V(A). Planned Program (Summary)

Program # 11

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
605	Natural Resource and Environmental Economics	100%		100%	
	Total	100%		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	1.0	0.0	1.0	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**
11479	0	30398	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
392647	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
412765	0	243570	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• Perform experiments to investigate renewable energy production.
• Develop methodologies and scientifically sound alternatives to fossil fuels
• Educate homeowners, business owners, farmers and agri-related businesses, youth and families about conservation and efficiency practices related to energy use.

• Provide education and training to enhance bio energy related job development and careers.

2. Brief description of the target audience

• University faculty, staff and students
• School aged youth
• Families
• Homeowners
• Farmers
• Agri-businesses
• State agencies and organizations
• Industry partners
• Small businesses
• Entrepernuers
• Policy and decision makers

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	4000	20000	1500	25000

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	0	4	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,publications. In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Increase knowledge, energy efficiency technologies and conservation practices related to energy use. Explore research strategies to replace fossil fuel consumption.
2	Medium Term - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.
3	Long Term - Fossil fuel consumption will be replaced with biofuels. Economic development will be enhanced through an increase of jobs and careers as a result of bioenergy development. Environment quality enhanced as a result of sustainable biofuel production and utilization.

Outcome #1

1. **Outcome Measures**

Short Term - Increase knowledge, energy efficiency technologies and conservation practices related to energy use. Explore research strategies to replace fossil fuel consumption.

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

Medium Term - Participants in direct and indirect educational methods will adopt practices to conserve energy use and reliance on fossil fuels. Business owners will create and maintain green jobs/careers as a result of bioenergy development. Newly developed plants and technologies will be adopted to enhance energy independence.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

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)
Reducing Greenhouse Energy use by Investigating Current and Alternative Technologies

Controlled environment plant production systems (greenhouses and growth chambers) are used worldwide to produce high quality plant material (produce, floriculture, and nursery crops). Rising energy prices have made a significant impact on the profitability of many greenhouse operations. Engineering information and solutions can help growers reduce energy use and operating costs.

What has been done
Research was conducted at the open-roof greenhouse investigating the energy flows associated with the operation of a greenhouse floor heating system. The research results can be used by commercial greenhouse growers who are using or planning to install hydronic floor heating systems. Energy audit checklists were developed that commercial growers can use to evaluate the energy use of their operations and/or to make smart

energy decisions about retrofits and/or new construction. Recent efforts to further reduce fossil fuel requirement have focused on designing systems with heat pumps contributing to the first increment of base load heating.

Results

The original floor heating research has resulted in a significantly updated information to be incorporated in a revision of the Rutgers Cooperative Extension Root Zone Heating Extension Bulletin. An energy audit checklist was developed for commercial greenhouse operations. The checklist has been distributed throughout the northeast and beyond. Growers who implemented the information resulting from the research and the various presentations and publications have been able to realize energy savings between 5% and 30%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #3

1. Outcome Measures

Long Term - Fossil fuel consumption will be replaced with biofuels. Economic development will be enhanced through an increase of jobs and careers as a result of bioenergy development. Environment quality enhanced as a result of sustainable biofuel production and utilization.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition 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)

Biomass/Biofuels

Alternatives to the dependence on fossil fuels need to be investigated utilizing scientific methodologies for biomass/biofuel development.

What has been done

NJAES research is focused on breeding and selection of switchgrass, a perennial warm

season buchgrass native to North America.

Results

NJAES-supported research indicates that location (growing environment) significantly influence establishment, plant height, tiller number, and disease resistance in switchgrass. This will help to guide breeding and selection efforts to determine number replications that need to be evaluated, locations of breeding nurseries and selection criteria, as well as improve breeding efficiencies and hasten cultivar development. This information is important for identifying potential cultivars for use in marginal land in the Northeast. With this research we will be able to recommend cultivars with optimum performance for these conditions. Several switchgrass clones with high tiller density, anthracnose resistance, and rust resistance have been identified. These clones can be used as parents to develop new cultivars of switchgrass that are adapted to marginal lands in the Northeast US. These newly developed cultivars should have increased yields and reduced pesticide inputs while growing on marginal land.

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Other (Consumption Practices)

Brief Explanation

• State and local investment and support including funds and manpower in related research activities are essential to programs effectiveness.
• Partnerships with industry, government and communities.
• Public education and involvement of individuals, youth families and communities in conservation practices.
• Job training and career development opportunities will effect work force and economic enhancement.

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

1. Evaluation Studies Planned

- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Comparisons between program participants (individuals, group, organizations) and non-participants

- Comparisons between different groups of individuals or program participants experiencing different levels of progra intensity.
- Comparison between locales where the program operates and sites without program intervention

Evaluation Results

See Qualitative and Outcome Impact Statements

Key Items of Evaluation