IDENTIFYING OPPORTUNITIES FOR FOREST SECTOR COMPANIES TO PARTICIPATE IN THE WOOD-BASED BIO REVOLUTION: A SUPPLY CHAIN INSERTION APPROACH FY 2010

U.S. forests are expanding with an annual net forest biomass increase of 3 percent. This creates new opportunities for the forest products industry, especially in bio-energy sectors. While there is clearly accelerating interest in wood-based bioenergy right now, growth for this new industry may be constrained by sustainable harvest levels, wood fiber prices, and transportation costs. The emerging biomass market is expected to significantly strengthen the demand for wood fiber in the South which could create price incentives for forest residuals as the U.S. turns to alternative fuels for energy. Given the recent economic recession that lingers in the wood products sector due to slow growth in housing starts, and the accompanying decline of the forest sector in Louisiana, there is potential opportunity in the emerging wood-based biomass, biofuels and bioenergy arenas. What is missing is an understanding of the infrastructure and relevant information to aid enterprises in making decisions to participate or not.

The project combined research and outreach, focusing on the sectors relating to forest and production mill residues and dedicated forest biomass production. The research team surveyed Louisiana wood product industry manufacturing and distribution intermediary members as well as forest landowners to identify current and potential business positions and identify willingness to participate in new wood bio-based business opportunities. The outreach component consisted of business education workshops to increase the target audiences' understanding of options and opportunities, provide guidelines and advice on how to proceed if they are interested in pursuing alternative business strategies, and provide potential matchmaking linkages to potential business partners in forest-based bio-based ventures. Market-oriented publications, presentations, and web site postings were produced and disseminated throughout the course of the project.

FINAL REPORT

SURVEY INSTRUMENTS

POWERPOINT PRESENTATIONS

WOOD-BASED BIOMASS PRIMER

THE LOUISIANA FOREST INDUSTRY AND BIO FUELS MAPS AND FINDINGS

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FEDERAL-STATE MARKETING IMPROVEMENT PROGRAM, USDA/AMS; CFDA: 10.156
OPPORTUNITY NUMBER: USDA-AMS-FSMIP-2010

PROJECT FINAL REPORT

February 27, 2014

PROJECT TITLE

Identifying Opportunities for Forest Sector Companies to Participate in the Wood-Based Bio Revolution: A Supply Chain Insertion Approach

GRANT PERIOD

Start Date: September 1, 2010
End Date: December 31, 2013

WHY DID WE PROPOSE THIS STUDY BE CONDUCTED?

Wood has several economic and environmental advantages over fossil fuel. It is significantly less expensive, renewable, carbon-neutral, and locally available when compared to most fossil fuels. In combustion, wood produces 90% less carbon dioxide (CO_2) than fossil fuels with minimal emissions of sulfur, heavy metals and particulates (USDA 2004). About 84% of the wood and wood waste fuel used in the U.S. is consumed by the industry, electric power producers, and commercial businesses while the rest is used domestically. In addition the cellulosic content of wood makes wood a viable candidate biomass input for transportation fuel production (USDA 2004).

U.S. forests are expanding with an annual net forest biomass increase of 3% (Kizhakkepurakkal 2008). This creates new opportunities for the forest products industry, especially in bio-energy sectors. Recent estimates show that American forests are able to sustainably produce 368 million dry tons of wood for energy generation per year; this figure is an underestimation as it excludes the wood used for pulp/paper, low-value solid products, or wood from fast-growing trees on nonagricultural lands (Richter et al. 2009). Wood residue is an important low-cost source of renewable biomass energy in regions where forest cover forms a major portion of land area. Nearly all of biomass fuel used for energy production today comes from wood wastes and residues (Parikka 2004).

While there is clearly accelerating interest in wood-based bioenergy right now, growth for this new industry may be constrained by sustainable harvest levels, wood fiber prices and transportation costs. Higher transportation costs means wood plants must gather their fuel near plants (Lindsay 2008). Kram (2008) indicated that the high cost of moving biomass beyond 50 miles to a processing facility is one of the main challenges facing the industry. Therefore, increasing the distance also makes supplying a biomass plant less attractive to the feedstock provider (Kram 2008).

The emerging biomass market is expected to significantly strengthen the demand for wood fiber in the South. This in turn could create price incentives for forest residuals as the U.S. turns to alternative fuels for energy. Emerging forest and other wood biomass demand will be

primarily driven by wood-burning power companies that produce and sell electricity to public utilities, as well as an increasing amount of wood pellets that are used domestically and exported to Europe energy markets. Conversion of biomass into cellulosic ethanol for transportation fuel will also impact the structure of the forest sector. According to Forest2Market (2008), U.S. demand for wood fiber from these emerging biomass markets is expected to rise from 2 million tons in 2008 to at least 13.5 million tons in 2020. However, this estimate is conservative and could be higher as more companies move to the sector to build biomass facilities (Forest2Market 2008).

Given the recent economic recession that lingers in the wood products sector due to slow growth in housing starts, and the accompanying decline of the forest sector in Louisiana, there is potential opportunity in the emerging wood-based biomass, biofuels and bioenergy arenas. Louisiana companies may have options to improve company viability, increase competitiveness; and improve access to new markets through effective wood-based bio supply chain management. What is missing is an understanding of the infrastructure and relevant information to aid enterprises in making decisions to participate or not. We believed it was important to discern forest sector member level of awareness of the nascent wood-based bio sector, better understand what kinds of incentives or barriers existed for them to participate, and provide information regarding how they could participate if the interest was there.

HOW DID WE CONDUCT THE PROJECT?

Overview

This was an integrated research and outreach effort to identify high potential alternative bio-based revenue and profit streams for members of the Louisiana forest sector supply chain. This took take place first, by mapping the supply chain for forest products in Louisiana and second, by identifying high potential wood-based bio business options that can be integrated into supply chain member current business models, to enhance profitability and diversify revenue streams.

Forest and production mill residues and dedicated forest biomass production were the focus of the project. In the research component, we surveyed Louisiana wood product industry manufacturing and distribution intermediary members as well as forest landowners to identify current and potential business positions and identify willingness to participate in new wood bio-based business opportunities.

The outreach component consisted of business education workshops towards the end of the project period to increase target audience understanding of options and opportunities, provide guidelines and advice on how to proceed if they are interested in pursuing alternative business strategies, and provide potential matchmaking linkages to potential business partners in forest-based bio-based ventures.

In the outreach workshops, we provided an overview of market, economic, and financial information through the workshops. The workshops were conducted in locations that ensured state-wide coverage. In addition, market-oriented publications, presentations, and web site postings were produced and disseminated throughout the course of the project.

Detailed Project Description

The Scope of Work for this project was intended to update previous Louisiana-specific forest sector studies by including the emerging wood-based bio-industries. This project identified competitive advantages the state offers to the wood bio-based sector and helped companies improve their access to and response to new market information.

The Louisiana Forest Products Development Center (LFPDC), the Center for Business and Information Technologies (CBIT), and the Louisiana Business and Technology Center (LBTC) partnered with the Louisiana Forest Products Development Center (LFPDC) in the project. Business development and improving the competitive position of the forest products industry is multi-dimensional, requiring the unique skills and capabilities of the partner institutions.

All three centers have a strong track record contributing to economic development in Louisiana. The LFPDC has developed the innovative www.laforestproducts.org website that facilitates forest-sector economic development, while CBIT has developed the www.Access.Louisiana.gov the State of Louisiana's official portal for economic development. Both initiatives will be enhanced from the project. The LBTC has documented the creation and saving of nearly 10,000 jobs and has assisted Louisiana businesses raise $127,638,210 in equity, loans and SBIR grants since 1999. During that time period, the LBTC has conducted 318 training events for nearly 20,000 participants. In addition, research results and recommendations can contribute to Louisiana's economic growth; create a new class of jobs; and more closely link forest-sector companies in wood-based bio supply chains

SPECIFIC OBJECTIVES, ACTIVITIES, DELIVERABLES, AND GOAL ACHIEVEMENT

Task 1. Update existing list of companies in the Louisiana forest sector supply chain.
The project updated a list of companies involved in all phases of the forest products supply chain in Louisiana from upstream to downstream, including forest landowners, loggers, suppliers, processors, distributors and retailers, etc.

Task Deliverable: An updated list of Louisiana forest products companies.

Goal Achievement: We were able to update the lists of forest products manufacturers and distribution intermediaries. Although the Louisiana Forestry Association (2010) estimates that there are 148,000 private timberland owners in Louisiana, we were not able to update or even compile a list of forest landowners in the state. Louisiana is far behind many other states in maintaining records of landowner status. Each parish (county) maintains its own tax rolls without any consistency between methods. Some are in Excel spreadsheets, while others are in archaic data formats that are inaccessible. Many do not make their lists public, some charge exorbitant fees for the data, and others will only provide paper output or copies. This was the most exasperating realization considering that forest landowners have the most to gain and have the majority of woody resources to supply the bio sector. This puts Louisiana forest landowners at a distinct disadvantage to neighboring states with centrally located computerized tax roll data.

Task 2. Examine Louisiana forest products supply chain processes from the forest through value-added product customer sales. Telephone surveys were administered to all

known forest products companies in the state (approximately 1,200). This task examined state-level and regional wood products supply chain processes, products manufactured/sold, and waste products generated. In addition, a small sample of 500 forest landowners we were able to identify around the state was also surveyed.

Task Deliverable: This resulted in a supply chain map illustrating the Louisiana wood product supply chains.

Goal Achievement: Accomplished. Participants provided fundamental information on products produced, markets, and sources of raw materials. The telephone survey process was more arduous than expected. Response rate was low primarily due to the lack of understanding of the fundamental bio sector questions that were being posed. A general wariness by potential respondents also made this effort into a protracted effort that took much longer than expected. We were able to extract enough information from this activity to develop a set of biomass intra- and interstate flow maps for Louisiana for the manufactured goods sector and the forest landowner sector. These findings are located in an attached document titled "The Louisiana Forest Industry and Bio Fuels: Maps and Findings".

Task 3. Identify the level of awareness and information necessary for Louisiana forest supply chain members to participate in wood-based bio-sectors. The research team used a mail survey methodology. A questionnaire was developed and sent to all members of the 1,200 Louisiana solid wood forest products industry members. As mentioned earlier, because Louisiana's 148,000 forest landowners are impossible to currently identify, we surveyed 1,000 forest landowners from a partial list compiled in 2002.

Task Deliverable: A summary that identifies requirements and status of readiness for Louisiana forest supply chain members to participate in wood-based bio-sectors.

Goal Achievement: The mail survey process also resulted in a smaller than expected response rate, similar to the telephone survey conducted in Task 2. This is likely because these wood sector supply chain companies had already been asked to participate in the phone exercise and experienced respondent fatigue. The fact that the study was conducted in a post-recession period that still had the forest products sector reeling also likely minimized response rate. This mail survey was mailed three times which further slowed the project. However, exploratory data were gathered that provided insight into participant perceptions and awareness, and potential participation in the bio sector. Results for fore

Task 4. Determine skills and training programs necessary to participate in wood-based bio-sectors. The task was to determine what skills are necessary for forest-sector companies (in general) to participate in wood-based bio sectors. The research team planned to apply a mixed-mode mail survey/telephone interview methodology to gather skills information from all known existing wood-based bio businesses in the U.S (approximately 300). Because the wood-based bio-sector is so new to Louisiana

and the rest of the United States, it is premature to even begin discussing skill sets required to supply, transport, and process wood into bioenergy and biofuels. Accordingly, the survey/interview template for this part of the study was not generated.

Task Deliverable: Report of skills and training programs available to participate in wood-based bio-sectors.

Goal Achievement: Not achieved due to the bio sector being so new with few supply chain members.

Task 5. Develop an operational framework for the Louisiana forest products supply chain incorporating wood-based bio-sector scenarios.

Task Deliverable: Maps of forest sector supply chain processes incorporating the three most likely wood-based bio-sector scenarios.

Goal Achievement: We were able to extract enough information from this activity to develop a set of biomass intra- and interstate flow maps for Louisiana for the manufactured goods sector and the forest landowner sector. We were able to extract enough information from this activity to develop a set of biomass intra- and interstate flow maps for Louisiana for the manufactured goods sector and the forest landowner sector. However, due to the lack of established bio-sector companies in the state that purchase wood-based feedstock, it was premature to develop maps or specifically discuss best business opportunities for wood suppliers. However, in the primer booklet that was printed at the latter part of the project, we include maps of Louisiana forest cover, where forest residuals concentrations are in the U.S., and a map of companies were planned to be constructed to potentially purchase wood for the bio-sector.

Task 6. Identify gaps between current industry skill sets and training programs required for wood-based bio participation.

Task Deliverable: A skills gap analysis.

Goal Achievement: For the same reasons mentioned in Task 4, this gap analysis was not possible to evaluate. Again, because the wood-based bio-sector is so new to Louisiana and the rest of the United States, it is premature to compare emerging and undefined bio-based enterprise skill sets to existing traditional industry employment skill requirements.

Task 7. Identify opportunities to expand the capabilities of the Louisiana forest sector companies.

Task Deliverable: Recommendations for Louisiana forest sector companies to engage in wood-based bio business opportunities.

Goal Achievement: Given the current nascent status of the wood-based bio-sector in general, our recommendations to stakeholders were provided at workshops and conferences at the end of the project period and into the next year. We continue to provide the following broad recommendations:

1) Keep abreast of developments in the emerging bio sector. There are a multitude of blogs and news services that provide updates on the sector status.
2) Develop contacts and relationships with potential bio-based wood material buyers near their enterprise as announcements are made regarding construction of such facilities.

Task 8. Create cross-linked web site informational pages on LFPDC and CBIT web sites. Web-based information dissemination is an important part of this project to facilitate access to potential opportunities for Louisiana forest sector companies to (a) understand the current supply chain for forest products and (b) be able to make informed decisions regarding potential participation in bio-based business endeavors.

Task Deliverable: Web-based content pages.

Goal Achievement: A comprehensive presentation presenting the findings from this and a complementary USDA project AFRI project can be found on the Louisiana Forest Products Development Center web site home page. www.lfpdc.lsu.edu

Task 9. Disseminate study results.

Task Deliverable: The study results were disseminated through "push" email to key policy makers – Louisiana Department of Labor, Louisiana Economic Development, other economic development agencies, trade associations, and political leaders to develop a dialog based on the project findings. A "primer" on wood-based bioenergy developed as part of this project was mailed to over 4,000 companies, associations, and every Louisiana state and federal legislator.

The Louisiana Business and Technology (LBTC) Mobile Classroom was located in each of two communities in heavily timbered locations in the state (Hammond and DeRidder) to disseminate materials, meet with clients and begin the business planning and technical assistance process. The sessions were a great success as indicated by follow-up evaluations. Follow-up will take place as long as needed to get the business started and operating effectively.

Study supply chain members will also be made aware of the reports and presentations available for downloading. The LBTC will work with businesses as requested to help develop business and marketing plans, financial models, competition analysis, and assist the businesses access capital. The LBTC will also provide one-on-one business counseling to the business owners to insure that they have access to all the resources needed to develop and operate a successful business.

Task Deliverables: a) In-the-field workshops/training, b) dissemination of a biomass/bioenergy primer booklet and c) presentations in various state venues regarding information gathered in the course of this project.

Goal Achievement: All of the outreach/extension and dissemination tasks objectives were achieved.

SUMMARY OF RESULTS, CONCLUSIONS, AND LESSONS LEARNED

Development of the wood energy sector is growing (slowly) in the U.S., including Louisiana. Although Louisiana currently has half dozen projects that have been announced, there are no facilities in the state to date. Comparatively, Mississippi has six plants that are using woody biomass for the production of pellets and fuels. Georgia is leading the nation in installed capacity. In this study, 76% of respondents said they would be willing to participate in the biomass economy if profitability exceeded current business opportunities. We also found throughout the project period that investors are opportunistic and are seeking competitive advantage as are the corporate entities that manufacture wood-based bio products. A related conclusion is that first mover advantage is significant due to a finite feedstock supply of wood biomass. For example pellet production for a plant planned in Louisiana will consume at least 1 million tons of wood chips annually. Given the scope of this consumption, there is adequate resources for only a few plants in a given region or state.

As the bio-sector develops, using primarily wood chips, increased demand for wood biomass will translate into increased wood biomass/chip prices. All sectors that use wood chips such as pulp & paper, composite wood panels and oriented strandboard (a structural panel used in new home and other types of construction) could face feedstock upward price pressure in the future. Currently, subsidies and other policy instruments are required to incentivize bio-based processors and suppliers to participate but can create an uneven playing field relative to these existing/traditional wood using sectors that use the same types of raw materials.

Post-research workshop discussion and conversations with stakeholders indicate that forest landowners are examining restructuring their business portfolios to include biomass energy. For example, there are forest land owner companies that have established long-tern supply agreements to provide biomass to planned facilities in Louisiana. In summary, an overriding observation is that wood energy industry trajectory is and will be uncertain in light of economic conditions, prices of alternative fuels, and availability of capital.

A DISCUSSION OF CURRENT OR FUTURE BENEFITS TO BE DERIVED FROM THE PROJECT

The primary benefit from this project is the increased awareness and education we provided to forest stakeholders regarding wood-based bio-business options. Responses in the research and in the workshops underscore the insufficient amount of knowledge that investors, wood products manufacturers, and forest landowners have on the emerging bio-based markets. The long-term commitment of bio-based facilities will likely depend upon the availability of long-term and high volumes of supply within the area.

It is important to stay abreast of current and future forest production and subsequent products in order to realize the potential amount of biomass supply. When asked what it would

take to participate, the majority report profit, with assurance that no harm will be done to the environment following close behind.

Thus, there is an inherent need for landowners to be reassured of the profitability of bio-based products and that no harm will be done to the environment during their production. For those respondents, particularly forest landowners (the primary source of wood-based feedstock) that do not manage their forests or that are unwilling to participate in biomass management activities, educational/outreach programs should be continued in order to potentially help sector members diversify their portfolios and also bolster rural economies.

RECOMMENDATIONS FOR FUTURE RESEARCH

At each Mobile Classroom workshop, attendees were asked to identify additional information that they would like to receive in the future. Their responses are a good guide in suggesting future research that is applicable to stakeholders. Specifically, their suggestions focused on assisting forest landowners to develop forest land use management and business plans that incorporate biomass removals, thinnings, and growing purpose-grown biomass tree species. A second area of focus for future research is to better understand European requirements/mandates/initiatives that are driving demand for wood-based biomass in the form of pellets from the U.S. The third area of research, which we are hoping to conduct this spring is to understand how the logging community might benefit from bio-sector growth in Louisiana. Finally, attendees have a strong desire to stay updated on the biomass industry, an area that is being addressed in ongoing research and extension at the Louisiana

A DESCRIPTION OF THE PROJECT BENEFICIARIES INCLUDING THE NUMBER, TYPE AND SCALE OF PRODUCERS, PROCESSORS, AND OTHER BUSINESSES

Key policy makers in Louisiana– Louisiana Department of Labor, Louisiana Economic Development, other economic development agencies, trade associations, political leaders, and any company or individual currently involved in the forest sector in the state. In addition, research findings and outreach materials can benefit forest sector stakeholders in other states, particularly those in the Gulf South with similar forest structures and industry participants.

ADDITIONAL INFORMATION GENERATED BY THE GRANT PROJECT SUCH AS PUBLICATIONS, PRESENTATIONS, AND WEBSITES

See separate PDF attachments.

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REFERENCES

Forest2Market. 2008. Southern Forest Industry Braces for Bioenergy, F2M Newsroom. http://www.forest2market.com/opencms/opencms/f2m/newsroom. Accessed April, 2009. http://www.timberbuysell.com/Community/DisplayNews

Kizhakkepurakkal, A.R. 2008. Opportunities and Challenges Associated with Development of Wood Biomass Energy Production in Louisiana, MS Thesis, The School of Renewable Natural Resources, Louisiana State University, Baton Rouge, LA.

Kram, J. W. 2008. Biomass Magazine. August 29, 2008. http://www.biomassmagazine.com/podcast. Accessed April, 2009.

Lindsay, J. 2008. Wood as a power source may be making comeback, The Associated Press, 2008.

Louisiana Forestry Association. 2010. Forestry Facts 2009. Alexandria, Louisiana.

Parikka, M. 2004. Global Biomass Fuel Resources, Biomass and Bioenergy. 27: 613–620

Richter Jr., D., Jenkins, D.H., Karakash, J.T., Knight, J., McCreery, L.R., and Nemestothy, K.P., 2009. Wood Energy in America. Science, 323: 1432-1433.

USDA. 2004. Wood Biomass for Energy. USDA Forest Products Laboratory, State & Private Forestry Technology Marketing Unit, One Gifford Pinchot Dr. Madison, WI 53726.2398

FOREST LANDOWNER BIOMASS QUESTIONNAIRE

Section I. Forestland Ownership

*Please remember these are your **opinions** and **estimates** and do not require scientific expertise.

1. Please enter the number at the top of the letter you received. You may enter your company name or first and last name if you do not have your identification number.

   _____

2. Do you own Forestland in Louisiana? **(Please fill in the correct response)**

   O NO → IF **NO**, PLEASE STOP HERE AND RETURN THE SURVEY IN THE POSTAGE PAID ENVELOPE.

   O YES If **YES**, please continue

3. Please list all parishes in which you own forestland.

   _____
   _____
   _____

4. Please indicate how much forestland you currently own in Louisiana. **(Please fill in only one)**

O	1-29 acres	O	140-249 acres	O	500-699 acres
O	30-79 acres	O	250-349 acres	O	700-999 acres
O	80-139 acres	O	350-499 acres	O	1000 or more acres

5. Please indicate the primary type of forestland you own in Louisiana. **(Please fill in only one)**

O	Natural Hardwood	O	Natural Pine
O	Planted Hardwood	O	Planted Pine
O	Mixed Hardwoods and Pine	O	Other (please specify) _____

6. Have trees ever been harvested from your land, either by you personally or by someone else, during the time you have owned your forestland?

O NO

O YES ⟹ If YES, what year was the most recent harvest? _____

7. Over the past 5 years, which products have been produced from trees harvested on your forestland in Louisiana? **(Please fill in all that apply.)**

O FIREWOOD FOR YOUR OWN USE OR FOR THE USE OF FRIENDS

O FIREWOOD FOR SALE

O SAWLOGS FOR SALE

O PULPWOOD FOR SALE

O POSTS, POLES, AND PILINGS FOR SALE

O BIOMASS FOR ELECTRICITY PRODUCTION

O BIOMASS FOR PELLET PRODUCTION

O BIOMASS FOR FUEL PRODUCTION

O OTHER PRODUCTS (please specify) _____

IF YOU CHOSE . . . . . .

8. FIREWOOD FOR YOUR OWN USE OR FOR THE USE BY FRIENDS
Please estimate the **average** number of **cords per year**
_____

9. FIREWOOD FOR SALE
Please estimate the **average** number of **cords** sold **per year**
_____

10. Who are the top three customers of the FIREWOOD you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

11. SAWLOGS FOR SALE
Please estimate the **average** number of **board feet** sold **per year**
_____

12. SAWLOGS FOR SALE

Please estimate the **average** number of **tons** sold **per year**

_____

13. Who are the top three customers of the SAWLOGS you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

14. PULPWOOD FOR SALE

Please estimate the **average** number of **tons** sold **per year**

_____

15. Who are the top three customers of the PULPWOOD you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

16. POSTS, POLES, AND PILINGS FOR SALE

Please estimate **average** number of **posts, poles, and pilings** sold **per year**

_____

17. Who are the top three customers of the POSTS, POLES AND PILINGS you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

18. BIOMASS FOR ELECTRICITY PRODUCTION

Please estimate **average** number of **tons** sold **per year**

_____

19. Who are the top three customers of the BIOMASS ELECTRICITY PRODUCTION you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

20. BIOMASS FOR WOOD PELLET PRODUCTION

Please estimate **average** number of **tons** sold **per year**

_____

21. Who are the top three customers of the BIOMASS WOOD PELLET PRODUCTION you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

22. BIOMASS FOR FUEL PRODUCTION

Please estimate **average** number of **tons** sold **per year**

_____

23. Who are the top three customers of the BIOMASS FUEL PRODUCTION you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

24. Who are the top three consumers of OTHER forest product type and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

Section II. Biomass Issues

*Please remember these are your **opinions** and do not require scientific expertise.

25. In general, what is your overall opinion of using biomass for bioenergy? **(Please fill in only one)**

Extremely Negative	Somewhat Negative	Neutral	Somewhat Positive	Extremely Positive
O	O	O	O	O

26. For each statement below, please fill in the appropriate response that **best describes your current** management activities regarding your forestland.

	No	**Yes**
Does part of your management costs involve burning/ removing slash piles or harvesting residues from harvesting activities?	O	O
Would you be willing to participate in management activities specifically geared toward biomass production such as short rotation woody crops or slash/harvest residue removal?	O	O

27. For each statement below, please indicate **your level of agreement or disagreement** regarding biomass policy issues by filling in the single most appropriate answer for each statement.

	Strongly Disagree	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Strongly Agree**
In my opinion, we should use wood biomass as feedstock for bioenergy markets.	O	O	O	O	O
I believe I/my company am/ is capable of supplying a wood biomass to bioenergy market.	O	O	O	O	O
I believe a bioenergy market will be competitive compared to the conventional energy market.	O	O	O	O	O

IF YOU AGREE . . .

