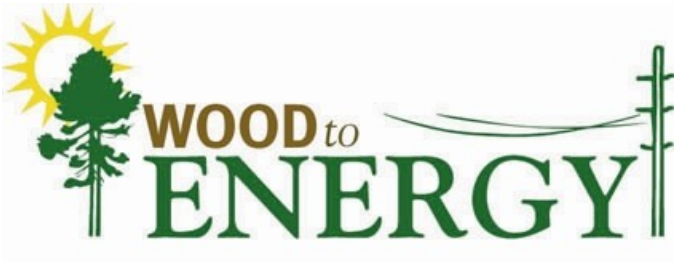

Final Report

Wood to Energy: An Outreach Program for Utilizing Interface Fuels for Bioenergy Outreach Program

SRS 05-CA-11330150-105

Martha Monroe and Annie Oxarart
with contributions from
Alan Hodges, Matthew Langholtz, Todd LeVasseur,
Lauren McDonell, Christie Staudhammer, & Jessica Tomasello

School of Forest Resources and Conservation
Institute of Food and Agricultural Sciences
University of Florida

June 2009

Introduction

With growing concerns about energy security and climate change, communities across the United States are considering renewable energy options to meet energy demands. Woody biomass is one potential source of energy, particularly in wildland-urban interface areas in the South. For community leaders, wood and energy suppliers, foresters, and citizens to discuss the possibility of using woody biomass for energy production, however, they need science-based information, tools, and resources. The Wood to Energy Outreach Program was developed by InterfaceSouth of the U.S. Forest Service and the School of Forest Resources and Conservation of the University of Florida to foster informed community discussions about using wood for energy. We produced 18 fact sheets, 14 case studies, and 13 community economic profiles; trained 78 professionals from Extension, forestry, economic development, the energy sector, and non-governmental organizations; provided support and assistance to trainees as requested; reached over 1,700 people in presentations related to the program; and may have influenced decisions about using wood for energy in communities in Florida, Kentucky, and Missouri. This is the final report of the project.

Throughout the United States, efforts to develop economically sound, environmentally sustainable, and socially acceptable bioenergy production systems are increasing. Federal policy, for instance through the Healthy Forest Restoration Act of 2003 and the Energy Policy Act of 2005, supports the establishment of biomass systems. Scientists in government and non-governmental agencies are taking the initiative to improve biomass production, processing, and conversion. Entrepreneurs are developing and marketing bio-based products for use as bioenergy (Cook and Beyea 2000). Consumers favor renewable sources of energy, and many are willing to pay more for fuel and power generated from these sources (Bang et al. 2000, Farhar 1999). National and international events are drawing public attention to energy–the quantity we use and the consequences of that use–and increasing the importance of identifying reasonable, cost-effective, renewable energy resources.

The use of woody biomass for power production in communities with wildland-urban interface areas could promote better forest management, create a market for logging residue, and utilize urban waste wood while generating electricity. It could also keep land in forestry for the production of short-rotation woody crops and conserve local greenspace. Yet, in order to advance biomass-based production, there is often a need to educate citizens, community leaders,

and those who can supply and use biomass fuels about the potential uses, sources of raw material, environmental and economic impacts, and requirements to convert from fossil fuels to biofuels (SAFER 2009). In addition, there are uncertainties about this unfamiliar technology and perceptions about reduced forest cover (NRDC 2003; Adams 2003; Upreti 2004). Social factors, such as a lack of public support and understanding, are often barriers to the advancement of wood energy. Thus, community education is critical and can help ensure that woody biomass proposals are evaluated in a fair and reasonable light (Richter et al. 2009).

The Wood to Energy Outreach Program was proposed in 2003 to meet this need for community education about using wood for energy. Since that time, climate change, renewable technologies, and the price of energy have become even more visible in the media, federal and state legislation, and household conversations. More communities are considering local sources of energy, such as woody biomass, to meet their energy demands and will need science-based, objective information to help them make informed decisions. We believe that providing this information and empowering agency educators to provide outreach programs on wood energy will engage communities in discussions about using this energy resource.

Objectives and Audience

The Wood to Energy Outreach Program is designed to help communities be engaged in informed discussions about the possibility of using wood for heat, power, and electricity. The overall objectives of the program are to:

1) increase awareness and knowledge about using woody biomass for energy production;
2) enable community leaders, potential woody fuel users, biomass suppliers, and forest managers to discuss the possibilities in their region; and
3) provide tools and resources as communities begin to plan for new opportunities.

The Wood to Energy Outreach Program focuses on wildland-urban interface areas in the southern United States. The U.S. Forest Service's southern region was used to define the scope of the program, which includes 13 states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia (Figure 1). Due to the large scope of the program and the numerous communities and audiences who could use program materials, the Wood to Energy Outreach Program targets Biomass Ambassadors—outreach specialists who can focus on target communities in the South

and use the program materials to increase awareness and foster informed community discussions about using wood for energy. Biomass Ambassadors may be Extension agents, natural resource professionals, renewable energy advocates, or community development professionals who have an interest in or responsibility to educate citizens, community leaders, and industries about using wood for energy. Biomass Ambassadors may reach several audiences with program materials, ranging from concerned citizens to foresters to energy company representatives.

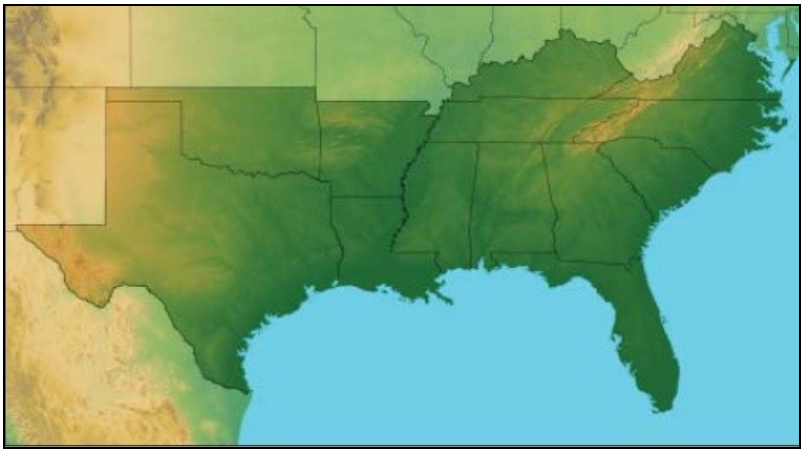

Figure 1. The Wood to Energy Outreach Program focuses on 13 southern states.

Program Development

Martha Monroe, Program Director, led a team of researchers, consultants, and students in the development and evaluation of the program from March 2005 to June 2009 (Appendix A). To ensure the program covered the variety of essential issues surrounding the use of wood for energy, four teams emerged: the economic analysis team, the outreach team, the technical team, and the General Technical Report leadership team. Multiple research activities informed program development, and program materials were pilot-tested with several audiences.

Research Activities

General Technical Report

A Forest Service General Technical Report (GTR), *Wood to Energy: Using Southern Interface Fuels for Bioenergy,* was written to summarize the current literature, technology, and perspectives on using wood for energy in the southern wildland-urban interface. The report contains seven chapters:

1) Introduction to Woody Biomass Energy
2) Woody Biomass Sources in the Wildland-Urban Interface
3) Harvesting, Preprocessing, and Delivery of Woody Biomass
4) Biomass Conversion to Energy and Fuels
5) The Economic Availability of Woody Biomass
6) Economic Impact Analysis of Woody Biomass Energy Development
7) Public Perceptions of Using Wood as Fuel

Most chapters were written and reviewed from 2005 to 2006 and formed the basis of the development of outreach materials. Three chapters (5, 6, and 7) reflect research results undertaken within this project, and to allow time for data collection and analysis, were completed later. Each chapter underwent extensive review and revision. Drafts were reviewed twice during the process by the GTR leadership team, a subcommittee of partners from the University of Florida and U.S. Forest Service. In addition, each chapter was sent for peer review by two individuals with expertise in the chapter's specific topic area. The chapters also were reviewed by several technical editors. The GTR is currently undergoing professional layout and design work by the Government Printing Office and is expected to be published in 2009.

Assessing Woody Biomass Potential in Southern Counties

To determine areas where using wood for energy is a reasonable option, county-level data were used to rank southern counties by a combination of resource and socioeconomic variables. This process enabled the economic analysis team to identify growing counties in forested portions of the wildland-urban interface, where an active forest industry might be close enough to reduce transportation costs of hauling wood and where energy should be needed in the near future. By ranking the counties based on the following indicators, areas where woody biomass is most likely to present a feasible energy resource were identified in each state:

- Estimated amount of forest biomass
- Electric power generation per capita
- Population growth
- Population density
- Personal income per capita
- Personal income change
- Estimated amount of urban wood waste
- Percent of wildland-urban interface

The indicators for each county were ranked on a scale from zero to one, and the variables were combined to identify the ten most suitable counties for woody biomass energy production. Local foresters and community leaders in several selected counties were contacted to ground truth the selections—to learn if the analysis had indeed picked counties that were likely to find woody biomass as a reasonable source of fuel. The majority of counties were realistic selections. Because at least ten counties were selected in each state, the selected counties in a less forested state could be less suitable for biomass than the eleventh or twelfth counties in heavily forested states. From these ten counties, one to five counties were then selected from each state that collectively represented a variety of population sizes, ecosystems, and situations (such as university towns or bedroom communities near metropolitan centers).

The results of this research allowed the economic analysis team to rank all counties in the South for their feasibility to use woody biomass and to select the counties for which further economic analyses would be conducted. While the final group of 28 counties for which we conducted economic analyses (supply curves and regional economic impacts) does not represent the 28 counties most likely to successfully use biomass, it does provide insight into the range of wood-to-energy possibilities in the South (Figure 2). Research methods and results were shared at the Wood to Energy Outreach Training and are accessible on the program web site.

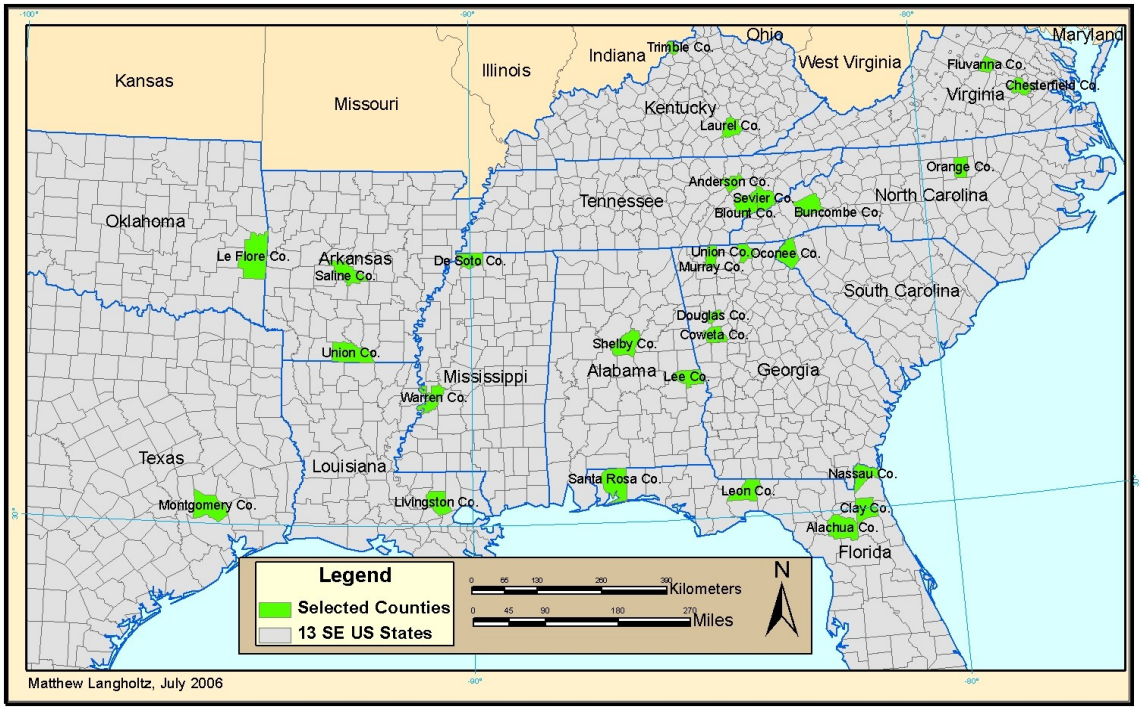

Figure 2. Twenty-eight counties were selected for economic analyses.

Economic Availability of Woody Biomass in Selected Counties

If Biomass Ambassadors are to help communities consider using wood for energy, the team recognized that economic considerations must be prevalent in the information, tools, and resources provided to them. Thus, a primary component of the program development was to determine how much wood is available at what cost within selected communities in the Southeast.

The feasibility of bioenergy projects depends largely on the economic availability (total delivered price for a given quantity) of woody biomass resources located near a community. Most assessments of biomass availability to date estimate the total amount of biomass within a given straight-line radius and assume average production costs for the area. A more comprehensive economic assessment of biomass resources takes into account that costs vary with biomass type, distance, and transportation infrastructure. When transportation costs are taken into account, more costly resources in close proximity may be economically competitive with cheaper resources farther away, and vice versa.

The ArcGIS Network Analyst extension was used in assessing the economic availability of woody biomass resources in the 28 counties selected to have potential for wood-to-energy projects (Langholtz et al. 2006). The first step was determining the proportion of each county within a given haul time category (Figure 3). Haul times were calculated to account for road infrastructure. Using the Field Calculator in ArcMap, speed limits were assigned to road features in U.S. Census TIGER shapefiles and road lengths were divided by speed limits to estimate travel time. The Service Area function in the ArcGIS Network Analyst extension was used to calculate service areas based on travel time and the proportion of each county. Each haul time category was based on a 15-minute interval. Publicly available data were used to estimate quantities of biomass and procurement costs within each 15-minute haul-time interval.

With information on quantities, distribution, procurement, harvest, processing, and transport costs for each woody biomass resource, supply curves were constructed. A supply curve is a basic economic tool used to express the price of a resource at a given quantity of demand (Figure 4). Supply curves were plotted so that the x-axis was the cumulative total amount of woody biomass with each additional resource-haul time category and the y-axis was the total delivered cost. In order to make conclusions relevant to multiple audiences (i.e., energy company representatives, foresters, citizens), quantities were expressed as British thermal units

(Btu), tons, truckloads, megawatts (MW), and typical number of homes powered. In order to use these curves to compare counties across the region, price assumptions were held constant.

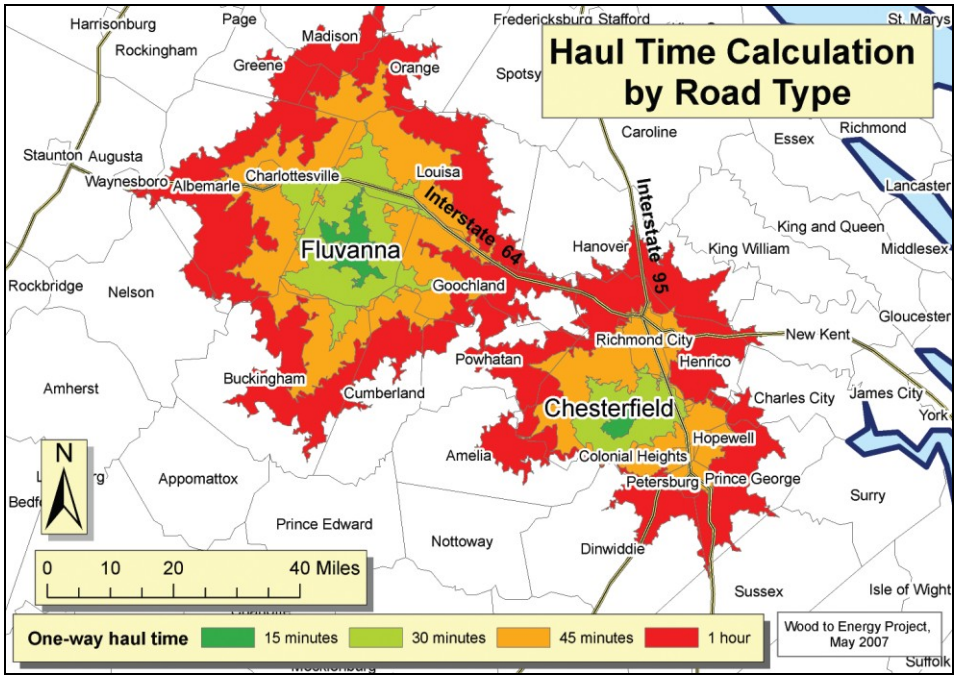

Figure 3. Service areas were based on 15-minute haul time increments.

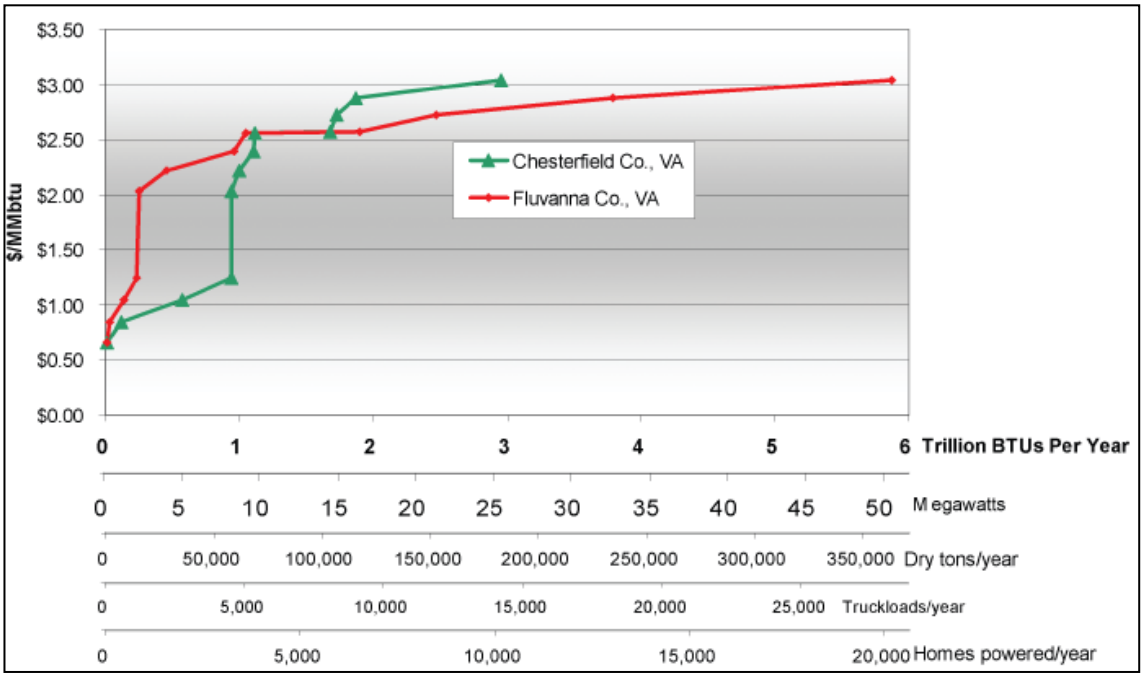

Figure 4. Woody biomass supply curves were created for each selected county.

