

# Forest-based Bioenergy Production: Implications for Rural Economic Development in Louisiana, USA

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# Outline

- Overview of Forest-based Bio Sector
- Emerging Bio-Technologies & Products
- The Study
- Conclusions



# Overview

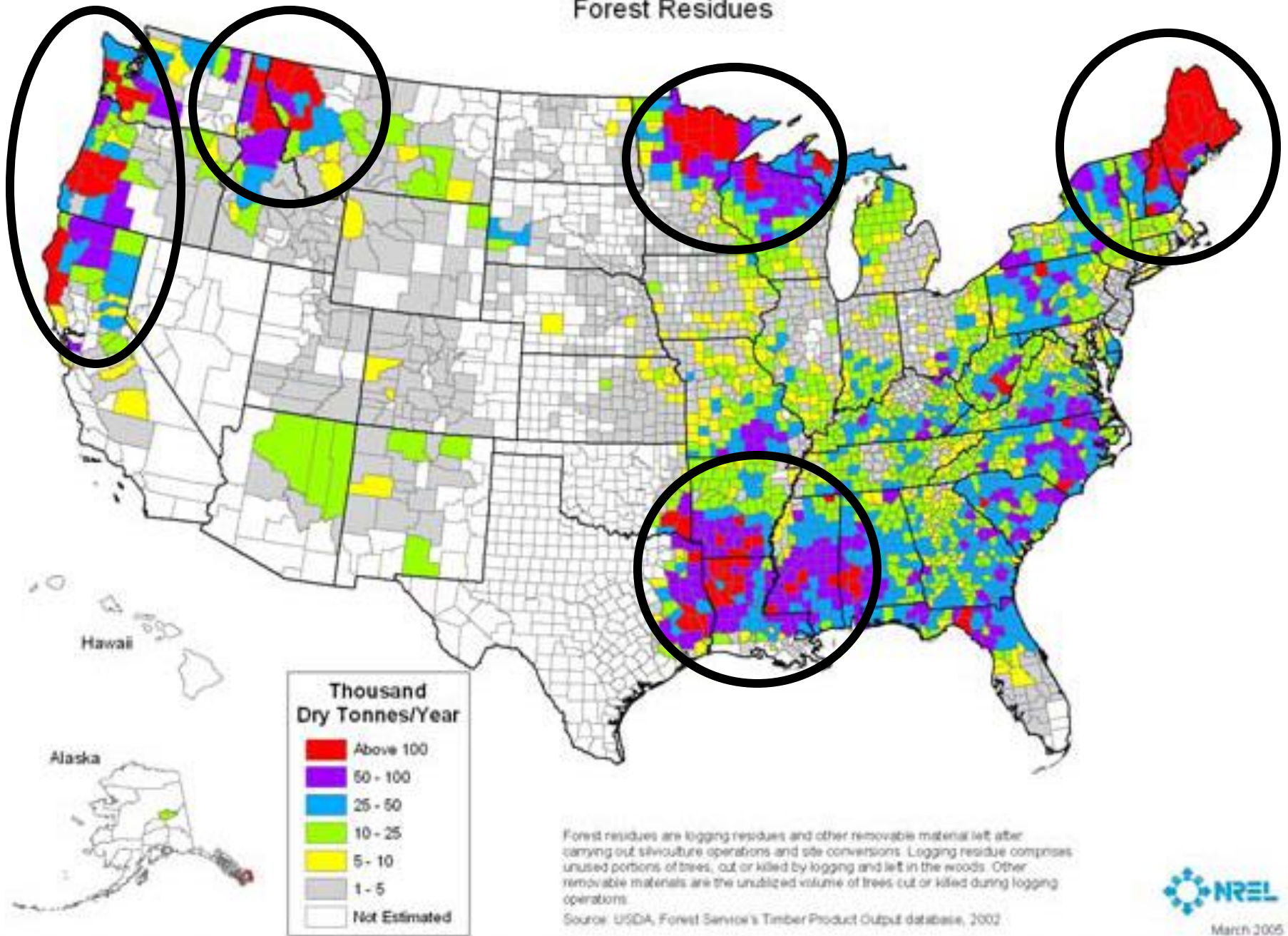
- Bio-based products are gaining attention to supplement the growing demand for “green” renewable energy.
- Much of this feedstock will come from the forestry community.
- The continued development of bio-based products and facilities will help to establish several market opportunities for forest landowners.
- Feedstock: post-harvest residues, dedicated energy crops, or small diameter material from thinning.
- Advancements focused on harvesting and collection, storage, pretreatment, and conversion of biomass to bio-based products.