28. Could you please **estimate** the types and amount of forest materials that you could produce and devote to bio-based markets **annually**? (Please provide all information in all units that apply.)

Post harvest residuals left on the ground in **tons** _____
Pre-commercial thinnings (pulpwood) in **tons** _____
Chips in **tons** _____

29. What prerequisites would it take for you to participate in a biomass to bioenergy market? (Select all that apply).

- O An understanding of profit potential
- O Does not harm wildlife habitat
- O Does not deplete the soil of nutrients
- O Does not cause erosion
- O Must not upset existing sectors that use the same raw materials (e.g. chips for pulp/paper)
- O Long-term purchase agreement with buyers
- O Understanding of risk
- O Other (Please specify)_____

30. Would you like to receive a free copy of the study results?

- O NO
- O YES

Your response has insured that this study will be a success. Thank you for your cooperation and time in completing this survey.

If you have any questions or comments about this survey please contact:

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FOREST PRODUCTS BIOMASS QUESTIONNAIRE

Section I. Forestland Ownership

*Please remember these are your **opinions** and **estimates** and do not require scientific expertise.

1. Please enter the number at the top of the letter you received. You may enter your company name or first and last name if you do not have your identification number.

   _____

2. Are you a Louisiana Wood Products Manufacturer? **(Please fill in the correct response)**

   O NO → IF **NO**, PLEASE STOP HERE AND RETURN THE SURVEY IN THE POSTAGE PAID ENVELOPE.

   O YES If **YES**, please continue

The following definition is to help **aid** you in your decision making:

"WOOD WASTE is defined as woody material that your company does not currently use to manufacture products or use to burn for combined heat and power for your manufacturing facility. Examples are sawdust, cuttings, bark, and other materials that would typically be discarded and land filled."

3. On average, over the past 5 years, please estimate how many **tons of wood waste** you produced in **Louisiana** on an **annual** basis. **(Please fill in only one)**

O	No wood waste production	O	1,000-9,999
O	1-9	O	10,000-999,999
O	10-999	O	100,000 or more

4. On average, over the past 5 years, please **estimate** the percent of each **wood waste** material you produced in **Louisiana** on an **annual** basis. **(Total must equal 100%)**

   Bark _____
   Chips _____
   Sawdust _____
   Cut offs _____
   Other _____

5. If Other, please specify _____

6. Does your company burn wood waste generated at your own manufacturing facilities in Louisiana for combined heat and power for the facility?

O NO

O YES

7. Does your company burn wood waste that you purchase for combined heat and power for the facility?

O NO

O YES

8. Do you use biofuels to generate heat or electricity?

O NO

O YES

9. If so, please fill in btu's or kilowatt hours produced

BTUs _____
Kilowatt hours _____

10. Over the past 5 years, have you sold wood-based biomass from your facilities in Louisiana for any of the following? **(Please fill in all that apply.)**

O Biomass for electricity production

O Biomass for wood pellet production

O Biomass for fuel production

11. Who are the top three customers of the biomass for **electricity production** you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

12. Please estimate the **average** number of **tons** sold **per year** in electricity production
_____

13. Have you ever sold electricity generated by your facility to a grid?

- O NO
- O YES

14. Who are the top three customers of the biomass for **wood pellet production** you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

15. Please estimate the **average** number of **tons** sold **per year** in wood pellet production

_____

16. Who are the top three customers of the biomass for **fuel production** you sold and where are they physically located?

Customer Name	Physical Location Delivery Point (City, State)
_____	_____
_____	_____
_____	_____

17. Please estimate **average** number of **tons** sold **per year** for fuel production

_____

Section II. Biomass Issues

*Please remember these are your **opinions** and do not require scientific expertise.

25. In general, what is your overall opinion of using biomass for bioenergy? **(Please fill in only one)**

Extremely Negative	Somewhat Negative	Neutral	Somewhat Positive	Extremely Positive
O	O	O	O	O

26. For each statement below, please fill in the appropriate response that **best describes your current** management activities regarding your forestland.

	Yes	**No**
Does part of your management strategy involve burning or recycling your wood waste products internally?	O	O
Does part of your management strategy involve others burning or recycling your wood waste products?	O	O
Would you be willing to participate in management activities specifically geared toward biomass production?	O	O

27. For each statement below, please indicate **your level of agreement or disagreement** regarding biomass policy issues by filling in the single most appropriate answer for each statement.

	Strongly Disagree	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Strongly Agree**
In my opinion, we should use wood biomass as feedstock for bioenergy markets.	O	O	O	O	O
I believe I/my company am/ is capable of supplying a wood biomass to bioenergy market.	O	O	O	O	O
I believe a bioenergy market will be competitive compared to the conventional energy market.	O	O	O	O	O

28. If you **agree**, could you please **estimate** the types and amount of wood waste materials that you could produce and devote to bio-based markets **annually**? **(Please provide information in all units that apply)**

    Bark _____
    Chips _____
    Sawdust _____
    Cut offs _____
    Other _____

29. If Other, please specify _____

30. What prerequisites would it take for you to participate in a biomass to bioenergy market? **(Select all that apply).**

- O An understanding of profit potential
- O Does not harm wildlife habitat
- O Does not deplete the soil of nutrients
- O Does not cause erosion
- O Must not upset existing sectors that use the same raw materials (e.g. chips for pulp/paper)
- O Long-term purchase agreement with buyers
- O Understanding of risk
- O Other (Please specify)_____

31. Would you like to receive a free copy of the study results?

- O NO
- O YES

Your response has insured that this study will be a success. Thank you for your cooperation and time in completing this survey.

If you have any questions or comments about this survey please contact:

Richard P. Vlosky, Ph.D.
Director, Louisiana Forest Products Development Center
Phone: (225) 578-4527; Fax: (225) 578-4251; e-mail: vlosky@lsu.edu

FOREST LANDOWNER BIOMASS QUESTIONNAIRE
PHONE SURVEY

1. Do you own forestland in Louisiana? **(Please fill in the correct response)**

O NO ⇨ IF **NO**, PLEASE STOP HERE AND CLICK THE SUBMIT BUTTON AT THE BOTTOM OF THIS PAGE

O YES If **YES**, please continue

*Please remember these are your **opinions and estimates** and do not require scientific expertise.

2. Please indicate how much forestland you currently own in Louisiana. **(Please fill in only one)**

O	1-29 acres	O	140-249 acres	O	500-699 acres
O	30-79 acres	O	250-349 acres	O	700-999 acres
O	80-139 acres	O	349-499 acres	O	1000 or more acres

3. Please indicate the primary type of forestland you own in Louisiana. **(Please fill in only one)**

O	Natural Hardwood	O	Natural Pine
O	Planted Hardwood	O	Planted Pine
O	Mixed Hardwoods and Pine	O	Other (please specify) _____

4. Have trees ever been harvested from your land, either by you personally or by someone else, during the time you have owned your forestland?

O NO

O YES ⇨ If YES, what year was the most recent harvest? _____

5. Over the past 5 years, which products have been produced from trees harvested on your forestland in Louisiana? **(Please fill in all that apply.)**

O FIREWOOD FOR YOUR OWN USE OR FOR THE USE OF FRIENDS

Please estimate AVERAGE number of cords cut PER YEAR_____

O FIREWOOD FOR SALE

Please estimate AVERAGE number of cords sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE FIREWOOD YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

O SAWLOGS FOR SALE

Please estimate AVERAGE number of BOARD FEET sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF SAWLOGS YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

O PULPWOOD FOR SALE

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE PULPWOOD YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

O POSTS, POLES, AND PILINGS FOR SALE

Please estimate AVERAGE number of POSTS, POLES, AND PILINGS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE FIREWOOD YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

O BIOMASS FOR ELECTRICITY PRODUCTION

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE BIOMASS FOR ELECTRICITY YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

O BIOMASS FOR WOOD PELLET PRODUCTION

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE BIOMASS FOR WOOD PELLET PRODUCTION YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

BIOMASS FOR FUEL PRODUCTION

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE BIOMASS FOR FUEL PRODUCTION YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

O OTHER PRODUCTS (please specify) _____

WHO ARE THE TOP 3 CONSUMERS OF THIS FOREST PRODUCT TYPE AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

1. In general, what is your overall opinion of using biomass for bioenergy? **(Please fill in only one)**

Extremely Negative	Somewhat Negative	Neutral	Somewhat Positive	Extremely Positive
O	O	O	O	O

2. For each statement below, please fill in the appropriate response that **best describes your current** management activities regarding your forestland.

	Yes	**No**
Does part of your management costs involve burning/ removing slash piles or harvesting residues from harvesting activities?	O	O
Would you be willing to participate in management activities specifically geared toward biomass production such as short rotation woody crops or slash/harvest residue removal?	O	O

*Please remember these are your **opinions** and do not require scientific expertise.

1. For each statement below, please indicate **your level of agreement or disagreement** regarding biomass policy issues by filling in the single most appropriate answer for each statement.

	Strongly Disagree	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Strongly Agree**
In my opinion, we should use wood biomass as feedstock for bioenergy markets.	O	O	O	O	O
I believe I/my company am/is capable of supplying wood biomass to bioenergy market.	O	O	O	O	O
I believe a bioenergy market will be competitive compared to the conventional energy market.	O	O	O	O	O

IF YOU AGREE, COULD YOU PLEASE ESTIMATE THE TYPES AND AMOUNT OF FOREST MATERIALS THAT YOU COULD PRODUCE AND DEVOTE TO BIO-BASED MARKETS ANNUALLY (Please provide information in all units that apply)

1. POST-HARVEST RESIDUALS LEFT ON THE GROUND:_____TONS
2. PRE-COMMERCIAL THINNINGS (PULPWOOD): _____TONS
3. CHIPS:…….._____TONS

2. What prerequisites would it take for you to participate in a biomass to bioenergy market? (Select all that apply).

O An understanding of profit potential
O Does not harm wildlife habitat
O Does not deplete the soil of nutrients
O Does not cause erosion
O Must not upset existing sectors that use the same raw materials (e.g. chips for pulp/paper)
O Long-term purchase agreement with buyers
O Understanding of risk
O Other (Please specify)_____

WOOD MANUFACTURER BIOMASS QUESTIONNAIRE
PHONE SURVEY

1. Are you a Louisiana **Wood Products Manufacturer**? **(Please fill in the correct response)**

O NO ⇨ IF **NO**, PLEASE STOP HERE AND CLICK THE SUBMIT BUTTON AT THE BOTTOM OF THIS PAGE

O YES If **YES**, please continue

*Please remember these are your **opinions and estimates** and do not require scientific expertise.

WOOD WASTE is defined as woody material that your company does not currently used to manufacture products or use to burn for combined heat and power for your manufacturing facility. Examples are sawdust, cuttings, bark, and other materials that would typically be discarded and land filled.

2. On average, over the past 5 years, please estimate how many TONS OF WOOD WASTE you produced IN LOUISIANA on an ANNUAL basis. **(Please fill in only one)**

O We do not produce any wood waste
O 1-10
O 10-100
O 1,000-10,000
O 10,000-100,000
O 100,000 or more

3. On average, over the past 5 years, please estimate the percent of each WOOD WASTE material you produced IN LOUISIANA on an ANNUAL basis (**Total must equal 100%)**

Bark…….. _____%
Chips……. _____%
Sawdust……. _____%
Cut offs…… _____%
Other (please specify) _____ _____%
TOTAL 100%

4. Does your company burn wood waste generated at your own manufacturing facilities in Louisiana for combined heat and power for the facility?

O Yes O No

5. Does your company burn wood waste that you purchase for combined heat and power for the facility?

O Yes O No

6. Over the past 5 years, have you sold wood-based biomass from your facilities in Louisiana for any of the following? If YES, Please **fill in all requested information.**

O BIOMASS FOR ELECTRICITY PRODUCTION

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE BIOMASS FOR ELECTRICITY YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name Physical Location Delivery Point (City/State)

1
2
3

O BIOMASS FOR WOOD PELLET PRODUCTION

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE BIOMASS FOR WOOD PELLET PRODUCTION YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name Physical Location Delivery Point (City/State)

1
2
3

O BIOMASS FOR FUEL PRODUCTION

Please estimate AVERAGE number of TONS sold PER YEAR_____

WHO ARE THE TOP 3 CUSTOMERS OF THE BIOMASS FOR FUEL PRODUCTION YOU SOLD AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name Physical Location Delivery Point (City/State)

1
2
3

O BIOMASS FOR OTHER PURPOSES (please specify) _____

WHO ARE THE TOP 3 CONSUMERS OF THIS BIOMASS PRODUCT TYPE AND WHERE ARE THEY PHYSICAL LOCATED?

Customer Name	Physical Location Delivery Point (City/State)
1	
2	
3	

7. In general, what is your overall opinion of using biomass for bioenergy? **(Please fill in only one)**

Extremely Negative	Somewhat Negative	Neutral	Somewhat Positive	Extremely Positive
O	O	O	O	O

For each statement below, please fill in the appropriate response that **best describes your company's current** management activities regarding biomass and bioenergy

8. Does part of your management strategy involve burning or recycling your wood waste products internally?

O Yes O No

9. Does part of your management strategy involve others burning or recycling you wood waste products ?

O Yes O No

10. Would you be willing to participate in management activities specifically geared toward biomass production?

O Yes O No

11. For each statement below, please indicate **your level of agreement or disagreement** regarding biomass policy issues by filling in the single most appropriate answer for each statement.

	Strongly Disagree	**Somewhat Disagree**	**Neutral**	**Somewhat Agree**	**Strongly Agree**
In my opinion, we should use wood biomass as feedstock for bioenergy markets.	O	O	O	O	O
I believe my company is capable of supplying wood biomass to bioenergy markets.	O	O	O	O	O
I believe a bioenergy market will be competitive compared to the conventional fossil-fuel based energy markets.	O	O	O	O	O

12. IF YOU AGREE, COULD YOU PLEASE ESTIMATE THE TYPES AND AMOUNT OF WOOD WASTE MATERIALS THAT YOU COULD PRODUCE AND DEVOTE TO BIO-BASED MARKETS *ANNUALLY* (Please provide information in all units that apply)

1. SAWDUST _____TONS
2. CUT OFFS _____TONS
3. CHIPS _____TONS
4. BARK _____TONS
5. OTHER (PLEASE SPECIGY TYPE AND TONS)_____

13. What prerequisites would it take for you to participate in a biomass to bioenergy market? (Select all that apply).

O An understanding of profit potential

O Does not harm wildlife habitat

O Does not deplete the soil of nutrients

O Does not cause erosion

O Must not upset existing sectors that use the same raw materials (e.g. chips for pulp/paper)

O Long-term purchase agreement with buyers

Understanding of risk

O Other (Please specify)_____

LSU AgCenter Meeting Feedback Survey

Please share your feedback regarding the [MEETING NAME] on [DATE] in this very brief survey. We appreciate your candid responses, which will be completely anonymous.

1. Overall, please tell us how productive the meeting was using a 1 to 5 scale where 1 means not at all productive and 5 means extremely productive.

Not at all productive	Not that productive	Somewhat productive	Very productive	Extremely productive
◯	◯	◯	◯	◯

2. Now we have a few questions about the meeting content and its organization. Please tell us your level of agreement with the following statements about the meeting using a 1 to 5 scale, where 1 means you strongly disagree and 5 means you strongly agree. If a statement does not apply to the meeting you attended, please select "NA."

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	N/A
The meeting objectives were clearly communicated in advance of the meeting	◯	◯	◯	◯	◯	◯
The meeting objectives were met	◯	◯	◯	◯	◯	◯
Follow-up actions resulted from the meeting	◯	◯	◯	◯	◯	◯
Owners of follow-up actions were assigned	◯	◯	◯	◯	◯	◯
The meeting leader(s) effectively moderated the meeting	◯	◯	◯	◯	◯	◯
Meeting attendees had an opportunity to participate	◯	◯	◯	◯	◯	◯
The right people were invited to the meeting	◯	◯	◯	◯	◯	◯

3. We would also like your feedback on the meeting logistics. Please tell us your level of agreement with the following statements using a 1 to 5 scale, where 1 means you strongly disagree and 5 means you strongly agree. If a statement does not apply to the meeting you attended, please select "NA."

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	N/A
The meeting was the appropriate length of time	◯	◯	◯	◯	◯	◯
The meeting location fit all of the attendees comfortably	◯	◯	◯	◯	◯	◯
The speakers were easily heard	◯	◯	◯	◯	◯	◯
The presentation was easily seen	◯	◯	◯	◯	◯	◯

LSU AgCenter Meeting Feedback Survey

4. Did the meeting start on time?

- ◯ Yes
- ◯ No

5. Did the meeting end on time?

- ◯ Yes
- ◯ No

6. Who was the meeting organizer?

7. How will you use the information from this meeting?

8. What additional information would you like to get from future meetings such as these?

Emerging Markets for Wood Energy

Richard Vlosky, Director
Crosby Land & Resources Professor in Forest Sector Business Development
Louisiana Forest Products Development Center
Louisiana State University Agricultural Center

Forest Sector Business Workshops
DeRidder, Louisiana-October 10, 2013
Hammond, Louisiana-November 19, 2013
Lafayette, Louisiana-January 9, 2014
Alexandria, Louisiana-February 25, 2014
Port St. Vincent, Louisiana-March 13, 2014
Hammond, Louisiana-March 14, 2014

Federal-State Marketing Improvement Program
USDA/Agricultural Marketing Service Grant Award
12-25-G-111

And

This project was supported by the Agriculture and Food Research Initiative of the National Institute of Food and Agriculture, Grant #2010-85211-20492.

Presentation Outline

- The Louisiana Forest Products Development Center
- Wood-to-Energy
- Wood Biomass
- Energy Options
- Current Landscape
- Louisiana (mostly)
- Issues & Challenges
- Concluding Observations

The Louisiana Forest Products Development Center

School of Renewable Natural Resources, LSU AgCenter

&

School of Forestry, Louisiana Tech University

Through an act of the Louisiana State Legislature, the LSU AgCenter established the Louisiana Forest Products Laboratory in 1992 (renamed the Louisiana Forest Products Development Center in 2003) to:

1. ***Provide technical assistance & information***
2. ***Promote primary & value-added wood processing industries***
3. ***Aid the state's economy and well-being of its people through forest sector development***

Louisiana Forest Products Development Center

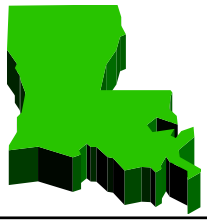
RESEARCH

EXTENSION/OUTREACH

Louisiana Cooperative Extension Service

LSU AgCenter Research & Extension

School of Forestry Louisiana Tech University



Key Areas-Research & Extension

- Manufacturing Efficiency
- Wood Quality
- Business & Economic Development
- Composites
- Biomass/Biofuels
- Wood Durability
- Safety
- Certification
- Nanotechnology
- Value-Added Products
- Treated Wood

Louisiana Forest Products Development Center

The LFPDC at the LSU AgCenter

LSU AgCenter Research & Extension

School of Renewable Natural Resources

Louisiana Forest Products Development Center

Wood Durability Laboratory

Director: Dr. Todd Shupe

Engineered Composites Laboratory

Director: Dr. Qinglin Wu

Wood-based Biomass→ Energy

Forest Landowner Opportunities and Challenges

- The U.S. South is the "wood basket of the nation."
- 200 million acres or 40% of the 504 million acres of forestland nation-wide.
- Significant forestland partly due to its sub-tropical climate, steady supply of rainfall, and favorable topography.

Sustainability Issues and Concerns

- Biomass industry drivers: sustainable harvest levels, wood fiber prices, and transportation costs.
- Harvesting, collecting and transporting cellulosic biomass residues can be difficult and expensive.
- High transportation costs means cellulosic biomass plants must source feedstocks near plant.

Wood-to-Energy
Why do we care?

The United States currently depends heavily on fossil fuels, much of which comes from foreign sources. According to the Energy Information Administration, in 2011, fossil fuels accounted for 77.6% of all energy produced in the U.S. Nuclear and renewables accounted for 10.6% and 11.8%, respectively. There are several concerns about this reliance on fossil fuels, including:

Wood-to-Energy
Why do we care?

Energy insecurity

About 32% of our fossil fuels and 67% of our crude oil are imported, with 30% of the crude oil coming from relatively politically unstable nations in the Middle East, Latin America, and Africa (Flintoff 2012). Some of these countries from which the U.S. imports oil frequently have interests that are neutral or antagonistic to those of the United States, and many of us remember the Oil Embargo of the 1970s. Another embargo or similar event could have similarly detrimental impacts on the U.S. economy.

Wood-to-Energy
Why do we care?

Price volatility

Energy prices have been volatile since the early 2000's (Murphy 2009) due to shifts in supplies, consumption, financial markets, and government policies. Emerging economies are driving the demand for oil, and China is currently the world's number two user of oil. With international demand for fossil fuels increasing as the emerging economies recover from the economic crisis, fossil fuel, particularly crude oil, prices are expected to increase.

Wood-to-Energy
Why do we care?

High unemployment

The U.S. is technically out of the Great Recession, but unemployment has remained stubbornly high, causing a sense of unease among consumers. Politicians at state and national levels are seeking ways to create and maintain domestic jobs. Locally- produced energy, including biofuels, has the potential to result in new jobs. Biofuel and bio-products production can create jobs involved in growing, harvesting, transporting, and processing biomass into a host of products.

Sustainability Issues and Concerns

- Biomass demand currently driven by wood-burning power companies---Pellets.
- Cellulosic ethanol could impact the structure of the forest sector
- Demand for wood→electricity could also change the landscape.

Overview of Emerging Biomass-to-Energy Markets

- Projections show U.S. energy consumption is increasing
- Concerns about fossil fuel supplies and climate change
- Interest in renewable energy sources among energy producers, developers, legislators, investors, and policy makers

Overview of Emerging Biomass-to-Energy Markets

- Government support of market development include financing the farmers and offering producers incentives and loan guarantees
- Programs for growers (farmers) are Woody Biomass Utilization Grants (Woody BUG) and Biomass Crop Assistance Program (BCAP)
- Renewable Fuel Standard (RFS) - requires annual production of 21 billion gallons of biofuel by 2022

Today's biofuel market

- Government mandates
- Economic trends

→ Emerging biofuel market

Today's biofuel market

- Main biofuels:
  - Wood burned for electricity
  - Corn for ethanol
  - Soybean for biodiesel
- Needed:
  - Non-food sources
  - High biomass growth potential
  - Low fertilizer, herbicide, water inputs
  - Capable of being chipped for dense biomass shipments

Wood-based Biomass Types

Primary mill residues

Wood materials and bark generated at manufacturing plants (primary wood-using mills) when round wood products are processed into primary wood products.

Slabs, edgings, trimmings, sawdust, veneer clippings and cores, and pulp screenings.

Wood-based Biomass Types

Secondary mill residues

Wood scraps and sawdust from woodworking shops, furniture factories, wood container and pallet mills, etc. that use lumber, plywood and other "primary" raw materials.

Wood-based Biomass Types

Urban wood waste

Discarded wood, tree trimmings, material from construction and demolition sites, etc.

Wood-based Biomass Types

Forest residues/Logging Slash

Logging residue, unused portions of trees, cut or killed during logging or silvicultural activities and left in the woods; unutilized volume of trees cut or killed during logging operations.

Wood-based Biomass Types

- **Logging slash:**
  - 3 to 8 tons per acre generated from needles, branches left on site
  - Potential:
    - Chip tree tops instead of pushing it back into stand

Forests for Biofuel: Potential forest biofuel products

- Logging slash bundled to support power plant
  - 100-MW Southern Energy wood-fired power plant in Nacogdoches (currently idled)
  - 20-year power purchase agreement with Austin Energy

Management Approaches: Short-rotation woody crops

- Fast-growing plantations that produce large amounts of biomass in short time
- Whole tree chipped in harvest
- Rotation lengths:
  - 3 to 7 years
  - Possibly get 1.5 rotations per planting due to re-sprouting

Short-rotation woody crops

- Species grow along SE coastal region
  - *E. benthamii, macarthurii, camadulensis*
- Tolerant to temperatures down to 17 degrees F
- Yields:
  - 12-20 tons per acre per year (loblolly pine = 8 tons per acre per year)
  - Mature by age 6-9

Short-rotation woody crops

- Many species with potential:
  - Loblolly pine
  - Cottonwood
  - Black willow
  - Hybrid poplar
  - Sweetgum
  - Sycamore

  } 2 to 8 tons/ac/year
- DOE: 8-10 tons/ac/year needed for sustainable biofuel production

Mead 2005, Davis and Trettin 2005, Merker 2007

Short-rotation woody crops

Hybrid Poplar

Paulownia (1 year)
Fastest Growing Species

Eucalyptus globulus
(3 years)
Australia

Eucalyptus sp.
(6 years-rotation age)
Brazil

Long-rotation woody crops

Frankensteinus sempervirens
6 years old

Management approaches

- Early-mid rotation biofuel:
  - Plant higher than normal tree numbers
  - Thin frequently (every 5 years, beginning age 5) until reach merchantable size for traditional products
    - Precommercial thinnings become commercial thinnings
    - "Hog fuel" operations

Blazier, 2013

Management approaches

- Hog fuel = in-woods chipping
- Minimum acreage ~ 50 acres

Blazier, 2013

Management approaches

- More harvest = less nutrients returned?

