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WISCONSIN'S BIOBASED INDUSTRY: OPPORTUNITIES AND ADVANTAGES STUDY

Volume 3: Policy Recommendations

Prepared on behalf of the Governor's Consortium on Biobased Industry

June 2006

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Volume 3: Policy Recommendations

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Introduction

As the nation's reliance on traditional energy sources becomes increasingly unstable—as fossil fuels become more expensive, and as they present a greater threat to the environment and national security—Wisconsin's ability to direct the emerging bioeconomy becomes that much more critical. Developing Wisconsin's bioeconomy can help existing industries expand and create entirely new industries for the state. At the same time, displacing petroleum-based fuel, energy and products with biobased sources provides Wisconsin with a way to simultaneously improve the economy and the environment. The state's raw materials in agriculture and forestry, its strong manufacturing base, its internationally recognized university and its robust statewide workforce development system are all key ingredients in turning feedstocks into valuable energy, fuel and products. The state also already has labor concentration in many of the primary and secondary industries that will make up a biobased sector, including not only the biomass growers and producers but also the manufacturing facilities, processors and potential end users of various bioproducts. These elements could combine to make Wisconsin very competitive in the bioindustry arena.

However, for Wisconsin to succeed in developing a robust bioeconomy, the state must take proactive measures to organize its existing strengths, build up its existing infrastructure and open the door to new entrepreneurship efforts and ideas. In this paper, we recommend a series of policy actions the state can take, ranging from policies to build a market for existing bioindustry products (such as ethanol and biogas) to policies that organize the state's public and private institutions to best take advantage of new and innovative research opportunities.

These recommended policies are wide-ranging and far-reaching, but we believe them to be crucial to the state's goal to create not just a bioeconomy, but a *successful* bioeconomy – one that not only produces cleaner products, but that includes a range of rural and urban jobs, entrepreneurship opportunities, and ownership opportunities for rural landowners, as well as economic incentives balanced with environmental protections. Accomplishing this task will require the state's major institutions – government, academia, business, labor, and community – to work together and mutually reinforce one another. Developing the bioeconomy is a huge task, but one that we feel the state cannot afford to ignore.

Elements of a Successful Bioeconomy

- **Strengthen existing industries:** A successful bioeconomy will take advantage of and build upon Wisconsin's existing resources and industries, including those that produce primary and secondary feedstocks (agricultural, forestry, food and meat processing, municipal waste management, etc.), those involved in biomass processing (ethanol plants, digesters, co-firing plants, etc.), and those involved in manufacturing and distributing final products (manufacturing facilities, utilities, fuel distributors, etc.).
- **Generate new industries:** A successful bioeconomy will create a market for bioenergy, biofuels, and bioproducts that draws new industry to the state to meet demand in these areas. New industry should especially focus on the processing and product development elements of the bioeconomy, as these are the value-added elements in the production chain.
- **Strengthen and develop links among industries:** The bioeconomy depends on a range of industries that run the gamut from farming to manufacturing to education. A successful bioeconomy will depend on strong linkages among these industries, which span the most rural and the most urban parts of the state.
- **Generate private investment in new industries:** The emerging biobased market will generate private capital investment in new ventures, especially in research and development of new and better technologies to convert biomass into viable products.
- **Create high-quality jobs:** By strengthening existing industries, generating new industries, and generating capital investment, the bioeconomy will create jobs at every level of the production chain: research and development, biomass production, biomass processing, and product development and sales. Job creation will extend out to support industries such as transportation, building construction, and other industries related to the bioeconomy infrastructure. Only by providing its residents with high-quality jobs will the state build the stable tax base it needs to reinvest in the building blocks of the bioeconomy: physical infrastructure, education and workforce training.
- **Generate wealth and provide ownership opportunities for rural communities:** A successful bioeconomy will provide rural economies with more than the basic cost of the feedstocks harvested from their lands. It will provide rural landowners and entrepreneurs with opportunities to own at least some of the means of processing these feedstocks, as well as some share of the resulting energy, fuel and products.
- **Increase trade with other states and countries:** Wisconsin's bioeconomy would be successful if it satisfied in-state energy, fuel, and product demands alone. However, an even more impressive model will produce products and technologies that the state can export to other states and countries.
- **Retain more dollars in Wisconsin's economy:** A successful bioeconomy will reduce expenditures for goods produced out of state by replacing them with substitute goods grown and manufactured in-state. Renewable transportation fuels, renewable energy, and biobased chemicals all can contribute.
- **Protect and improve the environment:** Because the bioeconomy has its roots literally in the land, a successful bioeconomy ensures that the land is productive for generations to come. Thus a successful bioeconomy balances raw material demand with long-term land preservation – including preservation of the wildlife, water and air that work together to support and enhance that land. Some bioindustries, such as farm manure management and replacing high-till crops with perennial crops, actually go beyond land preservation and improve the environment.

Section 2: Recap of Opportunities in Wisconsin

In our Briefing Paper, we discussed the fact that Wisconsin is rich in the farm and forest land that provides the basic feedstocks that will be the cornerstone of any bioeconomy plan. The state is also strong in the food and meat processing sectors that can provide organic material as a potential bioindustry resource. Municipal water treatment facilities are another key infrastructure component. Finally, the state already has in place many elements of the infrastructure that will be necessary to support the bioeconomy. This infrastructure is partly physical – for instance, our highway, rail and shipping systems – and partly comprised of organizational and institutional systems – for instance, the UW, technical colleges, and workforce and economic development infrastructure.

Our Technical Study examined and refined many of these broad opportunities, and identified nine “channels” through which the state might best pursue a biobased economy. Six of these channels center on the feedstocks on which they rely:

- **Traditional crops**, principally corn and soybeans, which focuses on how the state’s existing grower and processor base might add new value to their products
- **Crop residues**, which seeks additional value in the components of the crop not currently being utilized while remaining mindful of the ecological benefits these residues provide
- **The forest biorefinery**, which considers a specific set of integrated technologies for the pulp or paper mill that would diversify the mill’s product mix and reduce emissions while letting the mill become a net exporter of power
- **Wood residues**, which attempts to increase the production and use of forest, urban and mill wood residues while spurring further adoption of sustainable forest management
- **Industrial waste streams**, which looks at the biomass being processed by Wisconsin industry apart from the farm and paper mill and asks how biorefining might be a best practice for industry
- **Farm manure management**, which addresses perhaps the state’s most pressing animal agriculture issue.

The next two channels are based on the bioindustry’s future potential:

- **New and dedicated crops**, which explores a more speculative arena: What could Wisconsin grow? What should Wisconsin grow? In what directions does ongoing research point in terms of diversifying the state’s agricultural portfolio?
- **The biobased chemicals industry**, which, like the new and dedicated crops channel, questions what it would take to do something radical—to go beyond conventional ideas of “sustainable competitive advantage.” This channel goes beyond those resources immediately apparent and asks how we might extrapolate from our acknowledged strengths to kick-start Wisconsin’s participation in the chemicals industry.

The last channel focuses on Wisconsin’s **Research and Development** sector, primarily the University of Wisconsin, a rich source of human capital, and one of the institutions that will play

a primary role in helping the state convert existing feedstocks to value-added products, and also in exploring potential new crops and new biobased chemicals.

