## V(A). Planned Program (Summary)

**Program # 7**

**1. Name of the Planned Program**

Sustainable Energy

☑ Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 131 | Alternative Uses of Land | 10% | | | |
| 402 | Engineering Systems and Equipment | 20% | | | |
| 605 | Natural Resource and Environmental Economics | 20% | | | |
| 608 | Community Resource Planning and Development | 20% | | | |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | 20% | | | |
| 804 | Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures | 10% | | | |
| | **Total** | 100% | | | |

## V(C). Planned Program (Inputs)

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

| Year: 2012 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 2.3 | 0.0 | 0.0 | 0.0 |
| Actual Paid Professional | 1.7 | 0.0 | 0.0 | 0.0 |
| Actual Volunteer | 0.0 | 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** |
| 2984 | 0 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 0 | 0 | 0 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 90514 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Produce guides on current energy topics.
Conduct community meetings on energy topics
Conduct meetings for agriculture and other landowners on alternative energy topics.
Partner with agencies, local and tribal government, organizations and industry.
Conduct meetings and seminars on methods for evaluating alternative energy opportunities.

### 2. Brief description of the target audience

Farmers and Ranchers
Non-farm or ranch energy users
Landowners
Local Government
Current Community Leadership
Local Development Entities
Local Economic Development Entities
Chamber of Commerce Members
People interested in becoming involved with creating alternative energy opportunities
Small businesses by SBA definition

### 3. How was eXtension used?

Extension professionals and clientele are encouraged to use the system as a resource for information and educational materials related to their specific questions and concerns. The Ask an Expert function has been valuable to provide information that is not available in our state.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2012 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 7631 | 214000 | 0 | 100 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2012 |
| Actual: | 0 |

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2012 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 3 | 0 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Sustainable Energy: Number of people attending workshop/presentations and/or accessing the web site for information about wind energy. Number of people attending workshops/presentations on the pros and cons of various types of bio-fuels or alternative energy sources. Development of educational guides/publications on current energy issues. Workshops/seminars on quantifying the impact of energy generation or savings as it relates to the bottom line of their primary business function. Number of people gathering information from the Extension Energy web site.
  Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- Energy and Agriculture: Number of people attending workshops/presentations or using the website for information about energy alternatives and what criteria to use for decision making on becoming involved with energy generation. (wind, solar, bio-diesel, bio-mass, oilseed production/processing, ethanol etc.) Number of producers attending seminars/demonstrations on using energy saving tillage system practices.

| Year | Actual |
|---|---|
| 2012 | 257 |

**Output #3**

**Output Measure**

- Energy and Community: Number of people attending workshops/presentations or using the web site on public policy issues related to energy generation and transmission. Number of people participating in workshops/presentations on land leasing issues related to energy generation.

| Year | Actual |
|---|---|
| 2012 | 4000 |

**Output #4**

**Output Measure**

- Residential Energy: Number of homeowners and builders who attend workshops/seminars or accessing the web site on home energy saving/conservation practices. Number of home builders, contractors and crews attending workshops on weatherization techniques in construction of homes. Number of people who gain information about the Camelina Composite Pellet Fuels for home stoves.

| Year | Actual |
|---|---|
| 2012 | 2000 |

**Output #5**

**Output Measure**

- Home Energy Costs: Number of people learning methods to save home energy, including purchasing Energy Star products. Number of people using energy saving practices in new and remodel construction. Number of people practicing weatherization techniques.

| Year | Actual |
|---|---|
| 2012 | 30 |

**Output #6**

**Output Measure**

- Renewable/Alternative Energy: Number of people making decisions about alternative energy opportunities based on Extension information.

| Year | Actual |
|---|---|
| 2012 | 1032 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Energy and Agriculture (reservation and non-reservation) Participants will understand energy alternatives and how to use a framework to evaluate energy opportunities. Participants will be able to make a sound decision on becoming involved with energy generation. (wind, solar, bio-diesel, bio-mass, oilseed production/processing, ethanol etc.). Participants will use energy saving tillage system practices. |
| 2 | Energy and Community (reservation and non-reservation) Participants will understand the public policy issues related to wind and other alternative energy generation and transmission. Participants will understand land leasing issues related to wind and other alternative energy generation and transmission. |
| 3 | Residential Energy: Homeowners will apply home energy savings/conservation practices. Home builders, contractors and crews will use weatherization techniques in constructing homes. Participants will become aware of the Camelina Composite Pellet Fuels for home stoves. |
| 4 | Home Energy Costs: Participants will apply common methods to save home energy to new or existing homes. Participants will use high performance, resource efficient building materials and construction techniques in remodeling and new construction. Participants will increase their purchase of Energy Star products and appliances resulting in an energy saving of at least 30% annually per appliance. Participants will experience an energy savings due to weatherizing and remodeling existing homes (13-65% energy savings per household). |
| 5 | Renewable/Alternative Energy: Landowners/citizens will have tools to make decisions about becoming involved with renewable/alternative energy opportunities. |

## Outcome #1

### 1. Outcome Measures

Energy and Agriculture (reservation and non-reservation) Participants will understand energy alternatives and how to use a framework to evaluate energy opportunities. Participants will be able to make a sound decision on becoming involved with energy generation. (wind, solar, bio-diesel, bio-mass, oilseed production/processing, ethanol etc.). Participants will use energy saving tillage system practices.