Blazier, 2013

Management approaches

- Whole-tree harvest shown to reduce site productivity 18% on 15 of 19 research sites in Gulf Coastal Plain
  - Susceptible sites: low available P concentrations
- N + P fertilization increased productivity of whole-tree harvested sites to levels above stem-only harvest
- Fertilization, weed control highly energy efficient for increasing productivity

Scott and Dean 2006

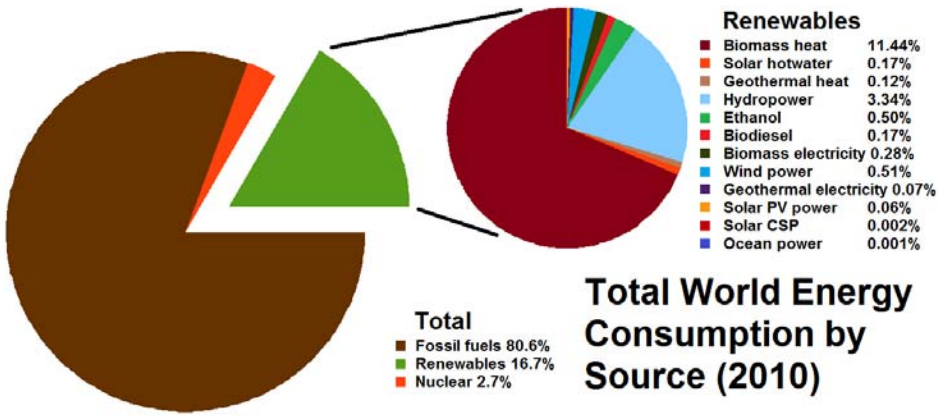
Management approaches

- Early rotation biofuel alternative:
  - Plant trees in wide rows (15 to 25 ft.)
  - Direct seed between rows
  - Cut all seeded trees around age 5
  - Continue managing stand for pulpwood and sawtimber

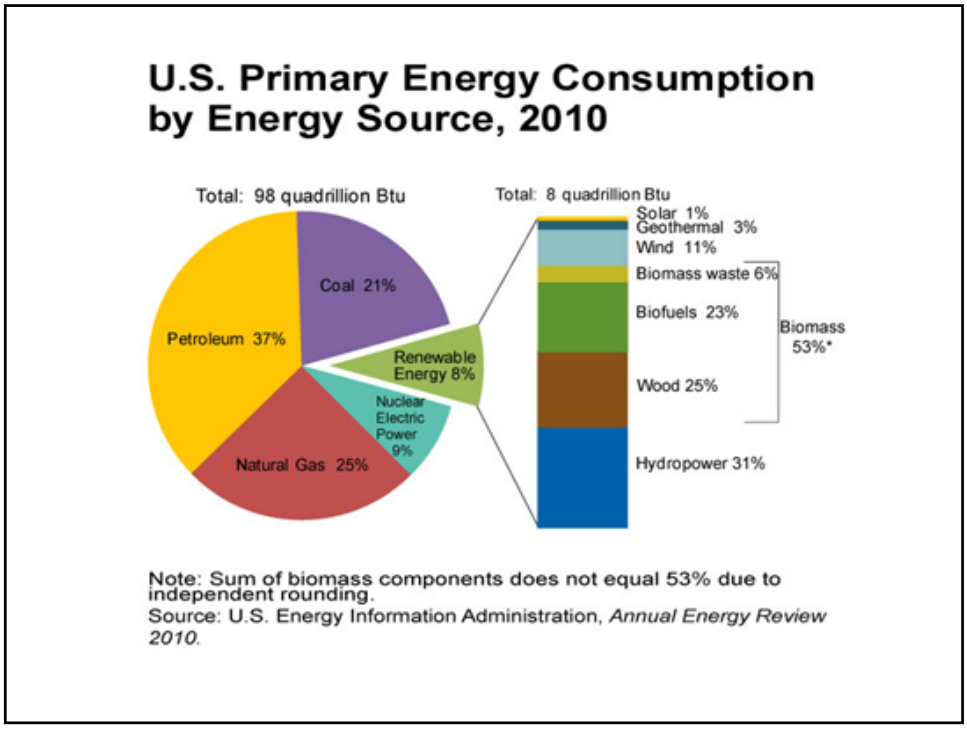
Scott and Tiarks 2008

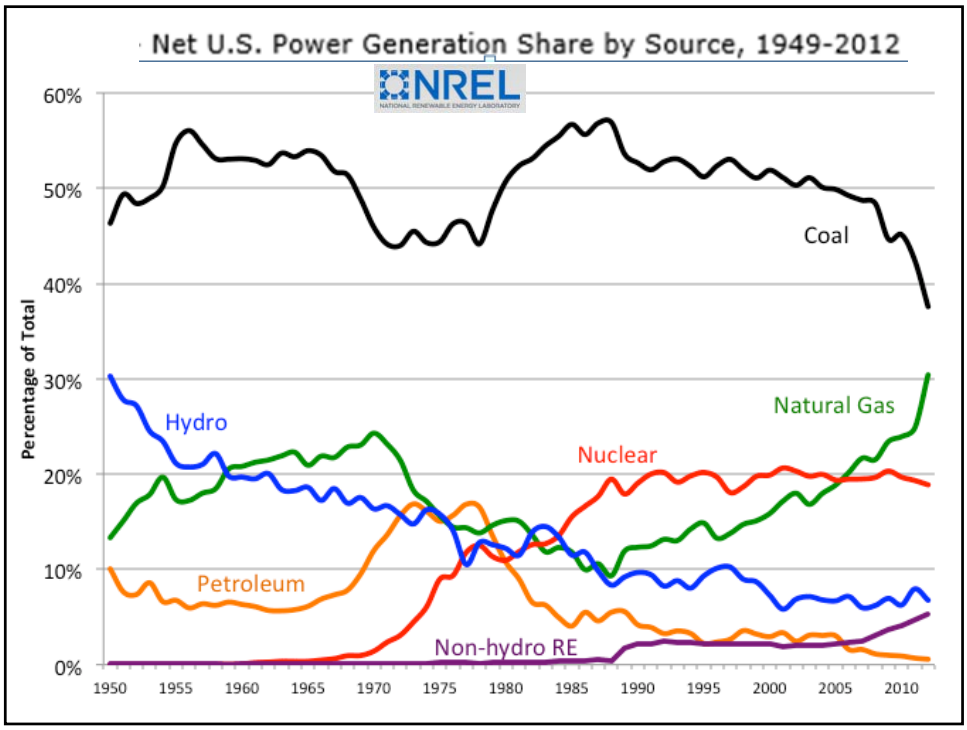
Other Wood-based Biomass Sources

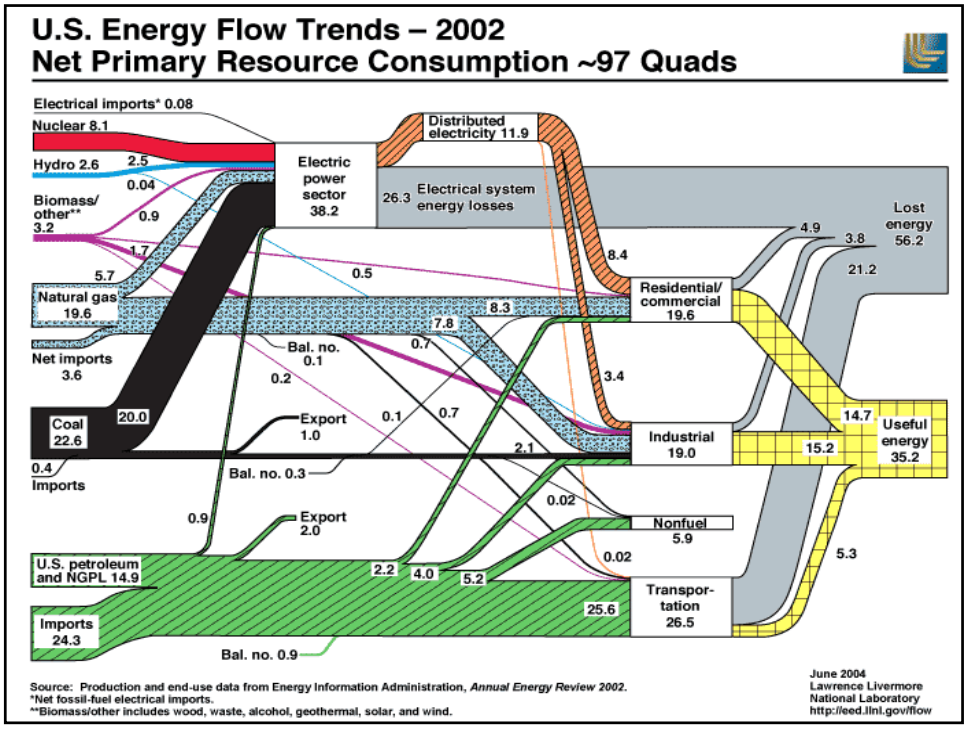
Where Does Wood Fit into the Picture?



REN21 Renewables 2012 Global Status Report


U.S. Primary Energy Consumption by Energy Source, 2010
Total: 98 quadrillion Btu
Coal 21%
Petroleum 37%
Renewable Energy 8%
Nuclear Electric Power 9%
Natural Gas 25%
Total: 8 quadrillion Btu
Solar 1%
Geothermal 3%
Wind 11%
Biomass waste 6%
Biofuels 23%
Wood 25%
Biomass 53%*
Hydropower 31%
Note: Sum of biomass components does not equal 53% due to independent rounding.
Source: U.S. Energy Information Administration, Annual Energy Review 2010.


Net U.S. Power Generation Share by Source, 1949-2012
NREL
Percentage of Total
60%
50%
40%
30%
20%
10%
0%
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
Coal
Hydro
Natural Gas
Nuclear
Petroleum
Non-hydro RE



Wood Energy in the U.S.

- Wood is the most commonly used biomass fuel for heat and power in the U.S.
- About 84% of the wood and wood waste fuel used in the U.S. is consumed by industry, electric power producers, and commercial businesses.
- Most of this is used at wood product manufacturing facilities in cogeneration.

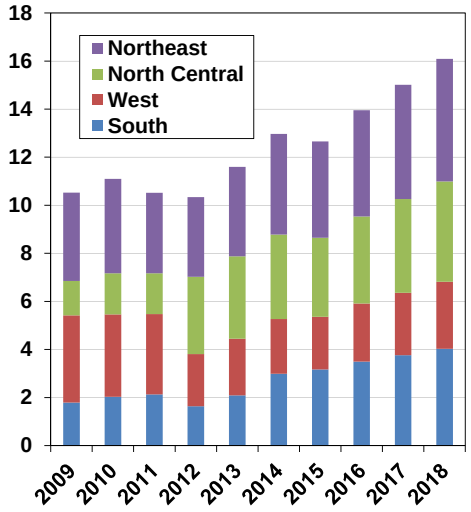
Why Wood?

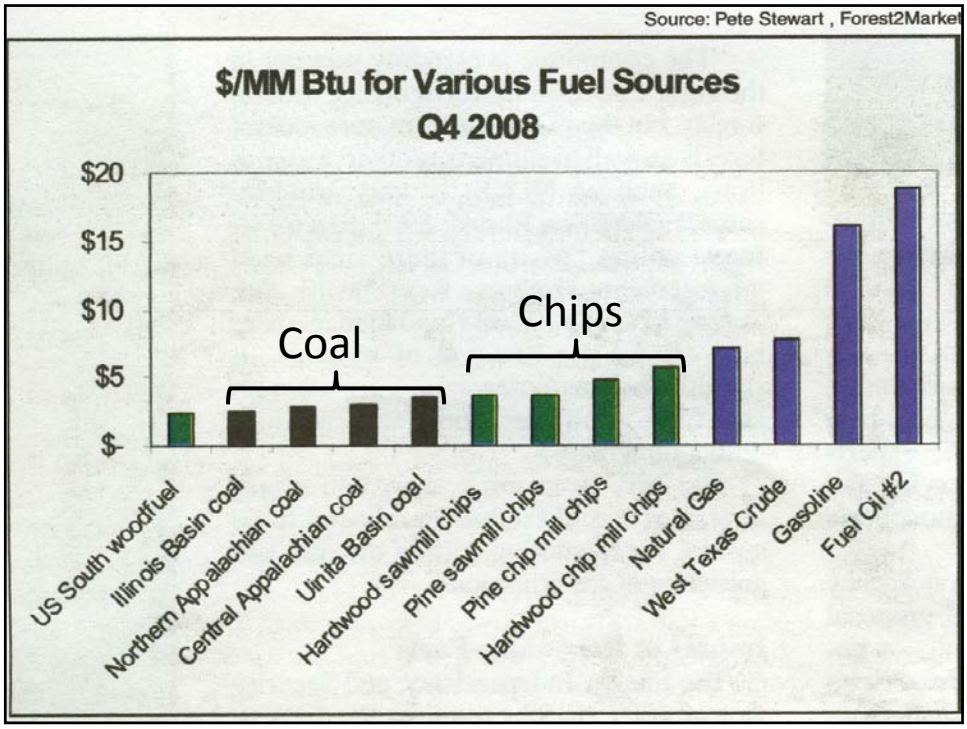
- Renewable, carbon-neutral, and locally available compared to most fossil fuels.
- In combustion, wood produces 90% less carbon dioxide (CO_2) than fossil fuels with minimal emissions of sulfur, heavy metals and particulates (USDA 2004).
- Cellulosic content of wood → candidate biomass for transportation fuel production (USDA 2004).

US Biomass Power Generation

Million MWh

- **Despite new capacity coming online, actual generation fell!**
  - **2010-2011 and 2011-2012**
- **Regulatory Support Limited**
  - **Federal**
    - **Zero**
  - **State:**
    - **31 states with RPS**
- **Recent Developments**
  - **Dominion x3**

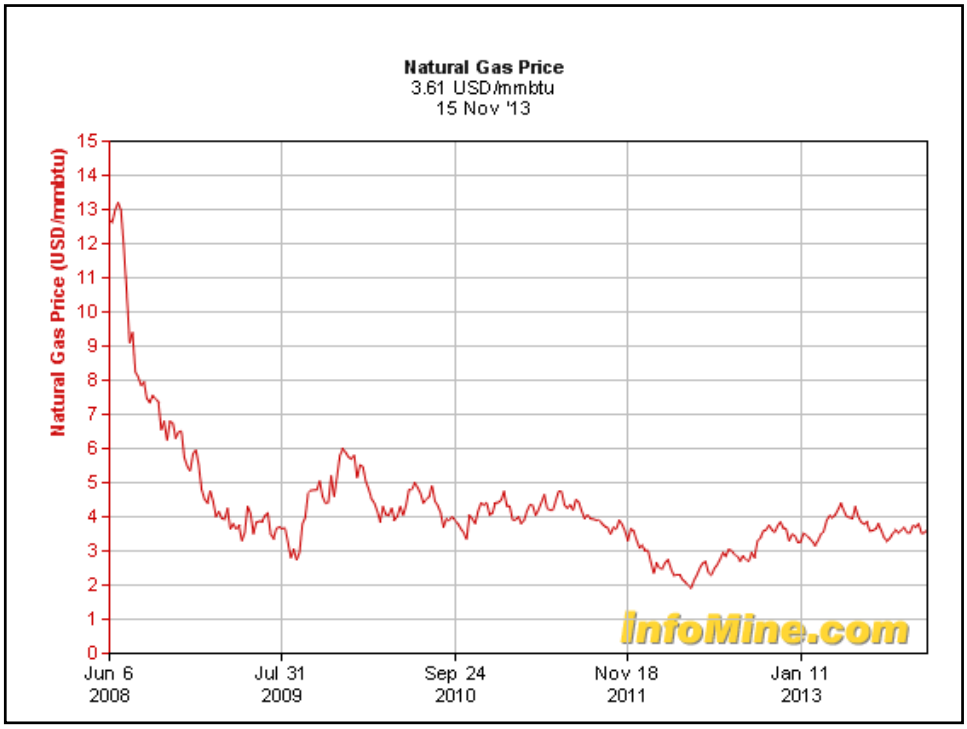


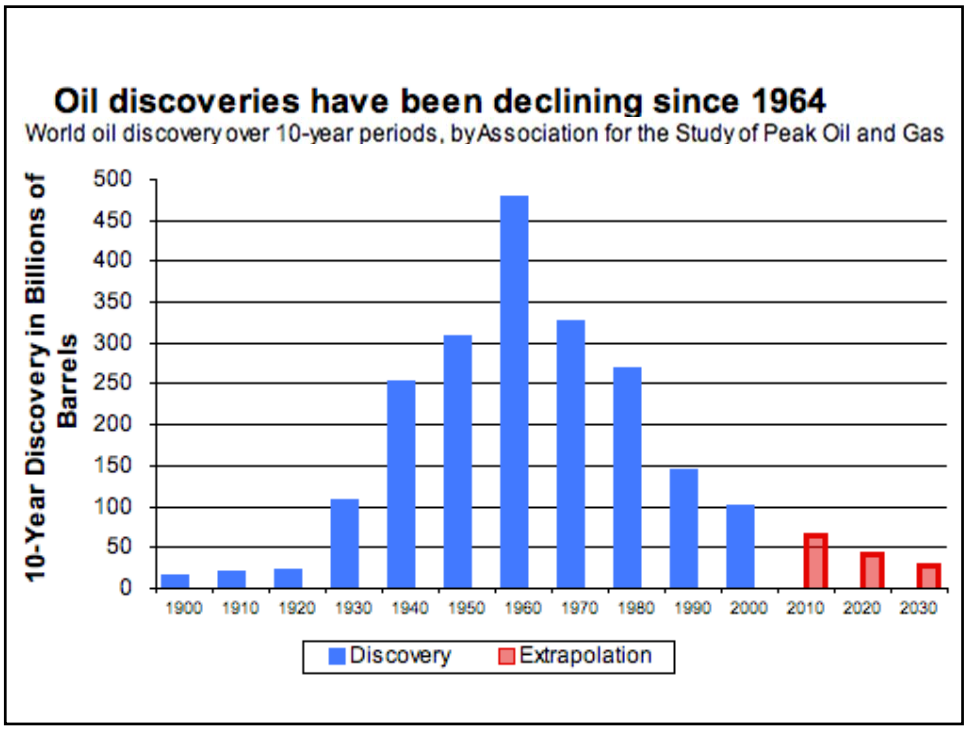


Energy Prices per Million BTU

- Coal – Powder River Basin[1] – $0.56
- Coal – Northern Appalachia[1] - $2.08
- Natural gas[2] - $5.69
- Ethanol tax credit[3] – $5.92
- Propane[4] - $13.28
- Petroleum[5] – $13.43
- #2 Heating oil[4] - $14.74
- Jet fuel[4] - $15.48
- Diesel[4] - $15.59
- Gasoline[4] - $17.81
- Wood pellets[6] - $18.57
- Corn ethanol[7] - $23.46
- Electricity[8] - $26.31
- Cellulosic ethanol from corn cobs[9] – $30.92

Forbes, The Price of Energy, 2010


Natural Gas Price
3.61 USD/mmbtu
15 Nov '13
Natural Gas Price (USD/mmbtu)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Jun 6
2008
Jul 31
2009
Sep 24
2010
Nov 18
2011
Jan 11
2013
InfoMine.com


Oil discoveries have been declining since 1964
World oil discovery over 10-year periods, by Association for the Study of Peak Oil and Gas
10-Year Discovery in Billions of Barrels
500
450
400
350
300
250
200
150
100
50
0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
Discovery
Extrapolation

Wood to Energy
What are the options?

Gasification

- Converts carbon-based materials, such as coal, petroleum, biofuel, or biomass…..
- into carbon monoxide and hydrogen…..
- by reacting the raw material, at high temperatures controlled *with oxygen* and/or steam.
- The resulting gas mixture is called synthesis gas or syngas and is itself a fuel.

Pyrolysis

- Chemical decomposition of a condensed substance by heating.
- Does not require oxygen.
- Extreme pyrolysis, which leaves only carbon as the residue, is called *carbonization* and is also related to the chemical process of *charring*.
- Pyrolysis is used in the to produce charcoal, activated carbon, methanol and other chemicals from wood.

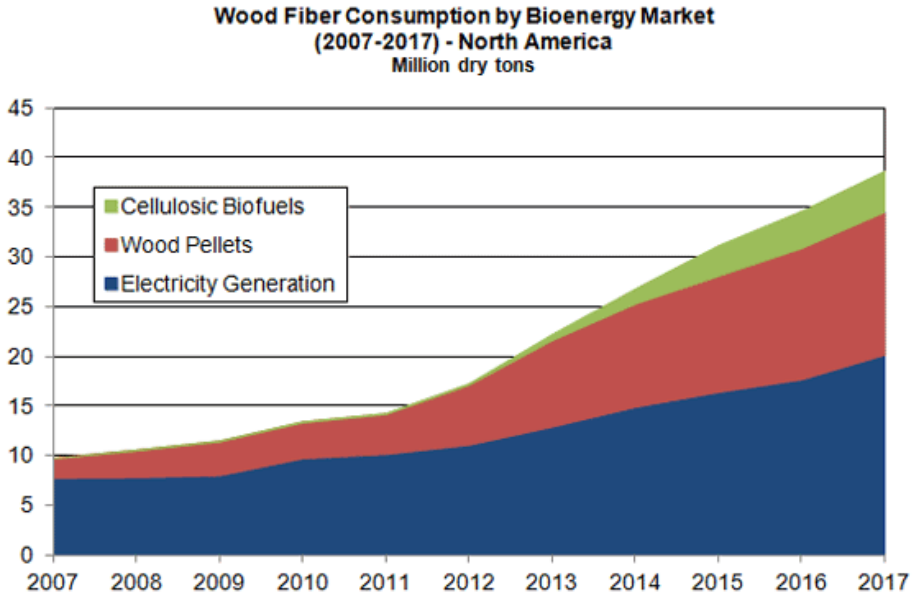
Cogeneration

- Simultaneous production of heat and electricity, commonly called combined heat and power (CHP), from a single fuel.
- Traditionally, a steam turbine is used to produce electricity, although a wood gasification/ internal combustion unit can also be a cogeneration unit.
- Most of **U.S**. CHP capacity is in wood products manufacturing industries.

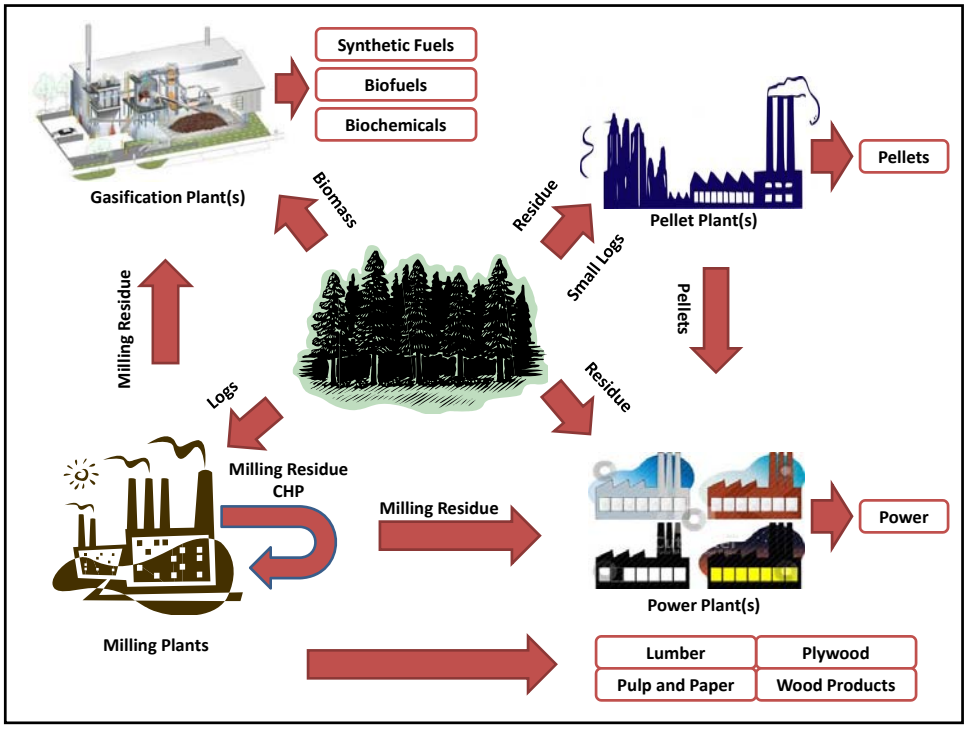
Ethanol

"Fuel or food debate" – ethical challenges in deciding the best use of natural resources.

There were purported to be 13 cellulosic ethanol plants currently operating or under construction in the U.S. that use woody biomass as feedstock (C. Cornell, 2009 in Biofuels Business).

