

Opportunities for Bioenergy Production in Every State

A Congressional Briefing

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October 31, 2007

About Biomass Energy

- Three major biomass energy technology applications.
 - Biofuels: Converting biomass into liquid fuels for transportation.
 - Biopower: Burning biomass directly, or converting into a gaseous fuel or oil, to generate electricity.
 - Bioproducts: Converting biomass into chemicals to make products typically made from petroleum.

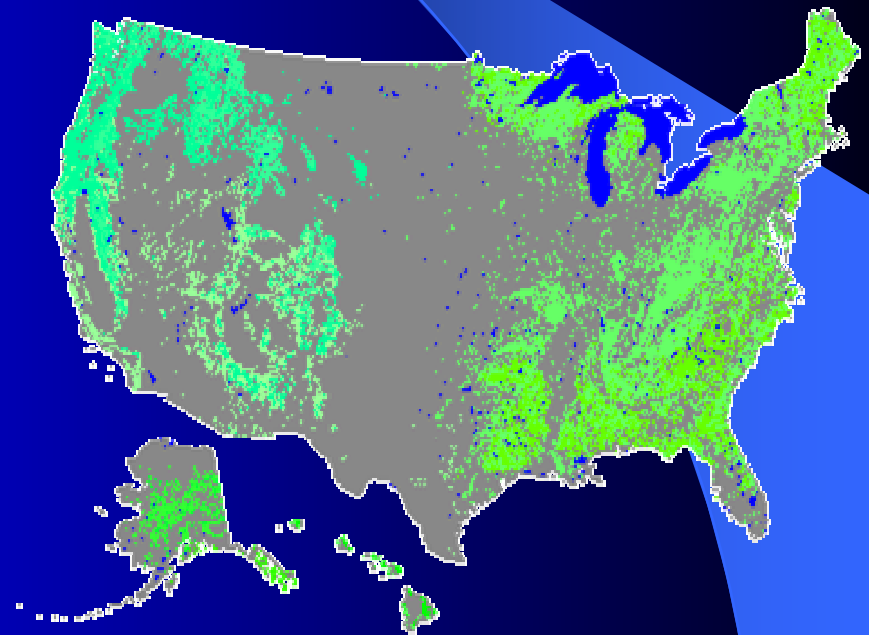
Issues and Opportunities Facing Southern Forests and Forestry

- **The South provides:**
 - 60% of the nation's and 18% of the world's timber supply
 - Habitat sources for 40% of the nation's hunters, 55% of the nation's fresh water anglers, and 30% of the nation's populace engaged in watchable wildlife
- **Many rural communities are:**
 - richly endowed with forest resources
 - economically dependent on forestry including recreation
 - suffering from recent setbacks in pulpwood markets
- **Urgent need to diversify utilization of the south's forest resources and to quantify the value of its ecological endowment**
- **Potentially large resource of underutilized biomass**
 - small diameter, dense stands, harvest residues
 - stands posing high fire risk in WUI areas

The Southern Forest

- 214 Million acres
 - 201 million timberland
 - 13 million reserved and other forest land
 - 89% privately owned
 - Established harvesting infrastructure
 - Demonstrated sustainable production

