



Renewable and Alternative Energy in Louisiana

2009 Louisiana Oil and Gas: From SONRIS to Sunset

September 22, 2009



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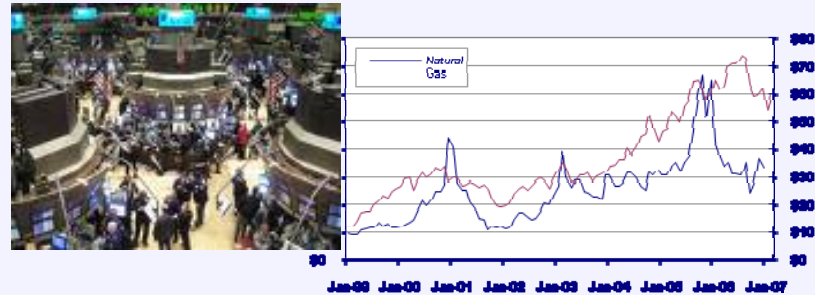
Why Renewable Energy Power Generation?

Energy Security

Energy Availability



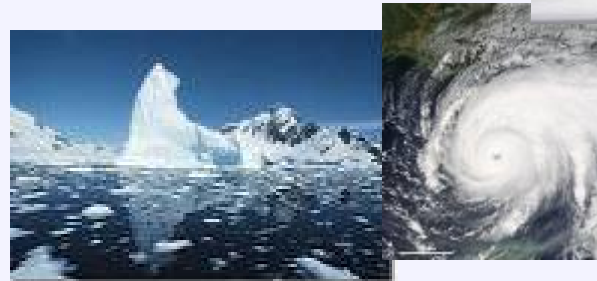
Price volatility



Growth in other renewable fuel industries like ethanol and biodiesel



Climate change

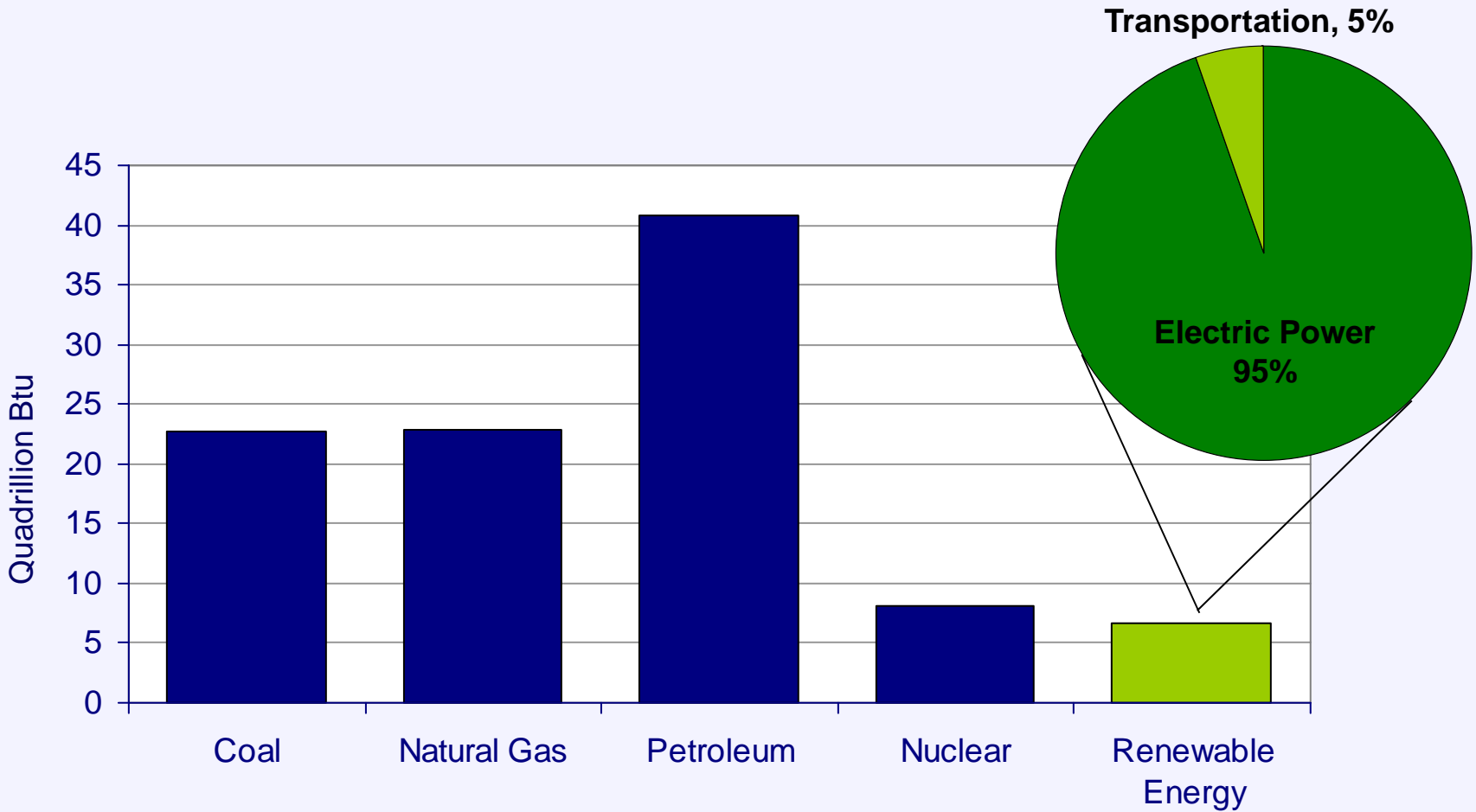




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Overview of Alternative Energy Generation