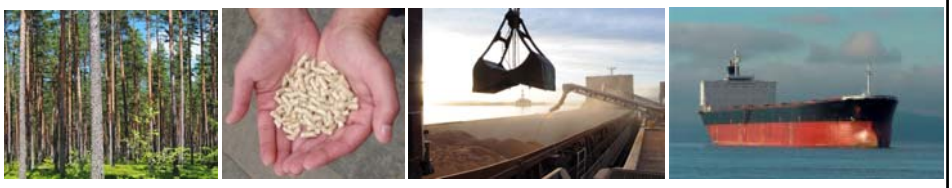


Source: risi.com



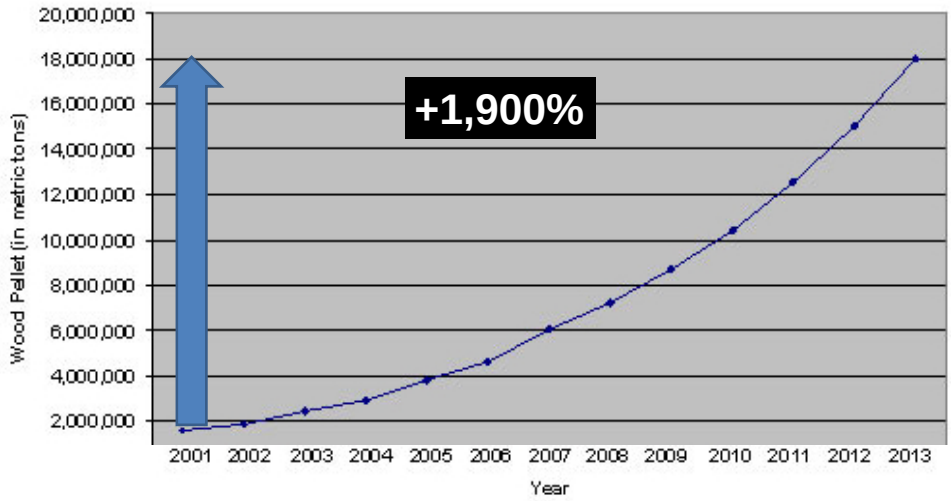
Pellets

- European Union nations imported some 4.46 million metric tons of wood pellets in 2012 up from 3.2 million in 2011.
- Sweden consumes more than 20% of the world's wood pellets and demand is growing.
- 36% of those pellets came from the United States, the most of any nation.
- Wood pellets have about 70 percent of the calorific value of coal.



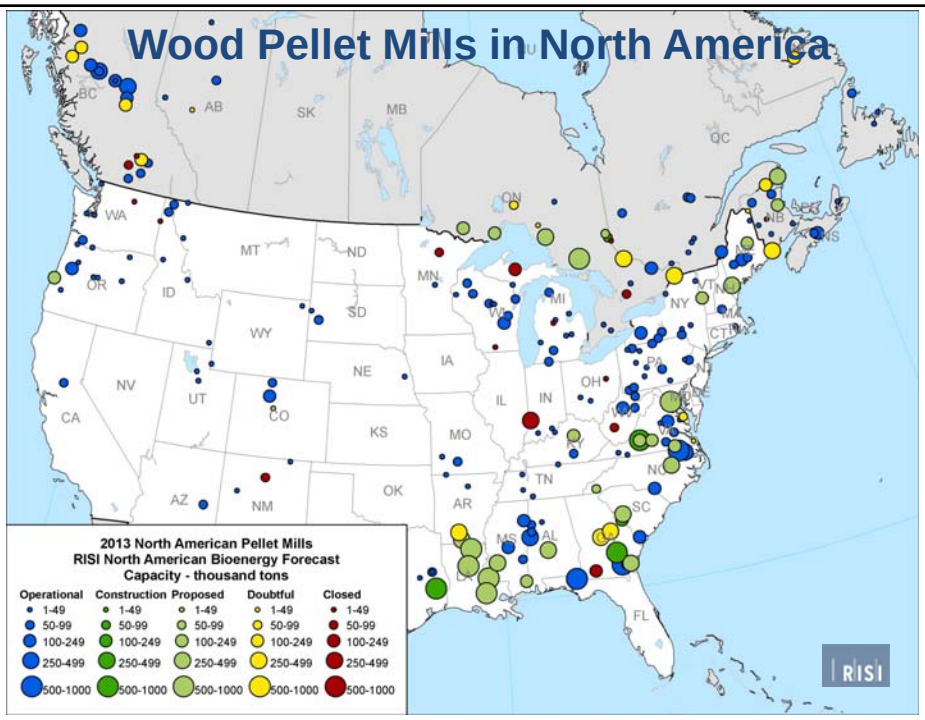
Source: Baton Rouge Business Report, June26, 2013

Wood Pellet Demand in Europe



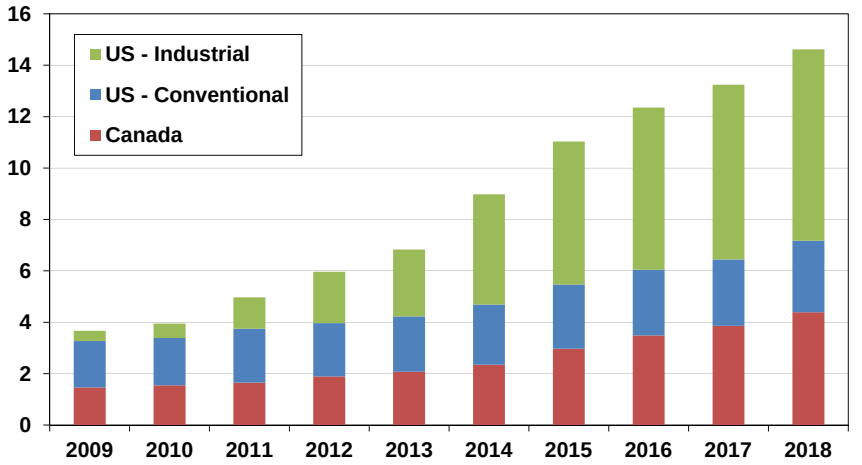
Sources – Pellets@las and Wood Resource Quarterly

Wood Pellet Mills in North America

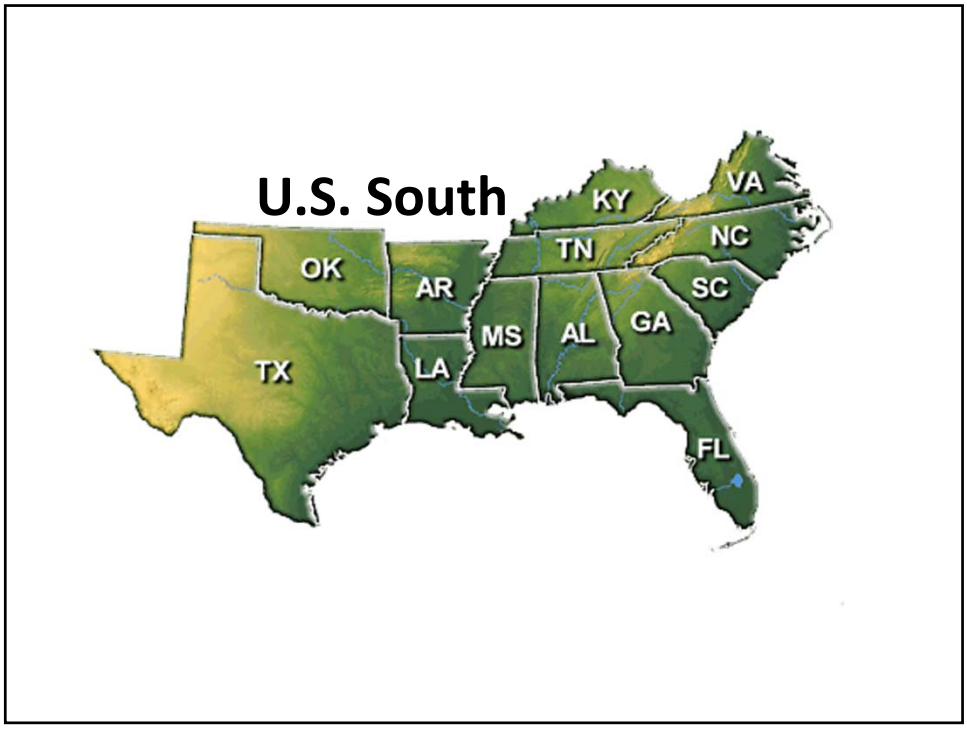


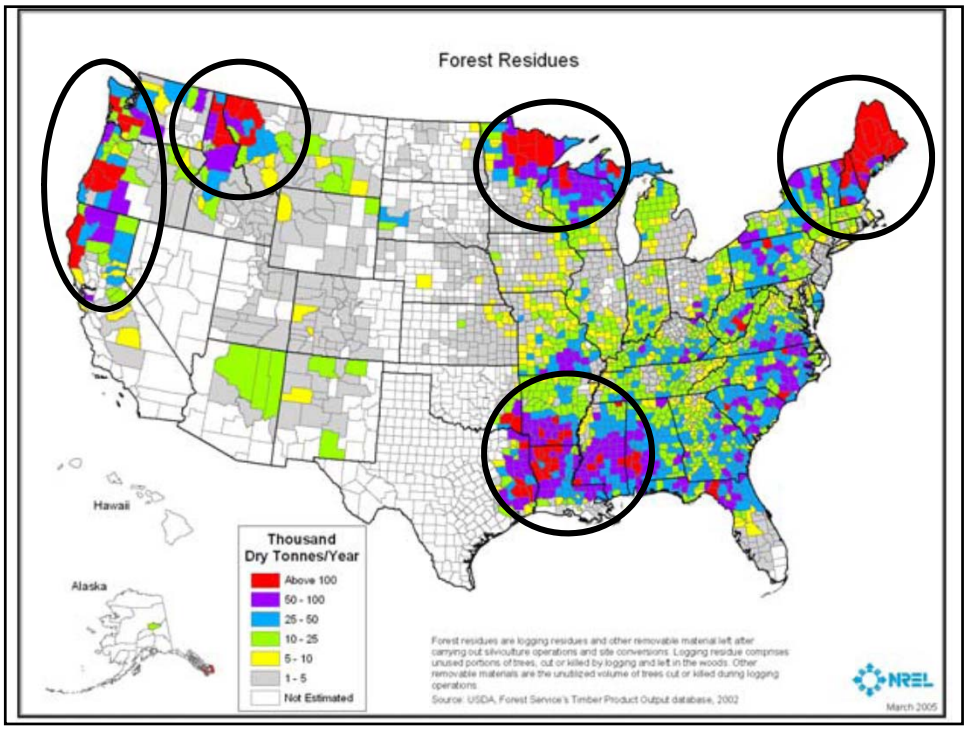
North American Wood Pellet Production

Million tonnes



What's Happening Here?


U.S. South
KY
VA
NC
TN
OK
AR
SC
MS
AL
GA
TX
LA
FL

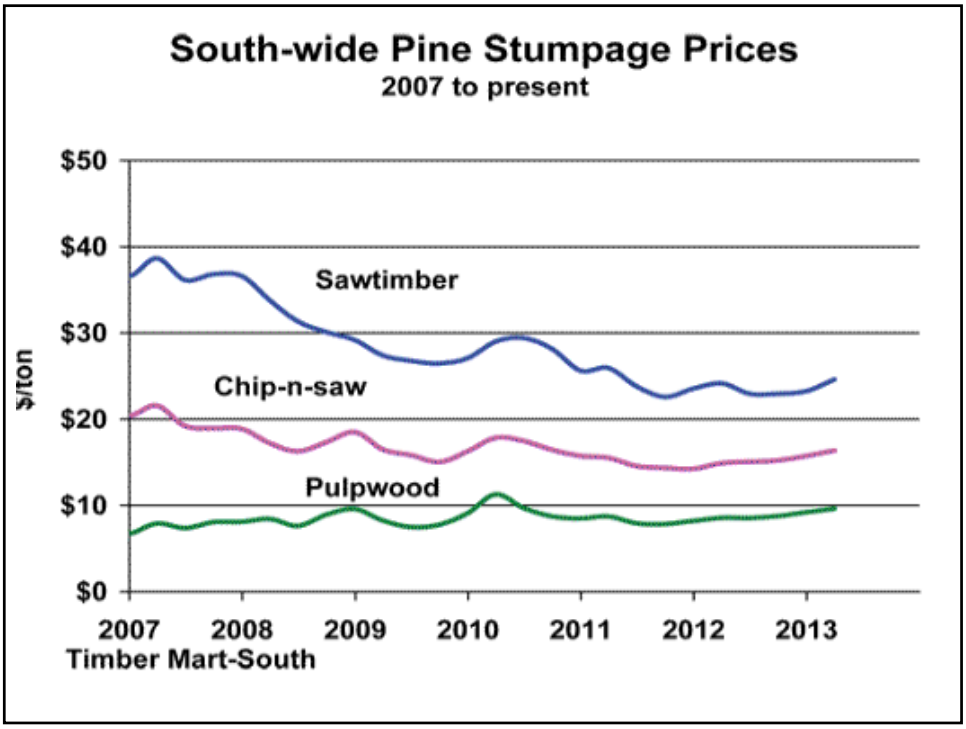

Forest Residues
Hawaii
Alaska
Thousand Dry Tonnes/Year
Above 100
50 - 100
25 - 50
10 - 25
5 - 10
1 - 5
Not Estimated
Forest residues are logging residues and other removable material left after carrying out silviculture operations and site conversions. Logging residue comprises unused portions of trees, cut or killed by logging and left in the woods. Other removable materials are the unutilized volume of trees cut or killed during logging operations
Source: USDA, Forest Service's Timber Product Output database, 2002
NREL
March 2005

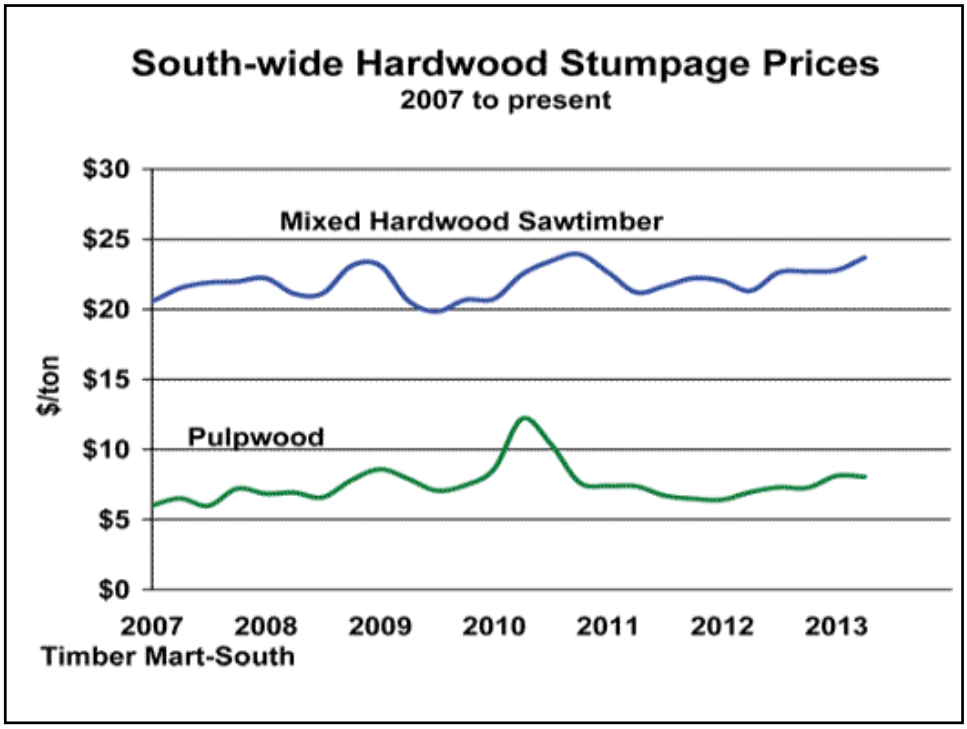
Southeastern Average Stumpage Prices - US$/ton

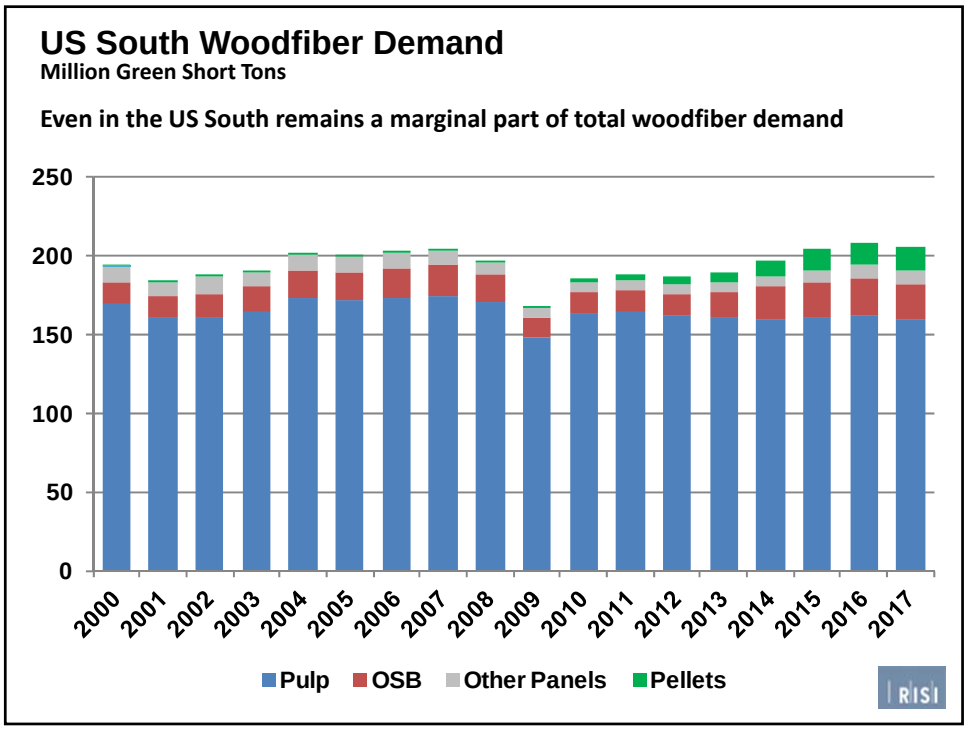
	one quarter			year ago	
	1Q 13	4Q 12	up/(dn)	1Q 12	up/(dn)
Pine Sawtimber	$24.61	$23.27	+$1.34	$24.15	+$0.46
Pine Pulpwood	$9.63	$9.21	+$0.42	$8.56	+$1.07

1st Qtr 2012-1st Qtr 2013	
Pine Sawtimber	+1.9%
Pine Pulpwood	+12.5%

Source: Timber Mart South




South-wide Hardwood Stumpage Prices
2007 to present
$30
$25
$20
$15
$10
$5
$0
$/ton
Mixed Hardwood Sawtimber
Pulpwood
2007
2008
2009
2010
2011
2012
2013
Timber Mart-South


US South Woodfiber Demand
Million Green Short Tons
Even in the US South remains a marginal part of total woodfiber demand
250
200
150
100
50
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Pulp
OSB
Other Panels
Pellets
RISI

An Example of Interaction in the Industry

A resurgence in OSB demand in the US,

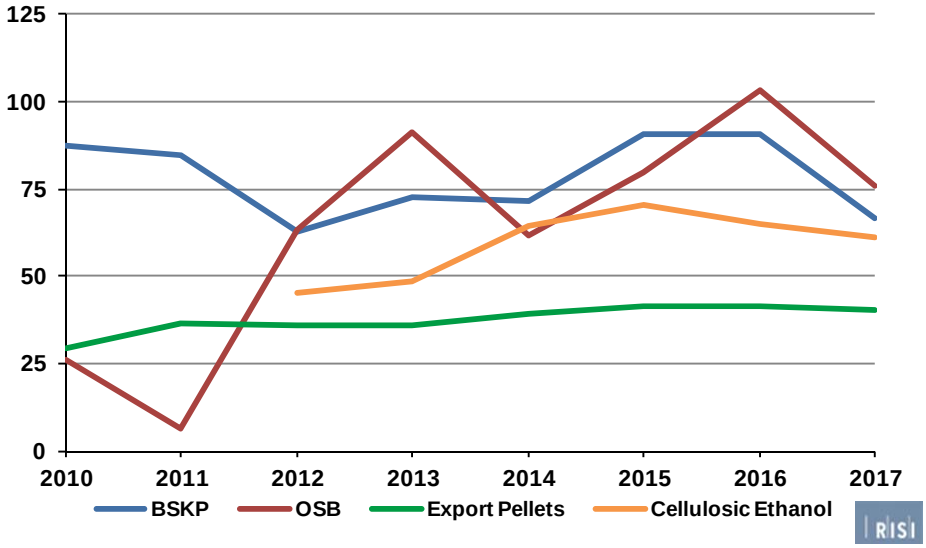
prompted by an earlier- and stronger-than-expected housing recovery,

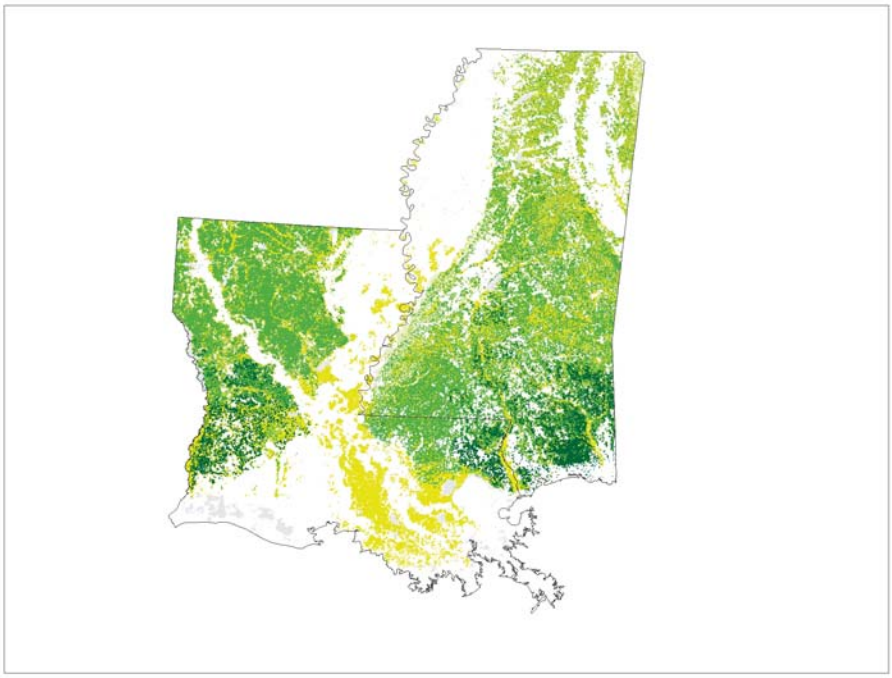
will mean stiffer competition for pulpwood,

putting pellet manufacturers at a competitive disadvantage.

Pulp, OSB Have Substantial FPC Advantage Over Wood Pellets

Fiber Paying Capability $,Green Short Ton – US South





Current Projects-Louisiana & Mississippi

1 **Enviva Pellets | Amory, MS**
Capacity to convert 100,000 tons of woody biomass per year.

2 **Enviva Pellets | Wiggins, MS**
Capacity to convert 150,000 tons of woody biomass per year.

3 **KiOr | Columbus, MS**
Uses wood chips to produce gasoline and biodiesel.

4 **BTH Quitman Hickory | Quitman, MS**
Produces 80,000 dry tons per year of terrified wood pellets.

5 **Recast Energy | Wiggins, MS**
Uses wood chips to produce 52,000 pounds/hour of steam for use in an adjacent Clearwater Paper mill.

6 **Scott Biodiesel | Greenville, MS**
Produces 15 million gallons of biodiesel per year from corn oil (75%) and used cooking oil (25%)

7 **Bayou Wood Pellets | West Monroe, LA**
Production capacity is 60,000 metric tons/year from hardwood and softwood - Operational

8 **Biomass Secure Power, LLC | Baton Rouge, LA**
Production capacity is 1,000,000 metric tons/year from softwood - Proposed

9 **German Pellets | Urania, LA**
Production capacity is 1,000,000 metric tons/year from softwood Under Construction

10 **Sundrop Fuels | Alexandria, LA**
Production of drop-in biogasoline from wood biomass – Under Construction

Pellets-U.S. South

- The expansion of pellet production has been particularly noteworthy in the U.S. South
- 14 new pellet plants that are either new or planning to expand production in the coming year.

Pellets-Louisiana

- ***Drax Biomass*** is building two wood pellet plants in this region: one in Bastrop, and one in Gloster, Miss.
- Plum Creek will deliver up to 770,000 tons annually of wood fiber to the two locations over a 10-year contract.
- Will ship pellets from a to-be-constructed export facility at the Port of Greater Baton Rouge.
- The combined investments in Louisiana are worth more than $120 million officials.
- Operational by late 2014 or early 2015.

Source: Baton Rouge Business Report, June26, 2013

Pellets-Louisiana

- ***German Pellets GmbH*** will begin work immediately on a $300 million pellet plant in Urania.
- The plant is expected to produce 1 million tons of pellets per year.
- The wood pellet plant will be located at the site of the former Louisiana Pacific and Georgia Pacific plant that closed in 2002, eliminating 355 jobs.
- German Pellets GmbH is the leading manufacturer of wood pellets in Europe.
- Will be biggest in the world- expected to employ about 80 people directly and support more than 400 indirect jobs
- The plant is expected to be operational in the spring of 2014.