# General Guideline for Economic Development Strategies in Rural Regions

- Strengthen the cooperation of local actors and the cooperation of actors inside and outside the region.
- Use a comprehensive territorial development plan, based on the strengths, weaknesses, opportunities and threats of the region, and integrate all measures and projects within the scope of this plan.

# Overview of the Forest-based Bio Landscape

# Forest Residues



# Forests for Biofuels:

## Forest biomass sources

- 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 Biofuels: Short-rotation woody crops

- 3-year-old eucalyptus grown for pulpwood in Southeast Texas
- Matures in 6 years
- Re-sprouts when cut and matures in about 3 years





# Forests for Biofuels: Small diameter trees/thinnings

- Trees:
  - Chipped small-diameter trees



# Emerging Bio-Technologies & Products

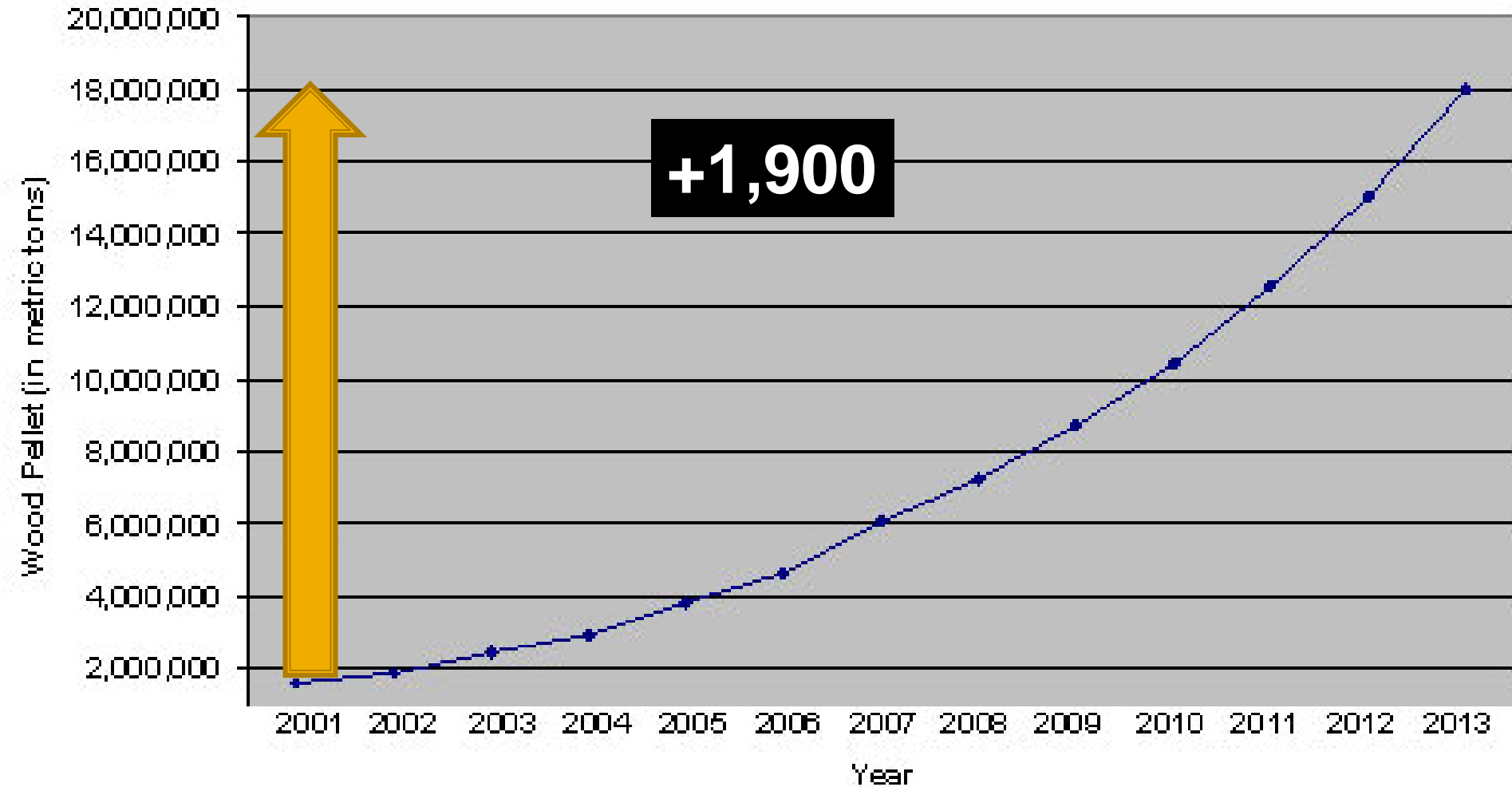
- Traditional – From primary logs, woodchips
  - Pulp and Paper, Lumber, Plywood, MDF, Particleboard
- Emerging – From biomass residues, chips & pulpwood
  - Bioelectricity
    - Combustion/Gasification → Biopower*
  - Synthetic fuels
    - Gasification → Syngas → Fischer-Tropsch Fuels & Chemicals*
  - Biofuels & Biochemicals –
    - Gasification → Syngas → Fermented biofuels & biochemicals*

