In some jurisdictions, the utility must help to finance the renewable energy off-grid alternative if it is cheaper than the line extension.

Research and Outreach
About seven states (including California, New York, North Carolina, and Washington) funded research and outreach programs on renewable energy. The funding is either by the state or electric and gas utilities.

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[6]Source: Kushler, Martin, and Witte, Patti, American Council for an Energy Efficient Economy, A Review and Early Assessment of Public Benefit Policies Under Electric Restructuring, Volume II, September 2000; U.S. Department of Energy, Database of State Incentives for Renewable Energy: Rules, Regulations and Policies, October 30, 2000.

Contractor Licensing and Training

About 14 states (including Michigan, Alaska, Arkansas, Colorado, Connecticut, and Nevada) have rules requiring solar contractor licenses. Completion of a technical training program and exam are a requirement for some state licenses.

Equipment Certification/Pre-certification

At least 13 states (including Arizona, California, Maine, New Jersey, and Oregon) have solar equipment certification requirements. In many cases, solar equipment certification requirements are linked to other state incentives, such as tax credits or loan programs. Equipment certification is a major consideration in the development of interconnection standards.

State Construction Policies

Eight states (including Colorado, Maryland, Montana, and Texas) have construction mandates for the use of renewable energy systems, typically requiring that state agencies assess the costs and benefits of incorporating these systems when planning state buildings and facilities.

Solar and Wind Access

The most common forms of solar access laws used throughout the U.S. are solar easements, covenant restrictions, local zoning authority rules, and the granting of solar permits by a governing board. Thirty-four states (including Alaska, California, New Mexico, and New York) either have explicit solar access provisions or allow the creation of solar easements, the most common provision identified. Fourteen of these states have gone beyond simple solar easements and developed provisions for the preservation of solar or wind access. Five of these states allow for the creation of easements for wind energy devices. Solar and wind access laws are created at either the state or local level.

States have also adopted other important policies and rules that help promote renewable energy resources in the electricity systems that are not included above. For example, several states offer tax deductions, exemptions or credits for green power options. About nine states have special economic development programs that are specifically designed to attract renewable energy companies to their state or local areas. Also, more than 15 states offer grants, loans, or lease purchases to encourage installation of green power systems.

Additionally, a report by the DOE, *"Making Connections: Case Studies of Interconnection Barriers and Their Impact on Distributed Power Projects,"* provides a 10-point action plan for reducing technical, business practices, and regulatory barriers (see Attachment B).

Federal Tax Credits

There are several federal tax incentives available to municipals, utilities, etc. for wind, solar, and other projects. For example, a one-and-one-half cent per kWh production incentive payment is currently available to wind, geothermal, solar or biomass power owned by state and local entities and not-for-profit electric cooperatives. The credit is available for the first 10 years of operations commencing between October 1, 1993 and September 30, 2003.

The Production Tax Credit is available to wind and closed-loop biomass facilities owned by private companies that pay income tax. The credit started in 1994 and was extended to 2001. The investment energy tax credit, or business energy tax credit, provides for a 10 percent credit on investment in or purchase of solar or geothermal energy property. Solar properties include solar electricity generation, heating, cooling or hot water systems. This credit is limited to commercial entities.

Renewable Energy Resources in Michigan

The primary challenge to greater utilization of renewable energy resources is cost and interconnection standards in the electric industry. Increased utilization in Michigan is expected when the cost to develop renewable facilities is deemed economical and technical and regulatory issues are resolved. As David Moskovitz stated in a paper for the World Resources Institute:

> "Even renewable technologies that are not yet cost effective in wide-scale applications, such as photovoltaics (PV) may be cost effective in 'niche' applications. Continued research and development and modest utility investments in demonstration-sized facilities promise to reduce costs. New initiatives that support the sustained orderly development of these technologies are needed."