Source: Town Talk May 1, 2013

Green Gasoline-Louisiana

- ***Sundrop Fuels*** is building a $450 million refinery near Alexandria that will convert wood waste and natural gas into gasoline.
- They have agreed to purchase about 1,200 acres of land.
- Will use wood 1 Million tons of wood biomass as a feedstock.
- Will extract hydrogen natural gas, combining the hydrogen in a proprietary reactor with carbon extracted from wood waste.
- The result — up to 50 million gallons of fuel a year — will be the world's first renewable green gasoline that's immediately usable in the U.S. transportation infrastructure.

Source: Baton Rouge Business Report, June26, 2013

Green Gasoline-Louisiana

- ***Cool Planet*** is investing $168 million in refineries in bio-refineries in Alexandria and Natchitoches.
- Wood feedstock-waste and byproducts.
- Will produce 10 million gallons of high octane gasoline and jet fuel.
- Will also use proprietary process to make biochar with carbon extracted from wood waste.
- A third Louisiana location is being researched.

Other Recent Announcements

- RoyOMartin announced the company will invest $20 million to modernize and expand the Martco plywood facility in Chopin, La.
- Boise-based Idaho Timber, will make a $3.5 million capital investment to refurbish and reopen a sawmill in Coushatta, Louisiana, with plans to create 90 jobs.
- Packaging Corporation of America (previously Boise, Inc.) plans a $111 million revamp at its mill in DeRidder to change a newsprint machine idled since 2009 to one that will make packaging components.

Research Studies

Forest Landowner Study I

This project was supported by the Agriculture and Food Research Initiative of the National Institute of Food and Agriculture, Grant #2010-85211-20492.

USDA United States Department of Agriculture National Institute of Food and Agriculture

Forest Landowner Study I

Objectives. . .

1. To identify key characteristics of NIPF landowners at the enterprise level
2. To determine NIPF landowners' knowledge of biomass concepts and issues
3. To discern the willingness to provide feedstock dedicated to producing bio-based products (post-harvest residuals, pulpwood, or dedicated energy tree crops)

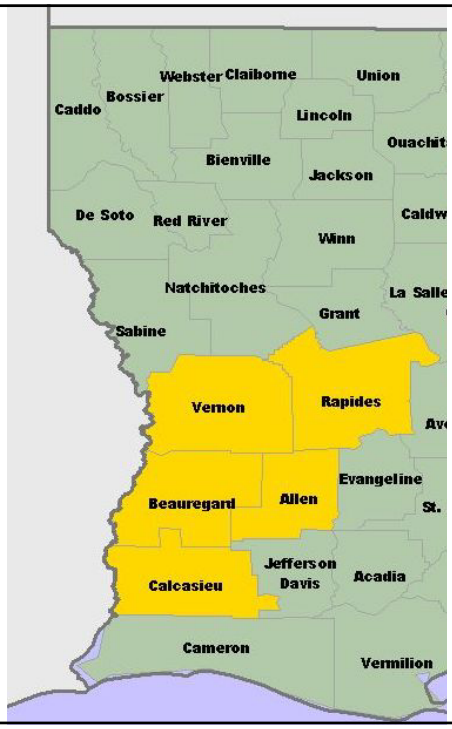
Forest Landowner Study

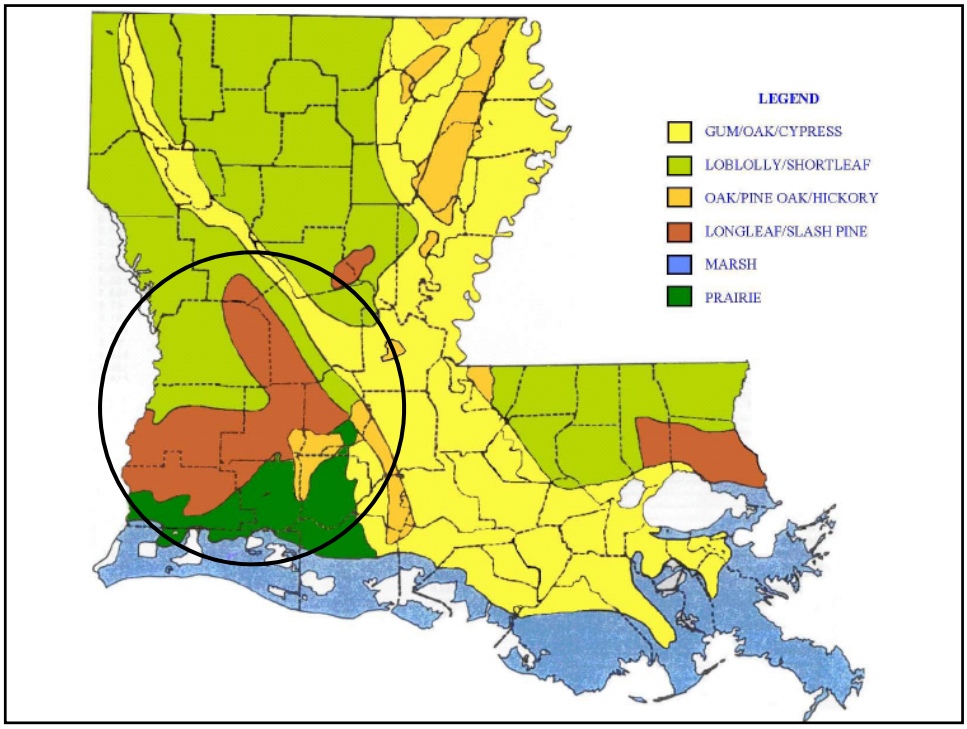
- 99% of landholdings in South are less than 999 acres.
- Non-industrial Private Forest (NIPF) landowners account for 81% of forest land ownership in Louisiana.

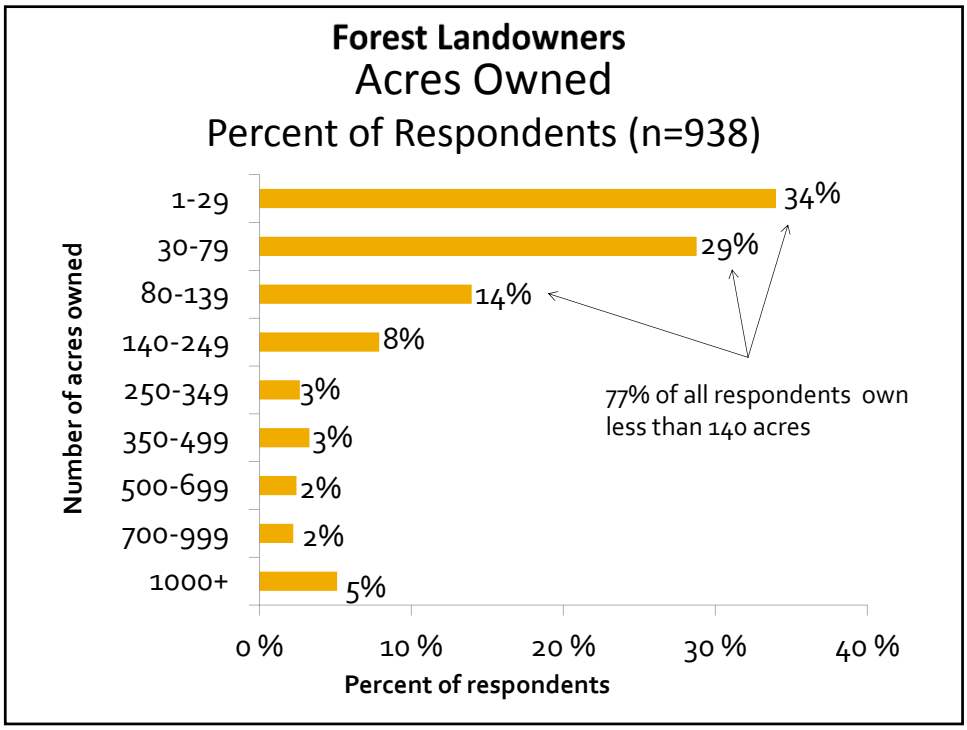
Methods

- Sample was 3,500 randomly selected Small & Medium Enterprise (SME) non-industrial private forest landowners **in SW Louisiana**.
- Sample frame information was from tax rolls and professional databases.
- The method of data collection were mail surveys.
- Adjusted Response Rate = 28.2%

Study Region



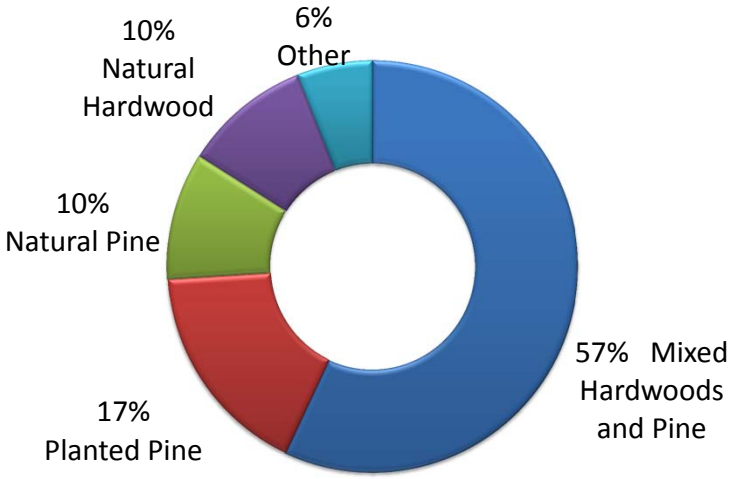

LEGEND
GUM/OAK/CYPRESS
LOBLOLLY/SHORTLEAF
OAK/PINE OAK/HICKORY
LONGLEAF/SLASH PINE
MARSH
PRAIRIE


Forest Landowners
Acres Owned
Percent of Respondents (n=938)
Number of acres owned
1-29
30-79
80-139
140-249
250-349
350-499
500-699
700-999
1000+
34%
29%
14%
8%
3%
3%
2%
2%
5%
77% of all respondents own less than 140 acres
0 %
10 %
20 %
30 %
40 %
Percent of respondents

Forest Landowners

Major Respondent Forest Types

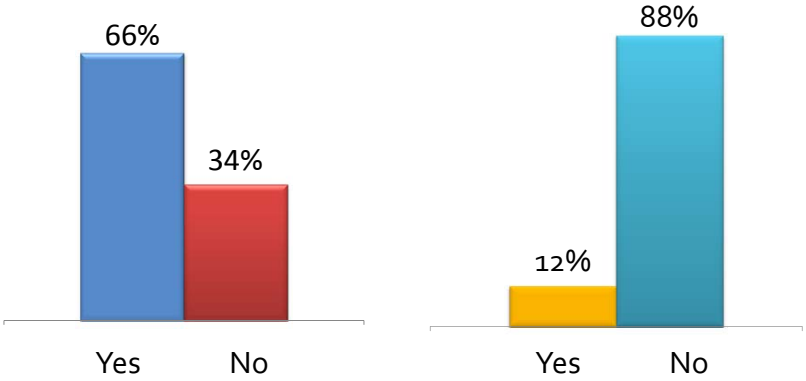
Percent of Forest Type Owned (n=916)



Forest Landowners

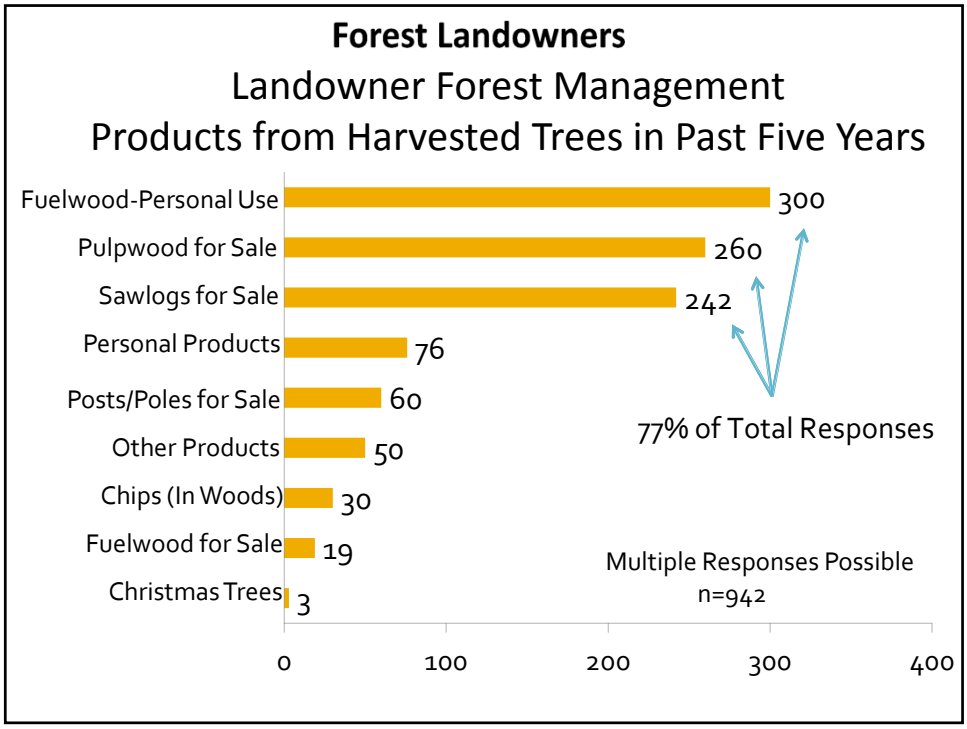
Landowner Forest Management

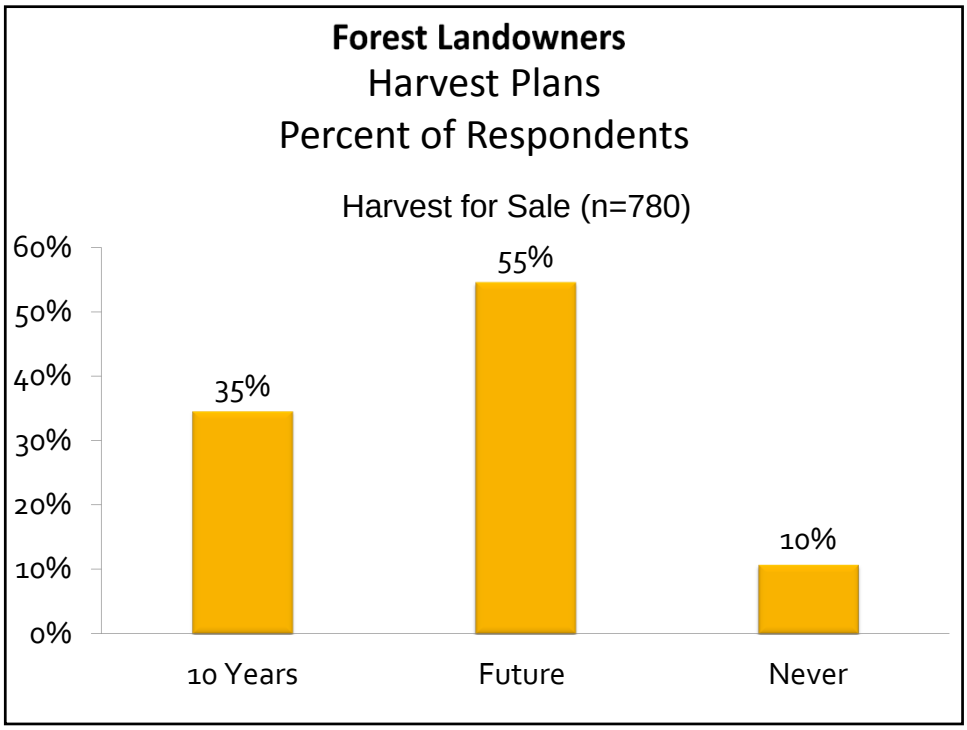
Percent of Respondents

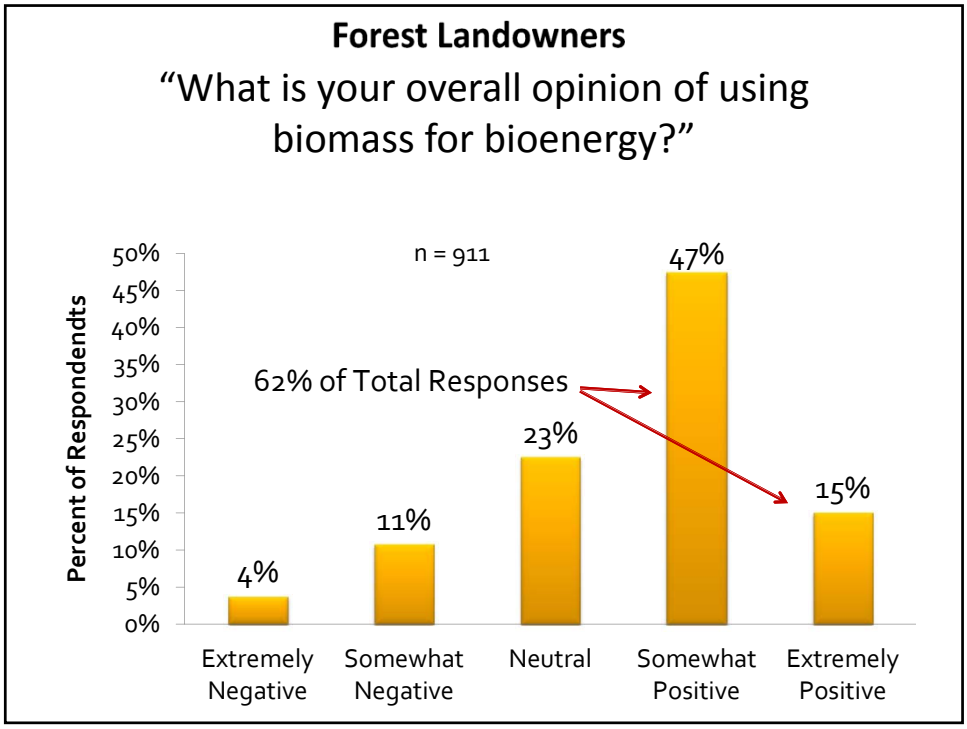


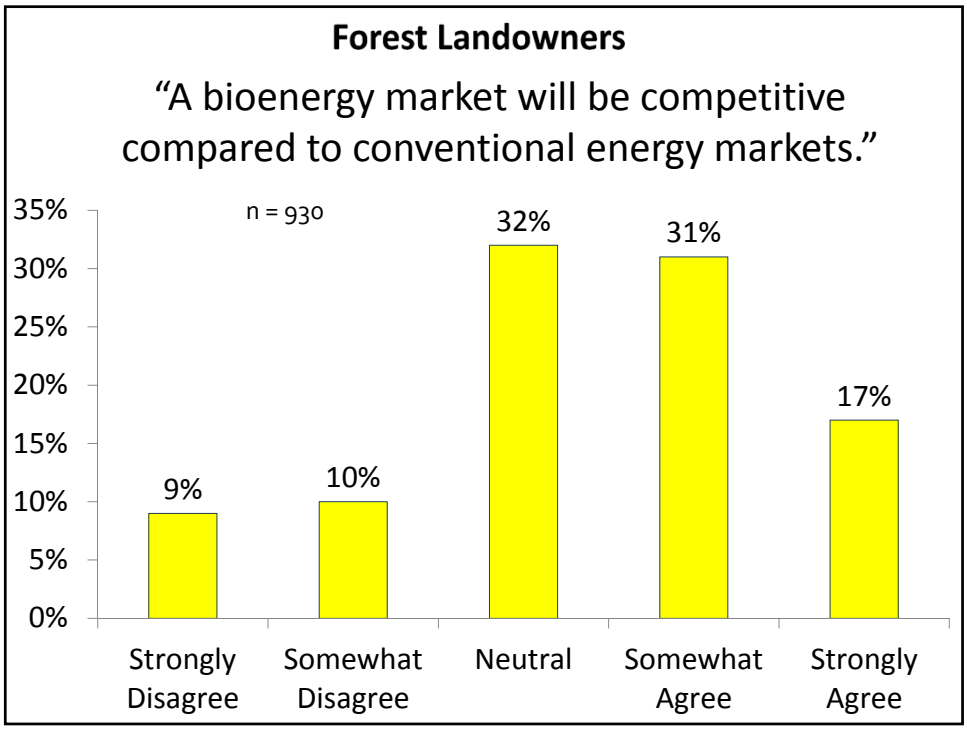
Respondents who have harvested trees from their land (n = 924)

Respondents with a written forestry plan (n=923)


Forest Landowners
Landowner Forest Management
Products from Harvested Trees in Past Five Years
Fuelwood-Personal Use
300
Pulpwood for Sale
260
Sawlogs for Sale
242
Personal Products
76
Posts/Poles for Sale
60
Other Products
50
Chips (In Woods)
30
Fuelwood for Sale
19
Christmas Trees
3
77% of Total Responses
Multiple Responses Possible
n=942
0
100
200
300
400


Forest Landowners
Harvest Plans
Percent of Respondents
Harvest for Sale (n=780)
60%
50%
40%
30%
20%
10%
0%
35%
55%
10%
10 Years
Future
Never


Forest Landowners
"What is your overall opinion of using biomass for bioenergy?"
n = 911
Percent of Respondendts
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
62% of Total Responses
4%
11%
23%
47%
15%
Extremely Negative
Somewhat Negative
Neutral
Somewhat Positive
Extremely Positive


Forest Landowners
"A bioenergy market will be competitive compared to conventional energy markets."
n = 930
35%
30%
25%
20%
15%
10%
5%
0%
9%
10%
32%
31%
17%
Strongly Disagree
Somewhat Disagree
Neutral
Somewhat Agree
Strongly Agree

Forest Landowners

Biomass Perceptions-Percent of Respondents

Survey Questions	Somewhat/ Strongly Disagree	Somewhat/ Strongly Agree
Economically viable technologies exist for converting wood to bioenergy. (n=881)	15%	55%
Wood biomass transportation can be done with traditional logging trucks. (n=903)	20%	47%

Forest Landowners

Respondent Perceptions of Environmental and Market Issues

Harvesting Wood Biomass……	Percent of Respondents that Somewhat/ Strongly Agree
negatively impacts *wildlife habitat* (n=884)	62%*
negatively impacts *air and water quality* (n=909)	31%
negatively impacts *soil quality* (n=908)	30%
will *reduce growth production* of standing timber (n=899)	21%

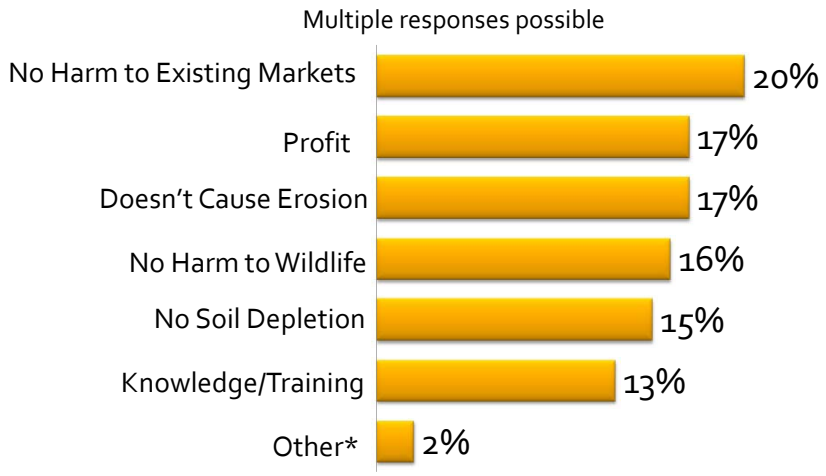
Forest Landowners

Respondent Perceptions of Environmental and Market Issues

	Percent of Respondents that Somewhat/ Strongly Agree
Tax credits should be given to landowners, harvesters, and companies that utilize biomass for bioenergy (n=904)	60%
Subsidies should be provided as an incentive to companies for selling biomass residues from forestry and mill operations (n=901)	42%
Secured loans should be provided to develop and construct commercial scale bio-refineries. (n= 900)	62%

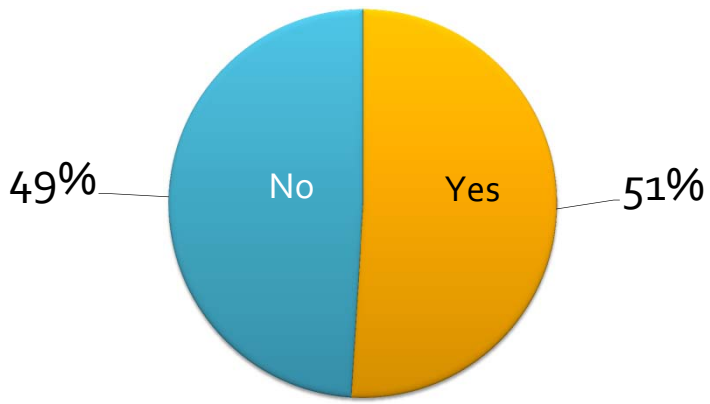
Forest Landowners

Incentives for Participating in Biomass to Bioenergy Markets (n=942) Percent of Respondents



Forest Landowners

"Would you be ***willing to participate*** in management activities specifically geared toward biomass production?"



n = 874

Conclusions

- In general, respondents have a limited level of familiarity with biomass issues (~1/3 have a neutral position for many issues/questions).
- The top prerequisites for respondents to participate in biomass-to-bioenergy markets are:
  1. Does not upset existing sectors that use same raw materials
  2. Profit
  3. Does not harm the environment
- Overall opinion of bioenergy markets is positive.
- 48% of respondents think biomass generated bioenergy is competitive with conventional energy markets.