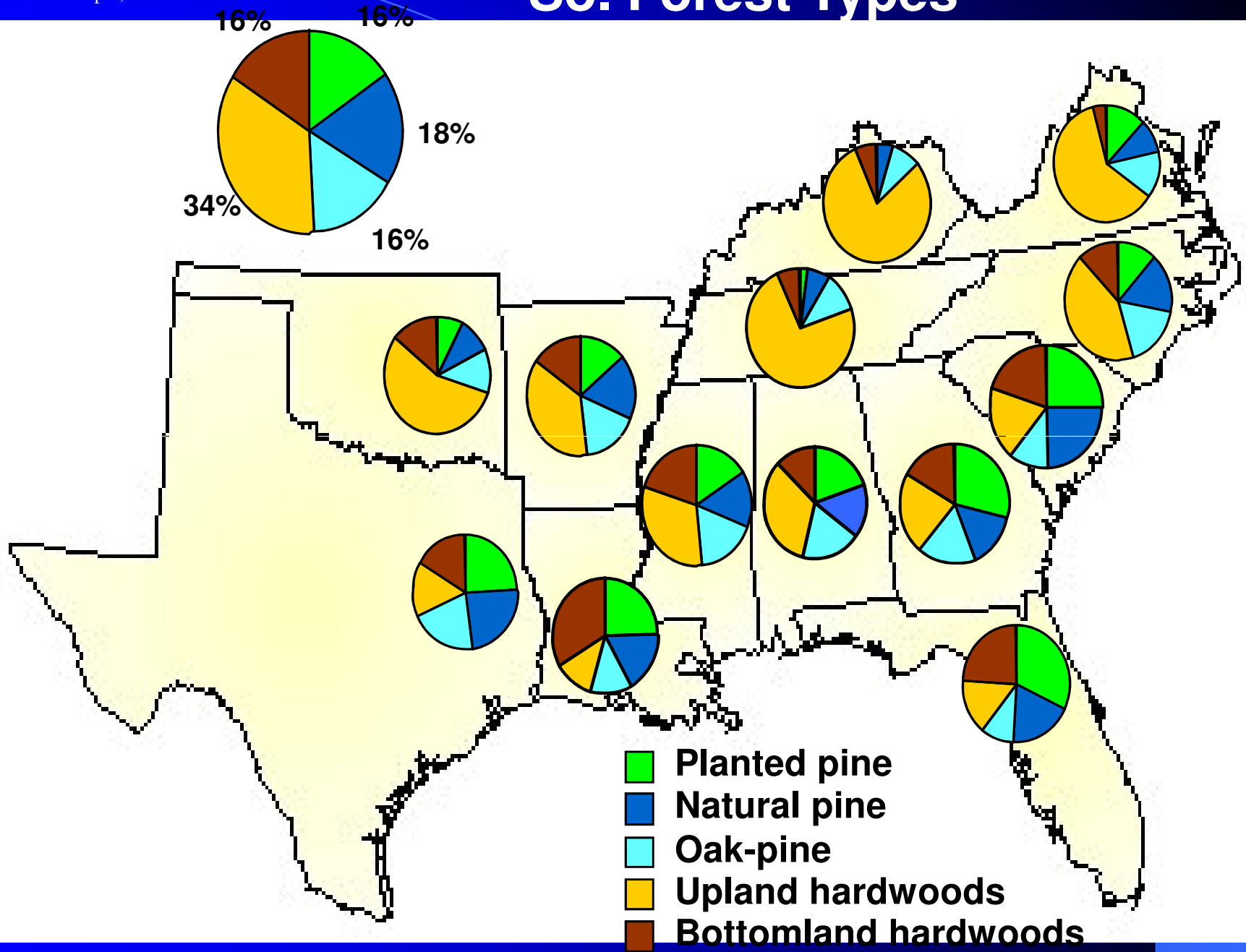
Forest Cover in the United States



Source: Foster, TX A&M

So. Forest Types

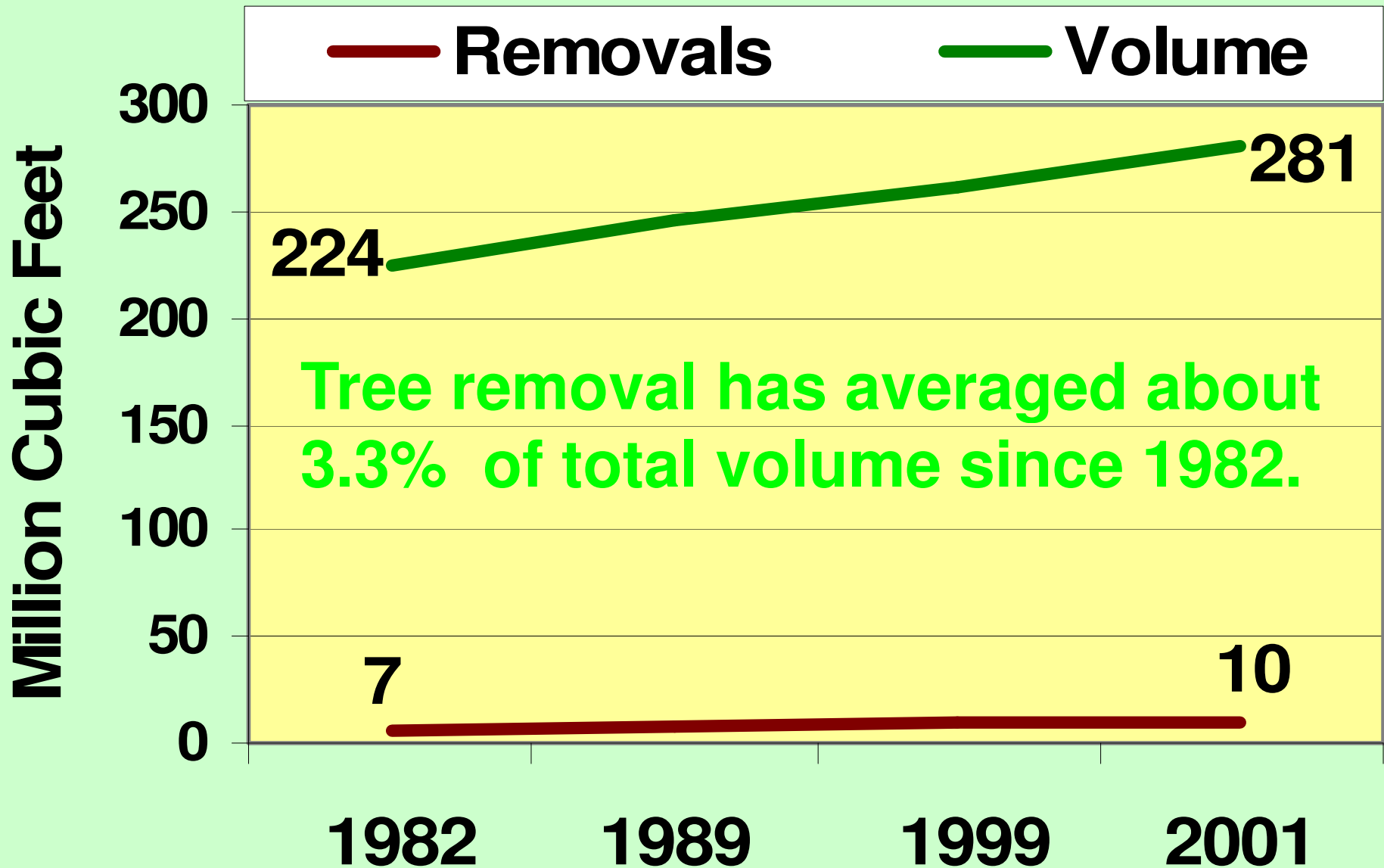
Source: Harper, USFS



Harvest Volumes

- 9 Billion Cubic Feet
 - 6.4 billion softwood
 - 1.4 billion - timber harvesting residues
 - 2.6 billion hardwoods
 - 1.5 billion timber harvesting residues

Tree Volume vs. Tree Removal



Sources of Woody Biomass

- Logging residues
- Thinnings and other stand improvement operations
- Underutilized species
- Stands severely damaged by climatic events, fires, insect or disease
- Bioenergy plantations



Source: Foster, TX A&M

Timber Harvesting Residues

- Easier when using even-aged silvicultural prescriptions --- example clearcutting --- a very common silvicultural practice in the south.
 - Whole tree vs. log harvesting followed by residue collection
 - Transpiration drying
- May be less feasible and profitable with uneven-aged silvicultural systems --- example single-tree selection.
 - Group selection is an intermediate option

Potential Benefits to Landowners for Forest Biomass/Bioenergy Production

- Revenue from biomass sales
- Savings on site preparation costs in forest regeneration (removal of logging residues)
- Reduction in the risk of wildfire and disease/pest outbreaks
- Opportunity for stand improvement and restoration of damaged stands
- Potential carbon credits