Geothermal resources are not addressed in this report since the National Renewable Energy Laboratory identifies Michigan as having no potential for this resource. The federal government has defined geothermal energy as having a heat source in the ground of at least 122 degrees Fahrenheit. Michigan has some lower temperature geothermal resources, but as far as we know to date, there are none that meets the federal definition. Hydrogen energy is also not addressed, not because it lacks potential in Michigan, but because it is presently considered more as a means of providing energy storage, rather than a renewable energy source in and of itself. As hydrogen energy technologies develop and systems approach widespread commercialization, they may offer renewable energy options for Michigan as well.

A description of each renewable resource – solar, wind, biomass and hydro – follows and details the capacity of each type of utility facility, the environmental impact of the resource, and the opportunities and barriers to developing that specific resource.

Solar

Solar/photovoltaic (PV) energy technology uses solid-state semiconductor materials to capture sunlight and directly convert a portion of the light to electricity. Some PV systems are also integrated with space or water heating systems that transfer waste heat away from the PV panels themselves for use in buildings.

Availability/Capacity of Utility Facilities

According to the National Renewable Energy Laboratory, as of 1999, there were only five reported PV systems interconnected with Michigan's electric utility grid. The generation capacity of these facilities ranges from 0.64 kilowatts (kW) to 28.4 kW. This is a minuscule portion of the state's total installed capacity, which is roughly 20 million kW. There are many more remote systems that are not integrated with the utility grid, but data on them are not readily available.

Environmental Impact

With 2 kW of PV capacity, the following emissions are avoided annually:

Nitrogen Oxide NOx (lbs)	*Sulfur Dioxide SO_2 (lbs)*	*Carbon Dioxide CO_2 (lbs)*
13	*28*	*6,520*

U.S. Environmental Protection Agency Web Page - Annual Emissions Avoided in Michigan

Opportunities and Barriers to Development

Using solar energy to meet a portion of our energy needs may displace fossil fuel energy sources and thus reduce pollution. Originally developed by NASA for use in space flights, PV technology is silent, reliable, has low maintenance, and can be installed anywhere with adequate solar access (that is, places that are not overly shaded). PV systems can be built to any size, from portable watches and calculators that operate on only a fraction of a watt to megawatt-scale utility power plants.

Smaller PV systems are frequently portable. Many PV systems are adjustable in size to meet changing energy needs by adding or removing PV panels and batteries, for example. Usually, stand-alone systems serve small power needs. Popular examples include all varieties of small consumer appliances; auxiliary power, battery charging, and ventilation systems for boats, cars, and recreational vehicles; remote sensing, telecommunications, and weather forecasting equipment; highway construction signs; and providing power for remote homes or cottages.

PV systems can be interconnected with the existing electric utility grid or operate as stand-alone systems with or without batteries to store electricity for use when the sun is not shining. Modern interconnection devices, called power inverters, convert the PV-generated low voltage DC power into 60-cycle AC household current. Inverters provide safe, reliable, automatic switching that manages power flows between solar, batteries, grid-produced electricity, and the loads connected to the system. National standards for the interconnection of inverter-controlled small energy systems, called distributed generation, are presently being developed and are expected to be in place by fall of 2001.[7]

The primary barrier to more widespread use of PV is the relatively high cost.[8] Education regarding the advantages of PV energy will be needed to generate public interest. Although PV may not currently be cost competitive for large-scale electricity generation, technology and manufacturing

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[7]Source: International Electrical and Electronic Engineers Standards Coordinating Committee 21, URL: http://grouper.ieee.org/groupscc21/1547/index.html.

[8]Source: U.S. Department of Energy, National Center for Photovoltaics, Information Resources: Frequently Asked Questions, URL: http://www.nrel.gov/ncpv/.

improvements have reduced production costs significantly and they are expected to continue to decline. Michigan is a relatively cloudy state which could limit the potential success of PV here. However, PV systems can produce some useful energy even on cloudy days, and for many purposes there is a good match between the days with the most intense sunlight, when PV systems produce the most electricity, and the peak days for energy needs.

In order to provide a continuous source of power, some combination of electricity storage and backup system is required with PV. Typically, batteries provide storage and backup generation is supplied by other on-site supplies or by grid interconnection with the local electric distribution utility. Some grid-connected systems rely on the local utility for backup and do not have any storage batteries. Systems with storage batteries, however, can offer extraordinarily high reliability because stored energy can be used on-site to supply at least emergency power needs in the event of a local power outage on the electric grid. Some newer inverter designs incorporate integrated uninterruptible power supply (UPS) protections for use with computers and other electronic equipment.