Forest Landowner Study II

(Statewide Study)

Federal-State Marketing Improvement Program
USDA/Agricultural Marketing Service Grant Award
12-25-G-111

U.S. DEPARTMENT OF AGRICULTURE
AMS
AGRICULTURAL MARKETING SERVICE

Forest Landowner Study II

(Statewide Study)

Objectives:

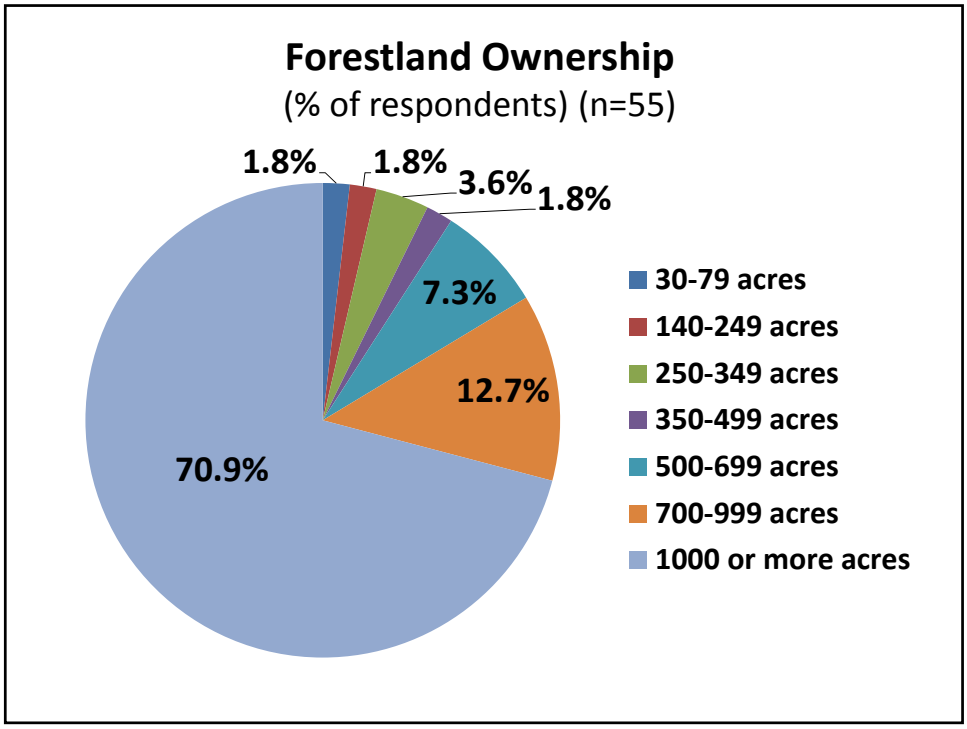
1. To update forest landowners' knowledge of biomass concepts and issues.
2. To understand willingness to participate in bio-supply for energy.

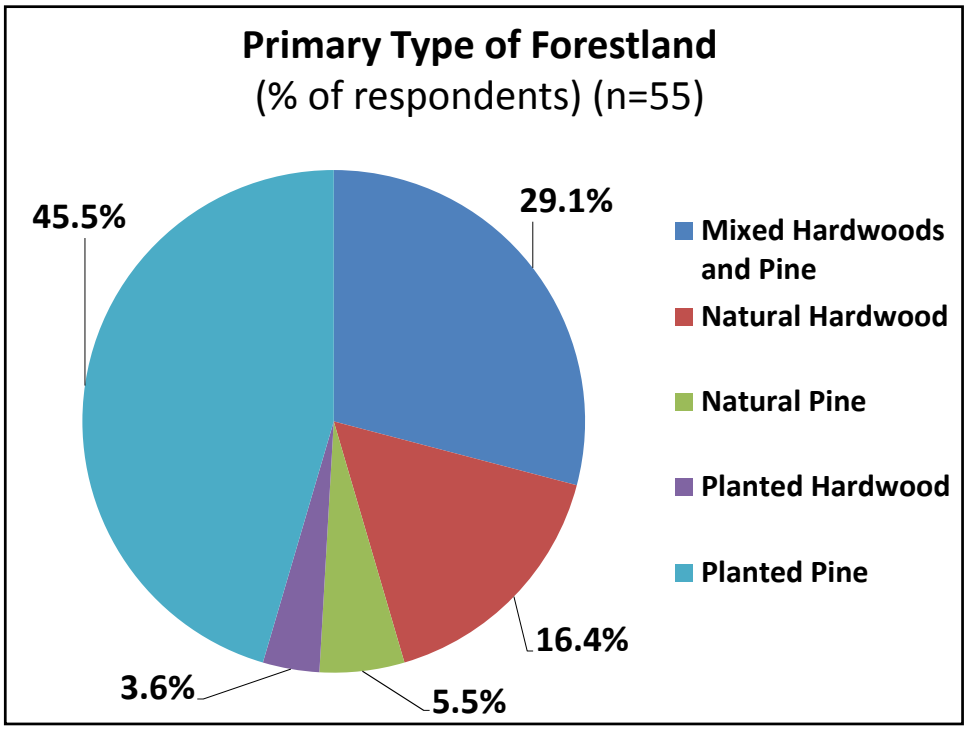
Methods

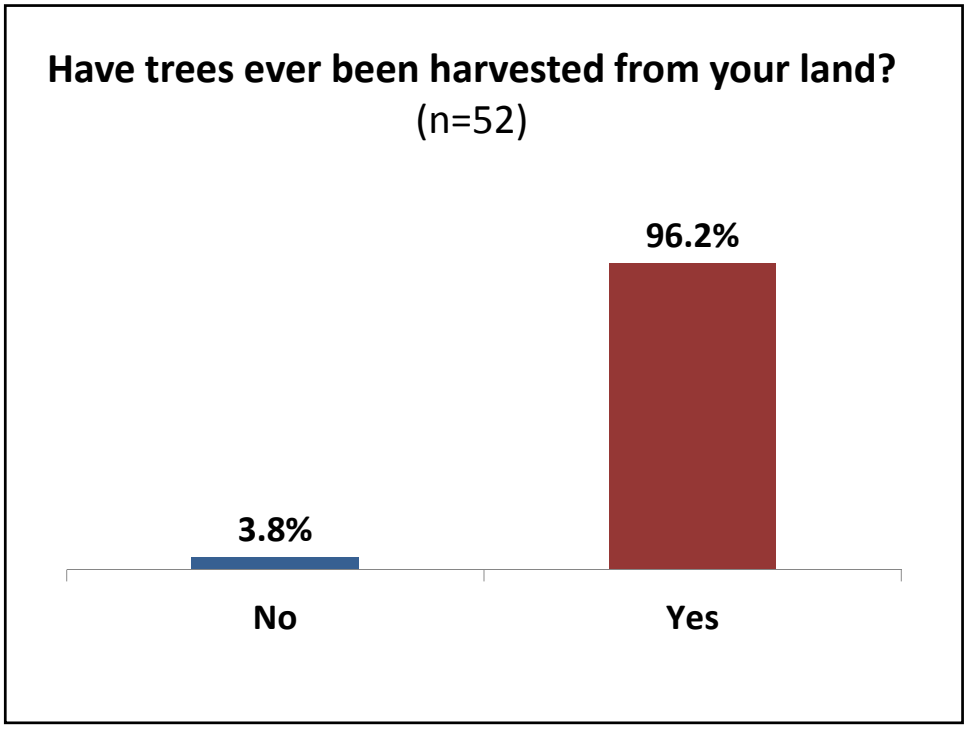
- Sample Frame for the study was 1,000 randomly sampled, forest landowners in Louisiana from 2002 tax rolls.
- The method of data collection were phone and mail surveys.
- 468 were undeliverable/unusable. Only 55 were useable.
- Adjusted Response Rate = 10.3%

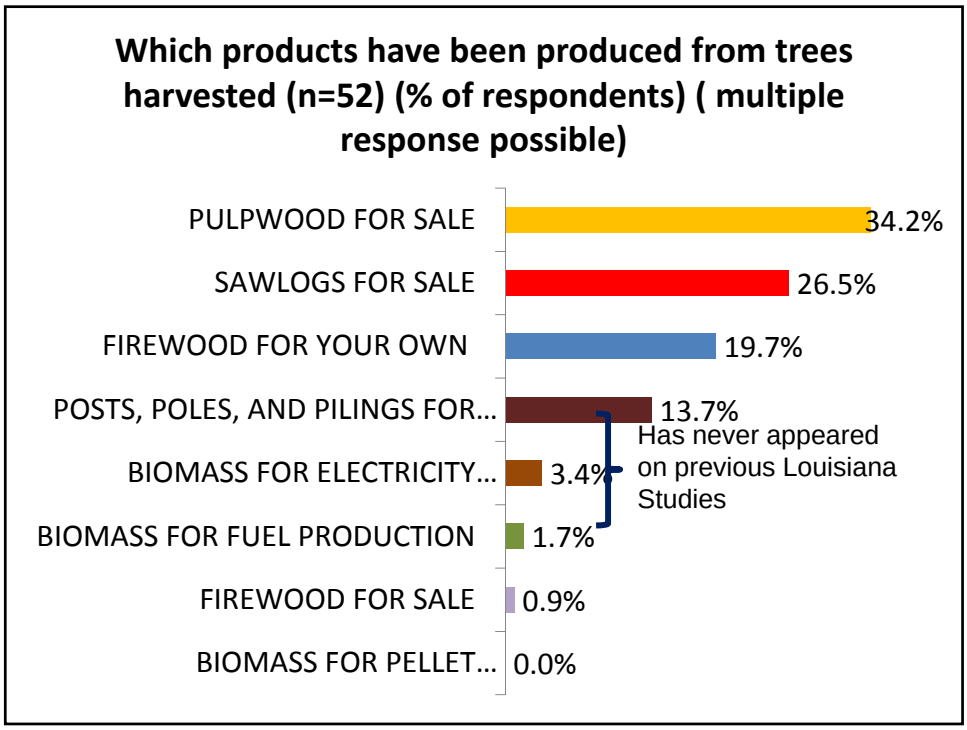
Forestland Ownership: Parishes
Multiple Parishes Possible (n=125)

Parishes	Frquency	Parishes	Frequency
EAST BATON ROUGE	2	LIVINGSTON	1
ALLEN	4	LINCOLN	1
BOSSIER	3	LASALLE	1
BIENVILLE	3	OUACHITA	1
BEAUREGARD	11	PLAQUEMINES	1
CLAIBORNE	3	RED RIVER	3
CALDWELL	1	RAPIDES	7
CADDO	5	ST. TAMMANY	1
CALCASIEU	7	ST. HELENA	3
DESOTO	7	SABINE	5
EVANGELINE	1	TANGIPAHOA	2
E. FELICIANA	14	TERREBONNE	1
W. FELICIANA	6	TENSAS	2
FRANKLIN	1	UNION	1
GRANT	7	VERNON	4
JACKSON	1	WEBSTER	1
JEFFERSON DAVIS	3	WINN	3
MOREHOUSE	2		
NATCHITOCHES	6		


Forestland Ownership
(% of respondents) (n=55)
1.8%
1.8%
3.6%
1.8%
7.3%
12.7%
70.9%
30-79 acres
140-249 acres
250-349 acres
350-499 acres
500-699 acres
700-999 acres
1000 or more acres


Primary Type of Forestland
(% of respondents) (n=55)
45.5%
29.1%
16.4%
5.5%
3.6%
Mixed Hardwoods and Pine
Natural Hardwood
Natural Pine
Planted Hardwood
Planted Pine


Have trees ever been harvested from your land?
(n=52)
96.2%
3.8%
No
Yes

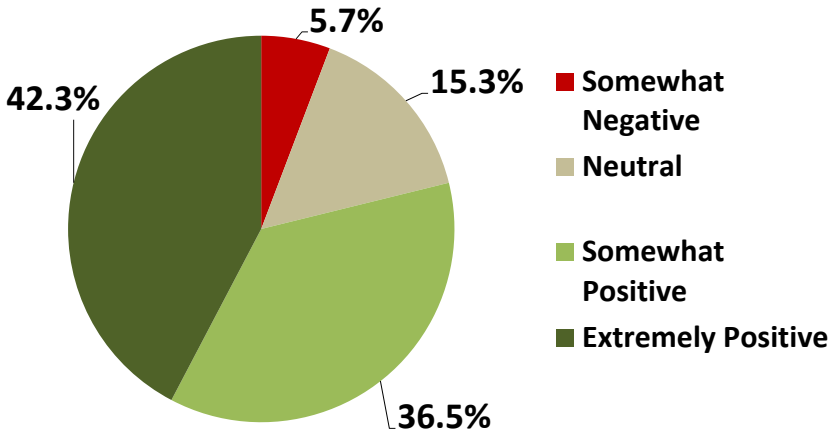

Which products have been produced from trees harvested (n=52) (% of respondents) (multiple response possible)
PULPWOOD FOR SALE
34.2%
SAWLOGS FOR SALE
26.5%
FIREWOOD FOR YOUR OWN
19.7%
POSTS, POLES, AND PILINGS FOR...
13.7%
BIOMASS FOR ELECTRICITY...
3.4%
BIOMASS FOR FUEL PRODUCTION
1.7%
Has never appeared on previous Louisiana Studies
FIREWOOD FOR SALE
0.9%
BIOMASS FOR PELLET...
0.0%

Pulpwood for sold in 2012
620,000 tons

Number of posts, poles, and pilings sold
125,104

Biomass sold for bioenergy
34,000 tons

Overall opinion of using biomass for bioenergy (n=52)



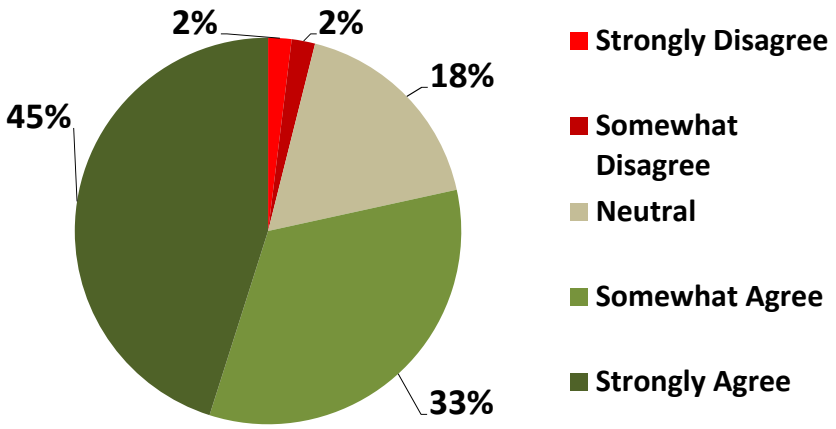
Management Cost involves burning/ removing slash piles or harvesting residue?	%
No	48.1
Yes	51.9

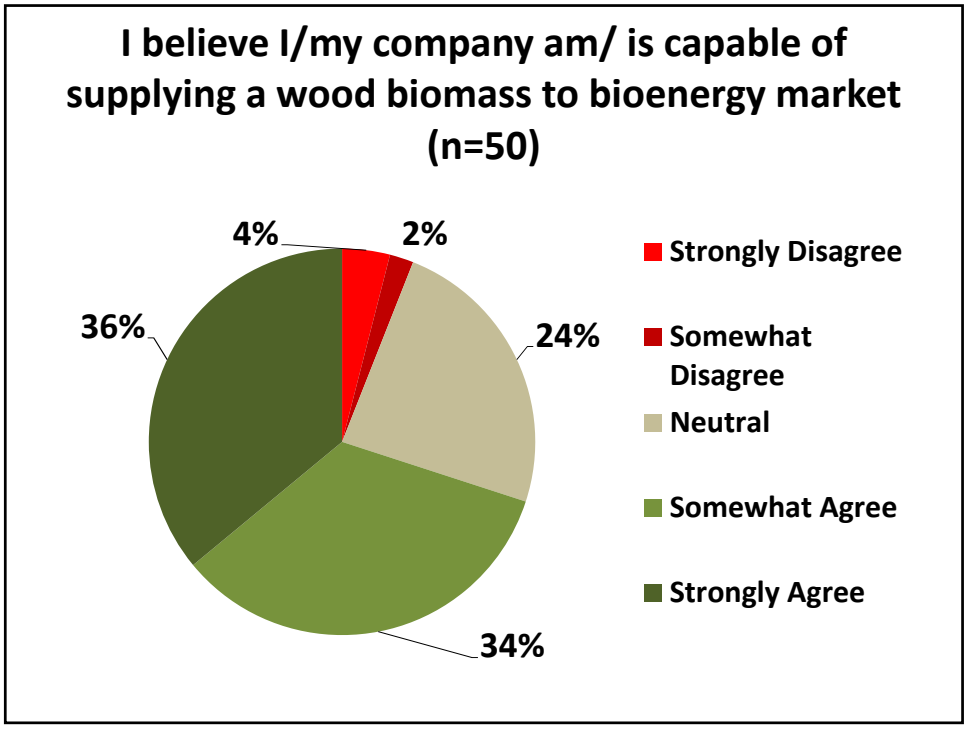
n=52

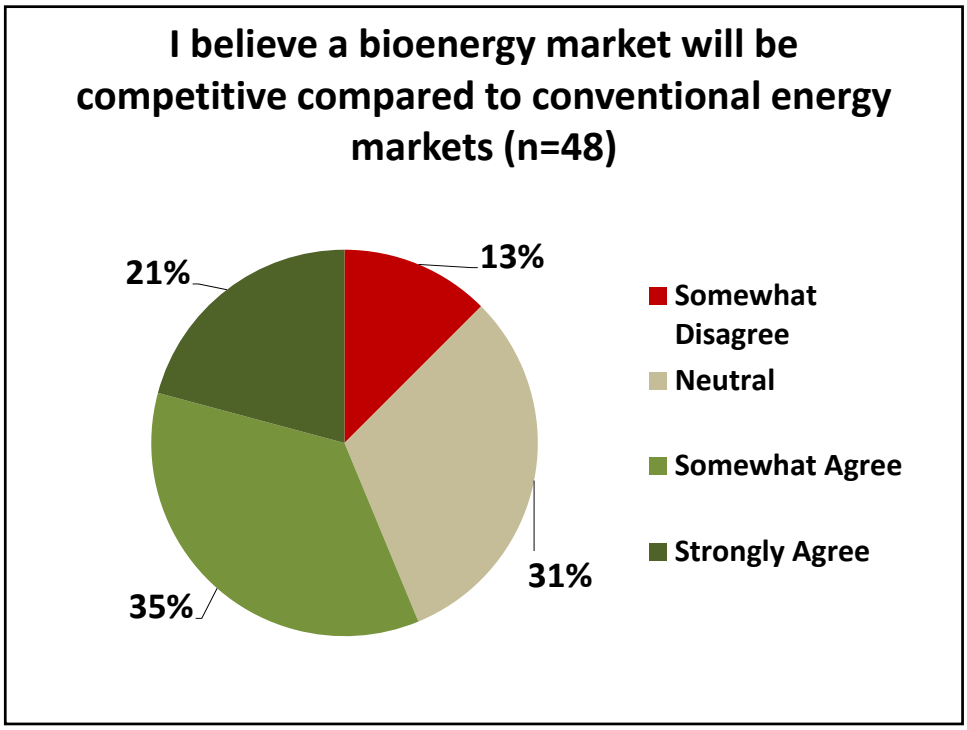
Willing to participate in biomass production	%
No	23.9
Yes	76.1

n=46

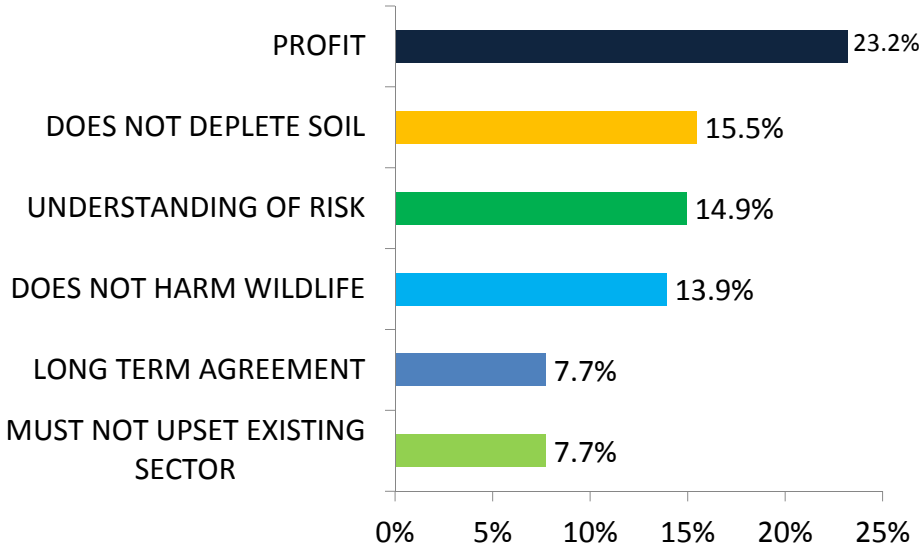
Wood should be used for biomass feedstock for bioenergy markets (n=51)




I believe I/my company am/ is capable of supplying a wood biomass to bioenergy market (n=50)
4%
2%
24%
36%
34%
Strongly Disagree
Somewhat Disagree
Neutral
Somewhat Agree
Strongly Agree


I believe a bioenergy market will be competitive compared to conventional energy markets (n=48)
13%
21%
31%
35%
Somewhat Disagree
Neutral
Somewhat Agree
Strongly Agree

Prerequisites for you to participate in biomass-to-bioenergy markets (n=51) (multiple responses possible)



Estimated Economic Impact of Hypothetical Woody Biomass Plants

1. Electric power plant
2. Wood pellet plant

Hypothetical Biomass Facilities in Louisiana

Electric power plant in Southwest Louisiana using chips/post-harvest residuals as a feedstock

Assumptions

- 55 megawatt
- Construction cost: $250 million
- 25% construction expenditures from within the region
- Feedstock cost: $30/green ton
- Feedstock annual consumption: 600,000 green tons

The Economic Impact of *Construction* of a Woody Biomass Electric Plant in Southwest Louisiana

	Jobs	Earnings	Output
Direct Effect	410	$22.7	$62.5
Indirect Effect	121	$6.0	$20.1
Induced Effect	133	$4.6	$14.7
Total Effect	**664**	**$33.2**	**$97.3**

Earnings and Output Figures are in $ Million (2011)

The Economic Impact of *Operations* of a Woody Biomass Electric Plant in Southwest Louisiana

	Jobs	Earnings	Output
Direct Effect	92	$6.6	$31.1
Indirect Effect	62	$3.0	$13.4
Induced Effect	45	$1.5	$5.0
Total Effect	**199**	**$11.1**	**$49.5**

Earnings and Output Figures are in $ Million (2011)

Hypothetical Biomass Facilities in Louisiana

Wood pellet plant in Southwest Louisiana using clean chips as feedstock (pulpwood, thinnings, energy trees)

Assumptions

- Annual production output: 187,500 tons of pellets
- Construction cost: $200 million
- Feedstock cost: $35/green ton
- Feedstock annual consumption: 375,000 green tons

The Economic Impact of *Construction* of a Wood Pellet Plant in Southwest Louisiana

	Jobs	Earnings	Output
Direct Effect	104	$5.7	$15.8
Indirect Effect	31	$1.5	$5.1
Induced Effect	34	$1.2	$3.7
Total Effect	**168**	**$8.4**	**$24.6**

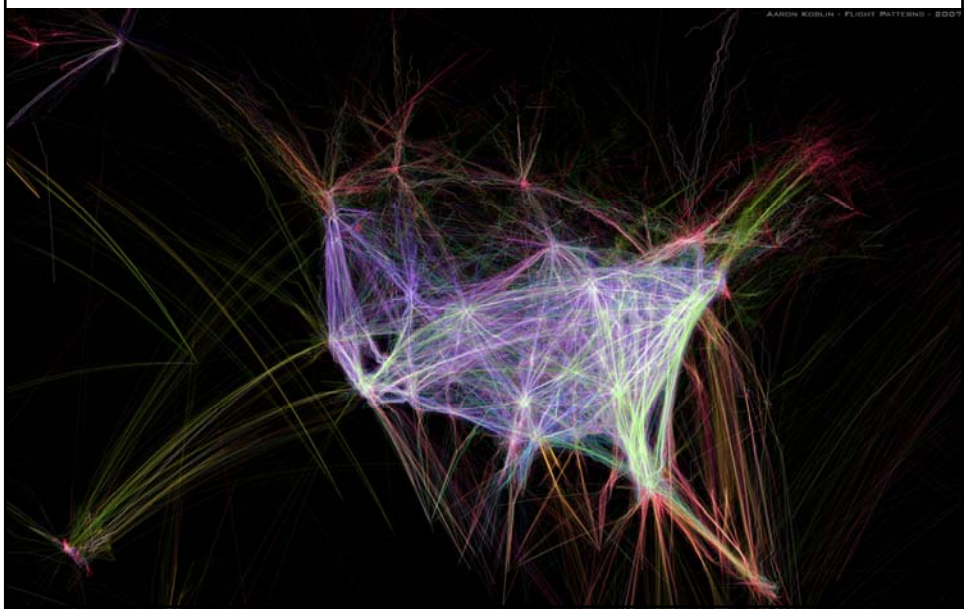
Earnings and Output Figures are in $ Million (2011)

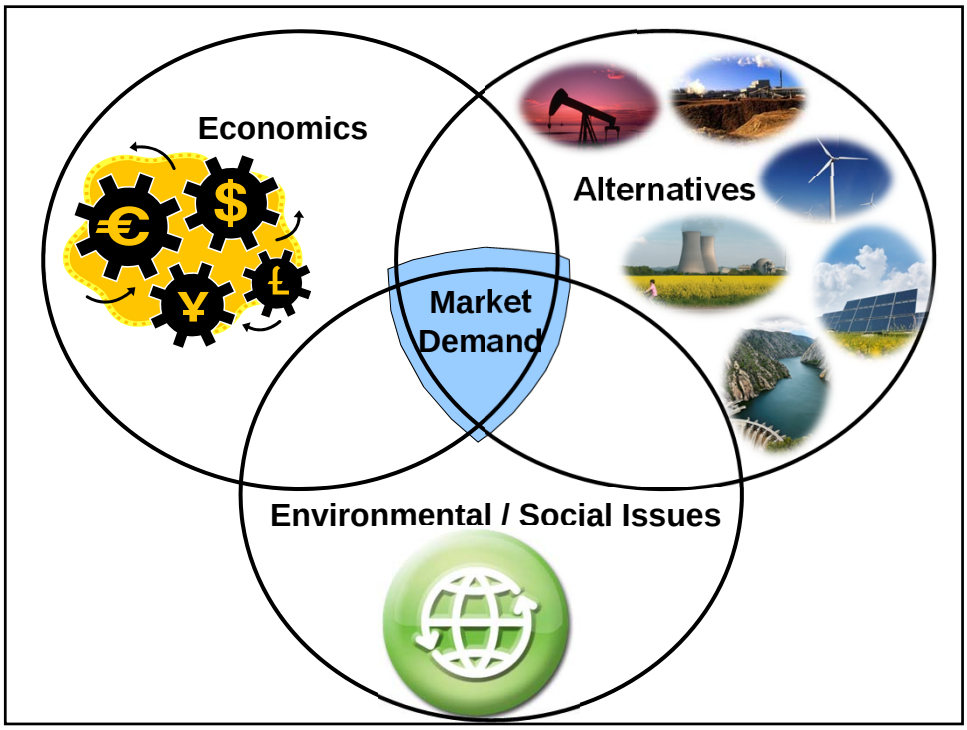
The Economic Impact of *Operations* of a Wood Pellet Plant in Southwest Louisiana

	Jobs	Earnings	Output
Direct Effect	136	$7.6	$36.4
Indirect Effect	116	$5.4	$25.1
Induced Effect	62	$2.1	$6.8
Total Effect	**313**	**$15.1**	**$68.3**

Earnings and Output Figures are in $ Million (2011)

Issues & Challenges





Effects on Forest Sector Structure?

