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**Biomass as an Energy Resource for Michigan:
Opportunities, Challenges and Policies**

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Introduction

This brief paper outlines some of the issues related to biomass as a feedstock for energy production in Michigan. This includes national and state policies that promote alternative energy including biomass. It is based on a presentation presented at the Coal to Clean Conference sponsored by the Institute for Public Utilities and the Michigan State University Product Center on December 3, 2010. Audio of the conference can be found at <http://www.ipu.msu.edu/programs/online/biomass.php>

Broadly defined, biomass is anything produced from plants or animals. Potential feedstocks for energy production are

- Crop and crop residues
- Woody biomass
- Biomass from municipal solid waste (MSW) facilities
- Biomass from farms
- Biomass from food processing and other industrial sources

Biomass can be used for heat or electricity. It can also be integrated into existing energy grids or used as an energy source off the grid. One source of concern is the long term commitment of some of these policies, particularly at the state level. The size of the state's budget deficit may mean a reduction in the support of some of these programs, especially grant and tax credit programs.

Michigan's Position

Michigan is an importer of energy. It imports 97 percent of its petroleum, 80 percent of its natural gas and 100 percent of its nuclear fuel. The use of biomass has the potential to make the state more self sufficient in energy production and could conceivably be a source of economic growth for the state, especially if this energy can be generated in a manner than is cost competitive with existing feedstocks such as coal.

Michigan ranks 9th nationally in terms of electricity production from biomass; the state produces 1,710,423 MWh from wood and 739,537 MWh from other biomass. While Michigan is not particularly a major producer of biomass from crop resources, it is a major producer of woody biomass. The state has 10 facilities that generate electricity from wood.

Another potential source of energy is from anaerobic digestion. The state has six farm anaerobic digesters that produce 186,600 MWh of electricity. This can also be used to generate heat. In the long run, the number of anaerobic digesters is likely to increase due

to increase regulation of manure. MSW facilities are also a potential source of biomass for heat and electricity.

Other potential sources of biomass include 870,000 dry tons of unutilized logging residues, 1.5 million dry tons of mill and other forestry residue, 4 million dry tons of crop residue and 1.7 million dry tons of municipal solid waste. The good news is that many of these feedstocks are extremely inexpensive to obtain and are often considered wastes. The bad news is that transportation and distribution costs for biomass are expensive.

Opportunities

A major opportunity is generating electricity from woody biomass. Michigan's forest resource is increasing about 750 million cubic feet per year, and there is a well developed but underemployed forest production and distribution system already in existence. The decline in the construction and paper industries have reduced the demand for lumber and an increase in demand for wood based biomass for energy could be met by the existing infrastructure and firms. Another potential source of biomass is land that has been converted to agriculture to other uses that can be used to produce dedicated biomass crops.

Another opportunity for biomass energy production is to develop larger scale operations that use biomass feedstocks. Examples include schools and hospitals and local government buildings. Economies of scale exist for biomass energy facilities.

The state's Renewable Portfolio Standard also creates an opportunity. Many sources of biomass such as MSW facilities, livestock farms, and landfills are more reliable sources of energy than some other types of renewable energy.

A final opportunity is the potential for exports. Many European countries are moving ahead with biomass as an energy source, with biomass used for heating showing particular promise. Michigan's access to deepwater ports and the St. Lawrence Seaway provides a potential competitive advantage to export woody biomass.

Challenges

Despite these opportunities there are several challenges facing the development of biomass. The first and most fundamental is cost. Currently, biomass is not cost competitive compared to coal and natural gas. One reason for this is the fact that biomass feedstocks tend to be bulky and have low energy density. Another issue is the fact that biomass is not as consistent as some other feedstocks. Biomass varies by moisture content, trace contaminants and the quality of gas. Providing a consistent product is very important for utilities, and until biomass is standardized it will be difficult for biomass to find acceptance.

Another major challenge is interconnection and grid access. Issues such as who pays for grid access, length of contract/performance criteria, and what is the price or feed in tariff

need to be addressed. These types of issues exist for all types of alternative energy and emerging markets not just biomass.

While some policies encourage the use of alternative energy sources including biomass an important proposed Environmental Protection Agency Rule could seriously retard the growth of the bio-energy sector. This rule could make most biomass boilers not in compliance with particulate matter and/or carbon monoxide standard. Further complicating the issue is the fact that most boilers that use biomass that meet the particulate matter standards do not meet the carbon monoxide standards and vice versa.