Typical demand was estimated in the range of 2 to 4 trillion Btu to produce approximately 20 to 40 MW of electricity (or enough electricity to power between 8,000 and 16,000 households in the southern United States). For the 27-county average cost curve (excludes Alachua County, Florida), quantities cost from $1.57 to $1.91 per gigajoule (GJ) or $1.66 to $2.01 per Million Btu (MMBtu), which is competitive with current coal energy costs. Under the average curve, demand up to 4 trillion Btu can be met with urban wood residues within a 135-minute haul, and forestry residues within a one-hour haul, with no need to harvest additional trees.

These supply curves illustrate the local economic availability of woody biomass resources and prices that might be paid as a function of demand. Project conclusions include the following:

- Using ArcGIS Network Analyst to calculate biomass haul service areas uses readily available data layers that can be retrieved from the Internet. The analysis can be replicated for potential bioenergy locations anywhere in the United States.
- Service areas calculated with ArcGIS Network Analyst enhance the speed and accuracy with which biomass supply curves are generated.
- Up to 4 trillion Btu (i.e., 40 MW or energy to power 16,000 homes annually) of woody biomass are typically available at less than $1.91 per GJ ($2.01 per MMBtu) in many communities in the southern United States.

The results of the supply curve analysis formed the basis of each state's community economic profile. In addition, background information and detailed instructions for how to create woody biomass supply curves was developed and provided as additional resources for Biomass Ambassadors. Methods and results were shared at the outreach training.

The economic analysis team also conducted assessments for additional counties that were not selected in the original assessment (Alachua and Putnam, Florida; Clark and Franklin, Kentucky). A simplified version of a supply curve has been adapted and used in high school and college classes to teach economic concepts.

Regional Economic Impact Analysis in Selected Counties

In addition to considering the economic availability of woody biomass, the specific ways a local economy may be affected by the development of a biomass energy facility is key

information for discussions about wood-to-energy possibilities. The economic analysis team evaluated the economic impacts of woody biomass for electric power generation for the 28 selected counties, using the *IMPLAN Professional* software system and regional datasets.

Economic impacts were calculated for two levels of development: a 20 MW plant and a 40 MW plant. The initial impacts of the project were from the one-time construction activity, calculated to occur within a year. The impacts of plant operations were calculated to recur annually. Total site acquisition and construction costs were valued at $48.7 million for the 20 MW plant and $86.8 million for the 40 MW plant, including land, site work, building, plant equipment, and engineering fees. The largest construction expense items were the boilers and turbines, which cost between $45 million and $90 million. The total annual operating expenses (first year) for a wood-fueled power plant averaged $8.0 million for 20 MW and $16.1 million for 40 MW. Fuel typically represented the largest operating cost for a facility. These costs varied significantly across the selected counties due to differences in availability of forest and wood waste resources and transportation infrastructure. Fuel costs averaged $4 or $9.8 million for the 20 or 40 MW plants, respectively, and ranged from $5.7 million to nearly $13 million for the 40 MW plant.

The estimated economic impacts resulting from the construction phase of power plant development varied by county if major capital items could be purchased locally or if the items would have to be imported from other areas. Total output impacts for a 20 MW power plant ranged from $2.8 million to $45.3 million. This impact included all of the purchases (such as food, clothing, and gasoline) that people are able to make because their wages are tied to the power plant. Employment impacts ranged from 27 to 379 jobs; some of these jobs resulting from the increased economic activity that the facility and the use of local fuel brought to the community. The value-added impacts, or change in total personal and business income, ranged from $1.7 million to $25.9 million. For a 40 MW power plant, output impacts ranged from $3.8 million to $78.7 million, employment impacts from 39 to 653 jobs, and value added impacts from $2 million to $44.9 million.

The economic impacts of annual operations in one year for power plants varied by county—due to differences in the specific makeup of the local economy and, in some cases, the absence of key sectors serving wood-fired power plant operations. Total output impacts for a 20 MW plant averaged $10.57 million and ranged from $2.8 million to $14.4 million; employment

impacts averaged 170 jobs and ranged from 27 to 266 jobs; value added impacts averaged $6.3 million and ranged from $1.7 million to $8.6 million. For a 40 MW plant, total output impacts averaged $21.7 million and ranged from $4.6 million to $31.5 million; employment impacts averaged 370 jobs and ranged from 43 to 629 jobs; value added impacts averaged $13 million and ranged from $2.8 million to $18.9 million. These results for plant operations would be permanent recurring annual impacts.

The following conclusions are based on the 28 counties and parishes included in this analysis:

- Construction and operation of wood-fueled power plants may have significant local economic impacts, but these impacts varied widely among selected counties, depending upon the particular make-up of the local economy.
- Wood fuel represents one of the largest expenditures for a power plant, and results in large impacts in the local forestry and forestry services sectors. Other sectors of the local economy are also impacted through supply chain purchases and employee spending.
- Economic impacts of a 40 MW power plant are greater than for a 20 MW plant, although not in proportion to the power output, due to economies of scale.

The results of the regional economic impact analysis for each selected county were included in the state's community economic profile. A fact sheet that provides an overview of the economic impacts of using wood for energy in the South was also developed. Biomass Ambassadors were provided information about these methods and results at the outreach training. These results were also presented at the National IMPLAN User's Conference (2006) and in the Southern Bioenergy Roadmap (SAFER, 2009).

Biomass Sampling in Urban Environments

Obtaining accurate estimates of tree biomass is important to support research in bioenergy, carbon storage, and traditional harvest studies. Urban tree biomass is of particular interest to communities who have experienced tree damage and debris generation from wind and ice storms or are interested in the supply of urban waste wood from tree maintenance and removal activities. Because these data results were not available in time for our economic analysis, we used a national average of 0.203 green tons/person to estimate county-wide urban wood waste. These results would have refined our analysis significantly.

In conjunction with another USDA Forest Service project aimed at developing a predictive model for urban tree damage and debris related to hurricanes, data have been collected on the biomass of several of the most common urban tree species in the southeastern U.S. Although a plethora of tree biomass equations are already available in the literature to estimate tree biomass, the vast majority of equations are for non-urban trees and/or developed from natural forest-grown trees sampled in areas other than the southeastern U.S. Moreover, the estimates of biomass for some of the most prevalent species sampled varied wildly (e.g., sweetgum (*Liquidambar styraciflua* L.) was estimated at 1343 tons/ha and 3.3 tons/ha, respectively, using two different published biomass equations).

In an effort to better estimate two commonly occurring urban tree species in the southeastern U.S., live oak (*Quercus virginiana*) and laurel oak (*Quercus laurifolia*), we established an urban tree above-ground biomass sampling protocol utilizing randomized branch sampling (RBS) with trees removed in and around the University of Florida campus. We specifically attempted to estimate canopy (e.g. leaves and small branches) and above-ground whole tree biomass. RBS estimates were compared to actual green weights taken in the field for ten trees, and those of existing biomass equations.

Preliminary results from 11 sampled trees showed that existing biomass equations significantly under-estimated the amount of biomass contained in these trees, producing estimates that were on average 35% lower than actual green weights (Figure 5). Results from the RBS protocol have produced consistent over-estimation of overall tree weights; however, this method was adequate to model the component parts of the trees, which will enable us to give an overall estimate of the woody biomass that may be available in urban environments after windstorm events. While these results were not available for use during program development, they will be used to update biomass equations for *Quercus* spp. in the southeastern US in the Urban Forest Effects (UFORE) model and elsewhere. As an example, we obtained forest composition data for Gainesville, Florida from UFORE sampling in 2006 (Escobedo and Zipperer 2007). Using the existing biomass for these two species, the UFORE model estimated the dry weight biomass of these two *Quercus* spp at 587,303 metric tons, representing 39% of the community's total urban forest biomass. We estimate that a conservative update to these biomass equations would increase the contribution of these species by at least 200,000 metric tons,

representing a 13% increase in the estimated biomass available for the community after windstorm.

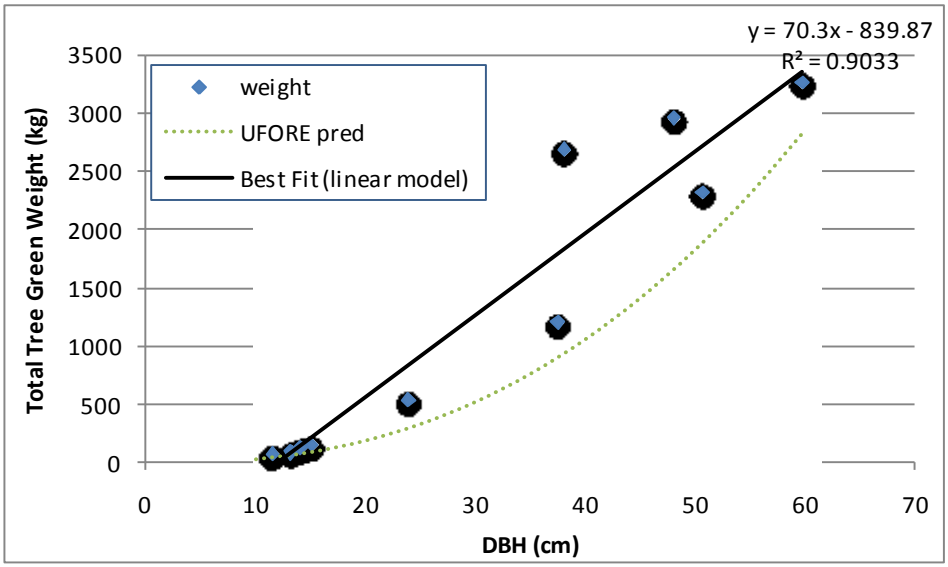

Figure 5. Comparison of existing biomass equations to preliminary results from 11 sampled trees.

Public Perceptions of Using Wood for Energy

While some research has been conducted on public perceptions of biomass energy and energy sources in general, little data have been published concerning perceptions of woody biomass, specifically. Thus, in order to understand more about public knowledge and attitudes toward using wood for energy, a random mail survey of single-family and mobile homeowners was conducted in Alachua County, Florida.

Prior to developing the mail survey, 12 interviews were conducted in two counties in South Carolina and Florida. Those interviewed were concerned about the cost wood, competition for wood, and the security of a wood supply that would continue throughout the life of a proposed facility. Economic impacts, specifically providing more local jobs, were also key considerations discussed by community leaders. Information collected during these open-ended interviews and during literature reviews of perceptions of biomass projects was used to develop the mail survey.

Of the 1,517 mail surveys sent, 298 surveys were returned (response rate 19.6%). Despite the fact the use of wood for energy was currently being discussed in Alachua County, only 18%

of respondents were familiar with this discussion. Over half of the respondents, 54.5%, considered themselves "not at all knowledgeable" about using wood for energy. Respondents had mixed attitudes toward the local use of wood for energy—31% had negative feelings, 41% were neutral, and 27% had positive feelings. Respondents reported feeling more curious and interested in the topic than fearful. In addition, more than half of the respondents showed high interest in participating in wood-to-energy discussions, with 53% believing that the community would be influential in a proposed project and 54% reporting interest in participating in the decision-making process. Air quality and loss of local forests were the most important concerns of these respondents, while making use of potential waste wood and maintaining local forests were viewed as the most important benefits. Respondents were confused about the advantages and disadvantages of wood as opposed to coal or natural gas in relation to climate change and believe that solar energy is a feasible energy source for meeting electricity demands in Florida.

These results were heavily used during the development of fact sheets, outreach tools, and additional resources for Biomass Ambassadors. For example, fact sheets on air quality, sustainable forest management, common concerns, and climate change were included in the program. A sample citizen survey was also included in the Appendix of the Biomass Ambassador Guide. In addition, these results have been shared in numerous presentations and in an article submitted to the *Journal of Extension* for publication.

Engaging Community Members in Local Issues

To develop protocols to engage the public and overcome the lack of knowledge about using wood for energy, the Wood to Energy outreach team planned and conducted a series of community forums in Gainesville, Florida. A community forum is one possible outreach tool that can provide information, enable participants to ask questions of experts, create an open atmosphere for discussing the issue, and share results with community leaders.

Six community forums reached a total of 172 community members at public libraries and organized meetings (e.g., Rotary Club, Sierra Club). Because the public does not know a lot about energy, several Wood to Energy team members presented information on the basic concepts of woody biomass. The public perceptions research was helpful in selecting key concepts and addressing common concerns. A neutral facilitator introduced the forum and presenters, coordinated questions, and encouraged participation. An interactive discussion

between the audience and presenters followed the 20-30 minute presentation. Typically, this discussion lasted for at least half of the total forum time.

To learn about the effectiveness of community forums as an outreach tool, participants were asked to complete pre- and post-forum surveys. Results suggested that participants gained knowledge about the issue. If their concerns were addressed in an energy proposal, nearly twice as many participants felt positive about a proposed facility after the forum (81%) than before (43%, n=108).

Data collected during the forums were used to write detailed guidelines and tips for the Outreach Tools section of the Biomass Ambassador Guide. In addition, key concerns and ideas from the forums were communicated to Gainesville's elected officials through a document titled *Using Wood for Energy in Gainesville, Florida* (The Gainesville Report), which is included in the Appendix of the Biomass Ambassador Guide. Finally, a journal article discussing the use of community forums as an outreach strategy was published in the *Journal of Education for Sustainable Development*.

Communicating with Written Text

Written communication is an easily accessible, familiar option used to aid in increasing public awareness and knowledge of science-based factual information. Thus, the Wood to Energy Outreach Program contains several fact sheets, case studies, and other written text to communicate with audiences. This research explored how well written text might work for the potentially controversial issue of using wood for energy and if text can be written to motivate readers to learn more about the topic.

To gain in-depth understanding, focus groups were used to review written text that was developed for this research. The text explained the issue of using wood for energy, aimed to motivate citizen involvement, and incorporated interesting examples and expert quotes. Three research questions were addressed in the focus groups. Using written, informative, interesting text that explains the option to use wood for energy and aims to motivate citizen involvement: (1) how do citizens perceive the information about using wood for energy, (2) how do citizens perceive the characteristics of interesting text, and (3) how does the text affect citizens' motivation to become involved? Three focus groups, n=16, were conducted in Gainesville, Florida with citizens who are interested and/or involved in community issues. Participants were

mostly female, educated, and over 50 years old. In general, the participants were environmentally concerned. Data analysis of the focus group transcriptions resulted in five themes that address the research questions.

Participants learned new information from the text about using wood for energy. The use of interesting examples and expert quotes helped participants consider the technical information and provided them with meaningful and relevant information. In addition, many participants were motivated to become further involved in the issue and could imagine themselves taking part in some comfortable and informal actions (such as discussing the issue with others, learning more about the issue, writing letters to elected officials, or touring a power plant).

However, several challenges of using text as a communication strategy for this issue were also apparent. While the provided information was factual and written to address common questions and concerns, the readers perceived the text as biased and inadequate. Participants discussed a lack of trust in the information sources and industries. Thus, mistrust, strongly held beliefs and misconceptions, and perceptions of bias affected the way these participants received the information. These results suggest that for complex issues similar to using wood for energy and when communicating with a similar audience, communicating and educating through written text is challenging. Combining written information with interactive outreach efforts may be more effective than using text alone—as personal interaction is often needed to build trust, identify misconceptions, and address individualized questions and concerns.

These results were not available during the development of program materials; however, recommendations from this research have been shared with Biomass Ambassadors and Extension professionals through presentations, personal communication, and journal articles.

Pilot Testing

Program materials were pilot tested in three counties in the South for which economic analysis had been conducted. In order to increase the relevance and applicability of program materials to counties throughout the South, the three counties varied in their availability of woody biomass resources, population, and industry, as well as whether wood was being discussed as an energy source.

- Alachua County, Florida – Since using wood for energy was already being discussed by community leaders and the local utility company, community forums were conducted to share information with the public and obtain comments on program materials.
- Le Flore County, Oklahoma –This rural county had less available woody biomass resources than others and had not previously considered using wood for energy in any capacity. A meeting of foresters, local leaders, energy company representatives, and regional development professionals was organized to discuss local wood-to-energy possibilities.
- Laurel County, Kentucky – While some local industries use wood waste to generate their own heat, steam, or power, the area's primary energy source is coal—which is locally available. Similar to Oklahoma, a meeting was held to discuss wood-to-energy possibilities and gather feedback on the program materials.

Valuable information was gained from each county. The meetings in Le Flore and Laurel counties helped outreach team members understand more about the process of selecting communities to work with, coordinating meetings with interested parties, developing agendas and presentations, and planning the next steps for considering wood-to-energy possibilities. This information was incorporated into the Get Started and Plan Activities sections of the Biomass Ambassador Guide. In Alachua County, where public outreach activities were pilot tested, important information about public concerns and ideas, working with the media, and holding community forums was obtained and incorporated into program materials. In each county, the team also collected feedback the applicability, accuracy, and readability of draft fact sheets, case studies, and community economic profiles.

Expert Review

Most program materials were reviewed by at least one content-related expert to ensure accuracy. Fact sheets were reviewed by consultants, university faculty, researchers, and industry professionals, while each case study was reviewed by the company or utility's key informant. The Outreach Guide portion of the Biomass Ambassador Guide was also reviewed for accuracy and to ensure applicability to counties throughout the Southeast U.S. In addition, all Wood to Energy team members were asked to review and provide feedback on all program materials. For a complete list of reviewers, please see Appendix A.

Program Materials

All materials for the Wood to Energy Outreach Program were combined into one notebook, the Biomass Ambassador Guide. This notebook contains four chapters to help ambassadors develop outreach programs, fact sheets, case studies, community economic profiles, and additional tools for outreach (Appendix B). Each notebook contains a CD, which includes digital files of all materials. The materials are also available for download on the program's web site (http://www.interfacesouth.org/woodybiomass).

Outreach Guide

The first four chapters (Get Started, Plan Activities, Outreach Tools, and Logistics) of the Biomass Ambassador Guide provide suggestions and materials for targeting potential communities, building a diverse team to discuss wood-to-energy projects, coordinating initial and follow-up meetings, and conducting community outreach programs. Suggestions for several types of outreach activities and detailed guidelines, tips, and templates for conducting community forums, symposia, and a media campaign are included. The guide was designed to be user-friendly with icons (e.g., light bulbs, books, magnifying glasses) directing the reader to tips, additional resources, and lessons learned from our pilot test experiences. In addition, boxes, tables, and figures were used to convey important information and to provide examples of letters, agendas, news releases, and other outreach materials.

Fact Sheets

Eighteen fact sheets provide information about the environmental, economic, and technical aspects of using wood for electricity and combined heat and power. The need for two of the fact sheets (*Woody Biomass Basics* and *Woody Biomass Conversion Technologies*) was recognized during the program evaluation, and these fact sheets were published in June 2009. The fact sheets range from providing information about general topics that may be of interest to general audiences to technical topics that may be of interest to specific audiences.

General Fact Sheets

- Woody Biomass Basics *(published June 2009)*
- An Invitation to Explore Possibilities
- Common Concerns
- Comparing Wood and Fossil Fuels

- Woody Biomass Conversion Technologies *(published June 2009)*

Environmental Fact Sheets

- Climate Change and Carbon
- Environmental Impacts
- Impacts on Air Quality
- Sustainable Forest Management

Economic Fact Sheets

- Economic Impacts of Generating Electricity
- Sources and Supply

Technical Fact Sheets

- Federal Policies and Incentives
- Financing Woody Biomass Facilities
- Heat and Power Applications
- Small Heating Units
- State and Local Policies and Incentives
- Systems That Convert Wood into Energy
- Using Wood Fuels in Existing Coal-Fired Power Plants

Case Studies

Fourteen case studies give an in-depth glimpse at some of the utilities, industries, and schools that are currently using wood to provide heat, power, or electricity. The case studies span the southern United States and provide insight into how urban waste wood, sawdust and scraps from manufacturing, forestry residue, and other biomass sources are used to generate power. Any challenges that were overcome in the process of using wood for energy are described. One case describes a wood-to-energy project was postponed due to the difficulties of obtaining a wood supply.