Efforts are underway to develop systems and techniques so that PV systems can be integrated directly into buildings.[9] A primary example is from a Michigan-based PV company, Bekaert ECD Solar Systems, L.L.C., headquartered in Troy. It makes a "solar shingle" product that is basically a PV system integrated directly into roof shingles. Other efforts are underway or just entering commercialization for PV systems that can be integrated with windows or skylights, wall structures, and the like.

Other Solar Energy Systems

Other solar energy systems available to Michigan consumers can provide significant energy cost savings by supplementing building lighting, water heaters, and heating and cooling systems. Daylighting techniques help to bring glare-free sunlight into building interiors and thus offset the use of electricity for lighting. Daylighting techniques are often very cost effective, measurably boost the performance of students and workers in daylighted spaces, and can be employed in both new buildings and retrofits.[10] Solar water heaters can supplement standard systems. They are particularly good investments for swimming pools and preheating water for industrial or residential purposes. In general, solar water heaters produce more hot water in the summer months when there are more hours of daylight and warmer outdoor temperatures. Solar water heaters are, therefore, a very good match for many facilities that are most used in the summer months. Also, solar designs for active

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[9]Source: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, National Perspective on Distributed Energy Resources, September 13, 1999;
Oliver, Mark, The Role of Renewable Energy in a Sustainable Energy System and the Potential for Building Integrated Photovoltaics, 1999.

[10]Source: Heschong Mahone Group, Daylighting in Schools: An Investigation into the Relationship between Daylighting and Human Performance, August 20, 2000, URL: http://www.h-m-g.com/default.htm;
Lawrence Berkley Labs, Introduction to Daylighting: Systems and Components, December 31, 1995,
URL: http://solstice.crest.org/environment/gotwh/general/lbl-daylight/html/sys-comp2.html.

or passive heating and cooling can be a cost-effective supplement for other sources. Generally speaking, active systems use pumps or fans to move solar heat from one location to another, and passive systems are designed to integrate with building components to soak up sunlight and either put that energy to use right away or store it and release it later.

Wind

Wind energy systems use the wind to turn propeller-like blades, which are connected to an electric generator or turbine. Wind generators are available in a wide range of sizes. Utility-scale generators range up to 2 MW. Small systems for residential use are available in sizes that produce only a few watts up to tens of kW. Most attention to wind generators in recent years has been directed to systems that generate electricity, but wind machines for pumping water and other applications that employ mechanical energy derived from the wind are also practical in certain applications.

Wind electric systems can be interconnected with the utility grid or employed in off-grid systems, usually using batteries for storage. Wind generators are often integrated with diesel generators or solar PV for added reliability. In Michigan, weather patterns generally favor combined wind and solar electric systems, as opposed to either wind or solar alone.

In areas with excellent wind resources, wind generators are cost competitive with fossil fuel generating sources. Recent contracts for wind electricity in the West and Plains states have been at prices between four and five cents per kWh.[11] However, a wind generator's output varies greatly, depending on the wind speed and duration where it is located, so proper siting of wind generators is critically important to system economics. Wind atlases showing average wind speeds over broad land areas have been developed by national energy laboratories and the State of Michigan's Climatology Office. They are accurate enough to give a general picture of the best locations in Michigan for wind energy systems, but detailed local wind prospecting is needed in order to determine the most attractive sites, and consideration must be given to alternative land uses at or near the windy areas.

Availability/Capacity of Utility Facilities

According to the National Renewable Energy Laboratory, as of 1999, there were six wind-powered energy systems connected to Michigan's electric utility grid. The generation capacity of these facilities ranges from five to 600 kW.