# Forests for Biofuels: Pellets

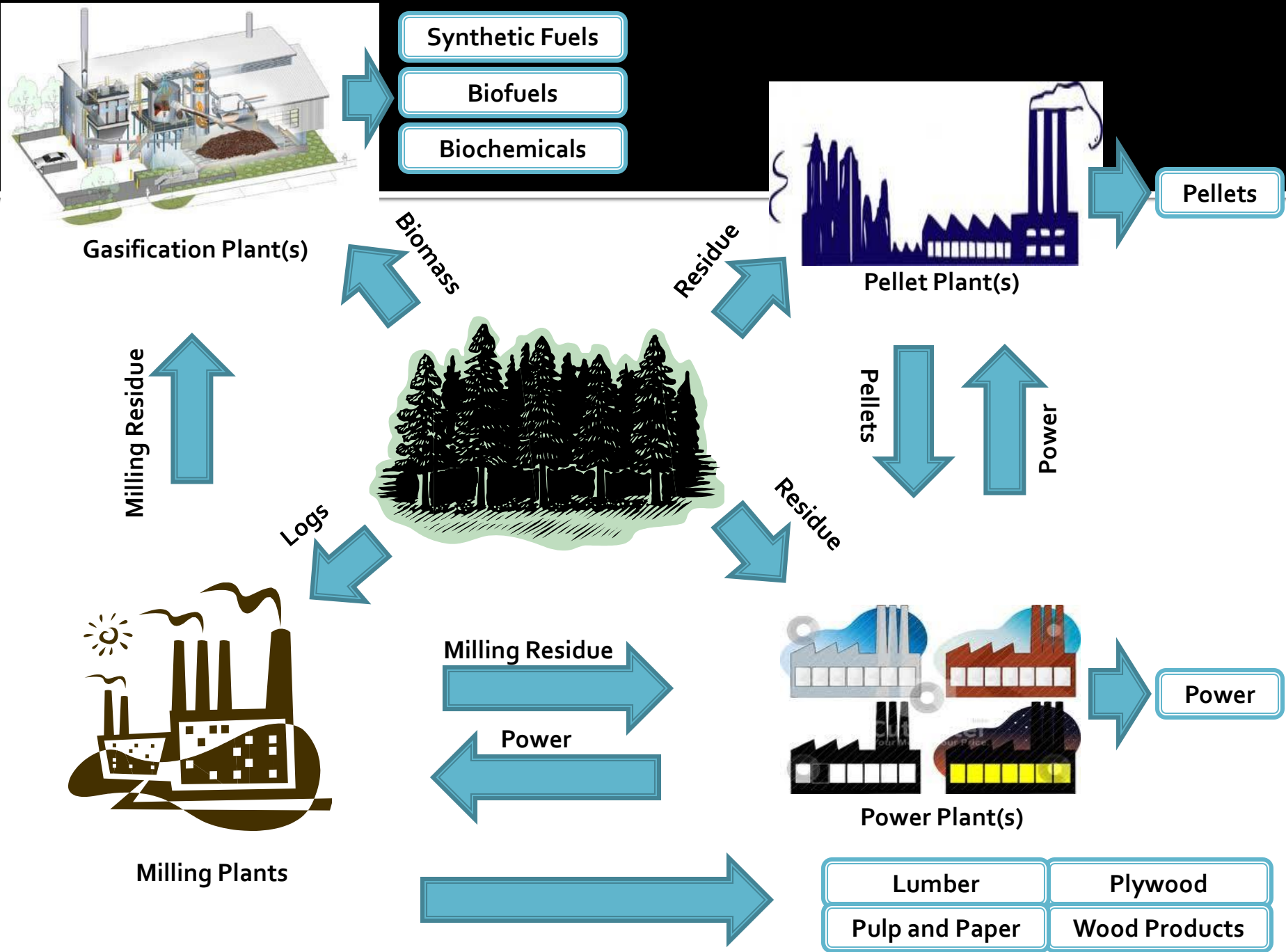
Can be small-scale plants that power small rural communities or parts of larger communities.