- Burning Sawdust for Heat and Power
- Challenges of Obtaining a Wood Supply
- Co-firing with Wood and Sugarcane Waste
- Co-firing with Wood and Switchgrass
- Converting from Natural Gas to Waste Wood
- Forest Industry Creates Its Own Power
- Innovative Fuel Sources Generate Success
- Powering the Grid with Waste
- Power to the People
- Using a Mix of Fuels to Produce Heat and Power
- Waste-to-Energy Program
- Wood and Paper Trim the Energy Bill
- Wood Power Heats a Public School
- Wood-powered Whiskey

Community Economic Profiles

The community economic profiles explore the amount of wood available in 28 selected counties in the South, estimate the cost to transport that wood to a central location, and estimate the regional impact to the local economy of using wood in 20 and 40 megawatt (MW) facilities. The counties are described in terms of forest cover, population, industry structure, and community features. These county descriptions provide valuable information which allows readers to compare and contrast counties and their potential wood supply.

- Alabama: Lee and Shelby Counties
- Arkansas: Saline and Union Counties
- Florida: Alachua, Clay, Leon, Nassau, and Santa Rosa Counties
- Georgia: Coweta, Douglas, Murray, and Union Counties
- Kentucky: Laurel and Trimble Counties
- Louisiana: Livingston Parish
- Mississippi: DeSoto and Warren Counties
- North Carolina: Buncombe and Orange Counties
- Oklahoma: Le Flore County
- South Carolina: Oconee County
- Tennessee: Anderson, Blount, and Sevier Counties
- Texas: Montgomery County
- Virginia: Chesterfield and Fluvanna Counties

Additional Materials

The Biomass Ambassador Guide also contains:

- Slide presentation with accompanying lecture and discussion notes,
- List of additional resources,
- Wood to energy conversion handout,
- Glossary,
- Sample citizen survey,
- Frequently asked questions,
- Guide to creating your own biomass supply curves, and
- Background information of the supply curves.

Woody Biomass Outreach Training

The outreach team organized and conducted the Woody Biomass Outreach Training in Atlanta, GA from September 11-12, 2007. The training was a joint effort between members of the Wood to Energy Outreach Program and the Southern Forest Research Partnership's (SFRP)

Sustainable Forestry for Bioenergy and Bio-based Products Program. Both teams agreed that holding a combined training would allow them to reach a wider audience and maximize attendance. The training was intended to familiarize participants with materials from both programs and help people from various professions network and collaborate with others from their region to develop successful, regional outreach programs. Materials from both programs were distributed at the training.

One-hundred and sixty-two people were invited to the training from Extension, state forestry, economic development, the energy sector, and non-governmental organizations. Seventy-eight participants attended the two-day training, and tables were organized by state to encourage networking and collaboration between various agencies and organizations within the same state (Appendix C). Eight presentations from members of both teams introduced a variety of topics including economics, sustainable harvesting, and public perceptions (Appendix D).

While the training included numerous PowerPoint® presentations, participant engagement and interaction was promoted through question and comment sessions, guided discussions, and small group activities. All training presentations were made available to training participants through the program's web site and a CD, which was mailed to each participant. The training also provided opportunities for participants to meet with experts from both teams for small group discussions, where they could ask questions, clarify concepts, and brainstorm ideas. The team of experts was available throughout the training to answer questions and provide insight.

Training Evaluation

To evaluate the training and both sets of program materials, participants were asked to complete a survey at the end of the training (Appendix E). The retrospective-pre survey contained 23 close and open-ended questions concerning knowledge and perceptions of woody biomass issues; confidence to conduct woody biomass outreach programs; relevance, uniqueness, usefulness, and effectiveness of program materials; intention to use program materials; and participant demographics.

The survey was completed by 49 of the 78 training participants (63% response rate). Survey respondents were mostly state, federal, or university employees—81% of whom have a graduate degree or professional training beyond a 4-year college degree. Most respondents were male (85%), Caucasian (81%), and between 36-55 years old (72%). Overall, respondents had

positive attitudes about the use of woody biomass for energy and the associated environmental and economic impacts.

Respondents reported an increased understanding of specific woody biomass topics (Figure 6) as a result of the training. In general, respondents left the training feeling they had a "good" understanding of woody biomass topics, with scores ranging from 2.7 to 3.0 (where 1=poor and 4=excellent). The greatest increases in understanding were reported for the following topics: biomass markets; supply, cost, and economic impacts; transportation, processing, and storage; and public perceptions. Before and after the training, respondents reported having the lowest level of understanding for the topic of conversion technologies.

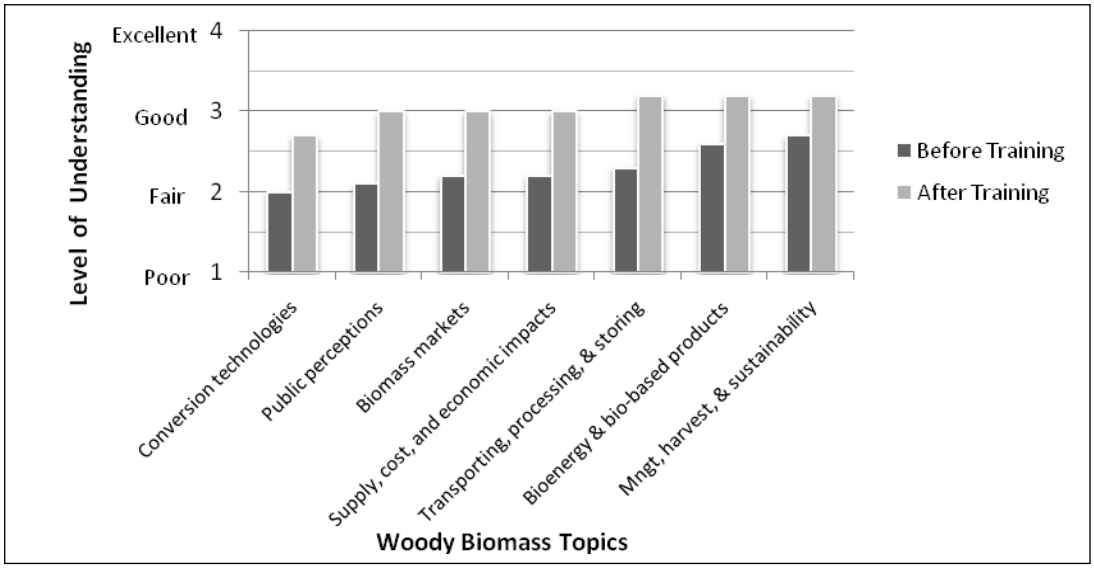

Figure 6. Level of understanding reported by workshop participants for specific woody biomass topics.

Similarly, respondent's confidence to develop outreach programs related to specific biomass topics increased (Figure 7). After the training, respondents reported having moderate levels of confidence to develop outreach programs for most topics, with the highest levels of confidence to develop programs concerning management, harvesting, and sustainability; bioenergy and bio-based products; and educating community leaders. Respondents had the lowest level of confidence for developing programs about conversion technologies.

Respondents were "mostly satisfied" with the Wood to Energy Outreach Program materials (score of 4.1, where 1=not at all satisfied and 5=completely satisfied) and reported that the materials are "quite relevant" to the work of their agency or organization (score of 3.9, where

1=not at all relevant and 5=completely relevant). The materials were considered "slightly similar" to other materials respondents had prior to the training (score of 2.3, where 1=not at all similar and 5=virtually the same).

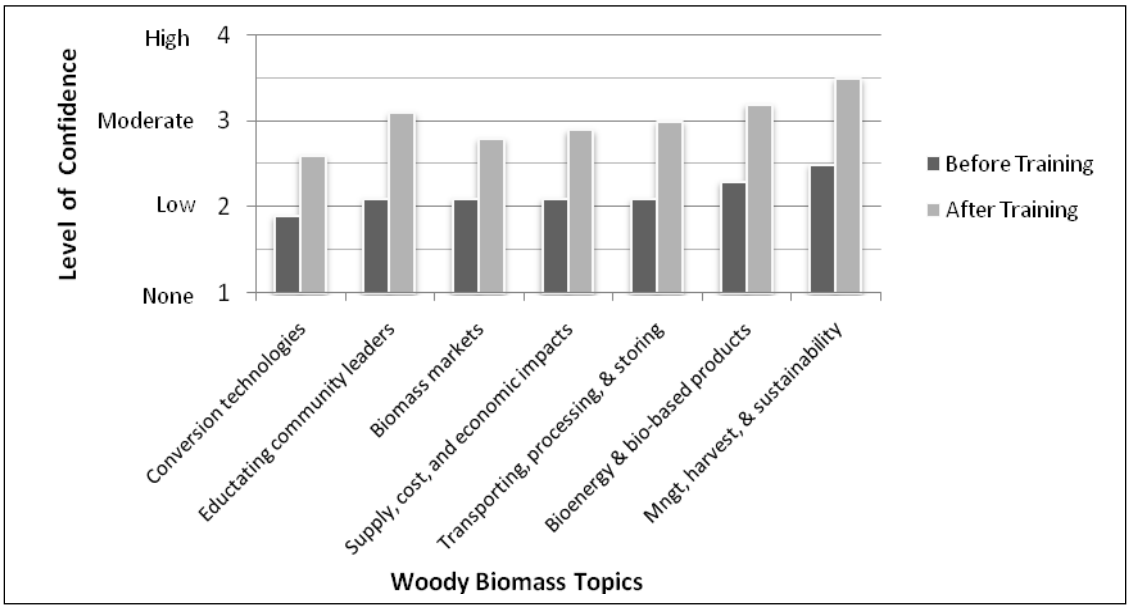

Figure 7. Respondent's level of confidence to develop woody biomass outreach programs before and after the training.

Information about the use of bioenergy and bio-based products, public perceptions, and the management, harvesting, and sustainability was deemed the most useful information provided by both programs (Table 1). Information about environmental impacts and conversion technologies received the lowest scores (3.6), although respondents still felt the information provided about these concepts was "somewhat" to "quite useful." Respondents felt the fact sheets and south specific case studies were the most effective elements included in the program materials (Table 2).

Table 1. Usefulness of Information

Concept	Score*
Using wood for bioenergy and bio-based products	4.0
Management, harvesting, and sustainability	3.9
Public perceptions of woody biomass	3.9
Biomass products and markets	3.8
Transportation, processing, and storage	3.8
Supply, cost, and economic impacts	3.7
Environmental impacts of producing bioenergy	3.6
Conversion technologies	3.6

*where: 1=not at all, 2=slightly, 3=somewhat, 4=quite, 5=extremely

Table 2. Effectiveness of Various Elements

Element	Score*
South specific case studies	4.0
Fact sheets	4.0
Slide Presentations	3.9
South specific economic profiles	3.8

*where: 1=not at all, 2=slightly, 3=somewhat, 4=quite, 5=extremely

In an open-ended question, respondents were asked to identify three things they found most useful from the program. The most frequent response focused on acquiring the program materials, with specific mentions of gaining access to fact sheets, web sites, and slide presentations. Secondly, respondents felt that making new contacts and networking with others in their state was a useful outcome. Finally, many respondents mentioned specific concepts and topics as useful, with economic analyses and community outreach mentioned most frequently.

Survey respondents reported that were "quite likely" to use some program materials in the future. Respondents showed the strongest interest in using the materials to give presentations, promote discussion about woody biomass, and share information with other trainers (respective scores of 4.4, 4.3, and 4.2, where 5=definitely will use the materials in this way). When asked about potential barriers to using program materials, several respondents mentioned economic issues and competitive markets as concerns. In addition, some respondents felt that the information would need to be updated or modified for use in specific communities and mentioned the general challenges of educating the public. Respondents felt that their efforts to use the materials could be supported by the future availability of team members and experts to answer questions, present at trainings and events, and conduct additional economic analyses on specific communities as needed. In addition, the need to provide updated information and announcements through the program web site and/or email listserve was mentioned.

Overall, these participants gained understanding of wood-to-energy topics and confidence to develop related outreach programs. They were satisfied with the program materials, felt the information is relevant and useful, and intend to use the program materials in the future.

"These two initiatives will help kick start the bioenergy industry—very timely with high energy prices and environmental issues."
- Training Participant, September 2007

"Notebooks are the best I've seen in terms of content, accuracy, completeness, appearance, and links to web site content. Fantastic—I'm impressed.
–Training Participant, September 2007

Program Implementation

Ambassador Support

The outreach team provided support and assistance to Biomass Ambassadors from September 2007 through May 2009. Specifically, the team maintained a program web site, offered to help evaluate ambassador's outreach efforts, coordinated the availability of team members for presentations and consultancies, and provided copies of program materials, free of charge. Biomass Ambassadors were made aware of these opportunities, along with additional announcements and updates, through an email listserve (forestbiomass-south@listserve.uga.edu) and the program web site.

Experts from the Wood to Energy team assisted Biomass Ambassadors as consultants or presenters as requested:

- Matthew Langholtz provided training in Texas about woody biomass supply curves.
- Phil Badger gave two presentations at a bioenergy conference in Mississippi.
- Matthew Langholtz created an additional supply curve for Franklin County, Kentucky.
- Martha Monroe, Alan Long, Doug Carter, and Alan Hodges presented at three continuing education logger workshops in North Florida.
- Martha Monroe and Lauren McDonell met with NACD to ascertain their use of the Wood to Energy materials.
- Larry Biles took Wood to Energy materials to a national think tank meeting on woody biomass.
- Martha Monroe and Annie Oxarart joined the eXtension Community of Practice on Forest-based Biomass and contributed Wood to Energy materials and insights.
- Martha Monroe and Jessica Tomasello worked with an Ambassador to offer a teacher workshop in west Florida.

In addition a listserve of all training participants, Wood to Energy Outreach Team members, and SFRP team members was created. This listserve is used to inform interested parties of new reports and publications, legislation, energy proposals, media releases, and funding opportunities.

Program Web Site

The program web site (www.interfacesouth.org/woodybiomass) contains digital files of all the program materials available for download. The web site contains a Biomass Ambassador Corner, which provides additional resources and links that may be of interest to Ambassadors. These include additional sources of information on woody biomass, upcoming events related to biomass, funding opportunities, material order forms and reporting forms, presentations from the Atlanta training, community selection data, additional presentation slides for case studies and community economic profiles, and a wood-to-energy conversion spreadsheet.

An online survey and web site tracking were used to evaluate the web site. From April 2008 to April 2009, the web site pages were viewed 5,811 times. The site received 724 first time visitors during this time period. The online survey contained 4 questions to determine who was using the web site and how they plan to use the program materials (Appendix F). From September 2008 to March 2009, a total of 12 people completed the online survey. Five of these visitors were interested citizens, while the other visitors had job responsibilities or businesses related to using wood for energy. Most visitors were from the Southeast U.S., along with 3 visitors from California, 1 from Connecticut, and 1 from outside the U.S. Visitors had various reasons for their interest in information about using wood for energy: 4 visitors have job related responsibilities, 3 visitors want to educate others about the topic, 3 visitors live in communities where wood is being considered as an energy option, and 2 visitors want to educate themselves about the topic. The majority of these web site visitors were extremely or quite likely to discuss the topic with interested people and community leaders, seek more information on the topic, distribute materials to interested people, and educate others about the topic. Even with very few responses, this is an indication that materials are being accessed by people, not only in the Southeast but also nationwide, who can use them.

Distribution of Program Materials

Biomass Ambassadors were encouraged to order reprints of all fact sheets, case studies, and community economic profiles from both programs to use for outreach and training purposes. These handouts, along with program folders and Biomass Ambassador Guide notebooks, were available free of charge from September 2007 to March 2009. During this time period, 11,875 handouts and several hundred program folders were requested and distributed to Biomass

Ambassadors. In addition, team members distributed over 160 folders containing over 1,200 handouts at presentations, conferences, and events. Finally, 155 Biomass Ambassador Guide notebooks were sent to 36 people for distribution and use after the training workshop.

Program Marketing

Through our marketing efforts, information about the program has been distributed to hundreds of individuals representing many agencies and organizations. Introductory letters and program CD's were mailed to all Atlanta Training invitees who did not attend the training and energy policy offices throughout the southern region. Extension directors in each of the 28 counties assessed in the community economic profiles were sent their state's profile along with a letter directing them to the program web site. In addition, letters offering program CD's and providing the web site link were emailed to 175 Resource Conservation and Development representatives in the southern region as well as to representatives of governors' state energy offices in each of the southern states. Information was also published in organizational newsletters (both online and print), including the Association of Natural Resource Extension Professionals, Southern Group of State Foresters, National Association of Conservation Districts Forestry Notes, Biomass Research Development Initiative, and Smallwood Utilization Network. A link to the program materials has been added to at least six organizational web sites, and the program was promoted during presentations at multiple conferences or meetings.

Biomass Ambassador Reports

To further evaluate the program, a 6-month follow-up survey was sent to all Atlanta training participants by email in June 2008 (Appendix G). This online survey was completed by only 29 of the 78 participants (response rate 37%). Therefore, to gather additional data, participants were invited to participate in brief, semi-structured phone interviews (Appendix H). This section provides the results of these phone interviews, specifically about Biomass Ambassador's use of the program since the training and their future plans to use the program.

Of the 78 training participants, 9 had either retired, changed jobs, or were unable to be contacted. In addition, 24 participants were not interviewed for the following reasons: 13 participants did not respond to interview requests; 7 participants declined to participate; and 4 participants reported that "they did not do much" and did not want to provide additional

information. Of those contacted, 45 training participants agreed to participate in the interview (response rate 65%). In addition, one interview was conducted with someone recommended by another training participant. Therefore, a total of 46 phone interviews were conducted in November 2008. The interviews were partially transcribed, key data was entered into a spreadsheet, the data were disaggregated, and common themes were identified—consistent with open coding qualitative research methodologies (Charmaz, 2006).

Interviews were conducted with participants from all 13 states in the southern region (Table 3). In addition, participants from Missouri were included in the sample. Most phone interviewees were employed by universities and public agencies (Table 4). University employees had extension, teaching, or research roles related to bioenergy. Other interviewees were professionals from federal, state, or county level agencies involved in bioenergy issues. Finally, a few interviewees were associated with the forest industry or renewable energy advocacy groups.

Table 3. Home States of Phone Interviewees

State	# of Interviewees
Arkansas	3
Alabama	4
Florida	4
Georgia	2
Kentucky	2
Louisiana	2
Missouri	2
Mississippi	4
North Carolina	5
Oklahoma	2
South Carolina	3
Tennessee	4
Texas	4
Virginia	5
Total	**46**

Table 4. Professions of Phone Interviewees

Professions	# of Interviewees	Total
University		19
Extension	9	
Teaching and/or Research	8	
Other	2	
Public Agencies		19
Federal Level Forestry	2	
State Level Forestry	16	
County Level Forestry	1	
Industry		4
Forestry Associations	2	
Inventory and Consulting	2	
Renewable Energy Organizations	4	4

Use of Program Materials

The majority of the 46 interviewees, 70%, have used one or more sections of the Biomass Ambassador Guide since the training. Of those who had used program materials, interviewees mentioned using the outreach guide, fact sheets, community economic profiles, slide presentation, and case studies most frequently (Figure 8). Fewer interviewees mentioning using anything in the appendix—the Do-It-Yourself Supply Curve, Background Supply Curve information, the Gainesville Report, and the citizen survey. Most interviewees had used the program materials from one to three times since the training.