- Federal and state mandates, if fully implemented, would lead to over-harvesting of forests in the United States and are unrealistic.
- Growth for wood-energy industry will be constrained by sustainable harvest levels and wood fiber prices.

Source: RISI. Sept. 23, 2008 (PRNewswire)

Effects on Forest Sector Structure?

- U.S. demand for wood fiber from these emerging biomass markets is expected to rise from 2 million tons in 2008 to at least 13.5 million tons in 2020.
- Higher prices for traditional biomass inputs (chips).
- Demand will be driven by a) wood-burning power companies that produce and sell electricity to public utilities and; b) increasing wood pellets exported to Europe.
- Biomass → cellulosic ethanol for transportation fuel will also impact the forest products industry.

Source: Forest2Market. 2008

Concluding Observations

- Development of the wood energy sector is growing (slowly) in the U.S.
- Investors are opportunistic and are seeking competitive advantage.
- First mover advantage is significant; finite feedstock supply.
- Increased demand for wood biomass = increased wood biomass/chip prices.
- Subsidies and other policy instruments can create an uneven playing field.
- Forest landowners are examining restructuring their business portfolios to include biomass→ energy.
- *But…The wood energy industry trajectory is uncertain* in light of current economic conditions and availability of capital in the U.S.

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Louisiana Forest Products Development Center

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Thank You

Questions??? Discussion!!!

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BIOMASS AS A RENEWABLE ENERGY SOURCE FOR LOUISIANA & MISSISSIPPI

By Michael Blazier, Ph.D., Forestry Research Project Leader, Hill Farm Research Station, Louisiana State University Agricultural Center; Glenn Hughes, Ph.D., Extension Forestry Professor, Coastal Research & Extension Center, Mississippi State University; and Richard Vlosky, Ph.D., Director and Crosby Land and Resources Endowed Professor of Forest Sector Business Development, Louisiana Forest Products Development Center, Louisiana State University Agricultural Center.

THERE IS INCREASING INTEREST IN RENEWABLE ENERGY.

Louisiana and Mississippi have abundant and reliable sources of biomass that can be used to produce renewable energy. Biomass includes trees, grass, agricultural crops and residues, and other plant-derived sources. This document summarizes:

1. Reasons for the interest in renewable energy both nationally and at the state level

2. Reasons that Louisiana and Mississippi are well-positioned to provide renewable energy from biomass.

3. Technologies for converting biomass to energy.

WHY IS THERE INTEREST IN BIOMASS?

The United States currently depends heavily on fossil fuels, much of which comes from foreign sources. According to the Energy Information Administration, in 2011, fossil fuels accounted for 77.6% of all energy produced in the U.S. Nuclear and renewables accounted for 10.6% and 11.8%, respectively. There are several concerns about this reliance on fossil fuels, including:

Energy insecurity

Approximately 60% of our fossil fuels, particularly crude oil, are imported, with approximately 30% of the crude oil coming from relatively politically unstable nations in the Middle East, Latin America, and Africa (Flintoff 2012). Some of these countries from which the U.S. imports oil frequently have interests that are neutral or antagonistic to those of the United States, and many of us remember the Oil Embargo of the 1970s. Another embargo or similar event could have similarly detrimental impacts on the U.S. economy.

Price volatility

Energy prices have been volatile since the early 2000's (Murphy 2009) due to shifts in supplies, consumption, financial markets, and government policies. Emerging economies are driving the demand for oil, and China is currently the world's number two user of oil. With international demand for fossil fuels increasing as the emerging economies recover from the economic crisis, fossil fuel, particularly crude oil, prices are expected to increase.

High unemployment

The U.S. is technically out of the Great Recession, but unemployment has remained stubbornly high, causing a sense of unease among consumers. Politicians at state and national levels are seeking ways to create and maintain domestic jobs. Locally- produced energy, including biofuels, has the potential to result in new jobs. Biofuel and bio-products production can create jobs involved in growing, harvesting, transporting, and processing biomass into a host of products.

Climate change concerns

Public concerns about climate change have escalated in recent decades due to a high number of years with record heat, severe droughts, and increased frequency and severity of extreme weather events such as hurricanes. A large body of research has produced evidence that the earth's climate is changing and that burning of fossil fuels has contributed to these changes. Although any specific weather event is not attributable to climate change, global increases in temperatures and extreme weather events are consistent with climate models that predict a changing climate.

The U.S. will depend on fossil fuels for the foreseeable future. However, it is clear that there are opportunities to replace or augment certain fossil fuels with other fuel sources that are renewable and sustainable. Renewable energy sources include wind, solar, biomass, hydropower, and geothermal. These are not, however, uniformly distributed across the United States. Each renewable fuel source has opportunities for generating energy that are geographically based. Wind and solar both have significant opportunities in the Southwest, whereas the Southeast has limited capacity for commercial application of wind and solar power. However, the availability of biomass is a strength of Southeastern states.

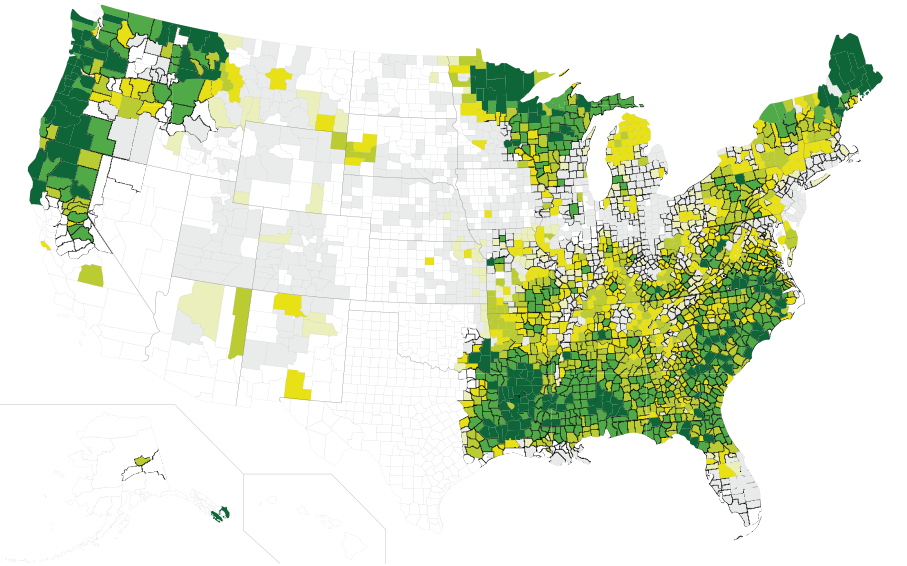
WHY ARE LOUISIANA AND MISSISSIPPI IMPORTANT?

- Central location
  within the United States, with good port access.
- Considerable biomass resources from forests
  LA and MS are 48% and 65% forested, respectively, and both states are growing more timber than is being harvested.
- Substantial biomass sources from agricultural residues
- Expertise in moving and handling wood and agricultural products
- Ability to document the sustainable nature of biomass resources

U.S. FOREST RESIDUE

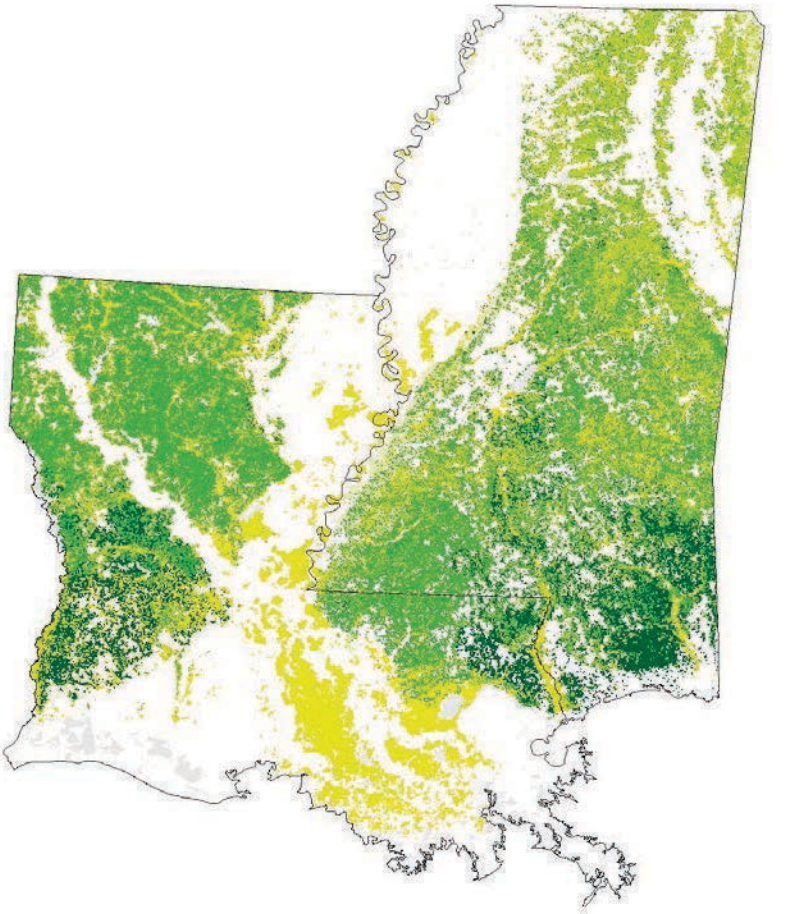
Thousand Dry Tonnes/Year

- > 100
- 50 - 100
- 25 - 50
- 10 - 25
- 5 - 10
- < 5
- Not Estimated



LOUISIANA & MISSISSIPPI FOREST COVER

- Longleaf-slash pine
- Loblolly-shortleaf pine
- Oak-pine
- Oak-hickory
- Oak-gum-cypress
- U.S. non-forest
- Lakes



HOW DOES BIOMASS TO ENERGY WORK?

Any biomass to energy (or biomass to chemicals) process involves three basic components: the FEEDSTOCK, the CONVERSION PROCESS, and the FINAL PRODUCT. With multiple feedstocks, conversion processes, and products, the biomass-to-energy process is more complex than many people realize, and for several of these types of processes economically viable industrial-scale facilities capable of conducting them have not yet been successfully developed. See **Figure 1** below.

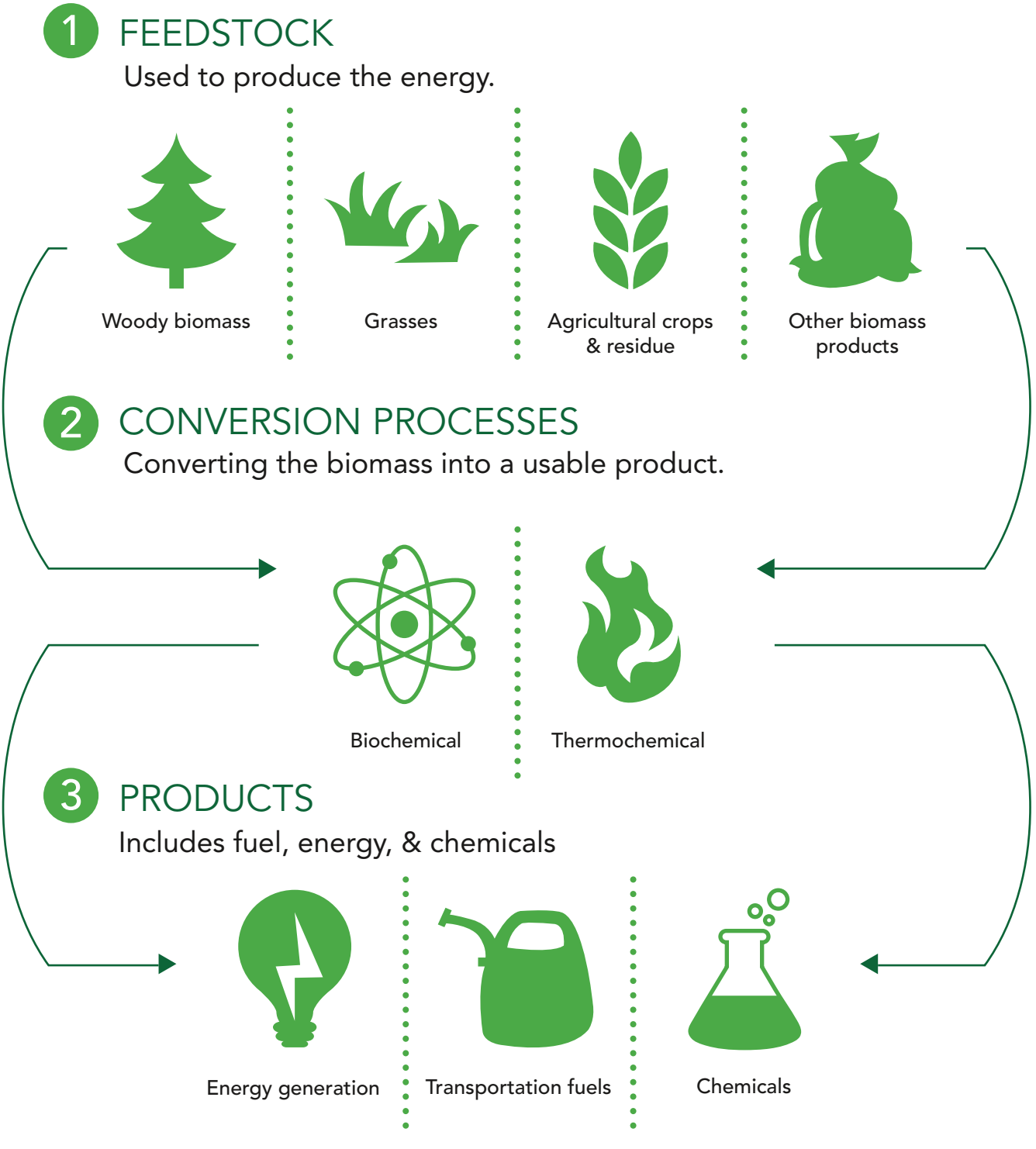


Figure 1 BIOMASS TO ENERGY PROCESS

BIOMASS FEEDSTOCKS

Several different sources of biomass are available and can be grown in Louisiana and Mississippi for conversion into fuel, energy, or chemicals. These include trees, grasses, agricultural crops and residues, municipal solid waste, and other products.

Woody sources of biofuel can be obtained from plantations grown expressly as energy feedstock (short-rotation woody crops), thinnings used to remove low-value trees so the remaining trees can increase in value, residual material from harvesting operations, urban tree trimmings, and mill residues. Most trees in the Southeast are grown to produce higher value products such as sawtimber, plylogs, and poles. Biomass, like pulpwood, is a low-value forest product. It would be economically undesirable for private landowners to convert forestland to biomass-only production, as this sacrifices economic returns from high-value products and reduces amenity values that are important to landowners. However, biomass from trees can be acquired through traditional forest management practices and used to produce energy, fuels, or chemicals. Unlike fossil fuels, trees are renewable resources, so trees harvested can be regrown to produce more biomass.

All of the woody biomass sources noted above can be used to produce biofuels, but to varying degrees based on availability. Currently, the availability of woody biomass from most to least available is as follows:

Thinnings

These are partial harvests of pine and hardwood forests in which smaller, poorer trees are removed from the forest (**Figure 2**). The greatest opportunity from a sheer volume standpoint is with first thinnings of pine plantations, which can yield on average 40 tons per acre. This is entirely a low-value product, and all of the wood can be used for biomass-to-energy purposes. The traditional market for thinned trees is pulpwood for paper-making, and for much of the Southeast this market is expected to continue, which is greatly beneficial to landowners and the forest products industry. However, some regions in the Southeast, including Louisiana and Mississippi, are now bereft of good markets for thinned trees due to paper mill closures, and these regions are attractive to biofuel investors looking to procure thinned trees for their processes.

2 A thinning operation in which small-diameter trees are being chipped for electricity generation.
Photo by Eric Taylor, Texas A&M Agrilife Extension Service.

❸ Urban wood waste.
Photo by Eric Taylor, Texas A&M Agrilife Extension Service.

Forest Residue

This category includes tree limbs and tops left over from thinning and clearcut operations. Around 17% of the volume of trees harvested in these operations remains onsite as forest residue. This residue is currently a mostly untapped resource. The problem with this category of biomass is the significant cost incurred in collecting the biomass, as well as the contamination with soil particles, particularly sand, that can reduce the lifespan of machinery used to turn the trees into chips.

Urban Tree Removals

Urban tree trimmings (**Figure ❸**) is a largely untapped resource, as most biomass from this source is generally landfilled. Working with communities, methods can be developed to collect, load, transport, and utilize this biomass for beneficial uses are possible.

Mill Residue

Mill residues are woody biomass that is wholly or partially chipped at paper mills, and this form of woody biomass is the most readily usable for conversion to energy or chemicals. However, the vast majority of mill residues is already being used by paper mills to generate electricity or to produce heat used to dry lumber.

Short-Rotation Woody Crops

Though there are presently few areas of trees planted as dedicated energy crops, this represents a significant opportunity. Marginal agricultural areas not currently supporting agricultural crops are candidates for dedicated energy crops, and the management of fast-growing hardwoods will produce significantly more biomass than traditional pine or hardwood management. These fast-growing hardwoods, such as cottonwood, sycamore, black willow, and eucalyptus, can reach a harvestable size for bioenergy feedstocks in 3 to 8 years and yield as much as 10 to 20 dry tons per acre per year (**Figure ❹**).

4 A one-year-old *Eucalyptus amplifolia* (cabbage gum) plantation in southeast Texas.
Photo by Michael Blazier, LSU AgCenter.

5 Mature switchgrass in northwest Louisiana.
Photo by Mary Ann Von Osdell, LSU AgCenter.

Grasses

Grasses that can be grown as biofuel feedstocks include native species such as switchgrass (**Figure 5**) or species such as miscanthus, which can generate as much as 10 to 15 dry tons per acre and grow to a height of 12 feet. Grass production on a per-acre basis is generally greater than that of trees because all of the biomass produced annually is available for harvest.

Agricultural Crops

There are several agricultural crops that can be grown in Louisiana and Mississippi to produce biofuels. Soybeans and corn are already abundantly grown, and a portion of these crops are being used to produce biodiesel and ethanol, respectively. Sugarcane is grown extensively in southern Louisiana, and it has great potential for producing ethanol and emerging biofuels such as green gasoline and jet fuels (**Figure 6**). Sweet sorghum can be grown throughout much of Louisiana and Mississippi to produce biofuels similar to those of sugarcane. Agricultural crops, though providing a significant amount of feedstock currently used in the production of ethanol, have generated concern. The concerns include using a food source to produce energy, thereby reducing the amount of food available for animal or human consumption and possibly increasing food prices. Byproducts of agricultural crops can also be used to produce energy and bio-products, and these biomass sources do not compete with the human and animal food markets.

6 Energy cane harvesting in southeast Louisiana.
Photo by Michael Blazier, LSU AgCenter.

BIOMASS CONVERSION TECHNOLOGIES

Production of energy, fuel, or chemicals from biomass requires using conversion technologies that are feasible both technically and economically. Some technologies have existed for decades and are feasible. Other technologies are in the research and development phase, and while promising, are not currently feasible from a technical and/or economic standpoint.

The two basic conversion technologies are biochemical and thermochemical conversion of biomass. Biochemical conversion involves the use of a biological process, such as fermentation, to break down complex chemicals into simpler and more usable forms. A well-known example of biochemical conversion is the processing of grains into alcoholic drinks such as beer and wine. Building a fire is a simple example of a thermochemical conversion process. Here, complex compounds are broken down by heat and the resulting chemical reactions release energy stored in wood to be used for heating, cooking, or other uses.

Biochemical Conversion

Processed biodiesel and ethanol are the primary liquid fuels that can be derived from biochemical processes. The biochemical process for biodiesel consists of extracting oils and fats from the seeds of plants and then converting the oils and fats into fatty acid methyl esters, also called biodiesel. Biodiesel is commonly manufactured using soybeans, but there are other plants such as sunflower and Chinese tallow tree under investigation for their potential.

The conversion process for ethanol involves breaking down biomass into sugars using enzymes or chemicals, and then later fermenting the sugars into ethanol. This conversion is operationally feasible for corn starch and juices from sugarcane and sweet sorghum. For woody biomass and grasses the conversion is much more sophisticated because the sugars must be broken down from the plant biomass rather than the seed or juice. Ethanol produced from such a process is called cellulosic ethanol. So far there have been no operational large-scale biofuel plants that convert woody or perennial grass biomass into biofuels using biochemical conversion processes. A wood-based cellulosic ethanol plant in Georgia was established, but it quickly went out of production due in part to higher than expected costs for trees. Efficiency and cost issues have prevented the commercial viability of large-scale biochemical conversion of woody biomass.

Thermochemical Conversion

Torrefaction

In the torrefaction process, water and volatile compounds are removed from wood using a controlled carbonization process (high heating in the absence of oxygen) that produces low-mass, high-energy material known as "torrefied biomass" or "bio-coal". The torrefaction process results in a dry product that can be used to produce an energy-dense fuel with all the logistical benefits of a low-volume, high-energy product. Interest in torrefaction has been growing among power utility, cement, and steel production sectors. Wood is typically used as feedstock for the torrefaction process.

Pellets

Pellets are heating fuels made by compressing biomass. Pellets can be manufactured from wood biomass such as sawdust and woodchips or perennial grasses such as switchgrass. Pellets are used for domestic heating and for combined heat and power plants due to their high energy content. Advantages of pellets for energy beyond their energy content include their uniform size and shape (which facilitates automated handling) and the ability of pellet production facilities to adjust for varying scales of demand and biomass supply (Alavalapati et al. in press).