# Wood Pellet Demand in Europe



Source: Wood Resource Quarterly

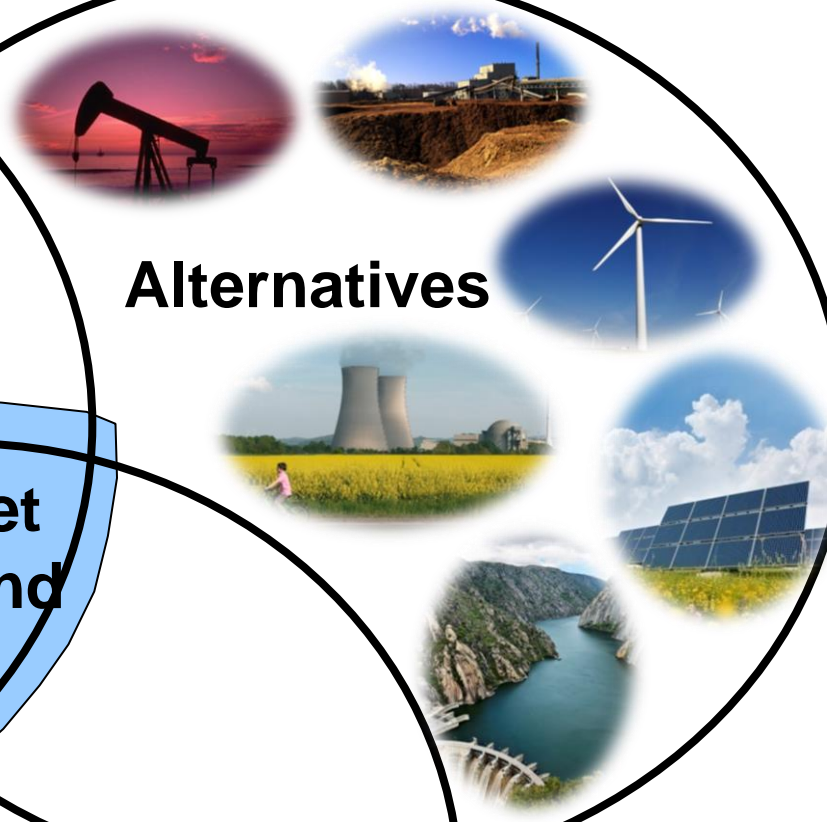