Some interviewees offered specific comments about how often or in which instances they have used program materials. For example, one interviewee used the outreach guide "in the train-the-trainers sessions just to explain to the folks what was in those sections and the kind of tools that were available, like the kind of templates for press releases," and another interviewee uses it "when I write letters or encourage folks to write letters to the editors, that kind of stuff—just refer to it for some insight into techniques…." Regarding the fact sheets, one interviewee noted they have "I've probably used them as references at least once a month." Another interviewee uses the fact sheets "once every other month just to kind of look at different things to make sure my message is on track. I'd say that the fact sheets are the most useful part for me because I get in front of groups a lot and use that for developing messages."

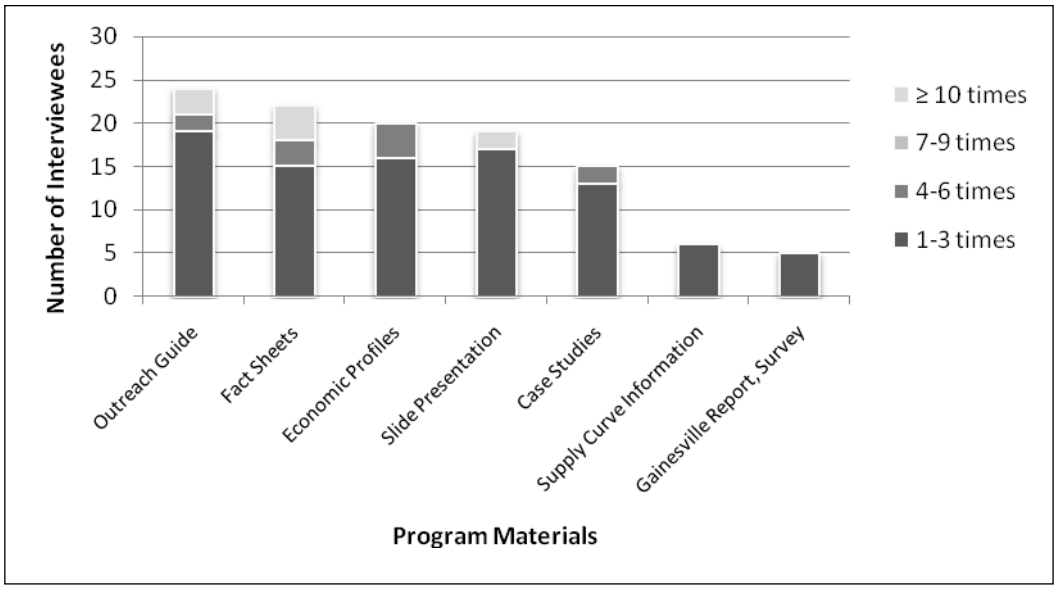

Figure 8. Number of interviewees reporting using program materials.

Lastly, the following interviewee uses case studies "…from time to time because I travel to 13-14 Southern states and go to talk to a group and I look at [the case studies] to say: businesses are operating that use woody biomass…economic development is occurring here in this state…you're benefiting from utilization of woody biomass…this is a real world application and the technology is here. [I] try to encourage the development of policies and citizen programs to help expand and create more incentives for these types of operations to come in and set up shop."

Overview of Activities

Most of the activities conducted across the Southeast used the materials in workshops, trainings, meetings, presentations, conferences and symposia. Table 5 presents a comprehensive list of activities, organized by state, that interviewees mentioned conducting from September 2007 to November 2008. Several of the activities listed were organized by the state biomass ambassador teams resulting from the Atlanta training. Specifically, 33 of the 46 interviewees reported working with other Biomass Ambassadors to conduct activities. In addition to those activities listed in Table 5, 17 interviewees reported using the materials for either personal reference and/or in discussions with co-worker and industry. As one interviewee commented, "I've used [the program] materials to highlight or illustrate specific points or to use it as a citation for facts….I've used it as a research guide."

Outreach Audiences

Interviewees have used the materials with a variety of audiences. For example, one interviewee mentioned reaching several audiences, "…the Environmental Protection Agency…different biofuels representatives throughout the Southeast…private landowners …legislature…potential companies." Similarly, another interviewee said, "We're after a whole bunch of people—land owners, foresters, forest products companies. We've got a [power company]…. economic development people."

Overall, the most common audiences mentioned by interviewees were landowners (14 responses), forestry professionals (12 responses), and the wood industry (11 responses). Other significant audiences included the general public (9 responses), elected public officials (8 responses), the economic development sector (6 responses), and Extension agents (7 responses). From 3 to 5 interviewees also used program materials when interacting with educators, employees, and other miscellaneous stakeholders. Box 1 describes in greater detail one of these audiences and their reaction to the Wood to Energy Outreach Program.

Table 5. Interviewee Activities Related to Wood to Energy Outreach Program

State	Activities	Participant Quotes
Alabama	• Auburn University Extension organized presentations for loggers using fact sheets and presentation slides • Auburn University organized 10 trainings with 50 people from the wood products industry using the presentation slides and outreach guide • Alabama Forestry Association Loggers Council organized training with loggers using presentation slides	"[The goal of our presentations were to] provide a little bit of technical detail, a little bit of economic detail, and then also some operational detail to the people we were talking to."
Arkansas	• University of Arkansas Extension – organized forest landowner workshops – organized Women in Forestry conference using the outreach guide, fact sheets, case studies, and presentation slides	"I think it just kind of increased awareness so [forest landowners] will pay a little more attention when they read news articles [on biomass]."
Florida	• University of Florida Extension – used community economic profiles for energy programs and forest newsletters targeted at forestry professionals and people with wood waste – organized a Bioenergy Conference where fact sheets were given to 120 participants – presented to elementary teachers at a teacher's science fair and distributed fact sheets – worked with Milton High School to begin development of a high school woody biomass curriculum – presented at University of West Florida's Earth Day celebration about renewable energy	"[The goals were to] let these people who are interested know that these resources are out there, to get them this information, to get started here in that direction."
Georgia	• Georgia Forestry Commission used the fact sheets and outreach guide to conduct educational seminars and in house training sessions with forestry agents • Southeastern Wood Producer's Association (headquartered in GA) organized 3 continuing logger education trainings with 63 participants in North Florida using presentation slides, fact sheets, community economic profiles, and case studies (Box 1)	"[The goals of the training were] dissemination of information and getting it out into the hands of people who could spread the word. In our case, we have got… probably close to 40 [agents] who work out in the rural counties… [We trained them] and gave them this information….We gave them web addresses for both books and walked them through the two resources."

Table 5 cont'd. Interviewee Activities Related to Wood to Energy Outreach Program

State	Activities	Participant Quotes
Kentucky	• Kentucky Division of Forestry used the community economic profiles for a convention presentation to promote biomass awareness to the public and soil conservation professionals • Participants from the pilot program are working on a proposal for a new facility in Franklin County.	
Louisiana	• Louisiana State University used materials to speak with the public and community groups	
Mississippi	• Mississippi Institute of Forest Inventory distributed BAG to co-workers and outreach foresters and uses slides for monthly presentations to EPA, biofuels representatives, private landowners, legislative bodies, and civic groups • Mississippi State University Extension organized booklets with fact sheets to distribute at 3 workshops and included community economic profiles in presentations for county directors, professional foresters, and industry • Biomass advocate used materials for presentations to businesses and economic developers and to write letters to editors about economic development opportunities about woody biomass	"I've used [presentation] slides, several…I've probably done 25 presentations over the last year. I do two of them a month."
Missouri	• University of Missouri Extension and Missouri Department of Conservation used outreach guide, fact sheets, case studies, and slides to conduct 6 workshops/townhall meetings in 3 communities with county commissioners, city planners, landowners, and regional economic development and wood industry professionals • Missouri Department of Conservation used slides for a presentation at a Missouri Forest Products Association continuing education class for loggers	"The goals were to take the W2E presentation to the local community and facilitate their development and ideas about maybe coming up with a community project such as using woody biomass to heat a public building or something of that nature."
North Carolina	• North Carolina State University – held 8 regional landowner meetings reaching 1,100 participants – organized 2, 2-day workshops for practicing professionals reaching 100 people – organized a teleconference to educate loggers and reached 120 people – published materials adapted from BAG on their web site • An advocate group used slides 3-4 times a month for presentations on biomass power generation	"What we have done is use some of the case studies, excerpts from [BAG] that we summarized and we have taken some of your fact sheets and adapted them with attributions, made them specific to NC and they have been included as handouts [in all activities]."

Table 5 cont'd. Interviewee Activities Related to Wood to Energy Outreach Program

State	Activities	Participant Quotes
Oklahoma	• Oklahoma State University Extension has used outreach guide and community economic profiles to educate landowners about W2E potential	"I want people to just think about, if they own land, could they possibly use wood for fuel? I'm really just trying to get people to think outside of the box in terms of what they can do with their wood products."
South Carolina	• South Carolina Forestry Commission uses the community economic profiles and fact sheets to consult with potential industry	"One goal was just to highlight an area [of our state]…that you thought was our top-ranked to recruit industry."
Tennessee	• Held seminars for 10 county forest landowner associations • Held a co-firing workshop Note: This data was reported to the SFRP team, not during the phone interview. It is unknown how Wood to Energy materials were used during these activities.	
Texas	• Texas Forest Service – organized presentations with landowners and resource professionals using the outreach guide, fact sheets, case studies, and slides – organized a Training of Trainer workshop with 60-70 in-house staff – held a one-day training for 40 landowners • Stephen F. Austin State University used materials from the slides for presentations and brochures	"I have used the information from the fact sheets in presentations and promoting biomass as a new market for Texas, so I used the case studies and fact sheets as I refer to them in presentations."
Virginia	• Virginia Tech Extension and the Virginia Forestry Association – organized 3 train-the-trainer workshops for 70 extension agents and VA forestry department staff. Each agent was given their own copy of the BAG. – organized two statewide biomass symposia/public forums (one for rural and one for urban audiences) and used the slide presentations and VA case studies. Suggestions were passed to the Governor's office.	"Our primary use for the [BAG] was related to questions of sustainability and developing an outreach program at the local level, so we had the extension agents in particular [trained] in the manual." "The symposia [are] pretty much to the public and also trying to target local government and municipalities…to provide them with information…to get them on board [to support] new industry or facilities."

Goals of Ambassador Activities

Of the 32 ambassadors who had used the program materials since the training, 27 (84%) used the materials to raise awareness and educate audiences about woody biomass opportunities (i.e., alternative energy source, technologies, markets, economic feasibility, potential regional supply). One interviewee summarized their goal by saying: "It truly is an outreach and educational phase, so my goal is to let them know and make them aware of biomass as a new market. And kind of, where we are in the state and the things that are being done to encourage biomass and increase the use of biomass and define what it is because it's a different audience." Four interviewees used the materials to encourage local assessments and the use of woody biomass. Lastly, five interviewees used the materials to increase their personal knowledge and skills related to using wood for energy. Please note that some interviewees mentioned more than one goal for using the program materials.

All of these ambassadors said the materials helped them meet their program goals. For example, one interviewee said, "Oh yeah. We wouldn't have done it without the materials. It would have been too much of a task to put together your own training seminar. But by having those resources at your fingertips you can organize a class and just teach the materials you all have prepared." Another interviewee stated, "They [the materials] definitely…have. I have been able to get the information in both cases, from more general to more technical."

Box 1. Insight into the Southeastern Wood Producers Association Workshops

In 2008, the Southeastern Wood Producers Association (SWPA) sponsored 3 continuing logger education workshops in North Florida. Each workshop included 5 presentations given by Wood to Energy team members, a Biomass Ambassador, and a USDA grants specialist. Wood to Energy Outreach materials were distributed to all workshop participants. The goals of the workshops were to increase knowledge about several issues surrounding the use of wood for energy and to provide professional development to logging professionals. A total of 63 participants attended the workshops. The workshops were evaluated with a pre-post survey and phone interviews, and the following results provide insight into participants' attitudes and knowledge about using wood for energy.

SWPA Survey

The pre-post survey contained questions about perceived knowledge, topic relevance, and attitudes toward using wood for energy (Appendix I). Surveys were completed by 48 of the 63 workshop participants (response rate 76%). The survey respondents reported gaining knowledge at the workshop (Figure 9). Before the workshop 37.5% felt "fairly" or "very" knowledgeable about using for wood. This percentage more than doubled to 78.4% after the workshop.

In both the pre- and post-survey, a majority of respondents (98% pre and 81.6% post) felt the workshop topic was "relevant" or "very relevant." A vast majority, 91.7%, of the respondents reported being "in favor" or "very in favor" of using wood for energy on the pre-survey. This positive attitude toward using wood for energy did not change during the workshop, with 89.2% being "in favor" or "very in favor" on the post-survey.

Box 1 cont'd. Insight into the Southeastern Wood Producers Association Workshops

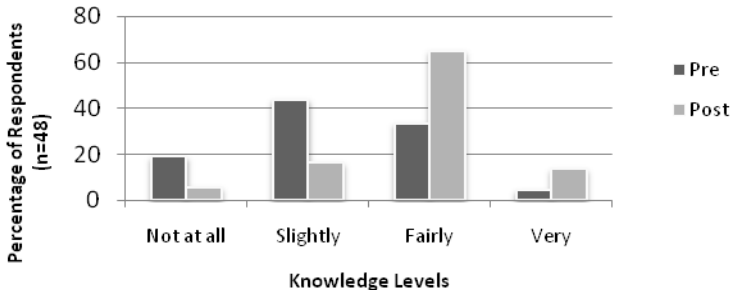

Figure 9. Survey respondents' knowledge about using wood for energy before and after the workshop.

The post-survey also included questions about workshop effectiveness and common concerns of using wood for energy. Respondents felt the workshop was "effective" at achieving the four given objectives, with increasing knowledge about public perceptions of using wood for energy being rated the highest (Table 6).

Table 6. Effectiveness of SWPA Workshop at Achieving Objectives

Objective	Average*	n
Increasing knowledge about public perceptions of using wood for energy	3.25	36
Increasing knowledge about costs and benefits of using wood for energy	3.15	40
Increasing knowledge about sustainable forest management to produce wood for energy	3.13	38
Answering questions about using wood for energy	3.13	40

*where: 1=not at all effective; 2=slightly effective; 3=effective; 4=very effective

Overall, when asked about common considerations that some people have concerning the use of wood for energy, respondents did not show any strong concern toward any specific consideration (Table 7). The consideration that the public might not approve a wood-to-energy facility received the highest average score (2.68), while the consideration that the demand for wood fuel will degrade local forests received the lowest average score (2.02).

Table 7. Level of Concern for Common Wood-to-Energy Considerations

Considerations	Average*	n
The public will not approve a wood-to-energy facility.	2.68	40
The community does not have enough wood to support a wood-to-energy facility.	2.4	42
The capital overhead is too high and rate of return too long.	2.35	40
A wood-to-energy facility will not be cost effective.	2.17	42
Competition for wood will drive pulp mills out of business.	2.05	43
The demand for wood fuel will degrade local forests.	2.02	43

*where: 1=not at all concerned and 4=very concerned

Phone Interviews

Nine workshop participants were willing to be interviewed by phone. Seven open-ended questions about attitudes and barriers toward using wood for energy, as well as local environmental and economic impacts, were asked during the interviews (Appendix J).

All interviewees are involved in some aspect of the wood industry in North Florida, from working in the logging industry to advocating for new wood markets. All interviewees would support a wood-to-energy facility in their community. Four interviewees mentioned being active supporters of wood-to-energy prior to the workshop.

Box 1 cont'd. Insight into the Southeastern Wood Producers Association Workshops

All interviewees said the workshops were beneficial and informative. While they mentioned learning a variety of topics at the workshop, their attitudes surrounding economic and environmental impacts, public perceptions, and the future of local forests did not change as a result of the workshop. Interviewees learned about new wood markets; new ways of capturing and using wood waste for making energy; the energy conversion of wood as compared to corn; how biomass energy can be obtained by utilizing understory biomass; sustainable timber harvest practices relating to bioenergy; and environmental issues. One interviewee mentioned the workshop should have covered how excess fuel loads on public lands can be used for energy sales, while another interviewee still had questions about the cost of obtaining and transporting forestry wood waste.

> "There was a lot of information [at the workshop], so that usually answers any question you have or have thought of. Basically there was so much material there for me. So many good answers and the speakers were really good and they had a lot of knowledge."
>
> –SWPA Workshop Participant, 2008

Five interviewees believe that a wood-to-energy facility would positively impact their local economy. Seven interviewees mentioned that a wood-to-energy facility would increase competition for wood and could provide a new market for wood, which interviewees view as a positive impact.

> "[A facility] would spur logging and when you spur logging and reforestation there's a [positive] ripple effect [through the economy]."
>
> –SWPA Workshop Participant, 2008

When asked about public perceptions regarding a wood-to-energy facility, four participants stated that best timber management practices must be utilized in order for the public to be supportive of a facility. Four interviewees also responded that the public needs to be educated about the benefits of wood-to-energy, while five interviewees said they were not concerned about public perceptions.

Interviewees were not concerned about competing markets for wood resulting from a wood-to-energy facility. In addition, they were not concerned about how a facility would impact their local environment. Five interviewees were not concerned about the future of local forests if a wood-to-energy facility were to be built, while one interviewee was concerned only if poor forest management practices were followed. Four people explained they more concerned with the possibility of nearby forested lands being sold and developed into urban areas.

Finally, participants provided some additional insights into perceived barriers of using wood for energy in their community. For example, one interviewee expressed doubt about "the cost of wood [and] whether or not they can produce [power] cheap enough to make energy any cheaper than what it is now." One interviewee felt there is not enough wood waste to use for energy and that facilities would have to use a mix of wood sources, while another interviewee felt that current knowledge about available wood waste for running power plants is inaccurate.

Conclusion

Overall, participants found the SWPA workshop to be relevant and informational. Participants reported gaining knowledge and felt the workshop effectively met its objectives—particularly in increasing knowledge of public perceptions. This could be an aspect of the concept of using of wood for energy that this audience had not previously understood. The workshop reinforced positive attitudes about the possibility of using wood for energy locally. The participants who were interviewed felt that a wood-to-energy project would benefit the local economy and did not have any strong concerns about environmental impacts of such a project as long as forests are well managed. A portion of the interviewees recognize the need to work in concert with the pubic—educating both the community and the industry together. Finally, a few participants expressed doubts about the estimates of wood availability, suggesting that a more refined analysis should be done locally.

Barriers to Using Program Materials

Fourteen of the 46 respondents had not used the program materials in any capacity since the training. The reasons for not using the materials fell into 4 main categories (with some interviewees giving multiple reasons): no opportunity to use the materials (7 responses); used other bioenergy materials (6 responses); not familiar enough with the materials (2 responses); and not within job duties to use materials (1 response).

Seven ambassadors stated that they have not used the program because they had not had an opportunity to do so, while two ambassadors have not taken the time to become familiar with the program. For example, one interviewee commented that they have not used the materials "…because of my workload…I've not taken the time to look at what I've got or what to do with it…part of it is lack of familiarity….I don't sit down and read things on my own that I don't have to read through." Six interviewees responded that they have used other materials about using wood for energy instead—3 interviewees used the SFRP program and 3 interviewees used in-house materials. For example, one interviewee stated, "We had to only use materials developed here at [their University]…so I would represent the University when I was doing presentations." Finally, one interviewee's job responsibilities did not relate to using the materials.