A long term challenge is the state of Michigan's roads. Moving biomass to energy generating facilities entails intensive use of roads. If the roads cannot handle the additional transportation demand development of the bio-energy sector is likely to lag.

Policies

The Conservation Reserve Program

The Conservation Reserve Program (CRP) is a federal program that pays landowners for planting grasses and other land conserving plants instead of cash crops. Some biomass crops can be produced on land enrolled in the CRP. Examples include switchgrass and short rotation woody crops.

The Biomass Crop Assistance Program

The Biomass Crop Assistance Program (BCAP) is part of the 2008 Farm Bill. Among other provisions, it provides up to 75 percent cost share for crop establishment, and provides matching funds for collection, harvest storage and transportation of eligible crop materials up to \$45 a ton. This money has often been used to purchase specialized harvesting equipment for crop residues. To a great extent this program has been used for cellulosic ethanol production. Little has been devoted to heat and electricity feedstocks although some farmers have expressed an interest in growing dedicated biomass crops.

Sun Grant

The Sun Grant program is a national policy designed to develop biomass for energy production. The primary focus of the program is research and development, much of it toward the development of cellulosic ethanol. In Michigan there are 5 poplar field trials and 6 willow field trials. All are located in the Northern Lower Peninsula or the Upper Peninsula.

Healthy Forests Restoration Act

This program provides grants and assistance to local communities for removing forest materials to reduce the probability and impacts of fires. The materials could be used to generate heat and electricity.

Tax Incentives

There are tax incentives for firms that use biomass to generate electricity. Closed loop biomass systems are eligible for tax credits of 1.9 cents a kWh; open loop biomass systems are eligible for a tax credit of 0.9 cents a kWh.

Rural Energy Self Sufficiency Initiative

This program provides grants for community-wide rural energy systems that reduce conventional energy use and increase renewable energy use. Grants could be up to 50 percent of the cost of the project. The program is geared to assist in the development and installation of renewable energy systems.

Renewable Portfolio Standard

The lynchpin of the state's renewable energy system is Renewable Portfolio Standard (RPS). The state is committed to produce 10 percent of its electricity from renewable sourced by 2015. The RPS is the primary generator of the demand for alternative energy including biomass, wind, and solar.

Included in the state's alternative energy program are Renewable Energy Credits (RECs), which allows for the trade and transfer of credits. RECs allow utilities that are unable to meet their RPS requirements to buy credits from utilities that produce more than the minimum amount of electricity from renewable sources. RECs enhance efficiency by allowing utilities to meet the requirements in a manner that minimizes costs. The state gives additional credits for electricity generated by solar, peak demand met by renewables and Michigan made equipment.

Centers of Energy Excellence

The state set aside \$43 million in Michigan Strategic Fund to six Centers of Energy Excellence (CoEEs) in 2008 and another \$30 million in 2009. The CoEEs provide grants to for-profit companies that are commercializing energy technologies with support from a university.

Renewable Energy Renaissance Zones

Firms located in Renewable Energy Renaissance Zones are exempt from virtually all state and local taxes for 15 years. The program allows for 15 zones with a requirement that at least 5 be focused on cellulosic ethanol.

Biomass Tax Credits

This tax credit provides a 100 percent exemption from real and personal property taxes for certain types of equipment that convert biomass into energy feedstocks. Examples include biomass gasification and methane digesters.

Biomass Energy Grant Program

This grant program provides funding for state bioenergy and biofuels projects. Biomass technology development and demonstrations are eligible.

Summary

If some technical issues can be addressed biomass could play a role as a feedstock for energy production. In order to do so, the feedstock will need to be produced consistently in a form that makes it easy for a gas or electric facility to use. Contractual issues and transmission issues will also need to be addressed. None of these problems appear to be insurmountable.

The state has some assets that make it attractive for biomass as an energy feedstock. It has several anaerobic digesters on farms, and the number is likely to increase in the future. MSW facilities located throughout the state are another potential source of biomass that can be converted into energy. Digesters and MSW probably have more potential as heat sources than as electric feedstocks. While Michigan is not a major crop producer, there is some potential to use crop residues as an energy source. Michigan's forests and forest byproducts have a great potential to be a source of energy.

There are several state and federal programs that are designed to promote the development of biomass as an energy feedstock. While several of these programs are geared towards the development of vehicle fuels, many of these programs can be used for heat and electricity as well. The driver at the state level is the RPS which creates a demand for renewable energy which includes energy from biomass. There are also programs that assist in research and development of alternative energy.

One potential problem is the size of Michigan's potential deficit. Cuts in government spending may include cuts in funding for grants and tax credit programs