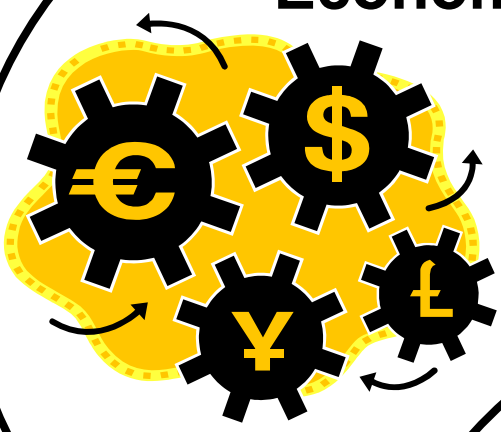
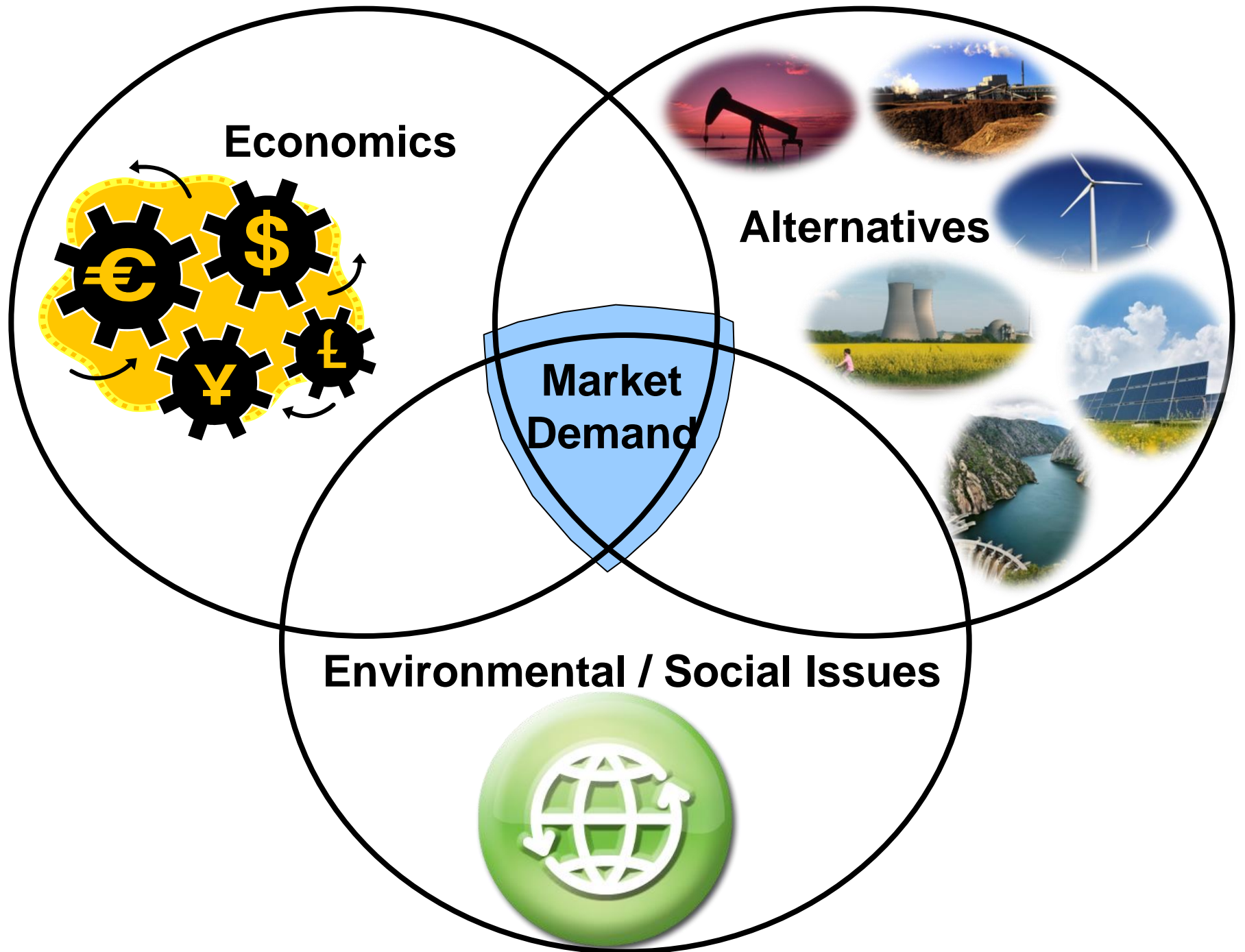