Future Plans for Using Program Materials

The majority, 87%, of the ambassadors plan to use the materials in some capacity in the future: to help communities consider wood-to-energy possibilities (6 responses); to provide information for publications, newsletters, web sites, and brochures (4 responses); to hold workshops and trainings (3 responses); to distribute handouts to target audiences (3 responses); to give presentations (2 responses); and as personal reference (2 responses). Other future uses mentioned by interviewees include using the materials in college courses and high schools to educate students about biomass, creating a statewide informational brochure, and collaborating with environmental NGO's to develop environmental regulations for renewable energy.

Most interviewees expect to use the fact sheets (15 responses), case studies and community economic profiles (8 responses each), and presentation slides (5 responses) in the future. Two interviewees shared the following thoughts: **"**I think definitely the fact sheets would be the quickest and easiest thing. We could get those on the web. We can provide those to

landowners and businesses interested in [woody biomass]." and "I would have to start with the fact sheets. Those are the most valuable things that are included here. And case studies, the more the better. Those are the success stories that we need…and maybe the local resources." Finally, interviewees excitedly spoke about potential uses of the program in the future, even if they have not yet used these resources:

- "Hopefully what's going to happen out of our wood to energy meeting [is] we still have groups at the community [level] getting together and talking about projects. Then we can take these case studies and show them what these other people have done, give them some information such as some of the outreach tools [about woody biomass] vs. gas or oil. Your book, even though we've used the [SFRP] book more, hopefully this book will come in pretty strong here in the near future on follow up."
- "[The notebook] sits on my shelf here, and I know it's available at a moment's notice and it doesn't seem like this topic is going [away].…I think we'll have more [meetings], and we'll have to utilize the manual. So I think it's good that it's there, and it will probably be utilized."
- "This is something we've talked about in our biomass council—to do some kind of educational outreach initiative to educate policy makers and stakeholders and general public about biomass utilization.…It's a biomass council made of all volunteers and that would be an excellent tool to base that off of, the Ambassador Guide."

Program Strengths

> "It's a fabulous resource. It's one of the best collections of information in one place and with the back up support from the web pages too. It's just a fantastic resource that you normally don't have for trying to put on programs like this, especially for emerging issues."
>
> –Interview Respondent, November 2008

The most commonly strength that interviewees recognized is the large amount of important information contained in the program materials (21 responses). For example, one interviewee felt the program "really had a lot of good information in one nice packet, so it was really easy to apply it to other venues as far as being able to just pick and choose out of that…" Another interviewee stated, "You've shared information across the southern U.S. with me. You've showed us case studies of what other folks have done. You've given me the tools to carry out these presentations."

The next most cited strengths were the ease with which interviewees were able to use, understand, adapt, and access the various materials (17 responses) and the variety and type of

information the materials contained (11 responses). For example, one interviewee exclaimed that, "You probably have the best set of material and the most easily adapted material that we've seen, and we've particularly liked so far the case studies and fact sheets. We've been able to easily adapt them and use them." Similar sentiments were expressed by another interviewee, who stated that, "It was put together in one format, one opportunity, one piece of material…to have it available in one place has been very useful very beneficial." Other strengths included the program's use as a reference tool (4 responses), the program's comprehensive regional outlook on biomass issues (4 responses), and the program's coverage of emerging biomass trends (3 responses). Finally, as found in the training evaluation, several interviewees mentioned that the ability to meet other training participants and build working relationships was a valuable component of the training workshop.

Some interviewees felt specific program materials were areas of strength. For example one interviewee shared, "I did think that the power point and all the pictures are very useful. I think the notebooks are great. I think that the fact sheets are a nice easy way to share information with folks. I like the resources section too where people can get additional information. I think that's really handy, and I also like the templates for things like the surveys and community surveys and public relation releases and things like that. So I think that was really useful." Another interviewee specifically cited the community economic profiles: "First off, putting it on the table and talking about all the potential different sources of biomass and also talking about your procurement area maps. Those are something else. And what I like about those in particular is taking into account the highway system, the infrastructure. Normally we sit here and talk about source and talk in a round circle but you're sourcing program takes into account the fact that I have [a major highway] and that spreads it out because that does increase my availability in that area. And I think that's unique, I've never seen that before."

Overall, when discussing the program's strengths, interviewees spoke with gratitude and admiration about the amount and variety of helpful information contained in the program and noted how easy the program is to use.

Program Challenges

> "It does require some adaptation. I don't think that's avoidable, but you definitely have to adapt the materials to your state. And a lot of the estimates now are wrong because of the increasing fuel costs and of course those are always going to change but those are things that have to be adjusted and taken into consideration especially in the economics portion of it."
>
> -Interview Respondent, November 2008

Of the forty-two interviewees who were asked about the program's challenges, twelve interviewees responded that they did not perceive any challenges. Compared to this, thirty interviewees reported one or more challenges, from which several themes are derived. The most prevalent challenge was that the program materials will become quickly outdated due to rapidly changing markets and emergent technologies (8 responses), as seen in the following response: "A challenge in general and especially with case studies is that they need updating all the time. We need more and more case studies as they become available. A good example is carbon credits… we need updating as information becomes available."

The second challenge is that the sources of biomass are not varied enough and are focused too much on the wildland-urban interface (5 responses). These interviewees wanted an increased focus on tree plantation and small-diameter wood. For example, one interviewee stated, "I've occasionally pondered why it was that for site feasibility and the supply curve stuff that so much emphasis was placed on urban wood waste [as] the low hanging fruit for feedstock…The reason that I kind of continue to question this approach and I think that it tended to undermine the usefulness of the supply curves…is that I have yet to hear of a really viable business plan or proposal in Tennessee, North Carolina, or South Carolina which did focus on that resource pool, that feedstock base, first or foremost."

Several other challenges were mentioned by interviewees representing a range of limitations:

- the materials are too broad and contain too much information (5 responses)
- the public's lack of biomass awareness strains education and communication efforts (4 responses)
- the ability of the interviewees to apply the materials within their job duties (3 responses)
- the need to adapt the materials to fit specific local conditions (3 responses)

- the lack of specific economic data to make the case that utilizing woody biomass is economically feasible (3 responses)
- the need for additional materials, such as fact sheets on emerging technologies and additional regional case studies (2 responses)

Lastly, one interviewee also offered an interesting criticism by commenting, "I don't know if it's a challenge but I think the terminology *ambassador* is perhaps what bothered me the most because I'm an educator, and my job is not to promote one scenario or the other. These are the options…and perhaps the pros and cons of each, and the word *ambassador* suggests that I'm proselytizing and I'm not allowed to do that." Similar to this sentiment, another interviewee shared how they thought that "everyone that was involved in the [program development] process probably had, I don't know if 'bias' is the right word, but a little bit of inclination toward promoting the use of bioenergy. So I don't think the fact sheets necessarily touch upon the other side so to speak, if there are any arguments against using these kinds of energy and things like that."

Some of the challenges mentioned, such as the need for more varied biomass sources or less focus on the wildland-urban interface, are outside of or conflict with this program's scope. Other challenges, such as program materials becoming quickly outdated and the need for additional materials, are important to recognize for the future. Please note, consistent trends or biases in the challenges mentioned were not found among responses for those interviewees who have frequently used the program, have not used the program, or within specific states or professions.

Summary

The data collected from phone interviews shows that the majority of these Ambassadors have used the program materials since the Wood to Energy Outreach Training in workshops, trainings, and conferences that have occurred throughout the South. Many Ambassadors worked with the state teams developed at the training to conduct outreach activities, with the goal of raising awareness and educating multiple audiences about woody biomass opportunities. Those interviewed recognize several strengths of the program, including the large amount science-based information and the ease of using and adapting the materials to meet their specific outreach needs. When asked about program challenges, most Ambassadors mentioned the need

to update the information and provide information about additional biomass sources. Finally, several Ambassadors spoke excitedly about their future plans to use the program.

Program Impacts

Educational Opportunities

Several students participated in the development of the Wood to Energy Outreach Program. Annie Oxarart, Jessica Tomasello, and Todd LeVasseur played a role in the program development and evaluation. Each student gained valuable experience by working for the program through a graduate research assistantship. In addition, the following University of Florida students helped to conduct research and author program materials on an hourly basis: Brian Becker, Jon Berg, Lindsey McConnell, Tyler Nesbit, Jennifer O'Leary, Richard Plate, and Douglas Renk. Michael Ha assisted with the program web site development. Lauryn Cannon and Sara Sillars also helped to develop program materials through a technology transfer internship for the USDA Forest Service.

The Wood to Energy program also spawned several classroom assignments and activities, carrying these concepts to a large number of high school and undergraduate students:

- Program materials were used to develop a high school wood to energy curriculum.
- Program materials were used to teach college courses on alternative energy and economics of timber products.
- Woody biomass was used as a topic in the courses Natural Resource Communications in 2006 and Society and Natural Resources in 2008 and 2009, exposing approximately 65 undergraduate students to the topic.
- A community decision about using wood for energy was developed into a case study for a course on the ethics of sustainability.
- Rachel and Steve Kaplan were brought to University of Florida to explore the Reasonable Person Model in the context of using wood for energy.

Publications

Research conducted for the Wood to Energy Outreach Program has resulted in approximately ten reports or peer-reviewed research publications (either published or expected to

be published within 1 year). All fact sheets, case studies, and community economic profiles have been reprinted as University of Florida, Institute of Food and Agricultural Science EDIS documents, which are available online. Articles describing results from research activities about public perceptions of using wood for energy, communicating about using wood for energy through written text, using interesting text as a communication strategy, and lessons learned from the Wood to Energy Outreach program have been submitted to scientific journals and are under review. Research results concerning the use of community forums as an educational strategy and the economic availability of woody biomass have been accepted and published in journals. Please see Appendix K for a complete list of publications.

Presentations

Team members delivered numerous presentations or programs related to the Wood to Energy Outreach Program from 2006 to 2009 (Table 8). Presentations were given at national and international conferences, including the Association of Natural Resource Extension Professionals, International Symposium on Society and Natural Resource Management, International Conference on Environmental Education, International Conference on Environment, and North American Association for Environmental Education. Presentations were also given at various field days and Ag Expos at county Extension offices in Florida and at several regional conferences and meetings, including the University of Florida, School of Forest Resources and Conservation and Society of American Forester's Spring Symposium, Southern Region Conference on Technology Transfer and Extension in Natural Resources, League of Environmental Educators of Florida, Colorado Alliance for Environmental Education, Northeast Texas Woody Bioenergy Symposium, Florida Bioenergy Conference, and Biomass South Conference. In addition, team members helped to conduct short courses or trainings with professional organizations, including the Southeastern Wood Producer's Association. Finally, several presentations were conducted with community groups and members of the public during the program's pilot test. For a complete list of presentations, please see Appendix L.

Table 8. Team Member Presentations Related to Program

Year	Number of Programs/Presentations	Audience Reached (approx.)
2006	19	415
2007	10	225
2008	32	985
2009	4	140
Total	**65**	**1765**

Awards

The Wood to Energy Outreach Program received a bronze award for Outstanding Education Materials (2008) in the Mixed Materials category and a poster on the misconceptions associated with woody biomass received a silver award (2006), both from the Association of Natural Resource Extension Professionals. The program also received a silver IMAGE award in the Short Course category from the University of Florida, Institute of Food and Agricultural Sciences.

Additional Opportunities

A variety of projects have developed as outgrowths of the Wood to Energy Outreach Program. Some projects involve adapting program materials for new audiences and new purposes, while others involve additional research or education efforts.

The National Association of Conservation Districts sponsored the adaptation of Wood to Energy and Sustainable Forestry for Bioenergy and Bio-based Products program materials for a Woody Biomass Utilization Desk Guide. The desk guide will consist of several chapters with overview information for professionals; sets of fact sheets to be used with the public, local leaders, and landowners; and case studies that illustrate examples, challenges, and successes of woody biomass production and utilization projects. In addition, the guide will feature a resource section with suggestions for supplementary materials and a glossary.

In Florida, Wood to Energy program materials have been adapted into a high school curriculum, with funding from the Southern Forest Research Partnership. The curriculum goals include increasing high school students' knowledge about using wood for energy, critically examining and weighing advantages and disadvantages of using wood for energy, and evaluating how using wood for energy relates to sustainability. This curriculum has been pilot tested and is expected to be distributed to high school teachers next year.

Extension agents and university faculty outside of the Southern region are taking the initiative to use and adapt the program materials to encourage communities to consider using wood for energy. Faculty in Minnesota and Missouri are using the program materials as a guide to create bioenergy materials that are specific to their state or region. In addition, an economic development council in Salmon, Idaho held a community forum to discuss local wood-to-energy possibilities, including a wood pellet plant and a 10 MW cogeneration plant. The forum was attended by 65 community members, and Wood to Energy fact sheets and case studies were distributed during the forum.

During the fall of 2008, a new Energy from Woody Biomass Community of Practice was developed through eXtension. Materials and research related to both the Wood to Energy Outreach Program and the Sustainable Forestry for Bioenergy and Bio-based Products Program will be used to develop the web site (http://cop.extension.org/wiki/Forest-based_Bioenergy). All Wood to Energy fact sheets and case studies have been uploaded to the web site. These programs have also been useful in developing topic and subtopic areas and identifying areas where additional research and efforts are needed.

Several other funded projects have been initiated that built upon the research conducted in this project. A study sponsored by the Southeast Agriculture and Forestry Energy Resources Alliance involved an inventory resources, commercial activity and economic benefits of bioenergy in the southern United States, for use by economic development agencies and industry investors. A project funded by Environmental Defense sought to evaluate the potential for reduction of greenhouse gases through the agriculture and forestry sector, including use of biofuels. Another project to evaluate economic impacts of a proposed wood power plant in Gainesville, Florida was sponsored by Covanta Energy. Finally, the literature reviews carried out for Wood to Energy Outreach program helped initiate a project, funded by IFAS Research Innovation Awards, for biochar and pyrolysis research. This research focuses on integrating the production of biofuels and biochar with the land application of biochar for carbon sequestration and nutrient absorption.

Program Reflections

The Wood to Energy Outreach Program raised awareness and knowledge about the use of wood for energy with several audiences (e.g., the general public at community forums, Biomass

Ambassadors at Wood to Energy Outreach Training, forestry professionals in North Florida). In those areas where woody biomass was being discussed as a possibility (such as communities in Missouri, Kentucky, Florida), the program materials were used to inform discussions among interested parties. Several components of the Wood to Energy Outreach Program have been successful:

- We conducted research activities on woody biomass available supply and economic impact, public perceptions, and outreach strategies to help create informed judgment—all of which informed program development and contributed to existing knowledge and literature through publications and presentations.
- We produced high quality outreach materials that provide relevant and meaningful information and made it available to people in several formats.
- We brought together the right people to attend the regional training and provided some funds to launch activities in their states.
- We provided support to Biomass Ambassadors as requested by distributing program materials, assisting in presentations, and providing additional resources and information.
- We conducted front-end, formative, and summative evaluation of the program to improve the program materials and learn about program use and usefulness.
- Our literature review and findings will be produced by Forest Service in a General Technical Report.

We also experienced challenges while developing, implementing, and evaluating the program. Based on our experiences, we offer the following reflections about the timing of the project, working with companion projects, and dealing with the issue of advocacy versus education.

Timing

The Wood to Energy Outreach Program was proposed when the use of woody biomass was a good idea known only to a very few biomass experts. The research and outreach products were developed as energy and climate became more important to Americans, and the program was ready for distribution as some communities began to consider carbon-neutral and renewable energy opportunities. In this sense, our timing was perfect. In reality, however, because we chose

to develop resources for the public to better understand the use of wood for energy, we were ahead of the need. On one hand, that's not bad, as now the resources are available and ready when people realize they have questions. On the other hand, we were not able to demonstrate a huge outreach effort with these materials in the short time we had to implement and evaluate our program. In order to serve communities and professionals when the need arises, we recommend that the program website and materials be maintained, updated, and promoted continuously as appropriate.

We think this disconnect between the obvious need and the lack of public involvement is a function of several factors: 1) The American public really doesn't understand much about energy, as our assessment and others have demonstrated. While they are interested in being involved in the decision-making processes, this lack of knowledge and the technical nature of energy issues often impede their involvement. As a result they are willing to let others decide how to provide the energy they use. The community forum model is one strategy we used and recommend to others for addressing this issue. 2) The organizations and agencies that provide forestry outreach and information do not have working relationships, familiarity, or comfort with the organizations and agencies that deal with energy. The topic of woody biomass requires that people first form relationships and ways of working together so that outreach can be conducted. Our training event helped move this process forward, but more work needs to be done. In hindsight, providing funds for additional state team meetings (i.e. in-person, phone conference, web conference) after the training could have been helpful. 3) People are interested in learning more when the issue is local. While we tried to identify places where outreach educators could introduce the opportunity to communities, few educators or foresters have the credibility or interest to tell a utility where they should get their fuel. A better strategy might have been to conduct outreach events for state energy experts, utility companies, and private industry, but that was clearly outside the scope of this project. Where communities are talking about using wood, outreach educators have found our materials to be useful and appropriate.

Companion Projects

Our project was approved in the same cycle as the SFRP Sustainable Forestry for Bioenergy and Bio-based Products Program. We met together at the outset to identify how to work together so that our activities would complement and support each other. We were able to

clarify differences that were critical to focusing our efforts: they were targeting forestry extension and rural communities on the supply side; we were targeting wildland urban interface communities on the supply side. They aimed to improve the woody biomass resource; we aimed to build the opportunities for the market. Outreach and education are key to both components, and sorting this out made it much easier for both projects to achieve their goals.

Both activities were launched at the same time, and rather than ask the same people to attend two training programs, we combined forces. We had funds in our budget for travel, and they anticipated offering grants to states to implement woody biomass outreach programs. We pooled our resources here, too, agreeing on a larger list of invitees than either project might have done initially to cover both target groups, and encouraging all members to work with their forest extension unit to deliver programs. This was very successful in only a few states, in part because of the challenges noted above. People were meeting each other for the first time in the Atlanta training, and working relationships often take longer to develop than two days. Some states were unable to access the funds; some forest extension programs were better able to deliver programs to their traditional audience (rural forest landowners and inservice trainings) than our new audience (communities in need of power).

We hoped to train individuals whose job it is to conduct woody biomass outreach. Very few of those people exist. In those instances where participants did conduct outreach, they had additional funding or a project with goals directing them to do so. The SFRP funds were helpful to kick-start many state training programs for extension, and it is possible that those extension agents will begin working with communities to discuss energy options in the future. Without continued funding and attention on this topic, however, they may backslide into familiar territory. Including funds for state teams to deliver outreach in communities with woody biomass potential will continue to help meet our public outreach program goals.

Advocacy vs. Education

Because our funding came through the US Forest Service for woody biomass outreach and education, we constantly battled accusations of promoting wood to energy. We went out of our way to explain that we were promoting community education so residents could decide if this is an appropriate fuel for them. However, because we were not providing information about other energy sources and because of our association with the Forest Service and the School of

Forest Resources and Conservation, no one believed us. Our research in this area was essential to helping us make recommendations to outreach educators, but it continues to be a challenge. Even some training participants were uncomfortable with the nature of the materials. In hindsight, we should have included case studies from communities and businesses who decided not to use wood for energy. We suggest this is a difficult challenge to overcome, because misconceptions are rampant and because truthful, factual information can be perceived as propaganda if it does not reflect those misconceptions.