Technology Opportunities

Within each of these channels, our interviews and research have highlighted various specific bioindustry opportunities that the state should consider focusing on in the next five years, as well as some less concrete, but still important, opportunities for future research and development:

Short-Term Opportunities (1-5 years)

- Anaerobic digestion to create biogas and help dairy farms manage manure
- Corn ethanol production, especially by growers and cooperatives
- Biomass combustion to reduce or eliminate natural gas use for thermal energy production
- Biodiesel production
- Anaerobic digestion of industrial and municipal waste to replace natural gas use at the facility
- Black liquor gasification
- Pilot scale demonstrations of:
 - New crops
 - Biomass gasification
 - Small scale on-farm anaerobic digesters

Longer-Term Opportunities (5-10 years)

- Cellulosic ethanol production
- Production of liquid fuels and chemicals from syngas
- Development of new chemical and plastics applications
- Gasification of crop residues
- Building a market for biobased chemicals, including creating infrastructure for eventual chemical production in the state

Research, Development, and Demonstration Opportunities

- Non-electricity uses of biogas from anaerobic digestion
- Fischer-Tropsch catalytic methods of converting syngas to liquid fuels and chemicals
- Pilot-scale testing of value prior to pulping technologies
- Chemical feedstocks from sugars
- Commercial-scale biomass-to-hydrogen technologies
- New and innovative crops (e.g. switchgrass) for energy/fuel/bioproducts

We have targeted our policy recommendations toward developing the first set of technologies – technologies that are known and have been proven to some extent – through market creation and public/private financing strategies. These policies include, for instance, a Renewable Fuel Standard to help create a more robust market for ethanol and biodiesel, two products that are already in development in the state, but at a low level. Many of these policies are aimed to help Wisconsin catch up to surrounding states, many of which have already implemented similar market creation mechanisms; they are also designed to help the state make the best, most sustainable use of its existing raw materials and waste streams. Because they focus on existing feedstocks and technologies, these policies tend to be aimed at the first six channels: Traditional

Crops, Crop Residues, Forest Biorefinery, Wood Residues, Industrial Waste Streams and Farm Manure Management.

For the second set of opportunities – technologies that are just beginning to be developed, or that are considered to have some potential – we recommend policies that will strengthen the overall bioindustry infrastructure. These policies include, for example, a recommendation that the state create a Wisconsin Bioeconomy Center that acts as a clearinghouse of data, intellectual property and funding information for new and emerging bioindustry efforts. These kinds of policies put the state in a strong position to take advantage of emerging opportunities even if those opportunities are not now known. Through these efforts, Wisconsin has a chance to surpass surrounding states and become a leader in bioindustry development. Because these policies are future-thinking, they tend to be aimed at the New Crops, Biobased Chemical and R&D channels.

Section 3: Recommended Policies

Wisconsin has the power to institute policies that will help take advantage of the state's strengths, and overcome its weaknesses, in the bioindustry sector. The remainder of this section will recommend policies that Wisconsin can pursue. As much as possible, we have tried to prioritize revenue-neutral policy options: market creation, regulation, education and information, and stakeholder involvement. Where we have suggested financing strategies, we have tried to include a combination of strategies including tax incentives, bond measures, incentives for private investment, etc. However, it is clear that any serious bioeconomy development effort must include some level of financial investment from the state. To this end, we also recommend some avenues for revenue generation, but these will not be sufficient to meet the level at which the state should choose to invest. We hope that our policy recommendations help to target that investment in the most efficient way possible.

The following list of policy recommendations are organized into five broad categories. These categories, in general terms, describe the overall goal that the categories of policies are intended to achieve. Policy categories are:

1. Organize, Build and Coordinate Wisconsin's capacities in the Bioeconomy
2. Increase or Enhance Biobased Feedstock Supplies
3. Accelerate Technology Research, Development and Demonstration in Wisconsin
4. Increase and Stabilize Demand for Biobased Products
5. Support Business Development in the Bioeconomy

Category 1: Organize, Coordinate and Build Wisconsin’s capacities in the Bioeconomy

POLICY 1.1

Create a Bioeconomy Center, a government/industry/university consortium on the bioeconomy

Channels Affected: All

Wisconsin’s public and private institutions are not engaged in bioeconomy development in an organized and systematic manner. Using recommendations of the Governor’s Consortium on Biobased Industry, Wisconsin should actively engage industries involved in the bioeconomy – from grower to end user – and the UW system to develop a constancy of purpose on Wisconsin’s future in bioeconomy. The public/private consortium’s work should be based on efforts of the Governor’s Consortium on Biobased Industry, the Working Lands Initiative, and the Manure Management Group. This consortium should involve state players from all relevant departments – DATCP, DNR, DWD, DOT, and Commerce – to ensure inter-agency cooperation on a broad bioeconomy strategy.

GETTING ORGANIZED: HOW IOWA BECAME ‘BIOWA’

In 2003, Iowa Governor Vilsack formally adopted the Biobased Products and Bioenergy Vision and Roadmap for Iowa. One of the major groups helping to implement the Vision and Roadmap is the BIOWA Development Association, comprised of state industry leaders, faculty from Iowa universities doing research on biobased technologies, agricultural producers, farm organizations and financial institutions.

POLICY 1.2

Conduct a review of policies and regulations affecting the bioeconomy. Based on the review, establish clear and consistent state policies for sustainable management of biomass feedstocks and biobased industry development.

Channels Affected: All

Interviews have pointed to the hurdles faced by innovators in the bioeconomy as they navigate a regulatory and policy system largely designed to manage traditional industries. Bioeconomy practices such as the use of innovative technologies, waste stream co-processing or

public/private ownership models face policy, programmatic and legal hurdles simply because these issues were not envisioned when the original policies or laws were developed. The sustainable production and use of biomass can deliver benefits to the environment, society and the economy that are above those of traditional practices that are common today. Dedicated state and federal efforts are needed to better reflect the needs of the bioeconomy.

POLICY 1.3

Review existing state databases, develop new databases as appropriate, and update data collection patterns to gain a better understanding of the volumes and locations of potential biobased resources

Channels Affected: All

During the development of the Technical Analysis Report, substantial efforts were made to locate data on Wisconsin's existing biobased resources. Our findings shed light on the challenges the bioeconomy faces in integrating with existing data collection efforts. Absent a strong need, *state databases do not collect data relevant for bioeconomy activities*. That this problem exists is not surprising. There simply has not been a strong push to collect data on biobased resources. However, the lack of this data does create a challenge for the state (or entrepreneurs) to fully understand the types and volumes of different resources available in Wisconsin. In a state with a diverse economy, such as Wisconsin's, the location of resources that may or may not overlap is a critical issue.

There is a need for the state to thoroughly review its existing data collection tools with an eye toward the channels and resources applicable to the state's bioeconomy development. For example, the state currently collects data for licensing activities. These licenses cover activities from dairy processing plants to veterinarians. Obviously, only subsets of these data are directly relevant to the bioeconomy. However, the licensing databases and data collection efforts could be useful for collecting the needed data.

POLICY 1.4

Develop bioindustry initiatives to encourage stakeholders (growers, processors, producers, state and regional agencies, technical colleges, and university campuses) to explore entrepreneurship, workforce and economic development strategies specifically related to the bioeconomy.

Channels Affected: All

Many institutions and industrial actors beyond the Governor's office and the university system must be engaged if Wisconsin is to build a successful bioeconomy. The businesspeople who are engaged every day in biomass growing and processing, the workforce development officials and

technical colleges that train Wisconsin’s workers in emerging industries, and the economic development agencies that educate the state on the potential behind these industries are also key stakeholders in this effort. The state can play a role in convening statewide and smaller regional “tables” of these stakeholders, to facilitate biobased industry planning in a consistent and organized manner throughout the state.