# Emerging Bio-Products & Technologies – Issues

- **Capacity Allocation**
  - How to allocate forest resource capacity between
    - **Traditional downstream industries**
    - **Emerging technologies**
  - How much “***Spare Resource Capacity***” should be maintained to serve emerging industries?
  - What future industries should be targeted to maximize strategic value of industry to all stakeholders?
  - What is the commercialization potential and time horizon?

# Emerging Bio-Products & Technologies – Issues

- **Supply chain risks**
  - Uncertainty across supply chain is a deterrent
    - **Resource owners** are uncertain about market potential
    - **Resource processors** are uncertain about supply potential
  - Innovative strategies and business models can help alleviate perceived risks and drive higher acceptance
    - **New generation cooperatives**
    - **Public-private partnerships**





# The Study

- Rural economies, especially in the South, are historically some of the poorest in the nation.
- Forest Bio-based energy production has been identified as a potential means to ameliorate rural poverty.
- We estimated jobs creation and economic contribution of two wood bio-based energy facilities in Southwest Louisiana.

# Methods

## 1. Mail Surveys:

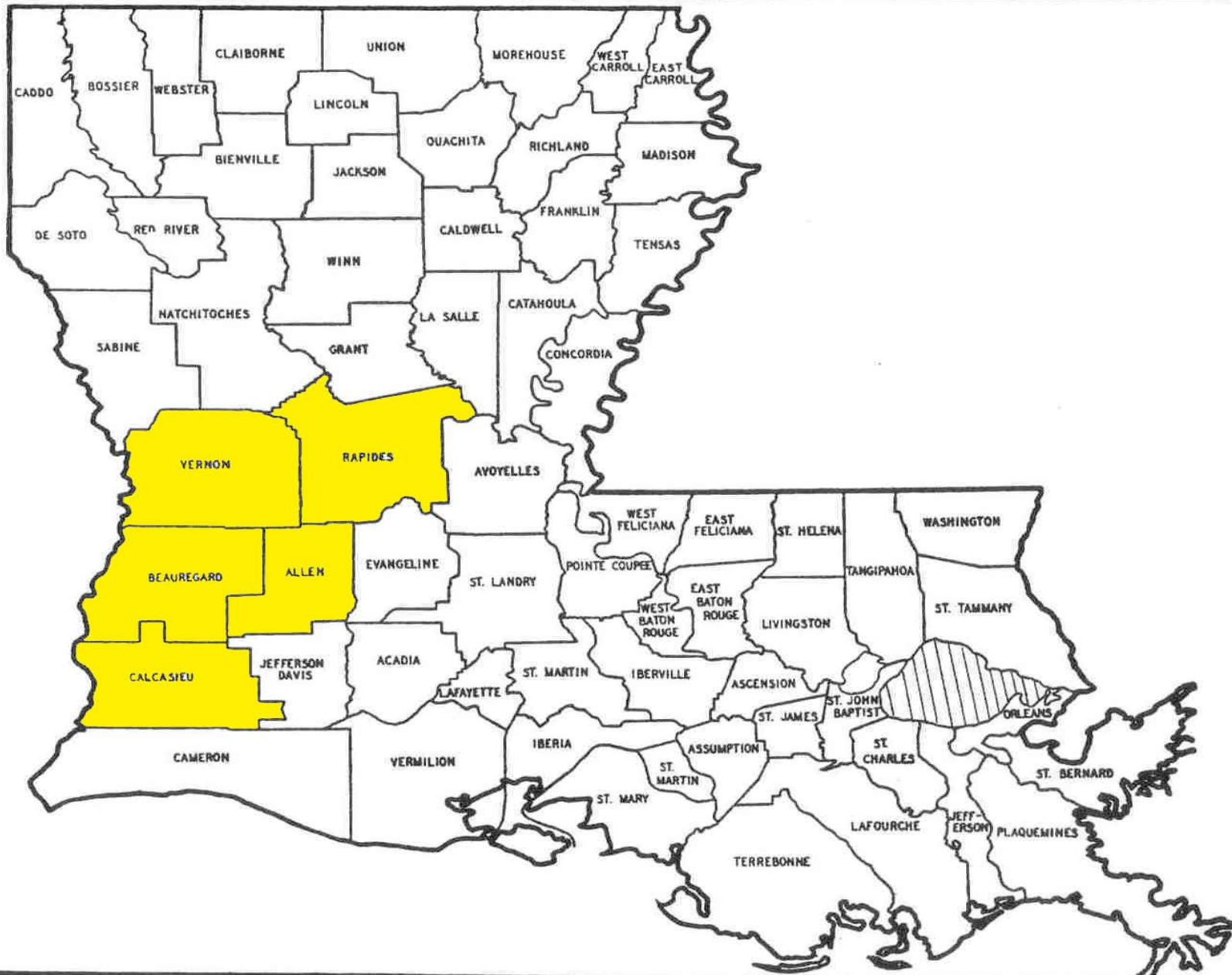
- 3,500 randomly sampled, Small & Medium Enterprise (SME) non-industrial private forest landowners in SW Louisiana (response rate = 26%)
- In part, to assess the extent to which new forest bio-based products would alter the existing production process and associated costs.
- Survey procedures, follow up efforts and data analyses were conducted in accordance with Tailored Design Method (Dillman 2000)