Potential Disadvantages of Residue Removal

- Removal of nutrients
 - Returning ash is often advocated.
 - Retaining leaves and twigs reduces nutrient removals
- Biological diversity and habitat issues
 - Can be affected by management
- Erosion and sedimentation
 - Site specific; minimize through planning; etc
- Damage to advanced regeneration

Sustainability Issues

- Most advanced use of woody fuels is mill waste (99% already utilized --- levels of efficiency in processing facilities reported to be quite high)
- Timber Harvesting Residues --- Low hanging fruit --- 29 million dry tons available at 65% recovery level)
 - Harvesting conducted under BMP, State Forest Practice, and Certification Rules/Guidelines --- Mostly Non-Regulatory

Sustainability Issues (cont.)

- 2nd most available source --- material currently labeled non-commercial, often associated with unmanaged stands, includes underutilized material --- growth in the south exceeds drain approximately 1.2 – 1.0
- Product switch --- pulpwood to bioenergy
- Debris associated with disasters

The Spectrum of Wood-Based Bioenergy Technologies:

- New:
 - Bio-refinery
- Not-So-New:
 - Combined Heat and Power
 - Co-generation
 - Gasification
 - Pyrolysis
 - Pelletization
- Emergent
 - Bio-refinery

The Southern Woody Biomass Processing Situation

- Combustion Technologies --- especially **Combined Heat and Power** within the **Forest Products Industry** very well established.
- **Co-generation** in electric power industry and general **gasification** and **pyrolysis** technologies less well established.
- **Biorefinery** Technologies emerging
- Animal based biodiesel more in vogue than cellulosic fuels

Combined Heat and Power Examples

- Most advanced use of woody fuels is mill waste (99% already utilized --- levels of efficiency in processing facilities reported to be quite high)
- Langdale Industries --- Georgia
- Laurel Lumber – Mississippi
- Jack Daniels - Tennessee
- Craven County --- North Carolina

Wood Co-Firing Examples

- Southern Company/ Alabama Power, AL
- Okeelanta --- Florida
- Santee Cooper --- South Carolina
- Campbellsville, Kentucky