Conclusions

The Wood to Energy Outreach Program developed materials that can be used to promote informed discussions about the possibility of using woody biomass to generate heat, power, and electricity. Science-based, accurate information is provided through 18 fact sheets, 14 case studies, and 13 community economic profiles. Tools and resources for conducting outreach activities with community leaders and interested parties are provided in the Biomass Ambassador Guide, and all program materials and resources are available online.

Those trained to use the program throughout the Southeast reported being satisfied with the program materials and find them relevant to their organization, agency, or company. Many Biomass Ambassadors have worked within their home states to train Extension agents, resource professionals, and other colleagues to use the program. This appeared to be the "next step" for most Ambassadors after receiving the program and training. Few Ambassadors chose specific communities and began promoting discussions and conducting public outreach. Where training and public outreach occurred, Biomass Ambassadors had additional sources of funding or projects that encouraged the outreach activities. Several Ambassadors plan to start doing community outreach activities in the future. However, the evaluation timeframe was not able to capture data on these foreseen opportunities.

As renewable energy sources continue to be a national priority, the use of programs similar to the Wood to Energy Outreach Program is likely to increase. Biomass Ambassadors may find themselves called upon more often to provide science-based information and resources to help communities work through the challenges of finding alternative sources of energy. The materials of the Wood to Energy Outreach Program will help them successfully and efficiently accomplish this task.

References

Adams, M.D. 2003. Assessing awareness of Florida homeowners about the use of biomass for electricity production. Gainesville, FL: University of Florida. 74 p. M.S. Thesis.

Bang, H., Ellinger, A.E., Hadjimarcou, J., and Traichal, P.A. 2000. Consumer concern, knowledge, belief, and attitude toward renewable energy: an application of the reasoned action theory. *Psychology and Marketing 17*(6): 449-468.

Charmaz, K. 2006. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis.* Thousand Oaks, CA: SAGE Publications.

Cook, J. and Beyea, J. 2000. Bioenergy in the United States: progress and possibilities. *Biomass and Bioenergy 18*: 441-455.

Escobedo, F. and W. Zipperer. 2007. Assessing Gainesville's urban forest effects and values. Unpublished raw data.

Farhar, B. 1999. Willingness to pay for electricity from renewable resources: a review of utility market research. National Renewable Energy Laboratory, U.S. Department of Energy: 9-14.

Langholtz, M., Carter, D., Marsik, M., and Schroeder, R. (2006). Measuring the Economics of Biofuel Availability. *ArcUser Magazine,* October-December: 22-25. Available at http://www.esri.com/news/arcuser/1006/biomass1of2.html.

Natural Resources Defense Council. 2003. Biomass Energy. Clean Air & Energy: Energy. http://www.nrdc.org/air/energy/fbiom.asp. [Date accessed: February 7, 2007].

Richter, D., Jenkins, D., Karakash, J., Knight, J., McCreery, L., and Nemestothy, K. 2009. Resource Policy: Wood Energy in America. *Science 323* (13 March 2009): 1432-1433.

Southeast Agriculture and Forestry Energy Resources Alliance (SAFER). 2009. *Southern Bioenergy Roadmap.* Research Triangle Park, NC: SAFER. Available at http://www.saferalliance.net/projects/bioenergy_roadmap.pdf.

Upreti, B. R. 2004. Conflict over biomass energy development in the United Kingdom: some observations and lessons from England and Wales. *Energy Policy 32*: 785-800.

Appendix A:
Individuals Involved with Wood to Energy Outreach Program Development

Economic Analysis Team
Douglas R. Carter, School of Forest Resources and Conservation, University of Florida
Alan W. Hodges, Food and Resource Economics Department, University of Florida
Matthew Langholtz, BioResource Management Inc.
Mohammad Rahmani, Food and Resource Economics Department, University of Florida

Outreach Team
Martha C. Monroe, School of Forest Resources and Conservation, University of Florida
Lauren McDonell, School of Forest Resources and Conservation, University of Florida
Annie Oxarart, School of Forest Resources and Conservation, University of Florida
Jessica Tomasello, School of Forest Resources and Conservation, University of Florida
Todd LeVasseur, Department of Religion, University of Florida
Richard Plate, School for Field Studies, South Caicos, Turks and Caicos Islands
Annie Hermansen-Báez, USDA Forest Service, Centers for Urban and Interface Forestry

Technical Team
Phillip Badger, Southern States Energy Board
Richard Schroeder, BioResource Management, Inc.
Christie Staudhammer, School of Forest Resources and Conservation, University of Florida
Pratap Pullammanappallil, Department of Agricultural and Biological Engineering, University of Florida
Alicia Lawrence, School of Forest Resources and Conservation, University of Florida

General Technical Report Leadership Team
Edward Macie, USDA Forest Service, Centers for Urban and Interface Forestry
Annie Hermansen-Báez, USDA Forest Service, Centers for Urban and Interface Forestry
Douglas R. Carter, School of Forest Resources and Conservation, University of Florida
Christie Staudhammer, School of Forest Resources and Conservation, University of Florida
Lauren McDonell, School of Forest Resources and Conservation, University of Florida

Outreach Assistants and Additional Authors
Michael Andreu, Jon E. Berg, Kelly Biedenweg, Rob Brinkman, Lauryn Cannon, Bruce Crain, Janice Easton, David E. (Ted) Hill, Alan J. Long, Lindsey McConnell, Jennifer E. O'Leary, Melissa Palmer, Sara Sillars, Jessica Tomasello, Andres Villegas

Reviewers
Tim Adams, Janaki R. R. Alavalapati, Sarah Ashton, Phillip Badger, Ron Bailey Sr., Charles Becker, Wade Bennett, Patsy J. Brown, James Bush, Burl Carraway, P. Daniel Cassidy, Rodney L. Clouser, Wendell P. Cropper Jr., Tom V. Cunilio, Devon Dartnell, Dian Deevey, Sally and Josh Dickinson, Tommy England, Darwin C. Foster, Paul Frey, Larry Fudge, Dennis Hazel, Jay S. Hodges, Joan Hourican, William Hubbard, Keith T. Ingram, John Irving, Tom Johnson, Elizabeth Kress, Jesse Lewis, Ruth Grant Logsdon, Larry Lowe, Edward Macie, Craig Marquardt, Mark A. Megalos, James M. Meriwether, W. David Mulkey, Jarek Nowak, Gustavo Perez-Verdin, George Stone, Adam Taylor, James Teaney, Ted Trent, Phil Tuohy, Chang-Yu Wu

Editors
Eleanor K. Sommer, Cynthia Johnson, Mary Chichester

Designer
Michele Linette, IFAS Communication Services, University of Florida

Web Site Support
Michael Ha, University of Florida
Matt Howell, University of Georgia

Pilot Test Participants
The residents and leaders of Gainesville, FL; London, KY; and Poteau, OK

Appendix B:
Biomass Ambassador Guide Table of Contents

Systems That Convert Wood into Energy
Using Wood Fuels in Existing Coal-Fired Power Plants

Case Studies
Burning Sawdust for Heat and Power
Challenges of Obtaining a Wood Supply
Co-firing with Wood and Sugarcane Waste
Co-firing with Wood and Switchgrass
Converting from Natural Gas to Waste Wood
Forest Industry Creates Its Own Power
Innovative Fuel Sources Generate Success
Powering the Grid with Waste
Power to the People
Using a Mix of Fuels to Produce Heat and Power
Waste-to-Energy Program
Wood and Paper Trim the Energy Bill
Wood Power Heats a Public School
Wood-powered Whiskey

Community Economic Profiles
Alabama
Arkansas
Florida
Georgia
Kentucky
Louisiana
Mississippi
North Carolina
Oklahoma
South Carolina
Tennessee
Texas
Virginia

Presentation

Resources
Community Engagement & Outreach
Economics
Energy
Environmental Considerations
Forest Management
Infrastructure & Logistics
Policy
Social Considerations
Technology
Woody Biomass Groups, Organizations, & Consultants

Appendix
Handouts
Wood to Energy Conversion Handout
Media Question and Answer Handout
Gainesville Report
Using Wood for Energy in Gainesville, Florida (Gainesville Report)
Citizen Energy Survey
Gainesville Community Forum Questions and Answers
Background
Assessing the Economic Availability of Woody Biomass
Do-It-Yourself Supply Curves
Supplying Equipment for Woody Biomass Projects: PRM Energy Systems, Inc.
Glossary

Appendix C:
Woody Biomass Outreach Training Participants

Alabama

Becky Barlow, Assistant Professor
Auburn University, Forest Management and Economics

Walter Cartwright, Forest Management Chief
Alabama Forestry Commission

Kozma Naka**,** Assistant Professor
Alabama A & M University, Faculty of Forestry

Mathew Smidt, Associate Professor
Auburn University, Scholl of Forestry and Wildlife Science

Allen Varner, Forest Management Division Director
Alabama Forestry Commission

Arkansas

Doug Akin, Assistant State Forester
Arkansas Forestry Commission

Sayeed Mehmood, Associate Professor
University of Arkansas Monticello, School of Forest Resources

Matthew Pelkki, Professor
University of Arkansas Monticello, School of Forest Resources

Tamara Walkingstick, Extension Specialist
University of Arkansas

Florida

Josh Dickinson
Forest Management Trust

Mike Goodchild, Extension Specialist
Walton County Extension

David Holley, Nassau County Senior Forester
Florida Division of Wildlife

Marsha Kearney, Forest Supervisor
National Forests in Florida

Marian Marinescu, Assistant Professor/Extension Specialist
University of Florida, School of Forest Resources and Conservation

Jarek Nowak
Florida Division of Forestry

Michael Ohlsen
Florida Energy Office

Georgia
Jack Bareford, Director
East Georgia College, Georgia Rural Economic Development Center (GREDC)

Tommy Carroll, Executive Director
Southeastern Wood Producers Association

Devon Dartnell
Georgia Forestry Commission

Sheldon Hammond, Program Development Coordinator
University of Georgia, College of Agricultural and Environmental Sciences

Kentucky
Loan Harris
Fort Campbell

Jeffrey Stringer, Associate Professor
University of Kentucky, Department of Forestry

Pam Waggoner, Chief Forester
Kentucky Division of Forestry

Dawn York
Fort Campbell

Louisiana
Michael Dunn, Associate Professor
Louisiana State University, Agricultural Economics and Agribusiness

Cornelis de Hoop, Associate Professor of Forest Products
Louisiana State University, School of Renewable Natural Resources

Mississippi
Sumesh Arora, Director of Strategic Biomass Initiative
Mississippi Technology Alliance

George Jones
USDA Rural Development

Andy Londo, Associate Professor/Extension Coordinator
Mississippi State University, Department of Forestry

Randy Rousseau, Associate Extension/Research Professor
Mississippi State University, Department of Forestry

Wayne Tucker, Executive Director
Mississippi Institute of Forest Industry

Missouri
Hank Stelzer, Associate Professor
University of Missouri, Forestry Extension

John Tuttle, Forest Field Program Supervisor – Forest Products
Missouri Department of Conservation

North Carolina
Dennis Hazel, Professor
North Carolina State University

Alex Hobbs
North Carolina Solar

Mike Mann, Utilization Forester
North Carolina Division of Forest Resources

Oklahoma
Salim Hiziroglu, Associate Professor of Wood Products
Oklahoma State University, Forestry

Mary Marek, Service Forester
ODAFF Forestry Services

Craig McKinley, Professor/Extension Forester
Oklahoma State University, Dept of Natural Resource Ecology and Management

Tom Murray, Service Forester
OADAFF Forestry Services

South Carolina
Tim Adams
South Carolina Forestry Commission

Richard Horton, Program Manager
State Energy Office

Joseph James, President and CEO
Corp for Economic Opportunity

George Kessler, Professor
Clemson University, Dept. of Forestry and Natural Resources

Beth Richardson
Clemson University

Gregg White, Director of Rural Business and Cooperative Programs
USDA Rural Development

Tennessee
John Fenderson, Environmental Affairs/Public Outreach Unit Leader
Tennessee Dept of Agriculture Forestry Division

Herb Paugh, Forester
USDA/NRCS

Tim Phelps, Information & Education Program Specialist
Tennessee Dept of Agriculture Forestry Division

Charles Robertson
Tennessee Division of Forestry

Steve Scott, State Forester
Tennessee Dept of Agriculture Forestry Division

Adam Taylor, Assistant Professor
Forest Products Extension

Texas
Ron Blackwelder, Forest Products & Business Development
WoodFuel.com LP

Tom Boggus, Associate Director for Forest Resource Development
Texas Forest Service

Burl Carraway, Economic Development Program Manager
Texas Forest Service

I-Kuai Hung, Assistant Professor
Stephen F. Austin State University, Environmental Science/Forestry

Yanshu Li
Texas Forest Service

Frank Wofford, Training Coordinator
Texas Forest Service

Virginia
Charlie Becker, Utilization and Marketing Manager
Virginia Department of Forestry

Jennifer Gagnon, Landowner Education Program Coordinator
Virginia Tech

Paul Howe, Executive Vice President
Virginia Forestry Association

Cartyle Robin Jones, Energy Program Manager
Virginia Department of Mines, Minerals and Energy

John Munsell, Assistant Professor and Forest Mgmt Extension Specialist
Virginia Tech, Dept of Forestry

Bob Smith, Professor
Virginia Tech, Dept of Wood Science and Forest Products

Regional
Phil Araman, Research Team Leader/Scientist
USDA Forest Service

Brent Bailey, State Facilitator
Southeast 25x'25

John Bonitz, Farm and Outreach and Policy Advocate
Southern Alliance for Clean Energy

Tom Darden, Director, Cooperative Forestry
USDA Forest Service

Anne Gilliam, Diesel and Biofuels Program Manager
Southern Alliance for Clean Energy

David Hoge, Rural Forestry Program Manager
USDA Forest Service

Ed Macie, Team Leader, Centers for Urban and Interface Forestry, InterfaceSouth
USDA Forest Service

Rick Morgan, Forester
USDA Forest Service

Richard Oliver, Forester
USDA NRCS

John Schelhas, Research Forester
USDA Forest Service

Jerome Thomas, Forest Supervisor, Francis Marion and Sumter Nat'l Forests
USDA Forest Service

Rodger Williams
USDA Forest Service

Appendix D:
Woody Biomass Outreach Training Agenda

September 11-12, 2007, Atlanta, GA

The purpose of this workshop is: To introduce new materials, to bring together new partners, to launch increased programmatic efforts to raise awareness and increase understanding of using wood for energy and other bio-based products in the South.

Tuesday: Sept. 11, 2007

7:00 am: Continental breakfast available

8:00 am: Welcome and Overview, Introductions

9:00 am: Keynote Presentation by Fred Deneke, Forestry Advisor – 25 x 25 Initiative: A vision for using woody biomass in the South

9:45 am: Break

10:15 am: Introducing two complementary Bioenergy Training Projects -- Two audiences, two purposes, one goal.

11:00 am: Woody Biomass Products and Possibilities -- Examples of local and international projects and technologies

12:00 pm: Lunch on your own and with team members if interested

1:15 pm: Information on reimbursement for travel

1:30 pm: The availability, cost, and economic impact of southern forest biomass use – examples from the South

3:15 pm: Break

3:45 pm: Growing forests sustainably to produce and harvest woody biomass

5:15 pm: Adjourn

Dinner on your own

Wednesday September 12, 2007

7:00 am: Continental breakfast available

8:00 am: Transporting, drying, and storing woody biomass

9:00 am:	What the public knows and cares about concerning using wood for energy -- strategies for conducting outreach
9:45 am:	Break
10:15 am:	Educating or advocating – the role of outreach.
10:45 am:	More resources: Forest Bioenergy Encyclopedia, Web Portal, Web Based Learning Center, Biomass Ambassador Guide, and InterfaceSouth.org.
11:45 am:	Small group expert consultation sessions over lunch
12:15 pm:	Lunch
1:15 pm:	How to get started with woody biomass outreach
1:45 pm:	State teams work on planning their woody biomass outreach programs
2:45 pm:	Break
3:15 pm:	Teams report, evaluations, follow-up strategies, and accessing resources.
4:45 pm:	Adjourn and Safe Travels

Appendix E:
Survey for Training/Program Evaluation

Thank you for attending the Woody Biomass Outreach Training. You have been exposed to a great deal of material related to the use of woody biomass for bioenergy and bio-based products. We look forward to supporting your future outreach efforts. Please complete this form with your candid responses so that we can evaluate our work.

1. Please indicate your level of understanding of woody biomass issues prior to and after participating in this workshop.

	BEFORE Program				AFTER Program			
	Poor	Fair	Good	Excellent	Poor	Fair	Good	Excellent
a. Understanding of the use of wood for bioenergy and bio-based products	1	2	3	4	1	2	3	4
b. Understanding of biomass markets	1	2	3	4	1	2	3	4
c. Understanding of conversion technologies	1	2	3	4	1	2	3	4
d. Understanding of supply, cost and economic impacts	1	2	3	4	1	2	3	4
e. Understanding of management, harvesting and sustainability of woody biomass	1	2	3	4	1	2	3	4
f. Understanding of transportation, processing and storage of woody biomass	1	2	3	4	1	2	3	4
g. Understanding of public perceptions of woody biomass	1	2	3	4	1	2	3	4

2. Please indicate your level of confidence in developing woody biomass outreach programs before and after participating in this workshop.