Possible models for this effort include:

- Developing a training curriculum for key existing opportunities in various bioindustries – such as ethanol and biodiesel processing, industrial waste management, and bioindustry plant construction and manufacturing – as well as in new bioindustry technologies as they emerge in the state.
- Facilitating companies and trade groups in engaging DNR’s Green Tier Program to “pre-approve” specific process technologies. For example, black liquor gasification has inherent environmental benefits for a paper mill. The technology may be a tool for the paper mill or a portion of the paper mill to achieve a Green Tier Charter.
- Promoting biobased products to companies and trade groups as an option for obtaining a Green Tier Charter.

MAKING INDUSTRY PARTNERSHIPS WORK IN SOUTHERN WISCONSIN

One model for these partnerships is the Wisconsin Regional Training Partnership (WRTP), a Milwaukee-based program that forms partnerships between employers and workers in the manufacturing, hospitality, health care, construction, technology, and transportation sectors, and with local technical colleges and other training centers. The goal of these partnerships is to help local companies modernize plants and adopt new workplace practices; to upgrade the skills of current workers; and to recruit, train, and mentor new employees. Another model, based in Dane County, is Jobs With a Future, which brings the regional Workforce Development Board together with employers in manufacturing, health care, and finance/insurance/business services, as well as representatives from labor unions, city and county officials, and technical college representatives. The goal is to identify barriers to industry development and work to provide solutions that benefit industry and workers alike. Both programs are described on the Center on Wisconsin Strategy website, www.cows.org.

GREEN TIER: WISCONSIN DNR REWARDS ENVIRONMENTAL EXCELLENCE

Green Tier is an innovative approach by Wisconsin's Department of Natural Resources designed to reward companies that go above and beyond the minimum standards for environmental regulatory compliance. To get started, a company solicits the Green Tier program with ways the company can go above and beyond minimal standards. If the company meets the standards for Green Tier participation, the company can receive a Green Tier Charter. The Charter codifies the expectations of performance by the company. In exchange the company receives greater regulatory flexibility, though is still required to meet all compliance standards. Additionally, the company can use the Green Tier logo in marketing. A central requirement of Green Tier is that the company must implement an Environmental Management System that meets the standards of ISO 14000.

The idea behind Green Tier is to align a business's environmental goals with its business success. Green Tier is a program that may help move technologies and practices of the bioeconomy forward. The Green Tier program has a role in the bioeconomy as the process technologies and the end products both have a role in improving the environment.

Green Tier is a voluntary program and does not actively persuade companies to join. This is a central hallmark of the program. The DNR wants companies with exemplary environmental behavior to propose options to the DNR and change the regulatory conversation with industry. In keeping with the Green Tier philosophy, the Green Tier Program would not be useful for proposing specific technologies or practices *to* industries. According to Green Tier officials, Green Tier is open to hearing options on a company-by-company basis or on a trade group basis.

POLICY 1.5

Create and participate in an Upper Midwest Consortium on the Bioeconomy

Channels Affected: All

A hurdle in bioeconomy development is that any one Midwestern state, no matter how well organized, will not have a large enough impact to change the region's markets for biobased products, nor will it have all the funding and expertise to conduct RD&D needed for technology development. Each state in the upper Midwest has different priorities, strengths and weaknesses in the biobased economy. Wisconsin should create a formal coalition of Midwest states, and work with these states to maximize the entire region's competitive advantage in producing biobased products for regional, national, and global markets. The Consortium could break into work groups, based on the channels presented in this document.

FOSTERING BIOBASED INDUSTRY IN THE AMERICAN SOUTH

Formed in July 2001, the Southern States Biobased Alliance (SSBA) advises the Southern States Energy Board on issues concerning the development of biobased products and bioenergy in the southern United States. SSBA's formal mission is to provide leadership and develop strategies that will foster a biobased industry and boost rural economies throughout the southern region. Members of the Alliance include gubernatorial appointees representing Southern States Energy Board member states and representatives of the public and private sector who are active in energy, environment, agriculture and forestry issues.

The SSBA is engaged in the following activities:

- convening and facilitating meetings and activities that foster communication, coordination and collaboration among members to enhance development of a biobased industry in the region;
- recommending policies and programs that foster development of a biobased industry in the region;
- identifying strategies that stimulate markets for biobased products and technologies;
- providing electronic access to information, public forums and appropriate links to facilitate information transfer on biobased products and bioenergy; and
- advancing research, development and demonstration of biobased technologies and promoting the use of those technologies.

Source: http://www.sseb.org/currentprograms/cpa_bpbd.htm

POLICY 1.6

Build and leverage existing capacity in Wisconsin to ensure that biobased industry facilities are able to benefit from future carbon credit trading programs

Channels Affected: All

Environmental benefits such as greenhouse gas (GHG) reductions are presently not monetized in Wisconsin as they are in countries that have signed on to the Kyoto Protocol. Payments for carbon reductions can be an important revenue stream for startup biobased businesses, and virtually all bioeconomy channels will have a positive effect on GHG if they replace use of fossil fuels with biobased energy. An established market for carbon credits (e.g., credits for GHG emission reductions or carbon sequestration) under a cap-and-trade program would provide a means of compensating businesses and individuals who reduce net carbon emissions. Reduction in carbon emissions over alternative production is a characteristic of most bioeconomy activities. Wisconsin could consider joining an existing regional GHG reduction initiative with carbon credit trading or forming a similar alliance with Midwest states. Sales of carbon credits provide

direct financial benefits to generators for avoided GHG emissions or sequestered carbon, which would promote bioeconomy development.

COLLABORATING ON CARBON CREDIT TRADING ON THE EAST COAST

Several Northeastern and Mid-Atlantic states are working together to create a regional GHG cap and trade program. Termed the Regional Greenhouse Gas Initiative (RGGI), the program will set limits on carbon emissions from the power sector. Sales of carbon credits provide direct financial benefits to generators for avoided GHG emissions allowing that aspect of generation to be included in operating costs. RGGI is still in the formative stage, with efforts focused on developing the core trading program.

POLICY 1.7

Use the successful WIDRC's collaborative approach to address new interconnection issues related to biobased electricity sources

Channels Affected: Forest Biorefinery, Manure Management, Industrial Waste Streams

Sales of electricity are the foundation for revenue generation by many biobased processing technologies. Revenues generated by energy sales, while often not sufficient to cover all costs, lay the foundation for these businesses to further refine their products to produce and sell chemicals or liquid fuels.

Wisconsin, through a cooperative effort among all stakeholders called the Wisconsin Distributed Resources Collaborative, developed and enacted rules that provide standard interconnection requirements for all electricity sources up to 15 MW in capacity (PSC 119). Standard forms and agreements have been developed to cover facilities of different size ranges:

- 20 kW or less
- 20 kW to 200 kW
- 200 kW to 1 MW
- 1 MW to 15 MW

The benefit of these rules is to reduce the uncertainty of distributed resource project developers and host utilities. Additionally, the rules reduce the transaction costs of the utilities and project developers. These rules are valuable tools to help reduce risk in the marketplace for biobased electricity.

Large industries, such as the paper industry, are the likely entities to implement generation technology exceeding 15 MW. These entities work closely with their utilities and have staff dedicated to engineering and regulatory issues. Utility acceptance of large projects is uncertain. It may be useful for the Public Service Commission of Wisconsin to make clear procedures and standards generally available for projects over 15MW. The procedures and standards could be part of an information clearinghouse discussed elsewhere in this document.