Environmental Impact

Wind energy systems produce electricity without combustion, so they do not create air

[11]These reported prices are based, in part, on federal renewable energy production tax credits, but the fossil fuel generators they compete against also receive important tax subsidies and other financial incentives. See, for example, *"Federal Energy Subsidies,"* Renewable Energy Policy Project Research Report No. 11 (July 2000), by Marshall Goldberg, http://www.repp.org.

pollution in their operations. Potential environmental problems or barriers to more widespread wind system utilization include aesthetics (visual concerns), noise, television and radio signal interference, and avian mortality (bird kills). All of these issues continue to receive a great deal of attention on the part of wind system manufacturers and developers. Development of a utility-scale wind farm requires careful siting research, cooperation and communication with local communities and governing authorities. Although turbine noise can be a problem, its potential for negative impact can be reduced by siting wind systems away from populated areas. Wind turbines can interfere through reflection with radio, television, and microwave signals. Although electromagnetic interference can be suppressed by shielding design, careful siting that avoids nearby telecommunication facilities is important. The avian mortality issue should also be considered during siting research and known bird migration routes should be avoided. Manufacturers are addressing these concerns and making progress in mitigating these problems.

Opportunities and Barriers to Development

Wind power, like other renewables, is a non-polluting energy resource that has the potential to offset fossil fuel electricity generation. Michigan's best wind resources are generally found along the entire Great Lakes shoreline. There are good sites throughout Michigan particularly in portions of the northern part of the Lower Peninsula and the northwestern portion of the Upper Peninsula. The wind generator located in Traverse City has been the most successful, producing 900,000 kilowatt-hours (kWh) annually. The American Wind Energy Association ranks Michigan fourteenth in the nation (with a potential for development of 7,460 average MW).

Wind power systems may not yet be cost effective for large-scale electricity generation in most Michigan locations, however, system costs are expected to continue to decline with further research and development and as markets continue to develop. Economies of scale in production and operations are also important factors that continue to make wind generation more cost effective.

Biomass

Biomass energy refers to the use of energy embodied in organic matter. The energy is stored in chemical bonds and when the bonds are broken by microbial digestion, combustion, or decomposition, these substances release stored energy. Biomass energy systems use wood and crop residues, municipal waste, paper mill sludge, manure, and other biomass materials as feedstock. When used for generating electricity, biomass is typically burned to transform water into steam, which is used to turn a turbine attached to a generator. Other biomass energy systems involve "co-firing," where small amounts of biomass are burned along with coal; "gasification," where air is applied to organic feedstock in a high temperature reactor to produce gaseous fuel, which can be used in standard gas turbines; and "anaerobic digestion," the biochemical conversion of biomass material, such as manure, to a gas.

Availability/Capacity of Utility Facilities

According to the National Renewable Energy Laboratory, as of 1999, there were more than 50 biomass systems connected to Michigan's electric grid. The generation capacity of these facilities

ranges from 81 kW to 55,000 kW. Michigan obtains about 1 percent of its electricity needs from biomass facilities.

Environmental Impact

The generation of biomass energy is often more environmentally friendly than using fossil fuels. Sulfur dioxide and nitrogen oxide emissions from biomass combustion are lower than those from most fossil fuels. And, by using waste material that would otherwise end up in landfills, groundwater and the air, biomass energy meets an important societal need.

Opportunities and Barriers to Development

In addition to the favorable environmental impact biomass energy usage provides, a potential economic advantage is also presented. New biomass generation plants can promote the development of local economies through the establishment of related businesses like waste material suppliers.

Co-firing represents a possible near-term opportunity for biomass energy. Co-firing combines a small amount of biomass (5-15 percent by heat content), such as woody crops and grasses, with coal in a traditional coal-fired generating plant. This process reduces the amount of coal used and, correspondingly, reduces the amount of polluting emissions. The National Energy Renewable Laboratory stated:

> "Using biomass for power production is a proven process requiring little capital investment on the part of electricity producers currently burning fossil fuels. Tests have shown that existing equipment at most coal-fired power plants is suitable for co-firing at least small amounts of wood with the coal."

In Michigan, most large-scale biomass energy systems operate in the lumber and pulp and paper industries. By using their operations' waste products as a combustion resource, the mills not only generate electricity, but respond to their own refuse disposal problem.