	BEFORE Program				AFTER Program			
	None	Low	Moderate	High	None	Low	Moderate	High
a. Developing programs related to the use of wood for bioenergy and bio-based products	1	2	3	4	1	2	3	4
b. Developing programs related to biomass markets	1	2	3	4	1	2	3	4
c. Developing programs related to conversion technologies	1	2	3	4	1	2	3	4
d. Developing programs related to supply, cost, and economic impacts of woody biomass	1	2	3	4	1	2	3	4
e. Developing programs related to management, harvesting and sustainability	1	2	3	4	1	2	3	4
f. Developing programs related to transportation, processing and storage	1	2	3	4	1	2	3	4
g. Developing programs to help citizens and community leaders learn about using woody biomass for energy	1	2	3	4	1	2	3	4

3. Please rank your agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. Woody biomass is a viable alternative to fossil fuels.	1	2	3	4	5
b. Domestic energy security can be enhanced by using woody biomass for bioenergy.	1	2	3	4	5
c. Waste wood from forest thinning should be used for bioenergy.	1	2	3	4	5
d. Greenhouse gas emissions can be reduced by using woody biomass for energy.	1	2	3	4	5
e. Using woody biomass for bioenergy will deplete our forest resources.	1	2	3	4	5
f. Using woody biomass for bio-based products can reduce our use of fossil fuels.	1	2	3	4	5
g. Harvesting biomass for bioenergy is detrimental to the forest ecosystem.	1	2	3	4	5
h. Forest health can be improved by using woody biomass for bioenergy.	1	2	3	4	5
i. Producing energy from woody biomass can be beneficial to local economies.	1	2	3	4	5
j. I would support the use of woody biomass for energy in my state.	1	2	3	4	5

4. Overall, how satisfied are you with the materials presented?

	Not at all	Slightly	Somewhat	Mostly	Completely
a. Sustainable Forestry for Bioenergy and Bio-based Products	1	2	3	4	5
b. Wood to Energy	1	2	3	4	5

5. How relevant is this material to the work of your agency or organization?

	Not at all	Slightly	Somewhat	Quite	Extremely
a. Sustainable Forestry for Bioenergy and Bio-based Products	1	2	3	4	5
b. Wood to Energy	1	2	3	4	5

6. How similar is this material to resources you already have in hand?

	Not at all	Slightly	Somewhat	Quite	Virtually the same
a. Sustainable Forestry for Bioenergy and Bio-based Products	1	2	3	4	5
b. Wood to Energy	1	2	3	4	5

7. How likely are you to use some of these materials?

	Not at all	Slightly	Somewhat	Quite	Very
a. Sustainable Forestry for Bioenergy and Bio-based Products	1	2	3	4	5
b. Wood to Energy	1	2	3	4	5

8. How useful is the information on the following concepts?

	Not at all	Slightly	Somewhat	Quite	Extremely
a. Using wood for bioenergy and bio-based products	1	2	3	4	5
b. Biomass products and markets	1	2	3	4	5
c. Supply, cost, and economic impacts	1	2	3	4	5
d. Management, harvesting, and sustainability	1	2	3	4	5
e. Transportation, processing, and storage	1	2	3	4	5
f. Public perceptions of woody biomass	1	2	3	4	5
g. Environmental impacts of producing bioenergy	1	2	3	4	5
h. Conversion technologies	1	2	3	4	5

9. How effective are the various elements of the materials?

	Not at all	Slightly	Somewhat	Quite	Extremely
a. Discussions	1	2	3	4	5
b. Slide presentations	1	2	3	4	5
c. Activities	1	2	3	4	5
d. Fact Sheets	1	2	3	4	5
e. South specific case studies	1	2	3	4	5
f. South specific economic profiles	1	2	3	4	5

10. Please rate the presenters in each of the following areas.

	Poor	Fair	Good	Excellent
a. Communicating effectively	1	2	3	4
b. Leading exercises effectively	1	2	3	4
c. Engaging us in discussions	1	2	3	4
d. Providing useful information	1	2	3	4
e. Organizing an appropriate schedule	1	2	3	4
f. Technical competency/knowledge of the subject	1	2	3	4

11. What are your plans for using these materials in each of the following ways?

	Definitely will not	Probably will not	Undecided	Probably will	Definitely will
a. Promote discussion about woody biomass	1	2	3	4	5
b. As part of a course or workshop	1	2	3	4	5
c. Share with other trainers	1	2	3	4	5
d. Develop a biomass outreach program	1	2	3	4	5
e. In a presentation	1	2	3	4	5
f. Contacting community leaders	1	2	3	4	5
g. Developing state-level materials based in part on these materials	1	2	3	4	5

12. What other ways have you thought to use this information and material?

13. What three things from this program will be most useful to you?
    a.

    b.

    c.

14. What elements of the program materials should be changed? How and why?

15. In what ways could we support your efforts to use these materials?

16. What barriers do you see for the potential use of these materials?

17. Is there anything else you'd like to share with us?

18. Which category best fits you? (Check all that apply)
    a. Consulting forester
    b. State Extension professional
    c. County Extension professional
    d. State agency professional
    e. Federal agency professional (this should be separate from state)
    f. University personnel
    g. Forest landowner
    h. Industry professional (forestry, logging, etc)
    i. Economic/rural development professional
    j. Energy professional
    k. Entrepreneur
    l. State forestry association member
    m. Environmental organization member
    n. Other

19. How many acres of forestland do you own or manage?
    a. Less than 50
    b. 50-100
    c. 101-250
    d. 251-500
    e. 501+
    f. I am not a landowner.

20. What is your age?
    a. under 25
    b. 25-35
    c. 36-45
    d. 46-55
    e. 56-65
    f. Over 65

21. You are . . .
    a. Male
    b. Female

22. What is the highest level of education you have completed?
    a. Some high school or less
    b. High school or GED
    c. Some college or post-high school training
    d. 2-year college degree
    e. 4-year college degree
    f. Graduate or professional training beyond a 4-year college degree

23. How would you describe yourself? (Select all that apply)
    a. White, non-Hispanic
    b. African-American, non-Hispanic
    c. Hispanic
    d. Asian-American
    e. Native American
    f. Other _____

We will be conducting a follow-up survey related to your adoption of the materials presented. This survey will be conducted in 6-9 months. In order to compare responses, we need to match the responses from the two surveys. Can you please provide the following information for matching purposes? All responses will be strictly confidential.

State: _____

Last 4 digits of Social Security Number: _____

Appendix F:
Online Survey for Program Web Site

Please take a moment to answer 4 questions to help us learn more about who is accessing this information on woody biomass. This information will be completely anonymous and you're free to skip any question by clicking "next." There are no risks to your participation, and the only benefit we can offer is the satisfaction of knowing your responses will help us improve information about woody biomass in the future! Your participation is completely voluntary and you may withdraw your consent to participate without penalty. There is no compensation to you for participating in the study. This survey will take five minutes or less to complete.

If you have any questions about this survey, please contact Martha Monroe, School of Forest Resources and Conservation, University of Florida (mcmonroe@ufl.edu or 352-846-0878). If you have questions about participants' rights and responsibilities, please contact the Institutional Review Board, Box 112250, University of Florida, Gainesville, FL 32611-2250; ph 352-392-0433.

1. Which of the following best describes your role as it relates to learning about the use of wood for energy?
   __ Interested citizen
   __ Policy maker
   __ Forest Landowner
   __ Business Owner
   __ It is my job
   __ Other (please describe: _____)

2. I am interested in information about the use of wood for energy because:
   __ My community (town, city, or county) is considering the use of wood to generate energy.
   __ I want to learn more about this topic to educate myself.
   __ I inform and educate others about this topic.
   __ Learning this information is related to my job responsibilities.
   __ Other (please describe: _____)

3. How <u>likely</u> are you to do the following after reading the Wood to Energy Outreach Program materials? (Please check all that apply)

1 = Not at all, 2 = Slightly, 3 = Somewhat, 4 = Quite, and 5 = Extremely

a.	Discuss this topic with other interested people	1	2	3	4	5
b.	Seek more information about this topic	1	2	3	4	5
c.	Discuss the topic with community leaders	1	2	3	4	5
d.	Distribute materials to other interested people	1	2	3	4	5
e.	Educate others who may be interested in this topic	1	2	3	4	5

4. Where do you live? (drop down menu with each of the 50 states and a choice that says “I live outside the U.S.”).

May we contact you in several months to ask you to help evaluate this program? If so, please click here to email us and express your interest. You will receive the survey by email; your name and address will not be known to us, and we will not use your email address for any other purpose. If you have any questions, please contact Lauren McDonell at mcdonell@ufl.edu.

Appendix G:
Follow-up Online Survey for Program Evaluation

Thank you once again for attending the Woody Biomass Outreach Training held September 10-11 in Atlanta. We would like to learn how you have used the Sustainable Forestry for Bioenergy and Bio-based Products and the Wood to Energy programs in your outreach work and about your plans to continue using these resources. Please complete this form with your candid responses so that we can evaluate our programs.

Section 1: The following questions relate to the white notebook entitled *Sustainable Forestry for Bioenergy and Bio-based Products*.

1. How have you used Sustainable Forestry for Bioenergy and Bio-based Products materials? (Select all that apply)
   a. Promote discussion about woody biomass
   b. As part of a course or workshop
   c. Share with other trainers
   d. Develop a biomass outreach program
   e. In a presentation
   f. Contacting community leaders
   g. Developing state level materials based in part on these materials
   h. Other, please explain _____
   i. I have not used the materials. (Skip to Question 6)

2. Who was the target audience for your outreach program? (Select all that apply)
   a. Landowners
   b. Forest industry
   c. Energy industry
   d. Economic development programs
   e. Community leaders
   f. General public
   g. Environmental organizations
   h. Educators
   i. Media
   j. Other (please list) _____

3. How *useful* was the information on the following concepts?

	Not at all	Slightly	Somewhat	Quite	Extremely	Did not use
a. Using wood for bioenergy and bio-based products	1	2	3	4	5	6
b. Biomass products and markets	1	2	3	4	5	6
c. Supply, cost, and economic impacts	1	2	3	4	5	6
d. Management, harvesting, and sustainability	1	2	3	4	5	6
e. Transportation, processing, and storage	1	2	3	4	5	6
f. Environmental impacts of producing bioenergy	1	2	3	4	5	6
g. Conversion technologies	1	2	3	4	5	6

4. How *effective* were the various elements of the materials?

	Not at all	Slightly	Somewhat	Quite	Extremely	Did not use
a. Slide presentations	1	2	3	4	5	6
b. Activities	1	2	3	4	5	6
c. Fact Sheets	1	2	3	4	5	6

5. What has happened, if anything, as a result of using these materials? Please share any stories you may have about the impact of using these materials.

6. Do you have plans to use some of these materials in future programs?
   a. Yes
   b. No....If no, why not? (Skip to Question 9)

7. What are your plans for using these materials in future programs? (Select all that apply)
   a. Promote discussion about woody biomass
   b. As part of a course or workshop
   c. Share with other trainers
   d. Develop a biomass outreach program
   e. In a presentation
   f. Contacting community leaders
   g. Developing state level materials based on these materials
   h. Other _____

8. Who will be the target audience for your future outreach programs? (Select all that apply)
   a. Landowners
   b. Forest industry
   c. Energy industry
   d. Economic development programs
   e. Community leaders
   f. General public
   g. Environmental organizations
   h. Educators
   i. Media
   j. Other (please list) _____

9. Is there anything else you'd like to share with us?

Section 2: The following questions relate to the green notebook entitled *Wood to Energy Biomass Ambassador Guide*.

10. Which of the following sections in the *Wood to Energy Biomass Ambassador Guide* have you read? (Please check all that apply.)

a. First 4 chapters (the Outreach Guide)
b. Any of the 16 fact sheets
c. Any of the 14 case studies
d. Any of the 13 community economic profiles
e. The slide presentation
f. Background and Do-It-Yourself Supply Curves
g. Gainesville Report, Citizen Energy Survey, Community Forum Questions and Answers

11. How often have you used the following components of the *Wood to Energy Biomass Ambassador Guide*?

	Not at all	Rarely	Every now and then	Fairly often	Very often
a. First 4 chapters (the Outreach Guide)	1	2	3	4	5
b. Any of the 16 fact sheets	1	2	3	4	5
c. Any of the 14 case studies	1	2	3	4	5
d. Any of the 13 community economic profiles	1	2	3	4	5
e. The slide presentation	1	2	3	4	5
f. Background and Do-It-Yourself Supply Curves	1	2	3	4	5
g. Gainesville Report, Survey, Forum Q&A	1	2	3	4	5

12. How have you used the *Wood to Energy Biomass Ambassador Guide* materials? (Select all that apply)

a. To promote discussion about woody biomass
b. To conduct a course or workshop
c. To share with other trainers
d. To develop a biomass outreach program
e. To give a presentation
f. To communicate with community leaders
g. To develop state level materials based in part on these materials
h. Other, please explain _____
i. Have not used the materials (Skip to Question 16)

13. How *<u>useful</u>* were the materials for providing information about the following concepts?

	Not at all	Slightly	Somewhat	Quite	Extremely	Did not use
a. Using wood for energy	1	2	3	4	5	6
b. Environmental impacts	1	2	3	4	5	6
c. Supply, cost, and economic impacts	1	2	3	4	5	6
d. Technical conversion processes	1	2	3	4	5	6
e. Realistic assessment of my area	1	2	3	4	5	6
f. Examples where wood is used for energy, heat, or power	1	2	3	4	5	6
g. Outreach strategies	1	2	3	4	5	6

14. How comfortable did you feel about using the materials to inform and educate the interested public about the use of wood for energy?

Not at all confident	Slightly confident	Somewhat confident	Confident	Very Confident
1	2	3	4	5

15. Please share any stories or observations you have about your experience using these materials.

16. How likely are you to use the materials for the following outcomes in the future?

	Not at all	Slightly	Somewhat	Quite	Extremely
a. To promote discussion about woody biomass	1	2	3	4	5
b. To conduct a course or workshop	1	2	3	4	5
c. To share with other trainers	1	2	3	4	5
d. To develop a biomass outreach program	1	2	3	4	5
e. To give a presentation	1	2	3	4	5
f. To communicate with community leaders	1	2	3	4	5
g. To develop state level materials based in part on these materials	1	2	3	4	5

17. What is your target audience for your outreach program?

a. Landowners
b. Forest industry
c. Energy industry
d. Economic development programs
e. Community leaders
f. General public
g. Environmental organizations
h. Educators
i. Media
j. Other (please list) _____

18. Do you think the materials could help you identify communities where wood may be an energy option?

a. Yes
b. No

19. What do you see as the strengths of this program?

20. What do you think are the weaknesses of this program?

21. Please imagine a time 10-20 years in the future when more Southern facilities are using wood from sustainably managed forests to generate electricity, heat, or power. What do you think will have been the key factors that motivate and support the use of wood for energy? You can think broadly and creatively!

22. Thinking again about the political and practical reality in the South, what barriers do you see to communities and facilities using wood for energy?

23. Is there anything else you'd like to share with us?

24. State: _____

25. Last 4 digits of Social Security Number: _____

This information will only be used to link this survey to the post-training survey, will be kept completely confidential, and will not be used for any other purposes.

Thank you so much for taking the time to provide feedback!

Appendix H:
Follow-up Phone Interview for Program Evaluation

Hello, this is _____ calling from the Wood to Energy Outreach Team with the School of Forest Resources and Conservation at the University of Florida. In July, we emailed an online survey to participants of the "Training of the Trainers" biomass workshop in Atlanta. I've been asked to call everyone to ask a few follow-up questions. This should only take 10 – 15 minutes. If this is not a good time to chat, is there another time I can reach you?

There are no right or wrong answers to these questions, and you do not need to answer any question with which you are uncomfortable. We will compile your responses and report them as a group. Your responses will remain anonymous as we are not attaching names or identifiers to the data we are collecting. With your permission, I would like to tape record our conversation. There are no risks involved with participating in this follow-up interview, and we can offer no rewards. Your participation in voluntary, and at any time during the interview, you are able to stop participating, and we can end the call. If you have any concerns about this, please feel free to contact Martha Monroe, the Project Director, at 352-846-0878 or the IRB02 Office at UF PO Box 112250, University of Florida, Gainesville, FL 32611-2250; ph (352) 392-0433. Are you willing to participate in this interview?

First, I should explain that about 25 people responded to the online survey, but we have no way of knowing who those people were. So some of these questions may sound like you've already answered them, and you can say that if you wish!

Phone Interview Questions

1. What is your involvement or role regarding wood to energy?

2. Please tell me approximately how many times you have used the following sections of the Wood to Energy Biomass Ambassador Guide:
   a. first 4 chapters (outreach guide)
   b. any of the 16 fact sheets
   c. any of the 14 case studies
   d. any of the 13 community economic profiles
   e. the slide presentation
   f. background and do-it-yourself supply curves
   g. Gainesville report, survey, forum question and answer

→*If they have used materials, ask:*

2a. Can you tell me more about how you have used the materials?

Possible prompts:
When and how did you use the material?
Who was the audience?
Who organized the event?
What were your goals when you used the material?
Did the materials help you meet these goals? How so/why not?
What were the outcomes?
Why did you choose to use these materials?

→*If they have **not** used materials, ask:*

2b. Can you tell me any reasons why you have not used the materials yet?

3. In which of the following ways do you plan to use the materials in the future?
   a. to promote discussion about woody biomass
   b. to conduct a course or workshop
   c. to share with other trainers
   d. to develop a biomass outreach program
   e. to give a presentation
   f. to communicate with community leaders
   g. to develop state level materials based in part on these materials

→*If they plan to use materials, ask:*

3a. Can you tell me more about how you plan to use the materials in the future?
   Possible prompts:
   Which materials would you use?
   Why would you use these?
   How would you use them?
   Are there any other ways you see yourself using the material?

→*If they do **not** plan to use materials, ask:*

3b. Can you tell me any reasons why you don't plan to use the materials in the future?

4. What do you see as the strengths and weaknesses of this program? Please be specific…

5. Is there anything else you would like to share with me?
   Possible prompts:
   Do you have any stories or observations about your experiences with these materials?
   Do you have any other comments?

Thanks for your time and cooperation!

Appendix I:
SWPA Pre-Post Survey

Thank you for completing this short survey.

You do not have to answer any questions you do not wish to answer and you can stop answering questions whenever you wish. We will compile your responses and report them as a group. We do not ask for your name and your response will be completely anonymous. Your identity will be kept confidential to the extent provided by law. There are no risks and no significant benefit to your participation in this project, just the knowledge that you are helping us evaluate our program. Your participation is completely voluntary and you may withdraw your consent to participate without penalty. There is no compensation to you for participating in the study. This survey will take 10 minutes or less to complete.

If you have any questions about this survey, please contact Martha Monroe, School of Forest Resources and Conservation, University of Florida (mcmonroe@ufl.edu or 352-846-0878). If you have questions about participants' rights and responsibilities, please contact the Institutional Review Board, Box 112250, University of Florida, Gainesville, FL 32611-2250; phone (352)392-0433.

Please answer the first three questions <u>BEFORE</u> the workshop begins:

1. **How knowledgeable do you consider yourself regarding the use of wood to generate heat, power, and electricity?**

   - ☐ Very knowledgeable
   - ☐ Fairly knowledgeable
   - ☐ Slightly knowledgeable
   - ☐ Not at all knowledgeable

2. **How relevant do you expect this workshop to be to you?**

   - ☐ Very relevant
   - ☐ Relevant
   - ☐ Slightly relevant
   - ☐ Not at all relevant

3. **In general, what is your opinion about using wood for energy production?**

   - ☐ Very opposed
   - ☐ Opposed
   - ☐ Neutral
   - ☐ In favor
   - ☐ Very in favor

Thank you. Now please enjoy the workshop!

To be answered AFTER the workshop:

1. **Now how knowledgeable do you consider yourself regarding the use of wood to generate heat, power, and electricity?**
   - ☐ Very knowledgeable
   - ☐ Fairly knowledgeable
   - ☐ Slightly knowledgeable
   - ☐ Not at all knowledgeable

2. **How effective was this workshop at doing the following:**

	Not at all effective	**Slightly Effective**	**Effective**	**Very effective**
Answering your questions about using wood for energy?	☐	☐	☐	☐
Increasing your knowledge about the costs and benefits of using wood for energy?	☐	☐	☐	☐
Increasing your knowledge about sustainable forest management to produce wood for energy?	☐	☐	☐	☐
Increasing your knowledge about public perceptions regarding using wood for energy?	☐	☐	☐	☐

3. **How relevant do you believe this workshop was for you?**
   - ☐ Very relevant
   - ☐ Relevant
   - ☐ Slightly relevant
   - ☐ Not at all relevant

4. **In general, how do you feel about the use of wood for energy?**
   - ☐ Very opposed
   - ☐ Opposed
   - ☐ Neutral
   - ☐ In favor
   - ☐ Very in favor

   If you answered this question differently than you did before the workshop, what changed your mind?

5. How concerned are you about the following considerations some people have expressed regarding using wood for energy in their community?

	Not at all concerned	Only a little concerned	Somewhat concerned	Very concerned
Our community does not have enough wood to support a wood-to-energy facility.	□	□	□	□
The public will not approve a wood-to-energy facility.	□	□	□	□
The demand for wood fuel will degrade local forests.	□	□	□	□
Competition for wood will drive pulp mills out of business.	□	□	□	□
A wood-to-energy facility will not be cost effective.	□	□	□	□
The capital overhead is too high and rate of return too long.	□	□	□	□

6. What role do you see yourself playing in the development of energy plans that involve the use of wood?

Is there anything else you would like to add?

