V(A). Planned Program (Summary)

Program # 12

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
101	Appraisal of Soil Resources	0%	0%	40%	0%
123	Management and Sustainability of Forest Resources	100%	0%	0%	0%
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	20%	0%
402	Engineering Systems and Equipment	0%	0%	10%	0%
511	New and Improved Non-Food Products and Processes	0%	0%	30%	0%
	Total	100%	0%	100%	0%

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Actual	3.0	0.0	2.1	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
113991	0	80000	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
113991	0	140000	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
25051	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Clemson University Extension Service staff developed and conducted educational programs to inform landowners about best management and conservation practices and continue to advise farmers on switchgrass as bio-fuel.

A market was developed for switchgrass as a biofuel, leading to a $20 million annual contract for South Carolina growers to sell switchgrass to European power plants.

Researchers are analyzing sorghum to improve its ability to be converted to ethanol. Additionally, the research will provide data that will help producers of related crops, including corn, rice and turfgrass. South Carolina uses nearly 2.5 times more energy than it produces, according to U.S. Energy Information Administration. While the state does not have oil, natural gas or coal resources, biofuels from crops show promise as renewable energy sources that can be produced here.

2. Brief description of the target audience

Research and extension programming in sustainable energy impacts all the citizens of South Carolina as power and fuel consumption grows with the population, along with the costs. New fuel options and new approaches to the generation of energy which can be environmentally safe and cost effective will be critical to growing the state's economy in the future.

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	4644	369300	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	0	8	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of people completing educational workshops

Year	Target	Actual
2010	{No Data Entered}	2572

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	New income sources for South Carolina farmers by finding markets for crops which can be converted to energy
2	Number of people gaining knowledge

Outcome #1

1. Outcome Measures

New income sources for South Carolina farmers by finding markets for crops which can be converted to energy

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}	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The identification of alternative energy sources is a critical national and international issue because of the limited availability of petroleum products and the volatility in prices.

What has been done
Clemson has conducted extensive research and field testing to determine best practices for the production of switchgrass in the Southeastern United States.

Results
Researchers at the Pee Dee Research and Education Center in Florence have teamed with a Charleston South Carolina company to begin supplying switchgrass to European power plants as a substitute for coal to generate electricity.

Carolina-Pacific LLC will ship more than 350,000 tons of switchgrass per year beginning in 2012. The initiative will be worth more than $20 million a year to the state of South Carolina farmers during the next decade. This initiative will be a huge benefit to South Carolina farmers and rural communities along the I-95 corridor.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #2

1. Outcome Measures

Number of people gaining knowledge

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	2486

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Forestry and crops for bioenergy production can contribute to the goal of energy independence for the country. In addition, many landowners are unaware of best practices for broadening sustainable forestry on their land.

What has been done
The Clemson University Cooperative Extension Service staff developed and conducted educational programs to inform landowners about best management and conservation practices. Over 64 programs were conducted. Thirty-one loggers received logger education certification. In addition, agents are serving as a part of the eXtension Community of Practice for wood energy, serving on statewide bio-energy committees, advising farmers on switch grass as bio-fuel and making presentations to advisory councils on alternative fuels for the 4-H Science, Engineering and Technology program.

Results
Of the 2,572 persons participating in educational programs, over 97% reported a gain in knowledge.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- During (during program)

Evaluation Results

Post program evaluations reveal that of the 2,572 persons participating in educational programs, over 97% reported a gain in knowledge.

Key Items of Evaluation