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Actual |
|---|---|
| 2012 | 257 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Oil and gas leasing-natural resource permitting has become an issue as production companies seek new opportunities for expansion. Many landowners are unprepared to make informed decisions concerning mineral and water rights.

**What has been done**
A series of workshops were offered that included water appropriations, water rights and water used in the hydraulic fracturing process, how a well is drilled and the actual process used to frac a well with in-depth discussion on oil and gas leases. Participants learned about existing water rights, water use by municipalities, water marketing, developing a gravel pit on their property and were given the opportunity to ask questions and hear from the experts on specific topics related to their property. A water well testing program was initiated to help water well owners establish a baseline for water quality at their well. Educational materials were handed out at the workshops and distributed to interested clients.

**Results**
Attendees reported feeling more able to make informed decisions when approached by energy companies. One particular participant indicated that a company offered him a 12% share; when the fair percentage is 17-18% or higher. The difference to the landowner could total over $130,000 in just one year. Participants understood that they could negotiate things like the length of the lease and other considerations.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 131 | Alternative Uses of Land |
| 605 | Natural Resource and Environmental Economics |

**Outcome #2**

**1. Outcome Measures**

Energy and Community (reservation and non-reservation) Participants will understand the public policy issues related to wind and other alternative energy generation and transmission. Participants will understand land leasing issues related to wind and other alternative energy generation and transmission.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2012 | 4000 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Consumers are interested in reducing consumption, using more efficient energy sources and learning about the latest technologies and solutions for being good stewards of limited resources. Finding reliable science-based information can be a challenge.

**What has been done**
In 2010 the Montana Weatherization Training Center, in partnership with Exxon Mobil and the National Community Action Foundation, created WxTV a national weatherization training show that uses a blend of expert advice, how-to techniques, innovation and reality TV to create entertainment-based learning. The show has since expanded to cover all aspects of energy-efficient living. WxTV is available anytime, anywhere. Live episodes encourage viewers to be interactive through a real-time blog. There are more than 90 eLearning modules for trainers. WxTV has 4,000-5,000 monthly viewers and has had 200,000 unique views on the WxTV site and 113,000 on YouTube.

**Results**
WxTV was recognized in 2012 at the 33rd Annual Telly Awards Show. The Telly Awards honor the finest film and video productions, commercials, and programs. WxTV earned first place in the category of Documentary Internet/Online Video and second place in the category of Informational Internet/Online Video. The daily use of the WxTV blogs connecting weatherization professionals nationwide and viewership in every state and all territories shows its wide value. Twenty two

states have approved the site for official weatherization training. The channel will soon be available via PBS.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 402 | Engineering Systems and Equipment |
| 605 | Natural Resource and Environmental Economics |
| 608 | Community Resource Planning and Development |

**Outcome #3**

**1. Outcome Measures**

Residential Energy: Homeowners will apply home energy savings/conservation practices. Home builders, contractors and crews will use weatherization techniques in constructing homes. Participants will become aware of the Camelina Composite Pellet Fuels for home stoves.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2012 | 2312 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Montana consumers have noticed a major difference in their utility bill during the past year; the cost of energy has increased significantly. With higher utility bills consumers (affluent and low-income) are requesting assistance for energy conservation and weatherization, seeking information on energy efficient construction and remodeling and purchasing Energy star appliances.

**What has been done**
This program consists of three education efforts: home energy conservation and weatherization methods and materials; EnergyStar product selection; and energy efficient remodeling and new construction. Programming support is provided through the MSU Extension Housing and Environmental Health Program. The center produces and distributes many energy-related educational resources including publications and visuals. WxTV was developed in 2010 and is a weatherization online program that blends expert advice, how-to techniques, innovation, and reality video.

**Results**
As a result of the Extension Weatherization training and certification program, 2312 homes were weatherized at an average labor and materials cost of $3,502. Annual energy savings associated with weatherizing those homes averaged 26% ($396/home) and energy consumption was reduced by an average of 33% resulting in a quick return on the investment.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 402 | Engineering Systems and Equipment |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities |
| 804 | Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures |

**Outcome #4**

**1. Outcome Measures**

Home Energy Costs: Participants will apply common methods to save home energy to new or existing homes. Participants will use high performance, resource efficient building materials and construction techniques in remodeling and new construction. Participants will increase their purchase of Energy Star products and appliances resulting in an energy saving of at least 30% annually per appliance. Participants will experience an energy savings due to weatherizing and remodeling existing homes (13-65% energy savings per household).

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2012 | 30 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Montanans have a sincere desire to be efficient and productive and as costs of energy rise and people become more conscientious of wastefulness, there is a great need for better construction practices and use of technology to limit the use of resources.

**What has been done**
A series of classes and workshops, both online and face-to-face have been developed to cover a range of new technologies, materials use, alternative energy and design practices to help

contractors build efficient new homes and to retrofit old ones.