Small-scale, biomass-fueled electric generation systems (5 kW to 5 MW) have potential for on-site, distributed power applications in Michigan. These systems (both gasification and solid feedstock) can be attached to the transmission or distribution grid close to where consumers use electricity. These modular units can be connected to the power grid on the customer side of the electric meter for continual, self-generated electricity and, if large enough, supply surplus energy to the local grid.

Distributed generation has seen limited application to date. Significant barriers to the development and use of small-scale electric generation systems involve the lack of interconnection standards and protocols in the electric industry. Crucial regulatory, economic, and technical issues must be resolved before successful interconnectivity can occur.

Hydro

Hydroelectric generation systems use the kinetic energy in flowing water to turn a turbine. The three basic hydro power technologies are dams, run-of-the-river, and pumped storage. A dam raises the water level and controls the flow of the water, thus increasing the potential energy. A run-of-the-river system does not use a dam. Instead, it takes advantage of existing elevation drops and relies on the natural stream flow to direct water to the turbine. A pumped storage system pumps water to an upper reservoir where the water is later dropped through a generator to a lower reservoir to generate power. Pumped storage systems are not considered a renewable energy technology because electricity (usually produced from coal or nuclear) is required to pump water to the upper reservoir.

Availability/Capacity of Utility Facilities

According to the National Renewable Energy Laboratory, as of 1999, there were more than 100 hydroelectric systems connected to Michigan's electric utility grid. The generation capacity of these facilities ranges from 3 kW to almost 2,000 MW.[12]

Environmental Impact

Throughout its history, hydro power has proven to be a reliable and cost-effective renewable energy resource. Additionally, hydro power does not produce greenhouse gases or other air pollution. Proponents also maintain that reservoirs formed by hydroelectric dams provide many water-based recreational opportunities and support diverse and productive fisheries. However, opposing views on hydro power technology point to its negative impact on aquatic life and its habitat. These negative effects include changing aquatic ecosystems and water quality and fish kill by the turbines.

Opportunities and Barriers to Development

There is some potential for obtaining additional capacity from hydro power resources in Michigan. FERC points to a potential for increased capacity through "... a combination of new site development, development of generating capability at preexisting impoundments, and equipment upgrade at existing plants." There is also potential for increased development of small hydroelectric (micro-hydro) systems.

Although the potential for additional capacity exists, there has been little development of hydro power in recent years. Large-scale development has been slowed by substantial front-end costs and the time required for permits and licensing (4-6 years are not uncommon). A primary factor in this slowdown is the Electric Consumers Protection Act (ECPA). This law directs FERC to give equal consideration to environmental and energy interests when issuing licenses and relicenses. As stated by the National Renewable Energy Laboratory:

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[12]Indicates the generation capacity of a pumped storage facility in Ludington, MI.

"As a result of the Electric Consumers Protection Act (ECPA), enacted in 1986, the time and cost of licensing hydroelectric projects have escalated. Many older hydro power projects will require relicensing during the 1990s, exposing these projects to greater scrutiny and a potential loss of capacity."

In Michigan, like other areas of the nation, environmental concerns are at the forefront of most controversies regarding new hydro development. Sound public policy requires that hydro power regulations balance competing interests on Michigan's waterways.

Michigan Efforts to Promote Renewables

There are many examples of renewable energy project efforts operating in Michigan. Listed below are just some of those efforts. The 11 Michigan project examples are predominantly utility and government-sponsored programs that are connected to the utility grid. Many more projects exist, but are not listed, such as solar homes, off-grid small wind generators, etc. By drawing on the experience of these pilot projects, more renewable resources can be developed in Michigan. Additionally, there are Michigan and U.S. manufacturers and equipment suppliers of renewable technologies available to Michigan customers (see Attachment C).