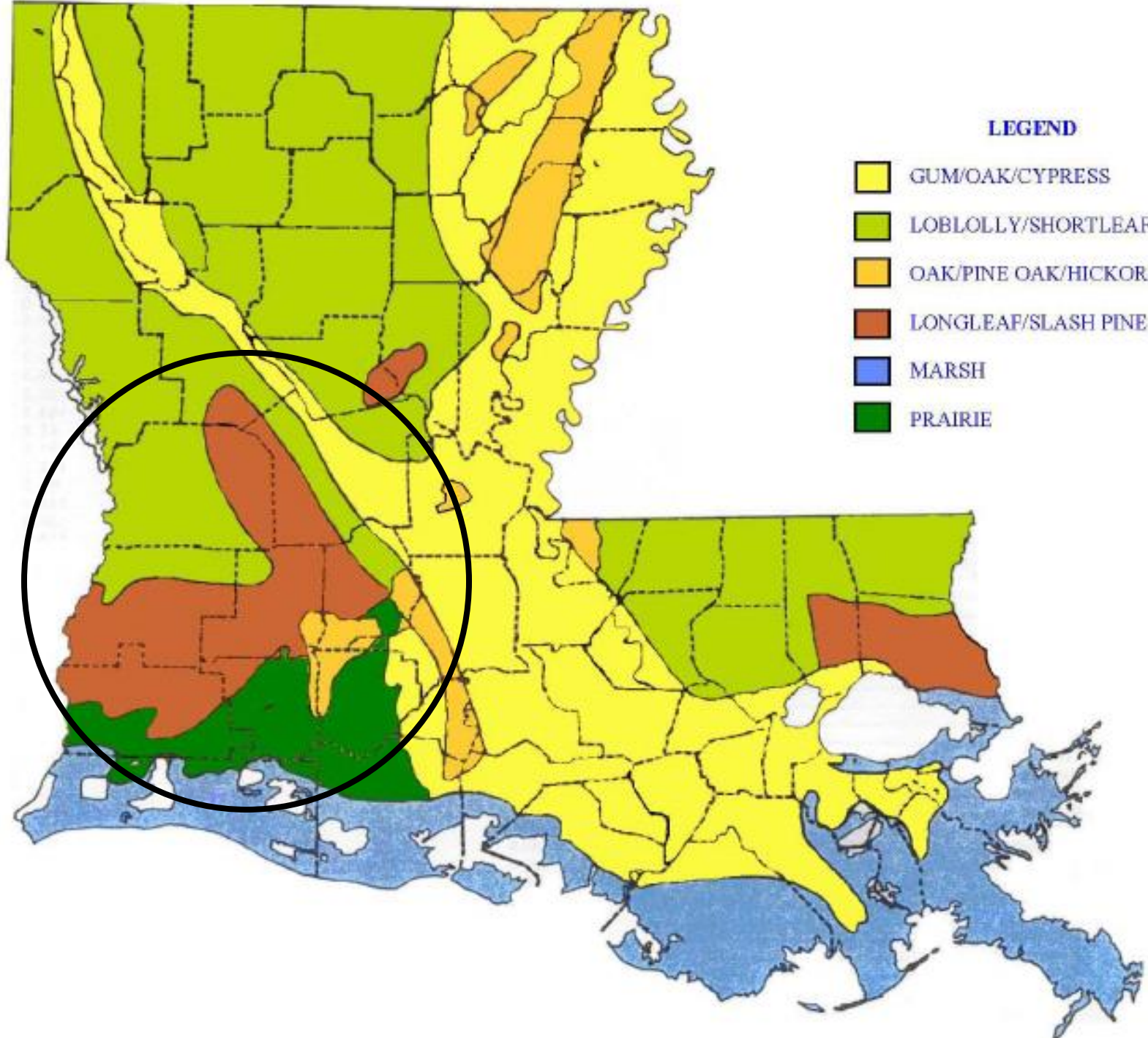
# Methods

## 2. Input/Output Analysis of Alternative Feedstocks & Products

IMPLAN Pro Social Accounting and Impact Analysis Software (Minnesota IMPLAN Group 2000) was used to identify the overall structure and linkages within state economies as well as to measure the indirect and induced impacts from transitioning from traditional agricultural and forest-based products to alternative bio-based products