Demand for wood pellets has emerged and rapidly grown in European countries such as Denmark, Italy, Belgium and the Netherlands, with 10.8 million metric tons consumed in 2010 (Gibson 2011). By 2020, pellet consumption of Europe is projected to grow to 23.8 million metric tons, and global pellet consumption is projected to be 44.9 million metric tons by 2020 (Gibson 2011). The global number of pellet production facilities has significantly increased recently, especially in Europe and North America. Traditional wood pellet exporters such as Canada and Russia are facing competition from United States plants. Some of the largest pellet producers in the world are being established in the Southeast United States, with 24 mills contributing about 46% of the country's 2 million Mg annual capacity (Pellet Fuels Institute 2010; Spelter and Toth 2009). Rather than using only sawdust from mills for producing pellets, these new plants also use whole trees and chips.

Gasification & pyrolysis

Advanced thermal technologies such as gasification and pyrolysis are technically feasible, but no commercially viable large-scale gasification or pyrolysis plants have yet been built in the United States. Gasification is a high-temperature process done in the presence of limited oxygen in which biomass is used to produce heat, electricity, methanol, ethanol, and syngas. Pyrolysis is a type of gasification technique that, at higher temperatures in the absence of oxygen, converts biomass to bio-oil and charcoal. Bio-oil can be used as fuel for heating, electrical applications, and production of chemical commodities (Faaij and Domac 2006). Converting biomass to bio-oil increases energy density, which improves its transportability. The disadvantages of bio-oil are its low heating value, poor ignition performance, and thermal instability (Jackson et al. 2010).

1 Enviva Pellets | Amory, MS
Capacity to convert 100,000 tons of woody biomass per year.

2 Enviva Pellets | Wiggins, MS
Capacity to convert 150,000 tons of woody biomass per year.

3 KiOr | Columbus, MS
Uses wood chips to produce gasoline and biodiesel.

4 BTH Quitman Hickory | Quitman, MS
Produces 80,000 dry tons per year of terrified wood pellets.

5 Recast Energy | Wiggins, MS
Uses wood chips to produce 52,000 pounds/hour of steam for use in an adjacent Clearwater Paper mill.

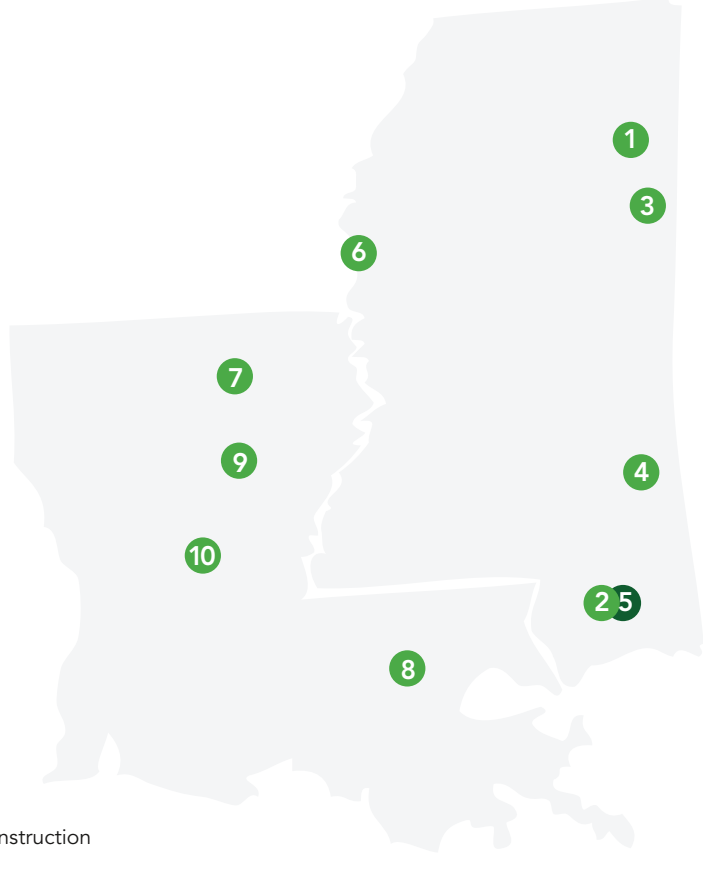
6 Scott Biodiesel | Greenville, MS
Produces 15 million gallons of biodiesel per year from corn oil (75%) and used cooking oil (25%)

7 Bayou Wood Pellets | West Monroe, LA
Production capacity is 60,000 metric tons/year from hardwood and softwood - Operational

8 Biomass Secure Power, LLC | Baton Rouge, LA
Production capacity is 1,000,000 metric tons/year from softwood - Proposed

9 German Pellets | Urania, LA
Production capacity is 1,000,000 metric tons/year from softwood – Under Construction

10 Sundrop Fuels | Alexandria, LA
Production of drop-in biogasoline from wood biomass – Under Construction



SUMMARY

Increasing global demands and prices for energy and public policies are fostering the development markets for renewable fuels, and Louisiana and Mississippi have the natural resources and infrastructure for producing fuels from biomass. Some bioenergy processes, like ethanol, biodiesel, and pelletizing, are now underway and in development at the industrial scale in Louisiana and Mississippi, and there are several more facilities in development. Landowners in the region may see new market opportunities for small-diameter trees, forest and agricultural residues, new crops and varieties to be grown for biofuel, and crops that can be grown on soils of suboptimal quality for conventional crops emerge in the years ahead.

References

Abt, R.C., Alavalapati, J., Lal, P., Susaeta, A., and D. Wear. In press. Forest Biomass-Based Energy. In: D.Wear, and J. Greis (Eds.) Southern Forest for Futures Project. General Technical Report. Southern Research Station, NC: U.S. Department of Agriculture, Forest Service.

Faaij, A., and J. Domac. 2006. Emerging international bioenergy markets and opportunities for socio-economic development. Energy for Sustainable Development. 1:7–19.
Flintoff, C. 2012. Where does America get oil? You may be surprised. Available online at: http://www.npr.org/2012/04/11/150444802/where-does-america-get-oil-you-may-be-surprised

Gibson, L. 2011. Conference addresses burning questions. Pellet Mill Magazine. 1(2):25-28.
Jackson, S., Rials, T., Taylor, A.M., Bozell, J.G., and K.M. Norris. 2010. Wood to energy: a state of the science and technology report.University of Tennessee and U.S. Endowment for Forestry and Communities Report. Tennessee: The University of Tennessee.

Murphy, C. 2009. Why oil prices are so volatile. Available online at: http://www.cbsnews.com/8301-505123_162-51337483/why-oil-prices-are-so-volatile/

Pellet Fuels Institute. 2010. Pellet Fuels Institute Homepage. Available online at: http://www.pelletheat.org/3/ residential/fuelAvailability.cfm

Spelter, H. and Toth, D. 2009. The North American wood pellet sector. Research Paper RP-FPL-656.USDA Forest Service, Forest Products Laboratory, Madison, WI. 21 p. www.fpl.fs.fed.us/products/publications/specific_pub.php?posting_id=17545

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OPPORTUNITY NUMBER: USDA-AMS-FSMIP-2010

PROJECT TITLE

Identifying Opportunities for Forest Sector Companies to Participate in the Wood-Based Bio Revolution: A Supply Chain Insertion Approach

The Louisiana Forest Industry and Bio Fuels
Maps and Findings

Description of the Sample

A survey of forest land owners and primary manufacturers was done to gather information for this study. A list of addresses was obtained from the Louisiana Forest Products Development Center. It contained 500 forest owners and 1,200 manufacturers. The focus of the study was on the locations of forest product buyers and their attitudes toward biofuels development. Primary manufacturers were also surveyed on their customers in the biofuels arena for their use of wood waste as a biofuel and their attitudes toward biofuels facilities. Each owner was mailed a survey, and later emailed and called if their numbers and email addresses could be found. The same was done for the primary manufacturers. There were 94 forest landowner responses that included 341 responses for customer locations. The survey asked for their top three customers each for saw logs, pulp, poles, and bio fuels. There were 27 responses from forest products manufacturers listing 30 top customers for biofuels. All totaled there were 53 biofuel responses when forest owners and manufacturers replies were combined for biofuel customers.

Explanation of Map Symbols

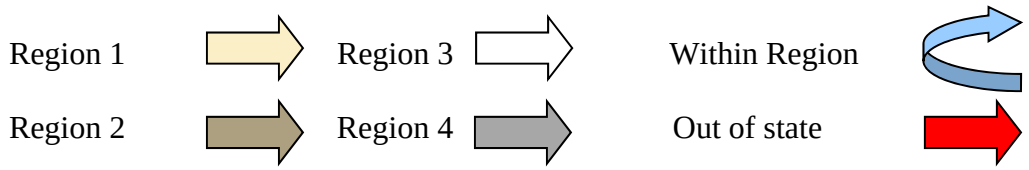
Louisiana's 64 parishes are divided into four regions. Each is in a different color. The survey received responses from 341 land holdings in 40 of these parishes. All of the parishes not represented run along the Mississippi river or were on or close to the Gulf Coast. The division of the responses is shown below. As can be seen, the Northern region reflects the most activity, followed by the Central, South East, and South Western parts of the state.

				Total
North 151	Central 96	South East 62	South West 32	341

In order to provide a visual of the survey data, we used different symbols, colors, and sizes for each map to convey information. The sizes of each symbol correspond with the percentage distribution of regional sales locations. Each percentage range was chosen based on the quantity of survey data. We did not include data for the less than 5% category to prevent cluttering the map. The five ranges have 15% increments because most of the data lies within these ranges.

Second, the color of the symbols indicates the location of the customers. For example, the second smallest red arrow pointing away from Region 1 in the south east signifies that between 21% and 35% of the customers are out of state. Here's another example to clarify: the smallest blue curved arrow in the south west region 2 represents that approximately 15-25% of the customers of the region's suppliers are in the same region.

Symbol Colors



Symbols Sizes

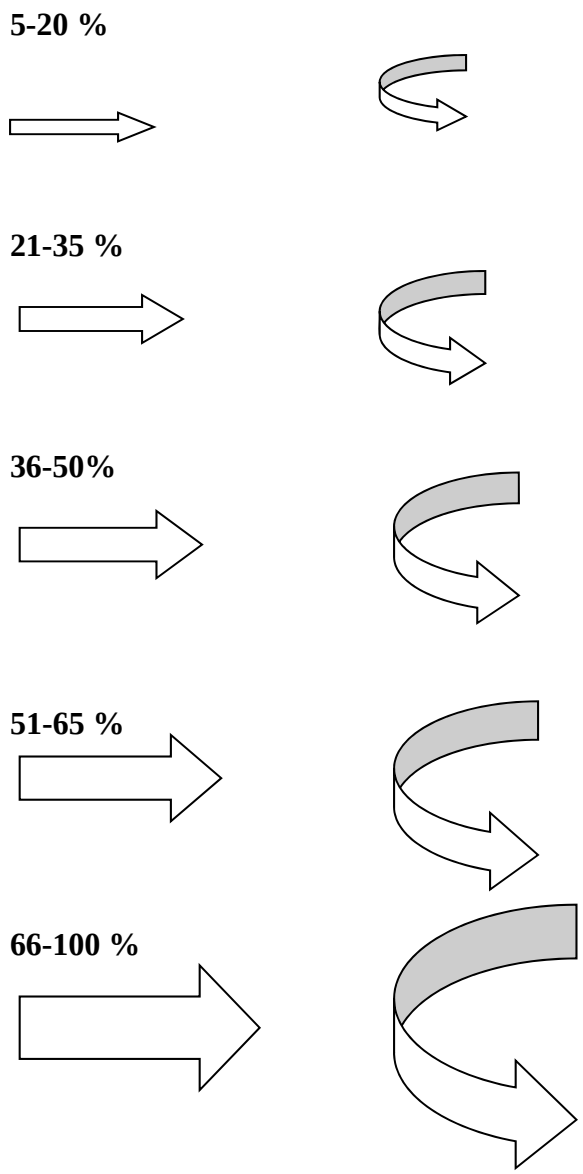
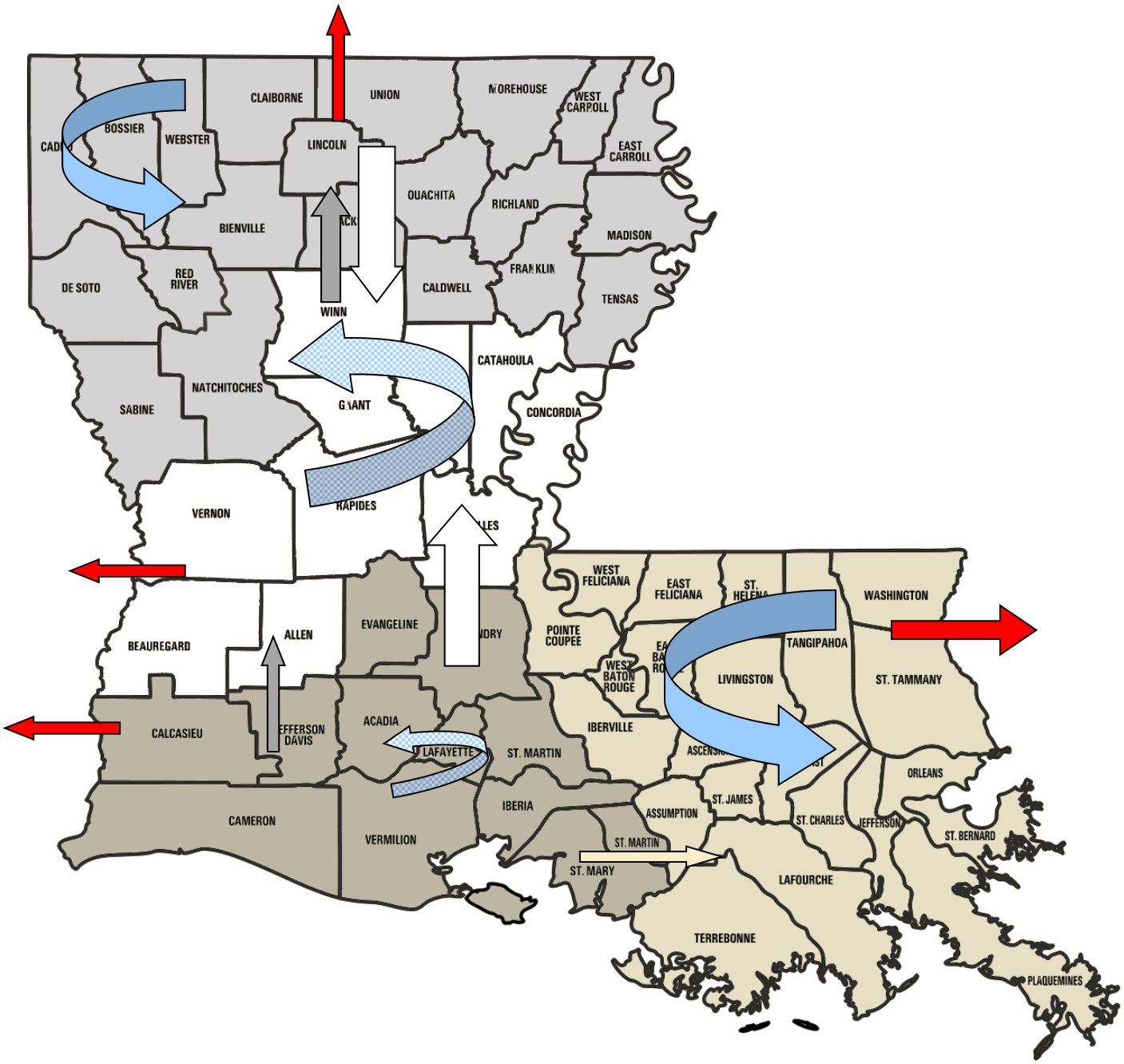


Figure 1. Forest Products [Logs, Pulp, & Poles]



Region 1 Region 3 Within Region

Region 2 Region 4 Out of state

Industry Descriptions for Figure 1. Forest Products [Logs, Pulp, & Poles]

South East Region 1

60% of the customers are located in South East Region 1
0% of the customers are located in South West Region 2
3% of the customers are located in Central Region 3
3% of the customers are located in Northern region 4
34% of the customers are located out of state

This region had the highest percentage of its customers out of state. These customers were all located in Mississippi.

South West Region 2

6% of the customers are located in South East Region 1
16% of the customers are located in South West Region 2
50% of the customers are located in Central Region 3
19% of the customers are located in Northern region 4
9% of the customers are located out of state

This region was the only region that exported more of its products to another region than it used itself.

Central Region 3

0% of the customers are located in South East Region 1
0% of the customers are located in South West Region 2
63% of the customers are located in Central Region 3
23% of the customers are located in Northern region 4
15% of the customers are located out of state

All of Central Regions out of state exports were reported to go to Texas. At 137, the Central region was the largest recipient of goods of all regions. This was true even though the Northern Region had more suppliers.

Northern Region 4

1% of the customers are located in South East Region 1
3% of the customers are located in South West Region 2
38% of the customers are located in Central Region 3
42% of the customers are located in Northern region 4
15% of the customers are located out of state

The Northern Region exported to more different areas than any other region. They exported to all the regions, Texas, Arkansas, and Mississippi.

Survey Response Breakdowns

Pulp, Saw Logs, and Poles

	From North	From Central	From South East	From South West	TOTAL N
To North	42%	23%	3%	19%	109
To Central	38%	63%	3%	50%	137
To South East	1%	0%	60%	6%	41
To South West	3%	0%	0%	16%	10
To TX	5%	15%	0%	9%	26
To AR	9%	0%	0%	0%	18
To MS	1%	0%	34%	0%	23
					341

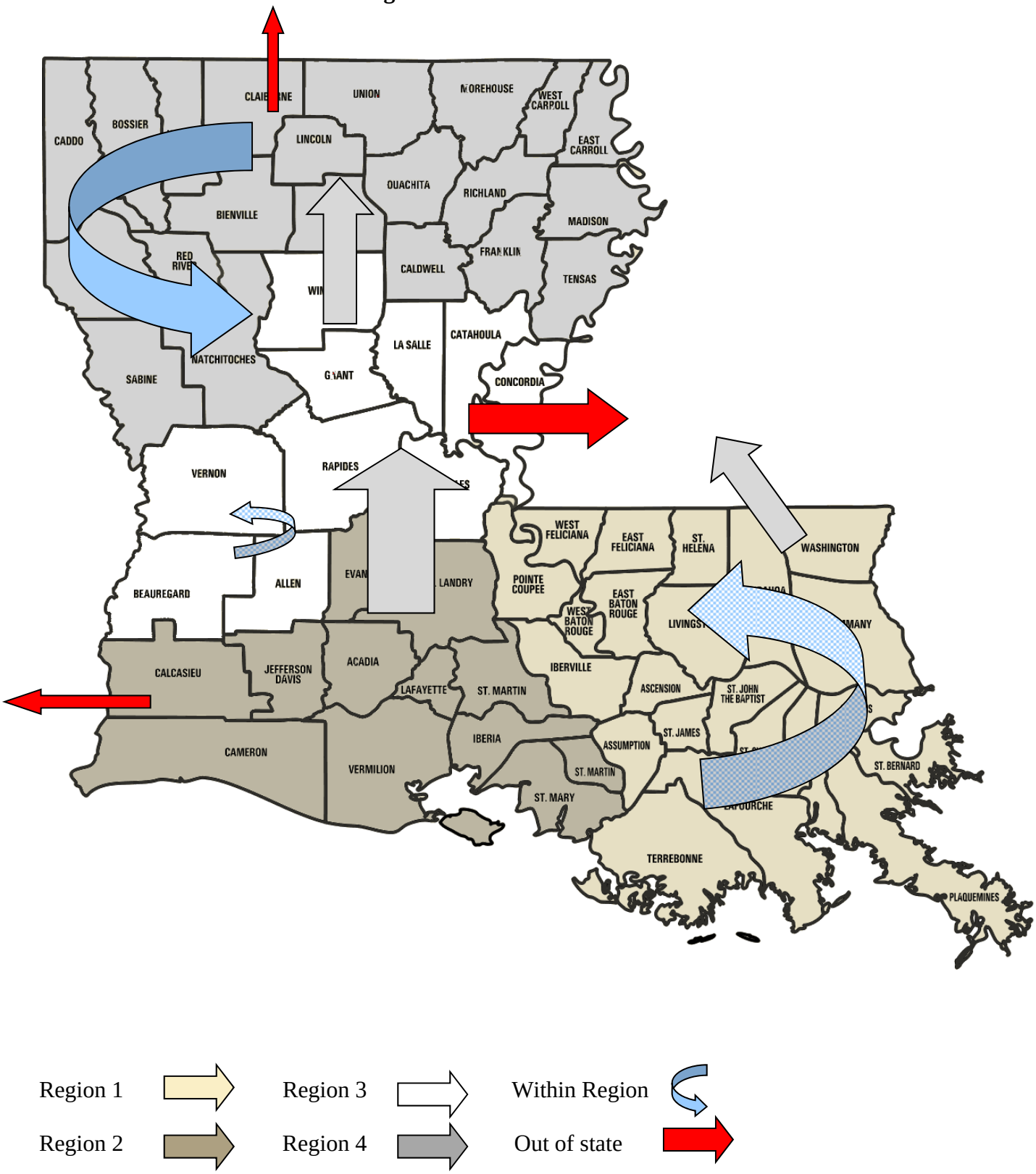
A Discussion of the Poles Market

The survey asked about the production of saw logs, pulp logs, and poles. The responses for saw and pulp logs were relatively similar. The responses for Pole production stood out however as unusual. This difference might be because the pole data was the smallest of the three categories. There were 143 saw log responses, 150 pulp responses, and only 48 pole responses. What set the pole data apart was the high level of out of state customers. All told, 29 or 60% of the reported customers were out of state.

Poles

	From North	From Central	From South East	From South West	TOTAL N
To North	9	2		1	12
To Central	3	4			7
To South East					0
To South West					0
To TX	7	12		3	22
To AR					0
To MS	1		6		7
	20	18	6	4	48

Figure 2. Bio Fuels



Region 1 Region 3 Within Region

Region 2 Region 4 Out of state

Industry Descriptions

The biofuels industry includes both the forest product and primary manufacturers' responses

South East Region 1

67% of the customers are located in South East Region 1
0% of the customers are located in South West Region 2
11% of the customers are located in Central Region 3
22% of the customers are located in Northern region 4
0% of the customers are located out of state

Region 1 was the second most active state, with 9 suppliers and 7 users.

South West Region 2

0% of the customers are located in South East Region 1
0% of the customers are located in South West Region 2
0% of the customers are located in Central Region 3
75% of the customers are located in Northern region 4
25% of the customers are located out of state

As is typical for this region, they had the lowest level of measured activity in the state.

Central Region 3

0% of the customers are located in South East Region 1
0% of the customers are located in South West Region 2
14% of the customers are located in Central Region 3
43% of the customers are located in Northern region 4
43% of the customers are located out of state

The central region exported the vast majority of their supply to either Region 4 or out of state.

Northern Region 4

3% of the customers are located in South East Region 1
0% of the customers are located in South West Region 2
0% of the customers are located in Central Region 3
79% of the customers are located in Northern region 4
18% of the customers are located out of state

The Northern Region is the largest single player in the biofuels industry with both 33 suppliers and 34 users. This is the more than half the activity of the entire state. Region

4 also exports more bio fuels out of state than the rest of the state. The survey had all of Region 4's out of state exports going to Arkansas.

Survey Response Breakdowns

Bio Fuels Results

	From North	From Central	From South East	From South West	TOTAL N
To North	79%	43%	22%	75%	34
To Central		14%	11%		2
To South East	3%		67%		7
To South West					0
To TX		14%		25%	2
To AR	18%	14%			7
To MS		14%			1
					53

Regional Descriptions

Region 1
Region 1 in the south east portion of Louisiana is separated from the rest of the state by the Mississippi river basin. With large coastal swamps and the state's two largest metropolitan areas of New Orleans and Baton Rouge it ranks third out of Louisiana's four geographic regions in forest product activity. It is largely self-contained with high levels of internal usage of both forest products and biofuels. The region is as likely to trade with the state of Mississippi as with other regions in Louisiana.

Region 2
Region 2 in the south west portion of the state is the smallest contributor to the forest industry in Louisiana. The broad coastal swamps and farm land are more conducive to growing rice, soybeans, and sugar cane than trees. This report's focus on forest products misses Region 1's large biofuel contribution coming from the sugar industry. Both sugar based alcohol and bagasse, the fibrous remains of the cane after crushing, are classed as biofuels. Most of its forest production is exported other regions of the state and to Texas.

Region 3
Region 3, in the central part of Louisiana, is the largest customer of saw logs and pulp in the state. The region is the second largest supplier. There was not much biofuel activity demonstrated by our survey however.

Region 4

Region 4, in northern Louisiana, is the largest supplier of saw logs, pulp, poles and biofuels in our survey by a small margin over region 3. The area where region 4 really stood out however, was as a customer for biofuels. It imported biofuels from every region in the state and used most of its own supplies.

Conclusions

This project involved mapping the customers of the forest land owners in Louisiana. Particular attention was paid to biofuels customers. The land owner responses were supplemented with replies from primary manufacturers for the biofuels data. Forest land owners proved difficult to survey because of their fragmented and varied ownership patterns. Many small land owners have a part time attachment to the industry. Individual owners, as opposed to corporate or business interests, were largely unaware of their customers. Many of these small land owners only knew of the contractor who cut the trees on their land and not the ultimate use of the timber.