Traverse City Light & Power Wind Project

In June 1996, Traverse City Light & Power dedicated the first utility-scale wind turbine generator in Michigan. The wind turbine is a Vestas model V-44, 600 kW generator and has a blade diameter of 144 feet, mounted on a 160-foot tower. The wind turbine has a variable blade pitch mechanism, designed to capture the most energy from winds. In average annual winds of between 14-15 miles per hour (mph), the wind turbine was expected to produce between 1.1 and 1.2 million kWh per year, which is enough electricity for approximately 200 average Traverse City homes.[13] The capital cost of approximately $650,000 was partially funded by a $50,000 grant from the Michigan Department of Consumer & Industry Services' Energy Office.

The wind turbine was made possible because of community support for a green rate program. The green rate premium of 1.58 cents per kWh amounts to a 17-23 percent increase, depending on the rate class. For the average residential customer this is a $7.58 per month bill increase. The wind electricity supplied to an average green rate customer will annually avoid the burning of three tons of coal and air pollution consisting of 10,000 pounds of carbon dioxide, 60 pounds of sulfur dioxide, and 40 pounds of nitrogen oxide. With an amortized operating cost of 6.7 cents per kWh, offset by the customer green rate premium of 1.58 cents per kWh and the federal renewable energy production incentive of 1.5 cents per kWh, the wind generator provides electricity at a variable cost equal to that available from the municipal power pool.

Detroit Edison Solar*Currents*® Program

Starting in 1996, Detroit Edison's Solar*Currents*® became the first program in the U.S. to give customers the choice of purchasing a portion of their electricity from central solar power facilities. With financial assistance from the DOE, Detroit Edison has constructed two solar energy plants. In May 1996, Detroit Edison first delivered electricity generated by the sun to residential customers from its solar facility in Scio Township, near Ann Arbor. Nearly 200 residential customers subscribe to solar service from the first facility. Between May 1996 and August 1997, the Scio Township's 28.4 kW facility produced more than 52,400 kWh of electricity. The second solar power plant is a 26.4 kW facility located in Southfield. Residential customers agreed to pay

[13]Actual production has been approximately 900,000 kWh per year.

an additional $6.59 per month to subscribe to 100 Watts of solar service. Customers pay a flat monthly fee, which provides a portion of their electricity consumption from the solar systems, at an average cost of about 60 cents per kWh.

Commercial customers help Detroit Edison promote solar energy by forming partnerships with school districts. Through Solar*Schools*,SM each participating school receives 1.5 kW of solar capacity credits, donated by its commercial business partner. The credits can produce as much as 2,000 kWh of electricity annually. The program also includes a two-week curriculum on solar and renewable energy for grades four through six, developed by Detroit Edison.

Lansing Board of Water & Light Green Power Project

The Lansing Board of Water & Light (LBWL) is currently developing a green power rate for its customers. Customer surveys have indicated that 49 percent of LBWL customers are extremely favorable (9-10 on a 0-10 scale) to LBWL offering a program, and another 34 percent are somewhat favorable. LBWL has solicited proposals for providing 1 MW or more of renewable energy, and is currently looking for a power source. Under the current LBWL plans, blocks of 250 kWh will be offered to customers who will be asked to pay a monthly green power premium rate.

Regional Biomass Program

The Michigan Biomass Energy Program (MBEP) is a renewable energy effort managed by the Michigan Department of Consumer & Industry Services' Energy Office. The program is based on the premise that projects which increase the production capacity and use of biomass energy can improve Michigan's environmental quality, energy security, and economic viability. MBEP's goal is to develop strategic partnerships which can increase the production and/or use of energy derived from Michigan's biomass resources. This goal is accomplished through information dissemination and state/regionally-funded research and demonstration projects. A current focus of the program includes greater development of Michigan's agricultural biomass energy potential, working to establish the state's ethanol refueling infrastructure for vehicles that burn ethanol-gasoline blends, biomass energy information dissemination, state project grants, and regional program participation. Annual funding assistance is also available for bio-power projects.

The MBEP receives its primary funding through a grant from the DOE-funded Great Lakes Regional Biomass Energy Program (GLRBEP). DOE sponsors similar regional programs throughout the country. Other states participating in GLRBEP include Illinois, Indiana, Iowa, Minnesota, Ohio, and Wisconsin. GLRBEP's purpose is to support biomass energy research, economic analysis, environmental assessments, workshops, and other information projects in each of its seven member states.