PROGRESSIVE INTERCONNECTION BOOSTING RENEWABLES IN NEW JERSEY

New Jersey currently has the most progressive net-metering and interconnection laws in the United States. In 2004, the New Jersey Board of Public Utilities expanded the state's existing net-metering rules and interconnection standards for residential and small commercial customers. The rules now include all electricity generated by solar technologies, wind, fuel cells, geothermal technologies, wave or tidal action, and methane gas from landfills or a biomass facility (provided that the biomass is cultivated and harvested in a sustainable manner). The 2004 rules also increased the maximum capacity of these systems to 2 MW, and standardized and simplified interconnection procedures for residential and small-commercial customers. Finally, the legislation provides that if, at the end of any month, a customer has generated a net excess, credits are carried over to the following month. Net excess at the end of the year is reimbursed at the avoided cost of wholesale power.¹

¹ See New Jersey Administrative Code 14:4-9.

POLICY 1.8

Build assessment capacity, capability and experience with priority biobased industry technologies at Wisconsin regulatory agencies

Channels Affected: All

Many interviewees perceived that regulators' lack of time and personnel, as well as general inexperience with the performance characteristics of new technologies, added risk to projects and presented a hurdle to the adoption of new biobased technologies. It was stated that regulators' unfamiliarity with technologies or products could lead to delays in permitting. This perception reportedly leads to a reluctance of potential adopters to even begin the permitting process. The state should signal its willingness to assist adopters in the bioeconomy.

POLICY 1.9

Aggressively conduct education and outreach on the state's bioeconomy plans

Channels Affected: All

The bioeconomy remains an unknown concept to many Wisconsin institutions. To successfully grow the bioeconomy, Wisconsin will need to develop support in the Legislature as well as at the grass roots level. Wisconsin should develop and implement a coordinated education and outreach plan using all state agencies, UW, UW Extension, and Tech Colleges. UW's alumni network should be directly involved in a campaign to bring residents to the state to work in high-value bioeconomy jobs such as R&D jobs, entrepreneurship opportunities and environmental engineering jobs. Wisconsin should seek opportunities to provide endorsement and promotion of industry and private bioeconomy efforts such as green energy and product pricing programs to improve participation and strengthen bio-based markets (e.g., Vermont certification of the Central Vermont Public Service's Cow Power program, in which utility customers pay a premium to support state farm AD systems).

POLICY 1.10

Coordinate Wisconsin investors, entrepreneurs and existing businesses with the UW and federal labs to provide greater technology transfer to Wisconsin businesses, and to facilitate spin-off companies that will locate in Wisconsin

Channels Affected: All

Wisconsin's research capabilities are well documented. However, spin-offs of university research on biobased industry are limited to a few companies. Strategies to capitalize on the state's research capacity include supporting a proposed law freeing faculty to become entrepreneurs¹ and including a provision promoting Wisconsin-based businesses. The proposed Bioeconomy Consortium should work with WARF to identify if/where UW System discoveries can be licensed to bioeconomy driver industries. It should explore how the Weintert Center for Entrepreneurship located at the UW Business School could promote the formation of bioeconomy-related entrepreneurial ventures in Wisconsin and consider a program for MBA candidates in Bioeconomy Entrepreneurship.

¹ The proposed law, discussed in the Governor's Grow Wisconsin report, would change State Law Chapter 946, which "inadvertently hinders UW faculty in dual roles as researchers and entrepreneurs developing a product."

POLICY 1.11

Build capacity of Wisconsin Technical College System to educate Wisconsin's workforce for bioeconomy jobs

Channels Affected: All

The bioeconomy will need workers who have multi-disciplinary technical education. Existing industries will be hesitant to invest in biobased technologies if they do not think there is a workforce prepared to operate them. The state should provide funding for curriculum development and certification programs. Iowa and Minnesota have begun new bioeconomy curriculums that have attracted more students than the curriculums that were replaced.

BIOPROCESSING TECHNOLOGY PROGRAM AT IOWA COMMUNITY COLLEGE

The 21-month Bioprocess Technology program at Indian Hills Community College in Ottumwa-Centerville, Iowa was designed with the assistance of industry advisors from companies such as Cargill, Heartland Lysine, Ajinomoto Food Ingredients, Ajinomoto Heartland, LLC and the University of Iowa Center for Biocatalysis and Bioprocessing. A bioprocess technician operates large-scale fermentation and bioprocessing equipment. Duties may include operating computer control systems, monitoring gauges, sampling and performing lab tests. Course work involves communication skills, chemistry, biology, fermentation and process controls. Graduates typically start with an annual salary over \$30,000.

Source: www.indianhills.edu

Category 2: Increase or Enhance Feedstock Supplies

POLICY 2.1

Develop and headquarter a Midwest Regional Biomass Exchange to facilitate the development of wider markets for biomass as well as create quality standards and develops the use of forward contracting or futures trading mechanisms

Channels Affected: Crop Residues, Manure Management, Wood Residues, Forest Biorefinery, New and Dedicated Crops

Interviewees mentioned one of the biggest hurdles in using more wood residues and crop residues is the lack of a formal market to supply these feedstocks, as well as the lack of standards or price premiums for quality, cleanliness or species consistency. Investors become reluctant to put their dollars to work in projects that use residues when bilateral contracts with small firms are the only method of securing supplies. Wisconsin can overcome this by researching, developing and creating formal, regional markets for wood and crop residues with regionally recognized quality standards as well as forward contracting and pricing mechanisms.

MAKING INROADS TOWARD A BIOMASS EXCHANGE IN MINNESOTA

The Minnesota Biomass Exchange site is a collaborative effort among the Agricultural Utilization Research Institute (AURI), Clean Energy Resource Teams (CERT), the Minnesota Department of Commerce, the Minnesota Department of Natural Resources, the University of Minnesota and the Green Institute. These organizations share the goal of efficiently connecting biomass consumers and producers in an effort to increase the use of renewable resources for energy in Minnesota.¹ The site was intended to help schools or commercial entities purchase biomass for energy, although individuals are encouraged to use the site's free services.

¹ More information on Minnesota's Biomass Exchange is at <http://www.mnbiomassexchange.org/index.htm>

POLICY 2.2

Implement market-based systems that reward the users/processors of Wisconsin-grown, biobased feedstocks that originate from no-till farming methods or certified sustainable forestry methods.

Channels Affected: Traditional Crops, Crop Residues, Forest Biorefinery, Wood Residues

This policy's intent is to capitalize on the opportunity of linking more sustainable production methods with the use of sustainable, biobased products. Creating valuable uses for a sustainable percentage of each year's corn stover production, via biorefining for cellulosic sugars or even for producing heat and power, is seen as a key to moving more farming toward no-till practices. In the forests, certified sustainable forest practices can increase the per acre production of forest biomass, thereby helping to overcome some of the industry's supply hurdles. Sustainable forest practices can also deliver improved environmental benefits.

Category 3: Accelerate Technology Research, Development and Demonstration in Wisconsin

POLICY 3.1

Create a state matching fund program for bioindustry research, development and demonstration with special attention paid to implementing a strategy for handling intellectual property issues

Channels Affected: All

State funding for RD&D on priority hurdles and opportunities is a key ingredient for progress in all channels.

This fund – perhaps administered by the proposed Wisconsin Bioeconomy Center – would match federal dollars geared toward bioindustry research and development (like those given out under the new Energy Bill, as well as transportation dollars and possibly farm subsidies). The Center would allocate funds based on prioritized R&D needs.

