V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Sustainable Energy

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%			
133	Pollution Prevention and Mitigation	10%			
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	10%			
403	Waste Disposal, Recycling, and Reuse	10%			
601	Economics of Agricultural Production and Farm Management	10%			
602	Business Management, Finance, and Taxation	10%			
605	Natural Resource and Environmental Economics	20%			
608	Community Resource Planning and Development	20%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	4.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
140747	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
211120	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The new interdisciplinary Bioenergy and the Bioeconomy Team facilitated new public-private partnerships to develop innovative educational and applied research collaborations that in 2010 focused on biogas projects (providing business education to various stakeholders), liquid biofuels (offering seminars on understanding emerging federal programs), and biomass supply and conversion (research was a top priority). Environmental Resources Center scientist Sharon Lezberg is collaborating with 50 regional colleagues to develop the BioEnergy and Renewable Energy Community Assessment Toolkit, as well as curricula to teach Energy Independence, BioEnergy Generation and Environmental Sustainability. Jason Fischbach, agriculture agent for Ashland and Bayfield counties, convened stakeholders to develop the Lake Superior Woody Biomass Initiative, which outlines efforts to develop a sustainable woody biomass supply chain that could provide income opportunities for area farmers. Bioenergy and bioeconomy specialist Tim Baye developed biomass supply business planning and pricing seminars, and counseled both private and public groups on risks and benefits of biomass-to-energy projects.

2. Brief description of the target audience

The audience includes regulated and unregulated utilities, biomass producers and aggregators, food processors, loggers, procurement foresters, wood products professionals, haulers, farmers, business owners, woodland owners, recycling volunteers, public and private agencies, government officials and firms dealing with liquid biofuel, anaerobic digester and biomass conversion technology. Of 8,297 adults reached through direct teaching methods in 2010, 91.6 percent were white, 3.1 percent American Indian, 2.4 percent Asian American, 2.4 percent African American, and 0.5 percent of other identity; 85.7 percent were male and 14.3 percent female; 1.9 were Latino.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	8297	8120	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2010
Plan:
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	3	4	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Develop biomass use for biofuels.
2	Build capacity to create, refine and implement scalable conversion technologies.

Outcome #1

1. Outcome Measures

Develop biomass use for biofuels.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increased interest in and funding for renewable energy sources may bring new economic opportunities to Ashland and Bayfield counties. The region's forests and farmlands offer a rich supply of herbaceous and woody biomass for use in the emerging bioeconomy. A number of companies have announced plans to establish or expand their use of woody biomass for energy production. Xcel Energy has received approval to nearly double their use of woody biomass at the Bayfront power plant in Ashland. Little is known about how woody biomass crops such as hybrid poplar, larch or willow will perform in the climate and soils of Ashland and Bayfield counties, nor are there agronomic or management recommendations for producers.

What has been done
Jason Fischbach, Wisconsin Cooperative Extension agriculture agent for Ashland and Bayfield counties, convened stakeholders to develop the Lake Superior Woody Biomass Initiative, which outlines education, research, and outreach efforts necessary to develop a sustainable woody biomass supply chain. Despite significant forest resources in the region and a considerable supply of harvest residues and mill waste, stakeholders recognize dedicated woody biomass crops as another important source of feedstock that could provide income opportunities for area farmers. Fischbach secured $35,000 in funding from Xcel Energy and the Wisconsin Office of Energy Independence to implement the Lake Superior Woody Biomass Trials. The trials consist of 25 acres of woody biomass plantings with a series of formal research projects and demonstration plantings. The trials include work on hybrid poplar, hybrid willow, and native conifers. A re-plant trial is also being conducted in two hybrid poplar stands harvested during winter 2009.

Results
The primary focus of the Lake Superior Woody Biomass Trials is to evaluate and demonstrate production scenarios for potential biomass producers. After a successful establishment year in

2010, data collection began in late October. In the first year, the trials introduced people throughout Wisconsin to woody biomass crops at a production scale, and have inspired collaborations for further research and development work. Funding from the Focus on Energy program was obtained to conduct a nitrogen fertilization trial with hybrid willow. The Natural Resources Research Institute in Duluth, MN, has provided hybrid poplar for a replicated performance trial of their select hybrid poplar accessions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Build capacity to create, refine and implement scalable conversion technologies.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
During 2010, uncertain and uncoordinated policies at both state and federal levels, coupled with low fossil fuel prices, prompted a significant slowdown in renewable energy project development and financing. However, given recent years' momentum and continued stakeholder interest, educational and research opportunities remained strong and in some sectors grew throughout the year.

What has been done
The new Wisconsin Cooperative Extension Bioenergy and the Bioeconomy Team focused educational programs on biogas, liquid biofuels, and biomass feedstocks and conversion, and provided information and assistance to clients and public-private partners in all areas of the state and Upper Peninsula Michigan. Their most daunting challenge was finding how to assure

sufficient year-round organic feedstocks for profitable conversion to energy. Biomass supply education was most effective in bringing previously unrelated stakeholders together and providing educational support for their efforts.

Results
Extension specialists have provided educational support to keep good projects moving forward, and to slow or stop projects with questionable economic or technical futures, keeping clients from making poor investment decisions. With help from Wisconsin Cooperative Extension, communities and businesses are in a better position to choose winners, generate jobs and keep communities moving forward. For example, a community manure digester project is generating energy in Dane county, with another under construction. The innovative communal digester with more than one farm providing manure may become a model for other projects. Another equally important educational outcome for private sector operators is the decision not to proceed, based on a better understanding of the risks of moving forward when future fuel prices remain uncertain.

4. Associated Knowledge Areas

KA Code	Knowledge Area
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Competing Public priorities

Brief Explanation

Economy: The Wisconsin Cooperative Extension Bioenergy and the Bioeconomy Team will play a key role in helping new bioenergy projects - from ultra-small to large - create new jobs for new industries. These uncertain times require careful analysis by an informed developer to ensure the best chance for a proposed project's success. While some larger-scale projects have been put on hold, extension business education and assistance will continue to bring research and innovation to an emerging bioeconomy.

Public policy changes: State and federal policies are driving research and development of the bioeconomy, and projects that can generate energy from bio-based residuals and specialty crops are being widely investigated. However, the changing political and economic landscapes in energy and environment have complicated bioeconomic development decision-making. During 2010, uncertain and uncoordinated policies at both state and federal levels, coupled with low fossil fuel prices, prompted significant slowdown in renewable energy project development and financing. Low current natural gas prices and the lack of a national carbon control policy are just two factors that could affect the long-term profitability of bioenergy projects.

Competing public priorities: Given Wisconsin's wealth of resources in forests and agricultural production, there is great interest among state businesses and communities in producing alternative fuels and feedstocks from biomass. Outreach and extension collaborations need further development. Additional collaboration in professional training and cross-discipline research is required to effectively and efficiently apply new technology. A new collaborative effort to develop a curriculum for USDA Farm Service Agency Biomass Crop Assistance Program education was begun by Wisconsin Cooperative Extension, the University of Wisconsin-Madison College of Agricultural and Life Sciences, and Wisconsin Bioenergy Initiative.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}