Energy Office Photovoltaic and Wind Demonstrations

The Energy Office has provided $50,000 in grants to each of two utility-scale wind generators. The first grant was awarded to Traverse City Light & Power. A second grant was awarded to the Grand Traverse Band of Ottawa and Chippewa Indians. It is expected that this

second wind generator will be installed in the Grand Traverse Bay area. Also, The Energy Office is currently implementing a special project grant from DOE related to small wind systems. Financial incentives have been provided to 12 small wind systems ranging in size from 400 Watts to 10 kW. The small wind systems will be metered and their electric production and operational histories will be documented. The Energy Office has also provided funding for 11 small photovoltaic demonstrations and six small wind generator demonstrations.

Energy Office Green Power Aggregation Project

The Energy Office received proposals on June 30, 2000, for a statewide project to increase the production and availability of green power through customer aggregation. Eligible applicants were public or nonprofit organizations located in Michigan, and the green power generation facilities supported were required to be located in Michigan. A $120,000 grant has been awarded to the Michigan Independent Power Producers Association to implement the project.

Renewable Energy Web Sites

Through a grant originally sponsored by the Great Lakes Information Network (GLIN), http://www.great-lakes.net, the MPSC currently provides Web hosting services to three Web sites devoted to Renewables Energy Programs, including: the Michigan Biomass Energy Program at http://ermisweb.cis.state.mi.us/biomass/, the Midwest Renewable Energy Association at www.the-mrea.org, and the Great Lakes Renewable Energy Association at www.glrea.org. In addition, the MPSC has links from its Web site to Michigan-specific renewables energy information at DOE's National Renewable Energy Laboratory.

Photovoltaic Systems in Michigan National Parks

At the Sleeping Bear Dunes National Lakeshore on North Manitou Island, Michigan, the National Park Service installed a solar/PV power system to provide electricity to the island. The 11 kW PV system, 288 kWh battery bank, and 15 kV inverter provides power for the staff residences and gift shop from May through August.

The National Park Service also uses PV systems for a variety of applications at Pictured Rocks Lakeshore in Munising, Michigan. A 2 kW PV roof-shingle system was installed at its back country cabin, and a 4 kW PV array system is being installed to power the light station. The system provides electricity for the light station, which is used as a seasonal staff residence in addition to being open for public tours. In winter, the array powers dehumidification and heating systems. Also, all hand pumps at the remote campsites have been replaced with PV-powered pumping systems.

Midwest Renewable Energy Association

The Midwest Renewable Energy Association (MREA), founded in 1990, is a network for sharing ideas, resources, and information with individuals, businesses, and communities to promote a sustainable future through renewable energy and energy efficiency. In 1996, MREA became a

chapter of the American Solar Energy Society. MREA hosts workshops and a major renewable energy fair each year in Wisconsin.

Great Lakes Renewable Energy Association

The Great Lakes Renewable Energy Association (GLREA) is a nonprofit organization that educates, advocates and promotes, and publicly demonstrates renewable energy technologies. There are more than 60 Michigan members. GLREA held its sixth annual Renewable Energy and Sustainable Living Fair in Lansing on August 4-6, 2000. The keynote speaker was Peter Dreyfuss, who headed the Million Solar Roofs Initiative Program at the DOE's Office of Energy Efficiency and Renewable Energy, and has since become the director of DOE's Region V headquarters in Chicago. At the energy fair, GLREA became an official partner in the Million Solar Roofs Initiative. Activities at the fair included a renewable industry conference, teacher education seminars, renewable energy and energy efficiency workshops, displays, demonstrations, and a children's activities area.

Million Solar Roofs Initiative

The Million Solar Roofs Initiative was announced by President Clinton in June 1997. The initiative includes two types of solar technology: photovoltaics and solar thermal panels. DOE works with partners in the building industry, other federal agencies, local and state governments, utilities, the solar energy industry, financial institutions, and non-governmental organizations to remove market barriers to solar energy use and develop and strengthen local demand for solar energy products and applications. The initiative tries to bring together the capabilities of the federal government with key national businesses and organizations and focus them on building a strong market for solar energy applications on buildings. GLREA was recently announced by DOE as a partner in the Million Solar Roofs Initiative. The goal of the program is to install solar energy systems on one million U.S. buildings by 2010.