Thank you for taking the time to share your thoughts with us!

We are interested in learning more about your thoughts on using wood for energy. If you are willing to participate in a one-on-one phone interview to be conducted at your convenience, please complete the interview consent form and give it to Todd on your way out the door. Thank you!

Appendix J:
SWPA Phone Interview

1. Please tell me about your interest in using wood to generate energy. Prompts: do you work in the forest industry? Are you a community leader? Are you interested in energy resources?

2. What do you think about using wood for energy in this community? Prompts: what advantages and disadvantages do you see?

3. Do you think there would be barriers to using wood to generate energy in your community? What would some of those be?

4. Did the SWPA continuing education workshop help you think differently about using wood for energy? If so, how? Prompt: Did it bring up any questions in your mind? What would those be?

5. How do you think a wood-to-energy facility would impact your local economy? Prompt: How about competing markets for wood? How about the price of energy?

6. How do you think a wood-to-energy facility would impact your local environment? Prompt: How about air quality? How about nearby forests?

7. Are you concerned about the future of forests if the value of wood increases? What strategies might help protect forests if wood is used for energy?

Appendix K:
Publications From or Related to Wood to Energy Outreach Program

Alavalapati, J.R., Hodges, A.W., Dwivedi, P., Lal, P., Kaufer, I., Susueta, A., Stevens, T., and Rahmani, M. 2008. Southern bioenergy asset inventory and roadmap. Final report to Southeast Agriculture and Forestry Energy Resources Alliance, December 2008. Available at http://www.saferalliance.net/projects/roadmap.html.

Carter, D., Langholtz M., et al. 2007. Economic Availability of Alternative Biomass Sources for Gainesville, Florida. Gainesville, Florida, Gainesville Regional Utilities.

Langholtz, M., Carter, D., Marsik, M., Schroeder, R. 2006. Measuring the economics of biofuel availability. *ArcUser Magazine*. October-December: 22-25. Available at http://www.esri.com/news/arcuser/1006/biomass1of2.html.

Langholtz, M., Carter, D., Rockwood, D. 2007. Assessing the economic feasibility of short-rotation woody crops in Florida. EDIS Fact Sheet CIR 1516. Gainesville, Florida: University of Florida Extension.

Monroe, M.C., Oxarart, A., McDonell, L., Plate, R. In press for 2009. Using community forums to enhance public engagement in environmental issues. *Journal of Education for Sustainable Development 3*(2).

Monroe, M.C., Oxarart, A., McDonell, L., Plate, R. In review. Woody biomass outreach: Lessons learned from a regional program. *Bioenergy and Biomass, Special Issue.*

Monroe, M.C. and Wood to Energy Team. 2007. Using wood for energy in Gainesville, Florida: A pilot test of wood to energy outreach materials. Unpublished report to Gainesville City Commission and Gainesville Regional Utility, May 2007, 32 pages.

Mulkey, S., Alavalapati, J., Hodges, A., Wilke, A., and Grunwald, S. 2008. Opportunities for Greenhouse Gas Reduction Through Forestry and Agriculture in Florida. University of Florida, School of Natural Resources and Environment, 70 pages.

Oxarart, A. 2008. Exploring written communication techniques for complex natural resource issues. Unpublished Master's Thesis. Gainesville, Florida. University of Florida.

Oxarart, A. and Monroe, M.C. In review. Citizen perceptions of written text about using wood for energy. *Journal of Extension*.

Plate, R., Monroe, M.C., and Oxarart, A. In review. Public perceptions of using woody biomass as a renewable energy source. *Journal of Extension.*

Rahmani, M. and Hodges, A.W. 2008. Economic impacts of a proposed wood-fueled power plant in Gainesville, Florida. Final report to Covanta Energy, 7 pages.

Appendix L:
Presentations/Programs Related to Wood to Energy Outreach Program, January 2006 – June 2009

2006

Date	Presenter(s)	Program/ Conference Presentation	Sponsor	Location	Type of Presentation	Comments
1/26-27	Christina Staudhammer, Martha Monroe, Lauren McDonell, Doug Carter, Ed Macie, Annie Hermansen-Baez	6th National Conference on Science, Policy and the Environment: Energy for a Sustainable and Secure Future *Wood to Energy: Utilizing Interface Fuels for Bioenergy in the Southern United States* (poster)	National Council for Science and the Environment	Washington DC	presentation to scientific/professional organization	5,000 conference attendees
3/29	Martha Monroe, Richard Plate	SFRC/SAF Spring Symposium *Public Perceptions and Acceptance of Biomass Production*	UF, SFRC Society of American Foresters	Gainesville, FL	presentation to scientific/professional organization and citizens	115 attendees
3/29	Richard Schroeder, Ben Jackson	SFRC/SAF Spring Symposium *Harvest, Transport, Storage and Preprocessing of Woody Biomass*	UF, SFRC Society of American Foresters	Gainesville, FL	presentation to scientific/professional organization and citizens	115 attendees
3/29	Alan Hodges	SFRC/SAF Spring Symposium *Economics of Using Biomass*	UF, SFRC Society of American Foresters	Gainesville, FL	presentation to scientific/professional organization and citizens	115 attendees
5/14-17	Martha Monroe, Richard Plate, Melissa Palmer, Lauren McDonell	Assoc. of Natural Resources Extension Professionals Conference *Perceptions of Woody Biomass Guide Community Outreach Program* (poster)	ANREP	Park City, UT	Poster at scientific/professional organization	
6/8-9	Mohammad Rahmani, Alan Hodges	National *Implan* User's Conference *Economic Impacts of Biomass-Fueled Electric Power Generating Plants in Selected Counties of the Southern United States*	Mid-Continent Regional Science Association	Indianapolis, IN	presentation to scientific/professional organization	
7/25	Martha Monroe, Lauren McDonell	Resource Conservation and Development Council Meeting	Alachua County	Gainesville, FL	presentation to scientific/professional organization	10 attendees and citizens

8/3	Martha Monroe, Lauren McDonell	Southern Region Conference on Technology Transfer and Extension in Natural Resources *Wood to Energy: Technology Transfer and Education Programs for the Southern U.S.*	Southern Regional Extension Forestry	Hot Springs, AR	presentation to scientific/professional organization	25 attendees
10/5	Lauren McDonell	Advisory Council for BIFSFS Project				10 attendees
10/25	Matt Langholtz, Lauren McDonell	Campus and Community Sustainability: Sharing Best Practices and Visions for Florida's Future *Wood to Energy: An Outreach Program for Utilizing Interface Fuels for Bioenergy*	UF	Gainesville, FL	presentation to scientific/professional organization	30 attendees
11/2	Martha Monroe, Matt Langholtz, Alan Hodges, Alan Long	Wood to Energy Forum, Sierra Club	Sierra Club	Gainesville, FL	presentation to lay organization	30 attendees
11/8	Martha Monroe, Lauren McDonell	Wood to Energy County Meeting	UF, SFRC	Podeau, OK	presentation to professionals	9 attendees
11/9	Martha Monroe, Matt Langholtz, Alan Hodges, Alan Long	Hot Ideas for a Cooler Planet, Women for Wise Growth	Women for Wise Growth	Gainesville, FL	presentation to lay organization	63 attendees
11/15	Martha Monroe, Matt Langholtz, Alan Hodges, Chris Demers	Wood to Energy Forum, Civic Media Center	UF, SFRC	Gainesville, FL	presentation to lay organization	10 attendees
11/21	Martha Monroe, Lauren McDonell	Wood to Energy County Meeting	UF, SFRC	London, KY	presentation to professionals	15 attendees
11/27	Martha Monroe, Matt Langholtz, Alan Hodges, Alan Long	Wood to Energy Forum, Downtown Alachua County Public Library	UF, SFRC	Gainesville, FL	presentation to lay organization	7 attendees
11/28	Martha Monroe, Matt Langholtz, Alan Hodges, Alan Long, Richard Schroeder	Wood to Energy Forum, Millhopper Alachua County Public Library	UF, SFRC	Gainesville, FL	presentation to lay organization	5 attendees
12/12	Martha Monroe, Alan Hodges, Matt Langholtz	Wood to Energy Forum, Kiwanis Club	Kiwanis Club	Gainesville, FL	presentation to lay organization	63 attendees
12/12-13	Pratap Pullammanappallil	Walton County Energy Expo and Biofuels Field day *Biofuels: An overview*	UF/IFAS	Defuniak Springs, FL	Presentation to community	25 attendees

2007

Date	Presenter(s)	Program/ Conference Presentation	Sponsor	Location	Type of Presentation	Comments
1/25	Martha Monroe, Matt Langholtz, Alan Hodges, Alan Long	Wood to Energy Forum, National Association for the Advancement of Colored People	NAACP	Gainesville, FL	presentation to lay organization	10 attendees
2/19	Martha Monroe	International Conference on Environment: Survival and Sustainability *Engaging the public in environmental decisions: Strategies for environmental education and communication*	Near East University	Nicosia, Cyprus	presentation to lay organization	15 people
4/11	Martha Monroe, Lauren McDonell	Emerging Issues at the Rural-Urban Interface *Power to the People: Public Engagement in Woody Biomass Discussions in Interface Communities*	USDA FS Interface South	Atlanta, GA	presentation to scientific/professional organization	30 attendees
6/12	Martha Monroe	Southern Group of State Foresters Meeting *The Wood to Energy Outreach Program*	SGSF	Oklahoma City, OK	presentation to scientific/professional organization	30 attendees
11/16	Martha Monroe, Lauren McDonell, Annie Oxarart	North American Association for Environmental Education Annual Conference *Public Engagement in Woody Biomass Discussions in Interface Communities*	NAAEE	Virginia Beach, VA	presentation to scientific/professional organization	6 attendees, distributed handouts
11/16	Martha Monroe, Lauren McDonell, Annie Oxarart	North American Association for Environmental Education Annual Conference *Are They Hearing What We're Saying? Public Perceptions of Using Wood for Energy* (roundtable)	NAAEE	Virginia Beach, VA	presentation to scientific/professional organization	20 attendees, distributed handouts
11/16	Jessica Tomasello, Lauren McDonell, Martha Monroe	North American Association for Environmental Education Annual Conference *Woody Biomass Outreach Takes Off* (poster)	NAAEE	Virginia Beach, VA	presentation to scientific/professional organization	distributed handouts
11/24	Martha Monroe	The 4th International Conference on Environmental Education *Public Engagement in Woody Biomass Discussions in Interface Communities*	UNESCO/ UNEP	Ahmedabad, India	presentation to scientific/professional organization	35 attendees
12/11	Pratap Pullammanappallil	Walton County Energy Expo II *Biogasification and its applications*	UF/IFAS	Defuniak Springs, FL	Presentation to community	40 attendees
12/11	Pratap Pullammanappallil, Doug Renk	Walton County Energy Expo II *Demonstration of small scale forestry and urban biomass waste biogasification system*	UF/IFAS	Defuniak Springs, FL	Presentation to community	40 attendees

2008

Date	Presenter(s)	Program/ Conference Presentation	Sponsor	Location	Type of Presentation	Comments
1/23	Pratap Pullammanappallil	St. Lucie County Agricultural Fair *Biofuels from energy crops*	UF/IFAS	Fort Pierce, FL	Presentation to community	50 attendees
3/24	Annie Oxarart	School of Forest Resources and Conservation Seminar *Exploring Written Communication Techniques for Complex Natural Resource Issues*	UF, SFRC	Gainesville, FL	presentation to scientific/professional organization	~40 attendees
3/27-30	Jessica Tomasello, Annie Oxarart	League of Environmental Educators of Florida *Involving High School Students in Local Energy Considerations*	LEEF	Camp Crystal, FL	presentation to scientific/professional organization	15 attendees
4/8	Lauren McDonell	Nat'l Association of Conservation Districts meeting *Overview of the Wood to Energy Outreach Program and possible uses for NACD* (telecommute)	NACD	Atlanta, GA	presentation to scientific/professional organization	~10 attendees
4/6-8	Pratap Pullammanappallil	1st Annual National Waste-To-Fuels Conference and Trade Show *Biogasification of municipal waste*	UF/IFAS	Orlando, FL	presentation to scientific/professional organization	100 attendees
4/15	Pratap Pullammanappallil	St. Lucie County Alternate Energy Seminar *Biofuels*	UF/IFAS	Fort Pierce, FL	Presentation to community	15 attendees
4/16	Pratap Pullammanappallil, Doug Renk	Ag tour, St. Lucie County Extension Office and USDA ARS *Demonstration of small scale forestry residues and urban biomass waste biogasification system*	UF/IFAS	Fort Pierce, FL	Presentation to community	150 attendees
4/24	Alan Long	Southern Wood Producer's Association Continuing Ed Course *Challenges & Opportunities of Community Perceptions & Acceptance of Wood Power Production*	SWPA	Palatka, FL	Short course/training	27 attendees
4/24	Alan Hodges	Southern Wood Producer's Association Continuing Ed Course *Expected Economic Impacts of Woody Biomass in FL Communities*	SWPA	Palatka, FL	Short course/training	27 attendees
4/25-27	Lauren McDonell	Colorado Alliance for Environmental Education *Wood to Energy High School Curriculum*	CAEE	Winter Park, CO	presentation to scientific/professional organization	4 attendees
5/15	Martha Monroe	Southern Wood Producer's Ass. Continuing Ed Course *Challenges & Opportunities of Community Perceptions & Acceptance of Wood Power Production*	SWPA	Hilliard, FL	Short course/training	16 attendees

5/15	Alan Long	Southern Wood Producer's Association Continuing Ed Course *Sustainable Forest Mgmt of Woody Biomass Production*	SWPA	Hilliard, FL	Short course/training	16 attendees
5/15	Doug Carter	Southern Wood Producer's Association Continuing Ed Course *Expected Economic Impacts of Woody Biomass in FL Communities*	SWPA	Hilliard, FL	Short course/training	16 attendees
5/19-23	Martha Monroe, Annie Oxarart, Lauren McDonell	Assoc. of Natural Resource Extension Professionals Conference *Wood to Energy Outreach Program: Fostering Informed Community Discussions*	ANREP	Madison, WI	presentation to scientific/professional organization	30 attendees, 50 material packets distributed
5/25-26	Martha Monroe, Jessica Tomasello	Teacher Meeting	SFRP and UF Extension	Milton, FL	presentation to lay organization	3 teachers and 3 UF participants
6/4-5	Phil Badger	Forestry Equipment Expo *Federal, State and Local Policies*	MS State Extension	Starkville, MS	presentation to scientific/professional organization	~60 attendees
6/4-5	Phil Badger	Forestry Equipment Expo *Economic Availability of Woody Biomass in the Southern U.S.*	MS State Extension	Starkville, MS	presentation to scientific/professional organization	~60 attendees
6/4-5	Matt Langholtz	NE TX Woody Bioenergy Symposium *Transportation of Woody Biomass*	TX A&M	Jefferson, TX	presentation to scientific/professional organization	100 attendees
6/10-14	Martha Monroe, Annie Oxarart, Matt Langholtz, Todd LeVasseur, Lauren McDonell	International Symposium on Society and Natural Resource Management *Woody Biomass at the Southern Wildland-urban Interface: The Wood to Energy Outreach Program* (panel session)	Int'l Assoc. of Society and Natural Resources	Burlington, VT	presentation to scientific/professional organization	10 attendees, 50 packets distributed
7/17	Matt Langholtz	Forest Stewardship Videoconference: Survive the Changes – Greenbelt Update and New Market Opportunities for Landowners *Economic availability of biomass resources*	UF Forest Stewardship Program	Gainesville, FL	presentation to scientific/professional organization	145 participants from 10 locations
8/5	Alan Hodges, Janaki Alavalapati	Southeast Agriculture and Forestry Energy Resources Alliance Regional Stakeholder Meeting *Southern bioenergy asset inventory and roadmap*	SAFER	Memphis, TN	presentation to scientific/professional organization	
9/4	Jessica Tomasello, Annie Oxarart, Martha Monroe	Teacher Workshop	SFRP and UF Extension	Milton, FL	presentation to lay organization	3 teachers and 4 UF participants

9/19	Jessica Tomasello	Florida Bioenergy Conference *Involving High School Students in Local Energy Decisions*	SFRP and UF Extension	Milton, FL	presentation to scientific/professional organization	~100 attendees
9/22	Alan Hodges, Janaki Alavalapati	Biomass South Conference *Southern Bioenergy Asset Inventory and Roadmap*	NC Biomass Ambassadors	Raleigh, NC	presentation to scientific or professional organization	
10/9	Martha Monroe	Southern Wood Producer's Ass. Continuing Ed Course *Challenges & Opportunities of Community Perceptions & Acceptance of Wood Power Production*	SWPA	Perry, FL	Short course/training	20 attendees
10/9	Alan Long	Southern Wood Producer's Ass. Continuing Ed Course *Sustainable Forest Mgmt of Woody Biomass Production*	SWPA	Perry, FL	Short course/training	20 attendees
10/9	Alan Hodges	Southern Wood Producer's Association Continuing Ed Course *Expected Economic Impacts of Woody Biomass in FL Communities*	SWPA	Perry, FL	Short course/training	20 attendees
10/15-18	Lauren McDonell, Martha Monroe	North American Association for Environmental Education, Annual Conference *Education or Advocacy: The Challenges of Explaining Controversial Natural Resource Issues* (poster)	NAAEE	Wichita, KS	presentation to scientific/professional organization	~15 attendees
10/15-18	Jessica Tomasello, Martha Monroe	North American Association for Environmental Education, Annual Conference *Involving High School Students in Local Energy Considerations* (poster)	NAAEE	Wichita, KS	presentation to scientific/professional organization	~15 attendees
10/15-18	Annie Oxarart, Martha Monroe	North American Association for Environmental Education, Annual Conference *Informing and Motivating the Public through Interesting Text* (poster)	NAAEE	Wichita, KS	presentation to scientific/professional organization	~10 attendees
11/21	Matt Langholtz	Haywood Community College Forest Biotechnology Teaching Consortium *Energy from Woody Biomass in the Southeast*	HCC	Haywood, NC	presentation to scientific/professional organization	~50 attendees
12/8-11	Christina Staudhammer, Alicia Lawrence, Francisco Escobedo	ACES (A Conference on Ecosystem Services) 2008: Using Science for Decision Making in Dynamic Systems *Analysis of Biomass Equations for Common Urban Trees in Gainesville, FL*	USGS, USDA, USEPA, NSF, UF, USDI, NOAA, NPS, USFWS	Naples, FL	presentation to scientific/professional organization	500 attendees

2009

Date	Presenter(s)	Program/ Conference Presentation	Sponsor	Location	Type of Presentation	Comments
1/12-13	Martha Monroe	CoP eXtension Core Leadership Meeting	eXtension	Dallas, TX	extension meeting	15 attendees
1/20	Martha Monroe	Southern African Association for Research in Mathematics Science and Technology Education 17th International Conference *Key note address, question and answer session, and skit about biomass misconceptions*	SAARMSTE	Grahamstown, South Africa via DVD and Skype	presentation to scientific/professional organization	
5/14-20	Martha Monroe	5th International Conference on Environmental Education *Presentation: Community Forums Engage Adults in Local Issues*	5WEEC	Montreal, Canada	presentation to scientific/professional organization	35 attendees