# Study Region – Southwest Louisiana



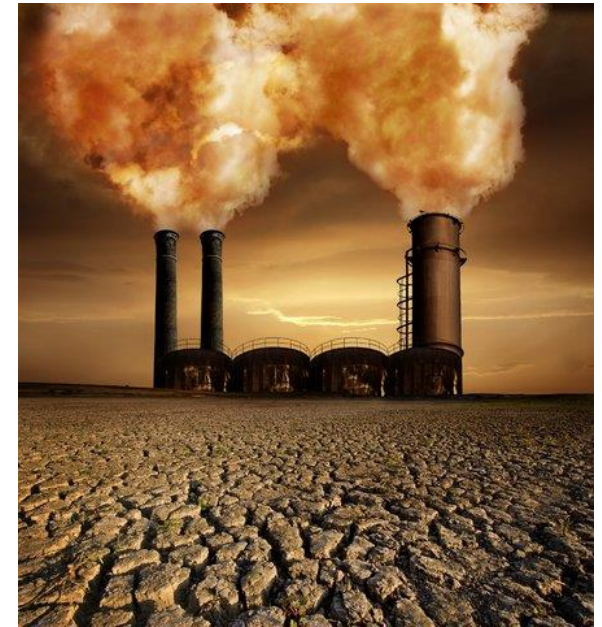


# Study Region – Demographic, Socio-economic and Resources Summary

	Population (1,000)	Median Income	Unem- ployment Rate (%)	% Below Poverty Line	% of Area Forested	Forest Area (1,000 Acres)	Ag. Land, Cropland and Pasture (1,000 Acres)	% of Area Agricul- tural	Total Land Area (1,000 Acres)
Allen	25,635	\$34,958	7.1	21.6%	70	342.9	83.2	17.0	489.9
Beauregard	34,978	\$40,592	5.8	15.9%	73	543.3	179.0	24.0	744.2
Calcasieu	185,618	\$42,018	5	17.5%	32	221.5	367.8	53.1	692.2
Rapides	133,131	\$36,938	5.4	19.8%	67	575.1	177.3	20.7	858.4
Vernon	45,639	\$41,605	5.3	16.6%	88	749.9	50.6	5.9	852.2

# 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

	<b>Jobs</b>	<b>Earnings</b>	<b>Output</b>
Direct Effect	410	\$22.7	\$62.5
Indirect Effect	121	\$6.0	\$20.1
Induced Effect	133	\$4.6	\$14.7
<b>Total Effect</b>	<b>664</b>	<b>\$33.2</b>	<b>\$97.3</b>

Earnings and Output Figures are in \$ Million (2011)

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

	<b>Jobs</b>	<b>Earnings</b>	<b>Output</b>
Direct Effect	92	\$6.6	\$31.1
Indirect Effect	62	\$3.0	\$13.4
Induced Effect	45	\$1.5	\$5.0
<b>Total Effect</b>	<b>199</b>	<b>\$11.1</b>	<b>\$49.5</b>

**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

	<b>Jobs</b>	<b>Earnings</b>	<b>Output</b>
Direct Effect	104	\$5.7	\$15.8
Indirect Effect	31	\$1.5	\$5.1
Induced Effect	34	\$1.2	\$3.7
<b>Total Effect</b>	<b>168</b>	<b>\$8.4</b>	<b>\$24.6</b>

**Earnings and Output Figures are in \$ Million (2011)**

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

	<b>Jobs</b>	<b>Earnings</b>	<b>Output</b>
Direct Effect	136	\$7.6	\$36.4
Indirect Effect	116	\$5.4	\$25.1
Induced Effect	62	\$2.1	\$6.8
<b>Total Effect</b>	<b>313</b>	<b>\$15.1</b>	<b>\$68.3</b>

Earnings and Output Figures are in \$ Million (2011)

# Issues/Risks

- Costs of alternative fuels (i.e. natural gas)
- What is the true commercialization potential and time horizon?
- Supply chain risks and uncertainty
  - Resource owners are uncertain about market potential
  - Resource processors are uncertain about supply potential
- Biomass industry drivers: sustainable harvest levels, wood fiber prices, and transportation costs.

# Issues/Risks

- Harvesting, collecting and transporting cellulosic biomass residues can be difficult and expensive.
- High transportation costs means cellulosic biomass plants must source feedstocks near plant.
- Environmental issues (e.g. organic material depletion)
- Biomass demand currently driven by wood-burning power companies in Europe---Pellets.

# Conclusions

- The development of bio-based facilities in rural communities can strengthen local economies through increased revenue, payroll and taxes.
- In order to maintain a sustainable supply, forestry professionals could develop new generation cooperatives that offer producers leverage and strength in the form of community involvement.
- Findings from research provide a base for entrepreneurs, developers, energy producers, and politicians to create alternative management practices and strategies for landowners in a rural environment to incorporate into current management plans or entirely new plans.



# QUESTIONS? COMMENTS?



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