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FINDINGS ON BARRIERS TO INTERCONNECTION

This report focuses on cases where barriers were present and does so from the project proponents' perspective. Nonetheless, the study offers the following findings about current barriers to interconnection of distributed power generation projects.

A variety of technical, business practice, and regulatory barriers discourage interconnection in the U.S. domestic market.

These barriers sometimes prevent distributed generation projects from being developed.

The barriers exist for all distributed-generation technologies and in all regions of the country.

Lengthy approval processes, project-specific equipment requirements, or high standard fees are particularly severe [barriers to interconnection] for smaller distributed generation projects.

Many barriers in today's marketplace occur because utilities have not previously dealt with small-project or customer-generator interconnection requests.

There is no national consensus on technical standards for connecting equipment, necessary insurance, reasonable charges for activities related to connection, or agreement on appropriate charges or payments for distributed generation.

Utilities often have the flexibility to remove or lessen barriers.

Distributed generation project proponents faced with technical requirements, fees, or other burdensome barriers are often able to get those barriers removed or lessened by protesting to the utility, to the utility's regulatory agency, or to other public agencies. However, this usually requires considerable time, effort, and resources.

Official judicial or regulatory appeals were often seen as too costly for relatively small-scale distributed generation projects.

Distributed generation project proponents frequently felt that existing rules did not give them appropriate credit for the contributions they make to meeting power demand, reducing transmission losses, or improving environmental quality.

Source: National Renewable Energy Laboratory, *"Making Connections: Case Studies of Interconnection Barriers and Their Impact on Distributed Power Projects,"* May 2000.

A TEN-POINT ACTION PLAN FOR REDUCING BARRIERS TO DISTRIBUTED GENERATION

Reduce Technical Barriers

(1) Adopt uniform technical standards for interconnecting distributed power to the grid.

(2) Adopt testing and certification procedures for interconnection equipment.

(3) Accelerate development of distributed power control technology and systems.

Reduce Business Practice Barriers

(4) Adopt standard commercial practices for any required utility review of interconnection.

(5) Establish standard business terms for interconnection agreements.

(6) Develop tools for utilities to assess the value and impact of distributed power at any point on the grid.

Reduce Regulatory Barriers

(7) Develop new regulatory principles compatible with distributed power choices in both competitive and utility markets.

(8) Adopt regulatory tariffs and utility incentives to fit the new distributed power model.

(9) Establish expedited dispute resolution processes for distributed generation project proposals.

(10) Define the conditions necessary for a right to interconnect.

Source: National Renewable Energy Laboratory, *"Making Connections: Case Studies of Interconnection Barriers and Their Impact on Distributed Power Projects,"* May 2000.

PROOF OF SERVICE

STATE OF MICHIGAN)

Case No. U-12915

County of Ingham)

Marcia Hoskins, being duly sworn, deposes and says that on April 17, 2001, A.D. she served a copyof the attached order, by mailing copies thereof by first class mail, postage prepaid, or by inter-departmental mail, to the persons as shown on the attached service list.

Marcia Hoskins

Subscribed and sworn to before me
this 17th day of April 2001

Sharon A. Allen

Notary Public, Ingham, County, Michigan
My Commission expires August 16, 2004

MR. DAN ROBERTS, MANAGER
ALGER DELTA COOPERATIVE
ELECTRIC ASSOCIATION
426 NORTH 9th STREET
GLADSTONE, MI 49837

MR. STEPHEN FLETCHER, PRESIDENT
ALPENA POWER COMPANY
310 NORTH 2ND AVENUE
ALPENA, MI 49707

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231 WEST MICHIGAN
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CLOVERLAND ELECTRIC COOPERATIVE
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MR. DAVID W. JOOS, PRESIDENT & CHIEF
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212 W. MICHIGAN AVENUE
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