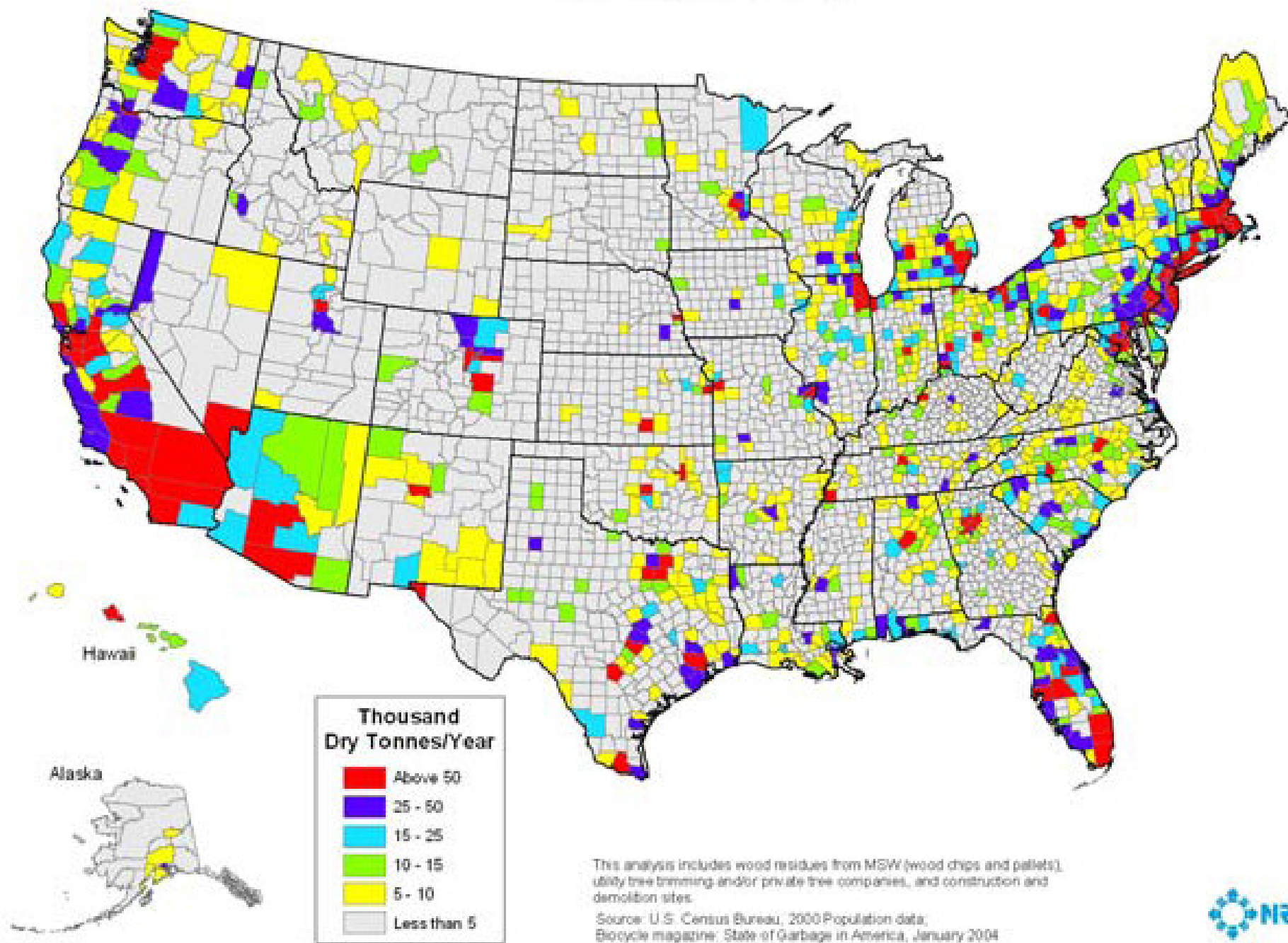
Wood Pellet Plant Examples

- 21 Southern Wood Pellet Plants
 - Dixie Pellets --- Alabama
 - Green Circle Bioenergy --- Florida
 - Appling County Pellets --- Georgia
 - Fram Renewable Fuels --- Georgia
 - Anderson Hardwood Pellets --- Kentucky
 - CKS Energy --- Mississippi
 - Northcut Wood Products --- Texas

Wood Ethanol Examples

- Demonstration Cellulosic Plant --- Univ. FL
- Range Fuels --- Georgia

Urban Wood Residues



Research/Technology Transfer Challenges

- Ensuring highest and best use of woody feedstocks
- Engineering --- Efficiencies
- Natural Resource
 - Little to no direct incentive(s) to private forest landowners for producing bioenergy feedstocks
 - Value currently seen as front end-savings on follow-up reforestation plans
 - Soil, Water, Habitat, and Biodiversity issues

Conclusions

- Biomass harvesting for bioenergy can and should be integrated into traditional forest management schemes in the South.
- Short and long term issues and opportunities
 - Public acceptance of and demand for alternative energy fuels (green energy)
 - Short term --- waste woods
 - Intentional regeneration for bioenergy and other biobased products, including
- Use of short-rotation woody crops

Forest Encyclopedia

Encyclopedia of Southern Bioenergy - Microsoft Internet Explorer

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Encyclopedia of Southern Bioenergy

WELCOME TO THE ENCYCLOPEDIA OF SOUTHERN BIOENERGY RESOURCES

The **objective** of this encyclopedia is to synthesize the available scientific and technical knowledge on improved systems for sustainably managing, harvesting, processing, and utilizing woody biomass in the southern United States.