Funding that goes toward research should have intellectual property issues well vetted. Intellectual property hurdles can undermine research investments if at the end of the research a key intellectual property owner is unwilling to license their intellectual property for purposes of commercialization. By starting the licensing at the beginning of the research, it may be possible to avoid intellectual property hurdles or at least identify critical intellectual property barriers prior to investing in the research. Understanding and addressing the intellectual property issues of research should be a central hallmark of such a funding effort.

IOWA INVESTING IN UNIVERSITY RD&D

The state of Iowa recently awarded \$3 million to Iowa State University's Center for Biocatalysis and Bioprocessing for the construction of a new facility to ferment and purify materials suitable for Phase I/Phase II clinical trials. The new facility will complement existing centers on fermentation and bioprocessing at the Center. The Center's overall goal is to "reshape the agricultural, chemical, nutritional and pharmaceutical industries by combining the intellectual talents of top scientific faculty with the practical delivery of new technologies." Since its inception in 1983, the Center has received 14 patents on its technology from DuPont.¹

¹ The Center for Biocatalysis and Bioprocessing website is available at <http://www.uiowa.edu/~biocat/index.html>.

POLICY 3.2

Provide state incentives or risk mitigation strategies for the first in-state, commercial installations of biorefinery technologies

Channels Affected: All

Hurdles to the first installations of biorefinery technologies are the high technology risk associated with such ventures as well as the risks that, once integrated into the company's process, the new technology adversely affects the output of existing products. Typical tools used are cost-share grants or tax incentives. If Wisconsin wishes to become a leader, it will need its companies, regulators, universities and the public to get experience with new technologies and build expertise with them. Having these technologies accessible to the R&D community also allows Wisconsin-based researchers to more easily develop and test secondary processing technologies such as Fischer-Tropsch liquids from syngas. But first, Wisconsin needs a gasification system.

POLICY 3.3

Assist existing businesses with costs of detailed techno-economic assessments required to integrate biorefinery technologies into existing industries

Channels Affected: Traditional Crops, Crop Residues, Manure Management, Wood Residues, Forest Biorefinery, Industrial Wastestreams, New and Dedicated Crops

Many biorefinery technologies require integration into existing industries' processes. This can be very time-consuming and expensive because the entire system must often be modeled and understood to quantify the new technology's impacts on existing product streams. Companies with tight budgets may not risk the capital on such a project without cost share, incentives or other facilitated assistance that the company does not have in-house. Encouraging these projects will help build a level of bioindustry expertise in the state's consulting industry as well as promote adoption of new technologies in existing clusters.

Category 4: Increase or Stabilize Demand for Biobased Products

POLICY 4.1

Wisconsin should enact Renewable Fuel Standards requiring that a certain percentage of the state's fuel come from renewable sources.

Channels Affected: Traditional Crops, Crop Residues, Forest Biorefinery, Wood Residues, Industrial Wastestreams, New and Dedicated Crops

Renewable fuels are the foundation upon which the state's biobased chemicals industry is likely to emerge and standards help overcome a number of hurdles. Without stable markets for today's products, ethanol and biodiesel producers are less likely to invest in new processing methods and build Wisconsin's biobased chemical infrastructure. Aligning policies with other neighboring Midwestern states (such as Minnesota) helps create a regional market and stronger bulwark against backsliding. Delaying fuel mixture mandates until in-state production reaches a certain capacity ensures that, on a net basis, Wisconsin will not begin importing refined biofuels, and also helps avoid conflicts with the Commerce Clause of the US Constitution. By enabling a solid market for ethanol and biodiesel, manufacturers can start to invest in higher value and more speculative markets for ethanol or fatty acids, such as the biobased chemical market.

Short-term options should include an E10 mandate for gasoline and a B2 mandate for diesel fuel. These mandates should consider triggers based on in-state production of ethanol and biodiesel. Longer-term options should consider expanding the ethanol and biodiesel content of fuels such as Minnesota's 20 percent standard (see case study, below). Other related long-term options could include extra credit via a tradeable credit system to cellulosic ethanol, extra credit to E85, a "production kicker" so that the required renewable blend increases when in-state production reaches a certain percent of the total, and enforcement of policy at the wholesaler level.

Looking over the long term, Minnesota's regulations regarding ethanol content in gasoline are particularly instructive. By encouraging that 20 percent of all gasoline fuel be ethanol (rather than requiring that all gasoline be a 20 percent ethanol blend) they allow E85 or other high ethanol mixes to play a part in the marketplace and helps encourage the shift to flex-fuel vehicles. It also provides room for the market to help move ethanol content forward. However, the state is still reserving the opportunity to implement the E20 mandate if the market does not move forward on its own.

MINNESOTA'S RFS SUCCESS

In the late 1980s, Minnesota passed legislation requiring 10% of its fuel to come from ethanol, and providing producer payments for all small-scale, in-state producers. As a result, the state's production increased from 11 million gallons in 1990 to 300 million gallons in 2002; the state exports 60 million gallons of ethanol per year. In 2002, Minnesota enacted the nation's first biodiesel mandate that would require nearly all diesel fuel sold in the state contain at least 2% biodiesel by 2005, when in-state biodiesel production would equal 2% of diesel fuel use.¹ Further, in 2010, Minnesota's gasoline market must be 20% ethanol by volume. This does not mean that all gasoline must be E20 (a 20% blend), but rather that the entire gasoline market must be one-fifth ethanol. This allows E85 or other ethanol fuel blends to play a role in making up the 20 percent. If the one-fifth mandate is not met by 2010, Minnesota's rule does require an E20 blend if the overall market by 2013.

¹ See <http://www.newrules.org/agri/biodieselmn.html>

In biodiesel, Wisconsin can potentially move ahead of Minnesota. If Wisconsin implements a B2 mandate, an eye should be kept on the next step. Options such as a B5 mandate are possible, as well as a mandate similar to Minnesota's ethanol rules. Once in-state production levels reach a certain point, the state could mandate 5 or 10 percent biodiesel content for the diesel market. In that case, sales of B20 could help meet the standard without requiring that all diesel fuel be 5 or 10 percent biodiesel.

POLICY 4.2

Adopt the Renewable Portfolio Standard proposed by the Governor's Task Force on Energy Efficiency and Renewables

Channels Affected: Manure Management, Industrial Waste Streams, Traditional Crops, Crop Residues, Forest Biorefinery, Wood Residues, New and Dedicated Crops

Renewable electricity production and sale is also a foundational product that enables biobased industries to transition to producing other, usually more profitable products. A Renewable Portfolio Standard (RPS) is currently being proposed as part of the larger set of legislation stemming from the Governor's Task Force on Energy Efficiency and Renewables. This legislation, currently introduced to the legislature, mandates a 10 percent RPS. The RPS is

designed to be implemented in phases, but to reach the 10 percent mark (including hydropower) by 2015. This policy will help move the market for all renewable energy sources, including biobased resources, forward.

Currently Wisconsin meets a less aggressive RPS of 2.2 percent, excluding hydropower. If hydropower is included, Wisconsin has an overall renewable electricity content of 4 percent. According to interviews with Wisconsin industry experts, the 10 percent mandate is achievable. Assuming the 10 percent mandate is reached, the state should look to moving more aggressively on a higher level RPS. However, at this point, the legislation for the 10 percent RPS is adequate and has widespread buy-in from stakeholders involved with the Task Force on Energy Efficiency and Renewable Energy.