**Results**
Work of the MSU Extension Weatherization Center has led to the creation of the Residential Building Performance Program, a new one-year Certificate of Applied Science training program in the MSU Gallatin College. The hybrid of online and traditional courses, some of them taught by Extension professionals, helps respond to the educational needs of energy efficient construction professionals, local government administrators and State Weatherization Assistance Program professionals.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 804 | Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures |

**Outcome #5**

**1. Outcome Measures**

Renewable/Alternative Energy: Landowners/citizens will have tools to make decisions about becoming involved with renewable/alternative energy opportunities.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2012 | 1032 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Exploring small-scale energy technologies, from small wind to solar hot water and from solar electric to biodiesel; which can be applied to home, farm, or ranch settings, is confusing and complicated for families, farmers, ranchers and business.

**What has been done**
MSU Extension developed E3A (Exploring Energy Efficiency and Alternatives) to make energy decisions easier and more useful for consumers. More than 80 fact sheets full of nonbiased, research-based information are available to consumers online at www.E3A4U.info or through the local Extension Office. Information and links on energy decision-making are also found at the site for download. In addition, the E3A toolkit includes lesson plans and resources to help make

teaching energy easy. A blog and Ask an Expert help connect resources with need, as well.

**Results**

Consistent knowledge gain was shown based on pre/post evaluation tools. For large classes (over 100), average knowledge gain on a five point Likert scale increased from 1.3, low level of understanding about E3A topics to an average of 3.65, moderate understanding of E3A topics. For a medium class (about 60 participants) knowledge increased by an average of 3 points. Participants indicated the extent to which E3A programming would influence their decisions to implement changes in energy practices was 4.1, on a 5 point scale where 5 is Extreme Influence. As an example, one participant learned that installing a small wind system on his property would not be effective due to his trees and other obstructions, so he focused instead on other energy efficient measures to reduce his consumption.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 605 | Natural Resource and Environmental Economics |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

**Brief Explanation**

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

The expense of energy and environmental concerns both contribute to Montanans desire to utilize energy more efficiently and effectively. The goals of this program were each met through careful direct one-on-one interaction with clients, as well as by up-to-date, leading edge networking and use of modern media.

To address the goal of helping agriculture and business entities, Extension offered Oil and Gas Leasing classes to give landowners the information they needed to make careful decisions when approached by companies to sell water and mineral rights. This filled an important need as natural resource exploration expands across Montana.

Montanans were given tips on weatherization and energy efficiency in their homes

directly through the MSU Extension Housing and Environmental Health Program. Professionals trained through the center weatherized 2312 homes saving an average of 26% on energy costs. In addition the program created WxTV, an award winning and national weatherization and training Web show that blends expert advice and how-to techniques in a modern format, gathering more than 200,000 unique views including more than 4,000 monthly viewers.

The MSU Extension Housing and Environmental Health Program invested significant time and resources into creating a one-year Certificate of Applied Science training program, the Residential Building Performance Program which is now offered by the Gallatin College. The hybrid of traditional and online classes responds to the educational needs of energy efficient construction professionals, government administrators and state weatherization assistance program officials.

The Exploring Energy Efficiency and Alternatives (E3A) program effectively packaged materials for classes across the nation to learn about energy alternatives. Creating more than 80 fact sheets full of nonbiased, research-based information on topics including wind, solar and other renewable energy options, and making them available online, along with a blog and Ask an Expert, connected resources directly with need.

**Key Items of Evaluation**

ENERGY AND AGRICULTURE

Oil and Gas Leasing class attendees reported feeling more able to make informed decisions when approached by energy companies. One particular participant indicated that a company offered him a 12% share; when the fair percentage is 17-18% or higher. The difference to the landowner could total over $130,000 in just one year.

Participants understood that they could negotiate things like the length of the lease and other considerations.

ENERGY AND COMMUNITY

WxTV was recognized in 2012 at the 33rd Annual Telly Awards Show.

WxTV earned first place in the category of Documentary Internet/Online Video

WxTV earned second place in the category of Informational Internet/Online Video

WxTV blogs connecting weatherization professionals nationwide has thousands of hits and viewership in every state and all territories

Twenty two states have approved the site for official weatherization training.

The channel will soon be available via PBS.

RESIDENTIAL ENERGY

As a result of the Extension Weatherization training and certification program, 2312 households have reduced energy consumption by an average of 33%, and energy costs by an average 26%.

HOME ENERGY COSTS

Work of the MSU Extension Weatherization Center has led to the creation of the Residential Building Performance Program, a new one-year Certificate of Applied Science training program in the MSU's Gallatin College.

RENEWABLE/ALTERNATIVE ENERGY

E3A Program training showed consistent knowledge gain based on pre/post evaluation tools.

For large classes (over 100), average knowledge gain on a five point Likert scale increased from 1.3 to an average of 3.65

For a medium class (about 60 participants) knowledge increased by an average of 3 points.

Participants indicated the extent to which E3A programming would influence their decisions to implement changes in energy practices was 4.1, on a 5 point scale where 5 is

Extreme Influence.