Getting Started: Before learning about southern bioenergy resources, new users of this site might want to learn more about what an online encyclopedia consists of. **A user may return to the home page of the Bioenergy Encyclopedia at any time by placing the cursor over the Encyclopedia Collections Link in the upper right hand corner and selecting it.** [Background information](#) is available for those readers unfamiliar with scientific content management systems such as ours and who wish to know more about them. [User Help](#) is available for those unfamiliar with how to browse and search our site to find what they need. [Author Help](#) is available for those wishing to submit new scientific content. If you wish to know who is developing these encyclopedias, click the CREDITS link at the top of each page. If you have questions or wish to make a comment, please feel free to use the **FEEDBACK** link at the top of each page to communicate with us. Familiarity with this administrative background material, will make using the forest encyclopedia network easier and faster.

The forest ecosystems of the South serve many purposes including the production of bioenergy. This encyclopedia consists of a synthesis of the best available scientific knowledge concerning the ecologically sustainable, economically viable, and socially acceptable production and use of bioenergy products in Southern forest ecosystems. We are certainly not suggesting that all existing forests should be tapped for energy production. Forest biomass for energy can and must be managed as simply one of a large number of goods and services that can be produced ([IEA Bioenergy Task 31, 2000](#)).



Worldwide summary data from 1997 show that about 85 percent of global bioenergy consumption is in the form of firewood and charcoal to address heating and cooking needs. Most of the remaining 15 percent is black liquor, a

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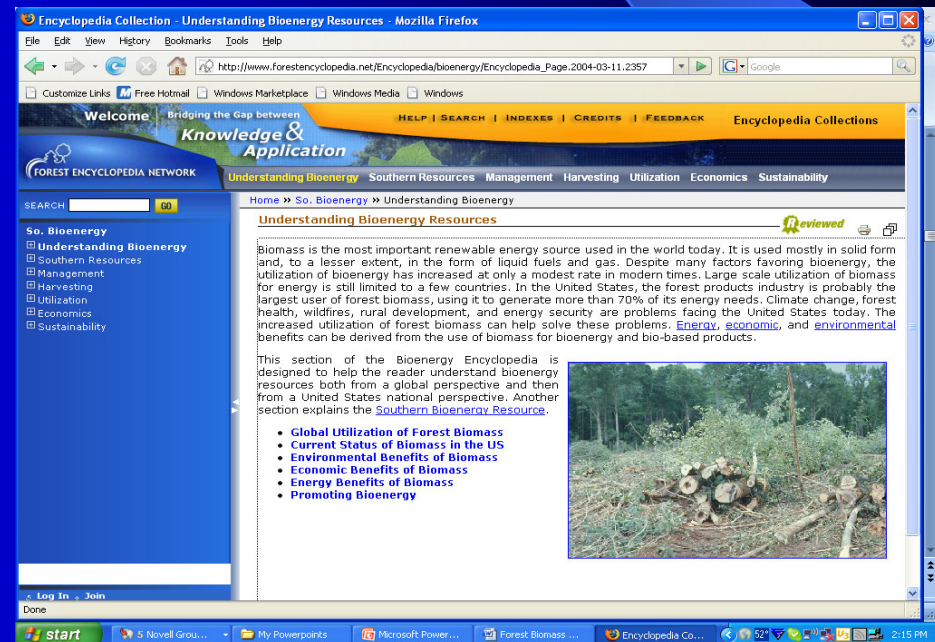
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Bioenergy and Bio-products



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The Southern Bioenergy Resource

Forest Management for Bioenergy Production

Harvesting Biomass for Bioenergy Production

Biomass Utilization

Economics of Bioenergy Production

Environmental Sustainability of Bioenergy Production



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Welcome to Forest Bioenergy

The Forest Bioenergy website is designed for information sharing among natural resource management and extension professionals as well as community planning and development professionals. It is one of several products resulting from the [Southern Forest Research Partnership](#) bioenergy training initiative.

The site is a repository of information related to biomass product use designed such that members can easily upload and the public can easily download relevant biomass-related information. The gateway includes publications, presentations, additional links, events, and images.

Future plans include the addition of case studies, activities, videos, and other educational tools designed to help users of the portal.

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