The role for biobased-specific policy may be to ensure that biobased resources play a role in meeting the 10 percent RPS. The other recommendations in this document will help move the market forward, though a deliberate effort to help biobased resources participate in the RPS market should be considered.

POLICY 4.3

Conduct research for selected biobased technologies to determine appropriate public policy that results in setting stable utility buy-back rates for renewable energy

Channels Affected: Forest Biorefinery, Manure Management, Traditional Crops, Crop Residues, Industrial Waste Streams, New or Dedicated Crops

Many benefits of distributed, biobased energy production accrue to the public via environmental benefits or energy security. These benefits are seldom reflected in utility buyback rates, and stable, more uniform rates would help promote more biobased processing opportunities. Currently utilities have a great deal of discretion in determining how much a renewable energy producer will receive for selling electricity to the grid. There is no standard for whether the utility claims any green energy credits or whether the customer retains these credits. The rates for purchasing biogas-based electricity vary from 2.8¢ to 6.1¢ per kWh (see Appendix A).

Some utilities choose to purchase biogas-based power based on their determined “avoided cost.” The avoided cost standards vary from utility to utility. Some argue that avoided costs should be based on the existing average cost of baseload power. Others argue that the avoided costs should be based on locational marginal pricing as set by the market. A third argument suggests that avoided costs should be based on the cost of new power plant production, which will be higher than either of the first two. In all three cases, there is little discussion that buy-back rates should be based on the benefit to the local economy or what the value of “green” energy brings to the transaction.

Thus, the market for biobased electricity is uncertain and variable across the state. This uncertainty is often compounded by the negotiation of power purchase agreements between a

utility and customer wishing to sell power. Setting a standard buy-back rate will help reduce the transaction costs of negotiating a power purchase agreement and allow developers a predictable price for the power they produce, reducing risk. The standard buy-back rate will benefit farmers wishing to invest in anaerobic digestion for manure management, municipal and industrial waste water treatment plants, and the forest biorefinery, particularly for black liquor gasification.

Ideally, a buy-back rate would be set at the level that triggers investment in biobased electricity generation. However, the technologies and economies of scale are such that it is difficult to determine what that level should be for different energy resources. Currently the highest buy-back rate being proposed by a Wisconsin utility is 6.2¢ per kWh. Whether this is sufficient to trigger the market is uncertain. There may be a need for all Wisconsin utilities to have the 6.2¢ per kWh in order to create the proper market conditions. A 6.2¢ per kWh buy-back rate could be implemented for all utilities regulated by the PSCW. As market prices for standard power increase, so too could the buy-back rate. A condition should not be reached when the buy-back rate for renewable energy is less than the standard electricity market.

The market may also determine that at certain sizes and scales, 6.2¢ per kWh is too low of a buy-back rate. For example, 6.2¢ may allow for farms of a certain size to reasonably implement anaerobic digesters. However, smaller farms may still not be able to implement a digester or other manure management technology unless the buy-back rate is higher. As the market matures, these economies will be better understood. A policy of continual review of technologies and implementation rates will help determine the ability of the buy-back rate to meet the goals and needs of Wisconsin's bioeconomy.

The Wisconsin Distributed Resources Collaborative (WIDRC) is beginning a review of distributed resource tariffs and technologies. Two key questions guide the research:

- 1) What do utilities require in terms of cost recovery for different technologies?
- 2) What do project developers require in terms of return on investment and the subsequent impact on buy-back rates?

WIDRC is a voluntary organization that includes a wide range of electric utility industry stakeholders, including utilities. Based on a collaborative and consensus-driven format, WIDRC makes recommendations to the PSCW on matters related to distributed electricity resources. Funding for activities is sporadic and uncertain, though recommendations from WIDRC have been adopted by the PSCW.

The State of Wisconsin could provide funding to WIDRC to ensure that research considers biobased resources. For example, though WIDRC may be starting to investigate the technology-by-technology needs for utility buy-back rates, there is no guarantee that some or all of the biobased options will be researched by WIDRC. As an existing organization, the state can efficiently leverage WIDRC's efforts to aid the development of Wisconsin's bioeconomy.

POLICY 4.4

Expand Wisconsin's electricity net metering practices to include larger systems or to increase the electricity's value to the producer

Channels Affected: Forest Biorefinery, Manure Management, Industrial Waste Streams

This policy is another in a menu of options to encourage and reward production of renewable biobased energy. Net metering allows that all production in excess of the customer's total usage is purchased by the utility at the customer's retail electricity rate, and is currently limited to customers whose loads are up to 20 kW. A typical home is 3-5 kW. All projects in excess of 20 kW that produce electricity that is delivered to the electrical grid, regardless of customer size, is purchased at varying wholesale rates. This policy has existed since 1992. Net metering is an opportunity for end-use electricity customers to receive greater benefits for implementing their own on-site generation of electricity and has a role in improving the investment climate for customer-owned biobased electricity sources.

In most cases electricity coming from biobased resources will have a capacity significantly higher than 20 kW. A farm-based anaerobic digester is likely to produce power in the hundreds of kilowatts. A black liquor gasification unit will be in the megawatt size. The challenge in finding the right net metering policy is to align the capacity (kW) requirements with the likely technologies *and* the power (kW) demand of a customer. One solution could be to allow for several net metering options for utilities and end-use customers to choose from, depending on the situation.

Complicating the net metering situation is the demand charge issue. Under current law, the portion of a customer's bill that represents the demand charge may make up a significant portion of their electricity costs. However, the net metering rules only allow for the customer to receive net metering benefits on the portion of their bill related to energy costs, not demand costs. Given that many biobased electricity sources can offer significant reductions in customer demand, with benefits to the utilities in terms of peak energy cost savings, allowing for the capture of demand benefits in the net metering arrangement would help rebalance the costs and benefits of customer produced energy.

Policy options for changing net metering rules include:

- **Raise the maximum kW that qualifies for net metering.** This will likely benefit lower capacity technologies for customers that don't have a demand charge on their bill or don't have the ability to absorb significant metering expenses. Raising the net metering rate to 100 kW is one option.
- **Base net metering on a customer's demand charge.** Larger commercial and industrial electricity customers receive a demand charge. The net metering limit could be set at the customer's peak demand. This limit should be "trued up" on a periodic basis to reflect changes in the customer's demand profile. Capacity delivered in excess of the peak demand would not receive the net metered rate. For example, a customer may have a

peak demand of 750 kW. All energy produced at a capacity over 750 kW would not be net metered. However, all energy delivered below 750 kW would qualify for net metering.

- **Consider “remote” net metering.** In some cases industry may have a demand for power that is not easily met on-site. However, an off-site location may be ideal for power production, but offer little in the way of net metering opportunities. With remote net metering, a company could produce power at one location for the purpose of offsetting power at another. Such a policy could radically change the landscape for distributed energy resource options, particularly biobased and other renewable energy technology.

POLICY 4.5.1

The State of Wisconsin should implement preferred purchasing policies targeting the purchase and use of biobased products at State facilities

POLICY 4.5.2

The State of Wisconsin should encourage and facilitate local units of government to purchase biobased products

Channels Affected: Traditional Crops, Crop Residues, Manure Management, Wood Residues, Forest Biorefinery, Chemicals

State government has the opportunity to build the demand for biobased chemicals and other products by purchasing and facilitating purchases of biobased products. High-profile actions and policies by the Governor set a standard for others to follow. The state, by creating and implementing market standards for product qualifications as a biobased product, define the market parameters for buyers and sellers alike. Hurdles for new biobased products to overcome are lack of consumer awareness, buyers’ lack of experience with biobased products and the difficulties in reaching a wider audience cost effectively. Government policies and actions that encourage public purchasing of biobased products are a proven method of increasing demand for preferred products while also allowing entities to gain experience with using the products. The federal governments FB4P program is creating market standards under which products can qualify as “biobased.” Wisconsin’s VendorNet system is a good avenue for aggregating suppliers and sellers in a relatively low-cost manner. Some case studies in the Technical Report suggested that direct participation by local units of government in building and operating biobased industry processing facilities can be a method of building the supply of certain products.

VEHICLE PURCHASING PLAN GETS ROLLING IN ARKANSAS

In April 2005, Arkansas enacted a vehicle purchasing plan (Act 2322) requiring all state agencies and entities to reduce overall consumption of petroleum by at least 10% by January 1, 2009. The Act directs agencies to accomplish these reductions through the use of alternative fuels, the acquisition of vehicles with higher fuel economy (including vehicles operating using biodiesel fuel), and substituting cars for light trucks where possible.

Source: Full text of the Act as passed is available at <http://170.94.58.9/ftproot/bills/2005/public/HB2670.pdf>

POLICY 4.6

State should encourage and facilitates private entities' purchase and use of biobased products

Channels Affected: Traditional Crops, Crop Residues, Manure Management, Wood Residues, Forest Biorefinery, Chemicals

Hurdles for new biobased products to overcome are lack of consumer awareness, buyers' lack of experience with biobased products and the difficulties in reaching a wider audience cost effectively. Private sector users also can incur risks such as running afoul of permits or negative affects to processes while they learn to use the new biobased products. Incentives to the private sector to purchase biobased products typically take the form of cash-back rewards, tax incentives or facilitation that get the attention of buyers and/or makes it easier to try the products. Tax incentives have been used in conjunction with Energy Star-labeled products to get the attention of customers and get them to try new products. In some cases, part or all of the tax reduction may flow to the producer or retailer in the form of higher prices, if the market allows.

VERMONT'S APPROACH TO RENEWABLE ENERGY AND SALES TAX HOLIDAYS

Vermont's sales tax exemption for renewable-energy systems applies to solar-electric (PV) systems, wind systems, anaerobic digesters and fuel cells fueled by renewable resources. On-farm systems with a maximum capacity of 150 kW are eligible for the exemption; other eligible technologies are limited to a system capacity of 15 kW. Systems may be independent of the grid or net-metered.¹

¹ Vermont sales tax exemption text can be found at <http://www.dsireusa.org/documents/Incentives/VT01F.htm>.

POLICY 4.7

Encourage further processing of biobased feedstocks and use of biobased products

Channels Affected: All

A common-sense axiom in policymaking is to reward or subsidize what you desire and to limit or tax what you do not. This policy seeks to include the second set of actions, which can be used to encourage the growth of and funding for the bioeconomy by creating disincentives to dispose of what could be biobased feedstocks or purchase traditional fossil-based products. For example, California has recommended limits on the organic fraction of waste allowed in landfills. Other actions could be to increase taxes on non-green energy and fuel purchases, while taxes on green alternatives are either not increased or removed. These are some means by which the playing field can be made more level.

Another option is to include applying fees and fines that would normally go into the general revenue fund to bioeconomy development projects instead. A similar practice is sometimes done through “supplemental environmental projects” (SEP) negotiated as part of an enforcement penalty by the Wisconsin Department of Justice. SEPs are environmentally beneficial projects that a defendant or respondent voluntarily agrees to undertake as part of an enforcement action for an environmental violation.

POLICY 4.8

Increase the volume of ethanol fuels used in the state above the recommended 10 percent RFS

Channels Affected: Traditional Crops, Crop Residues, Forest Biorefinery, Wood Residues, Industrial Wastestreams, New and Dedicated Crops

There is an opportunity to grow the use of ethanol fuels in Wisconsin, above and beyond the recommended 10 percent RFS, but without further mandates. Currently there are more than four million flex-fuel cars in the US (i.e. cars that can run on anything from a 0 percent ethanol blend to an 85 percent ethanol blend, also known as E85). Drivers often do not know their vehicle is flex fuel ready because cars are generally not clearly labeled as such. Other hurdles to using E85 include the lack of stations handling the fuel in Wisconsin, and their lack of signage. Wisconsin should take steps to increase the number of flex-fuel vehicles in the state, create more E85 stations and/or provide incentives to use the fuel or require labeling of all flex-fuel cars sold in the state by attaching a flex-fuel sticker. The state should take the lead by requiring purchasing of flex-fuel vehicles whenever feasible, and the state transportation facilities could serve as E85 refueling stations for the public until a specified number of stations were available. The state could also put policies in place to encourage and reward ethanol producers and farm cooperatives to partner in providing E85 stations.

Category 5: Support Business Development in the Bioeconomy

POLICY 5.1

Wisconsin should institute a series of tax credits or production payments to encourage production and investment in biobased processing

Channels Affected: All

A production tax credit would augment federal incentives and could be used to emphasize biobased energy generation in Wisconsin. Currently, federal biomass energy production credits are 1.5 ¢/kWh. Some states such as Minnesota and Oregon offer additional incentives for biomass generation (i.e. 1.5 ¢/kWh and 15 ¢/kWh up to \$2,000, respectively).

The 1999 Wisconsin Act 55 provides producer payments of 20¢/gallon for qualifying ethanol production facilities for up to 15 million gallons of production. Qualifying facilities must use locally grown feedstocks and produce at least 10 million gallons per year. The act is set to expire on July 1, 2006. The state could consider extending the act only for grower-owned and cooperative facilities, and/or regional facilities that aggregate feedstocks, and/or cellulosic ethanol facilities.

Providing production incentives that are competitively bid can help keep financial aid going to the most efficient and qualified producers. One example of a program is to conduct a reverse auction for ethanol and biodiesel producers in which an announced total available funding is allocated to producers based on lowest bids. One safeguard against domination by a few bidders would be to not allow more than 25 percent of the funds from each auction to be awarded to a single bidder.

Investment tax credits for growers who invest in cooperative methane digesters and ethanol or biodiesel production facilities is one means of encouraging growers to expand vertically in the bio-economy. One option would be to have the credit equal up to 50 percent of total investment with cap for individual investors.

PRODUCTION TAX CREDITS IN IOWA

Iowa Governor Tom Vilsack signed a bill on June 15, 2005 that extends state wind energy production tax credits to producers of energy products from biomass or solar energy. To earn the tax credit, the producers must have a signed agreement for the purchase of their energy product, which can be in the form of electricity, biogas, hydrogen or heat for a commercial purpose. The bill, Senate File 390, applies to facilities placed in service after July 1st of this year and before 2011. The renewable energy facilities can earn tax credits for up to 10 years.¹

¹ Full text of bill, Senate File 390, can be found on the Iowa General Assembly website, <http://coolice.legis.state.ia.us>.

TAX CREDITS PROVIDE INCENTIVE FOR CO-OP INVESTMENT IN MISSOURI

In 1999, Missouri established a tax credit system that provides incentives for agricultural producers to invest in cooperative renewable fuel production facilities. The legislation authorizes tax credits equal to 50% of any investment made by individual agricultural producers into cooperative renewable fuel production ventures. The tax credits are limited to \$15,000 per person; each project may only receive \$1.5M in tax credits in its lifetime.¹

¹ For more information on this program, see Missouri Department of Agriculture, *New Generation Cooperative Incentive Tax Credit Program*, at <http://www.mda.state.mo.us/Financial/a7a.htm>. Authorizing legislation, Missouri HB888, is available at: <http://www.house.state.mo.us/bills99/bills99/hb888.htm>.

POLICY 5.2

Wisconsin should share provision of risk capital with private financial markets to provide funding for viable projects featuring the adoption of biorefinery technologies or start-up of biobased products manufacturers

Channels Affected: All

Biobased industry technologies, products or projects often can have benefit streams that accrue to the investor as financial returns and to the public as improved environmental performance. However, the financial returns may not be large enough to satisfy investors or lenders, or they both may view the new technology as too risky. Private investors in biobased projects with long-term returns may need an entity that can provide financing that has a longer time horizon, such as the state.

The state should investigate funding due diligence of potential biobased investments opportunities and confidentially share that information with private investors to reduce transaction costs to the project. Then, the state should provide a pool of funds to be used to share financing of biobased projects via loans or equity financing, or subordinated debt when banks are unwilling to lend a principal that is justified by due diligence. The state should also investigate project financing, loan guarantees for bank-funded ventures, or creating cooperative structures to manufacture, produce or sell biobased products. Once a project has an operating history with proven cash flows, State funds should be extracted from projects and allow private financing to fill the void.

One possible funding mechanism is to target a portion of the state's employee and teacher pension funds into energy and renewable energy projects, including bioeconomy efforts. Investing in energy efficiency, which has a short-term return, could help offset the risks of longer-term investments in renewable projects. The state could also remove much of the risk

associated with these projects by providing a guarantee for the return of the investment principal to the investors.

PUTTING PENSIONS TO WORK FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY IN CALIFORNIA

California's Green Wave program is a model of how this might be accomplished. The program directs California's two largest pension funds, the California Public Employees' Retirement System (CalPERS) and The California State Teachers' Retirement System (CalSTRS) to invest roughly \$1.5 billion into the clean energy industry. The program has four elements:

- **Private equity investments.** CalPERS and CalSTRS will invest a combined total of \$500 million into private equity investments for environmental technologies. Technologies can include renewable energy, fuel cells, water purification, recycling technologies and waste reuse technologies.
- **Auditing the real estate portfolio.** As of November, 2004, CalPERS and CalSTRS have committed to reducing energy use by 20% within 5 years in their real properties. The two funds hold \$16 billion in property investments and a total of 200 million square feet of office, industrial, apartment and retail space. Energy savings from these properties will allow the funds to pay back energy efficiency upgrade costs within five years. This equates to an internal rate of return of 14.16% over 10 years.
- **Environmentally screened funds.** CalPERS and CalSTRS will invest a combined total of \$1 billion into "environmentally screened equity funds" –mutual funds with a proven environmental history or funds that have been selected through public equity investment managers. These investments have the potential to enhance returns and will send the message to corporations that environmentally responsible practices can increase value.
- **Demanding environmental disclosure.** Through dialogue, shareholder resolutions and financial clout, CalPERS and CalSTRS will urge corporations to provide meaningful, consistent reporting of their environmental practices.

POLICY 5.3

The state should assist existing businesses with costs of detailed assessments required to integrate biorefinery technologies into existing industries

Channels Affected: Traditional Crops, Crop Residues, Industrial Wastestreams, Manure Management, Wood Residues, Forest Biorefinery

Many biorefinery technologies require integration into existing industries' processes. This can be very time-consuming and expensive because the entire system must often be modeled and understood to quantify the new technology's impacts on existing product streams. Companies with tight budgets may not risk the capital on such a project. Encouraging these projects will

help build a level of bioindustry expertise in the state's consulting industry as well as promote adoption of new technologies in existing clusters. The state should provide cost share with existing industry to determine suitability for conversion to bioindustry facility. The Wisconsin Bioeconomy Center should receive copies of study results to refine policies, ensure targeting of appropriate technologies and facilities and share data to serve as a guide for future studies of similar options.

POLICY 5.4

Provide state support for private regional processing sites, or support state- or municipally-owned regional processing sites, to encourage efficient aggregation and processing of feedstocks or products.

Channels Affected: Manure Management, Crop Residues, Wood Residues, New and Dedicated Crops, Industrial Wastestreams

A key hurdle to biobased feedstock processing is the distributed nature of many feedstocks and the difficulty and cost of aggregating and transporting these non-dense feedstocks. A potential solution to this hurdle is to locate distributed preprocessing or processing facilities in the area of good feedstock concentrations. Case studies and interviews have indicated that partnerships among public and private entities will be needed. For example, regional publicly-owned treatment works for manure, state/municipal collection centers for feedstocks to produce biogas, regional biofuel plants, combined with pumping facilities for E10, E85, biodiesel and biomethane or centralized wood pelleting facilities, co-located near a low-cost heat source and partnered with grain elevators could all be potential business opportunities that may require substantial public facilitation, investment or ownership.

Conclusion

In one of our early interviews for this project, Don Erbach from the USDA Agricultural Research Service told us, “I would say the development of [the bioenergy] industry is 10 percent technology and 90 percent policy.” As may be clear from the wide array of policies we have recommended here, we tend to agree. Wisconsin has many of the raw ingredients it needs to create a successful bioeconomy: the crops, the trees, the people, the physical infrastructure, and the brains. To turn these ingredients into an actual economic development plan, the state needs to articulate a consistent vision for the bioeconomy, and enact those policies that will open up markets, encourage production, and generally move the state toward realizing this vision.

We hope that the policies we have recommended – in concert with the background information and research provided in our Briefing Paper and Technical Analysis – will help the Governor’s Consortium on Biobased Industry begin to articulate this vision, so that the state can take advantage of its many strengths and opportunities, and embrace a secure, sustainable, equitable biobased future.

Appendix A

Utility Buyback Tariffs and RECs								
Company	Rate	Size	Annual <i>on-peak</i>	Annual <i>off-peak</i>	On-peak \$ per kWh	Off-peak \$ per kWh	Includes RE Credits	Average \$ per kWh
Xcel	Pg-2	> 100 kW	3059 h	5707 h	\$0.044	\$0.020	No	\$0.028
WE-Energies	COGS 1	> 20 kW	3059 h	5707 h	\$0.045	\$0.019	No	\$0.028
<i>WE-Energies</i>	<i>proposed</i>	<i>< 800 kW</i>	<i>3059 h</i>	<i>5707 h</i>	<i>\$0.080</i>	<i>\$0.049</i>	<i>Yes</i>	<i>\$0.060</i>
WPS	PG-2	> 20 kW	3850 h	4916 h	\$0.066	\$0.025	No	\$0.043
Alliant	PgS-1	> 20 kW	3569 h	5197 h	\$0.055	\$0.023	No	\$0.036
<i>Alliant</i>	<i>Pgs-6</i>	<i>< 800 kW</i>	<i>3569 h</i>	<i>5197 h</i>	<i>\$0.080</i>	<i>\$0.049</i>	<i>Yes</i>	<i>\$0.062</i>
MGE	Pg-1	> 20 kW	2803 h	5963 h	\$0.078	\$0.041	No	\$0.053
MGE	Pg-3	> 20 kW			\$0.061	\$0.061	Yes	\$0.061

Source: Wisconsin Distributed Resource Collaborative (WIDRC)