U.S. Energy Consumption by Source



Types of Alternative Energy Generation



US DOE



US DOE

Hydroelectric

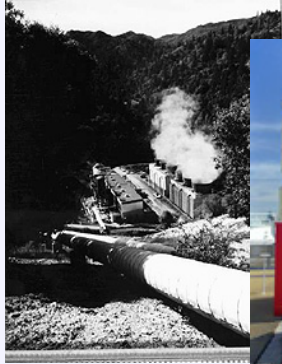


US DOE

Biomass / Biogas



Wave Energy



Geothermal



US DOE

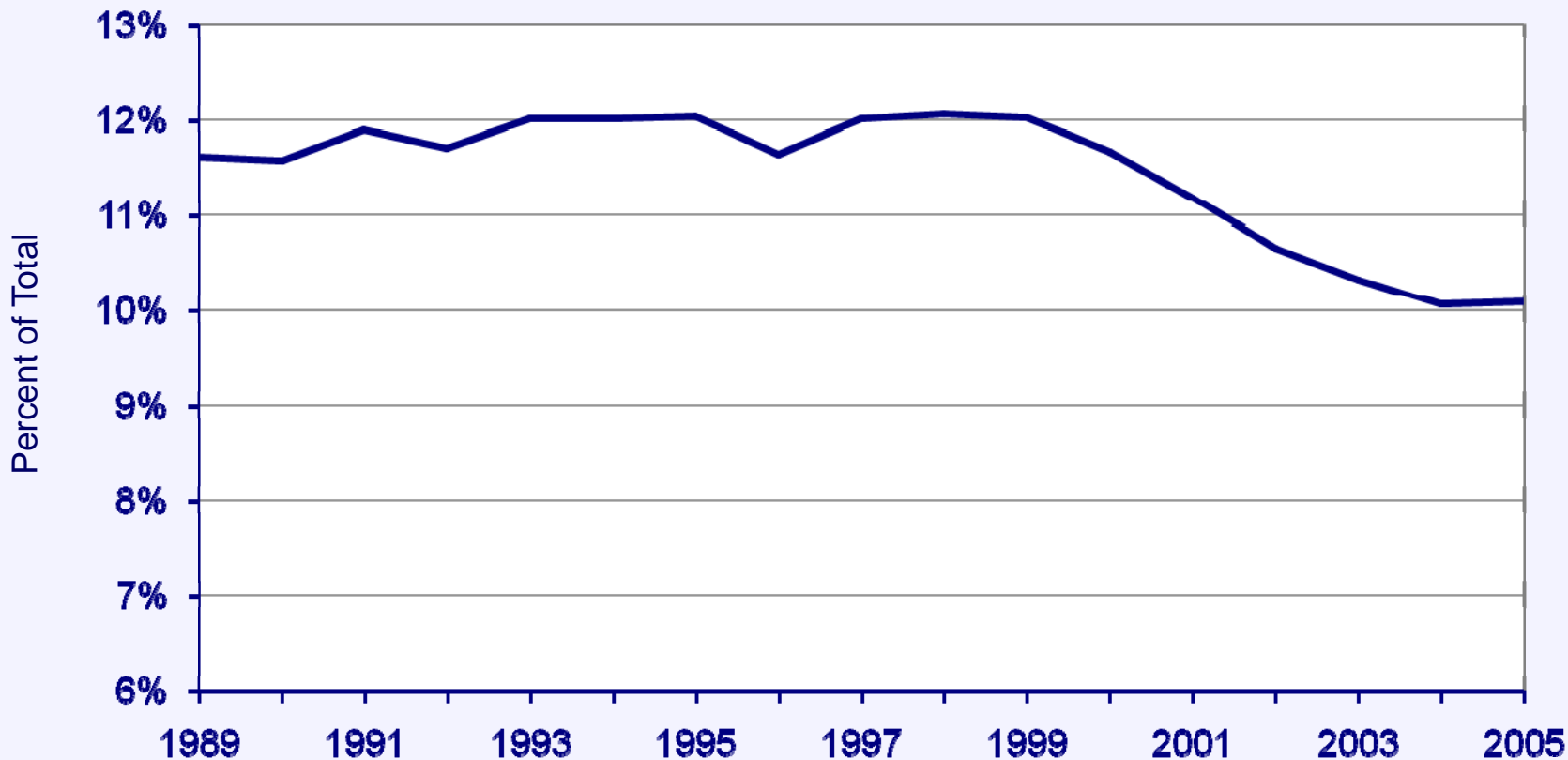
Wind



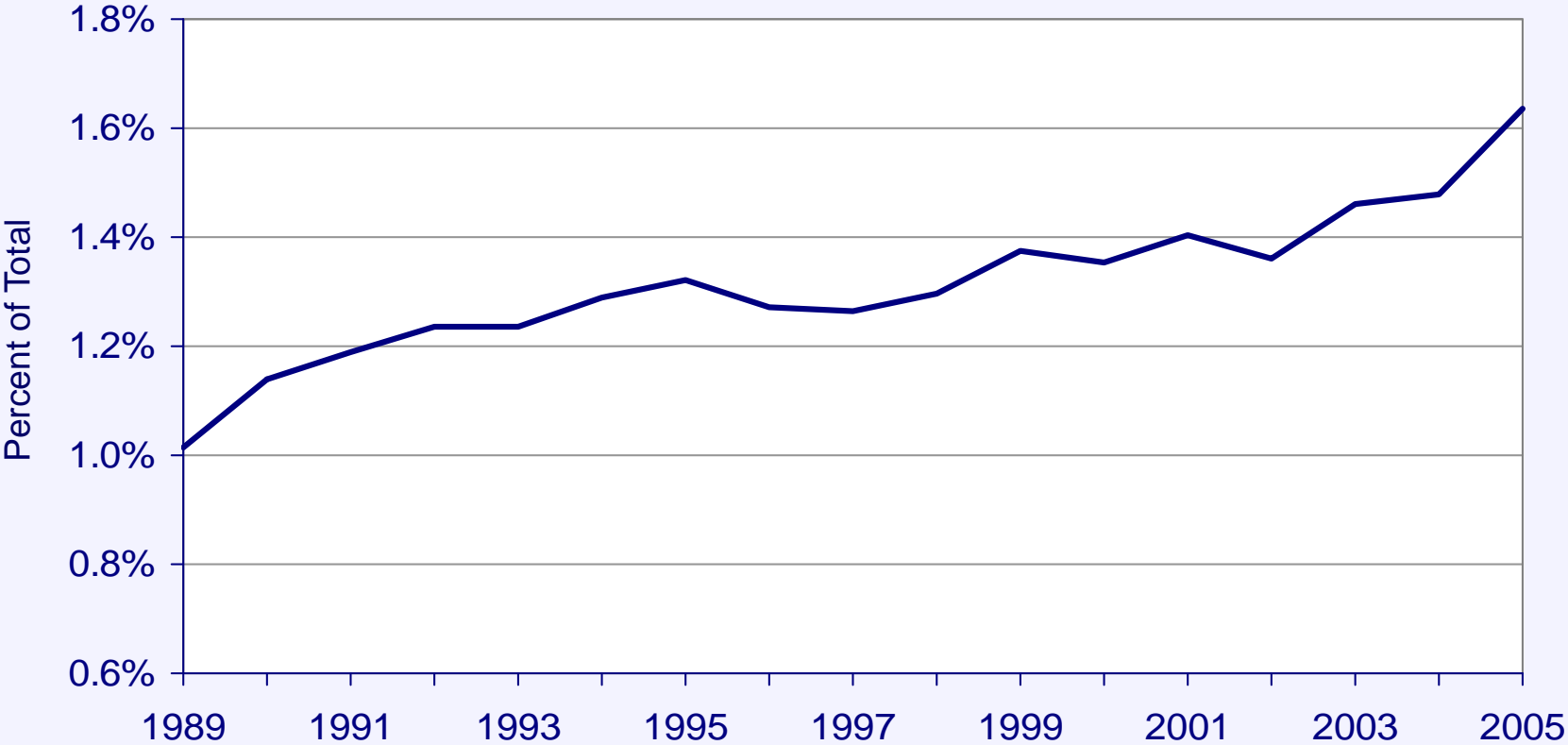
US DOE

Solar

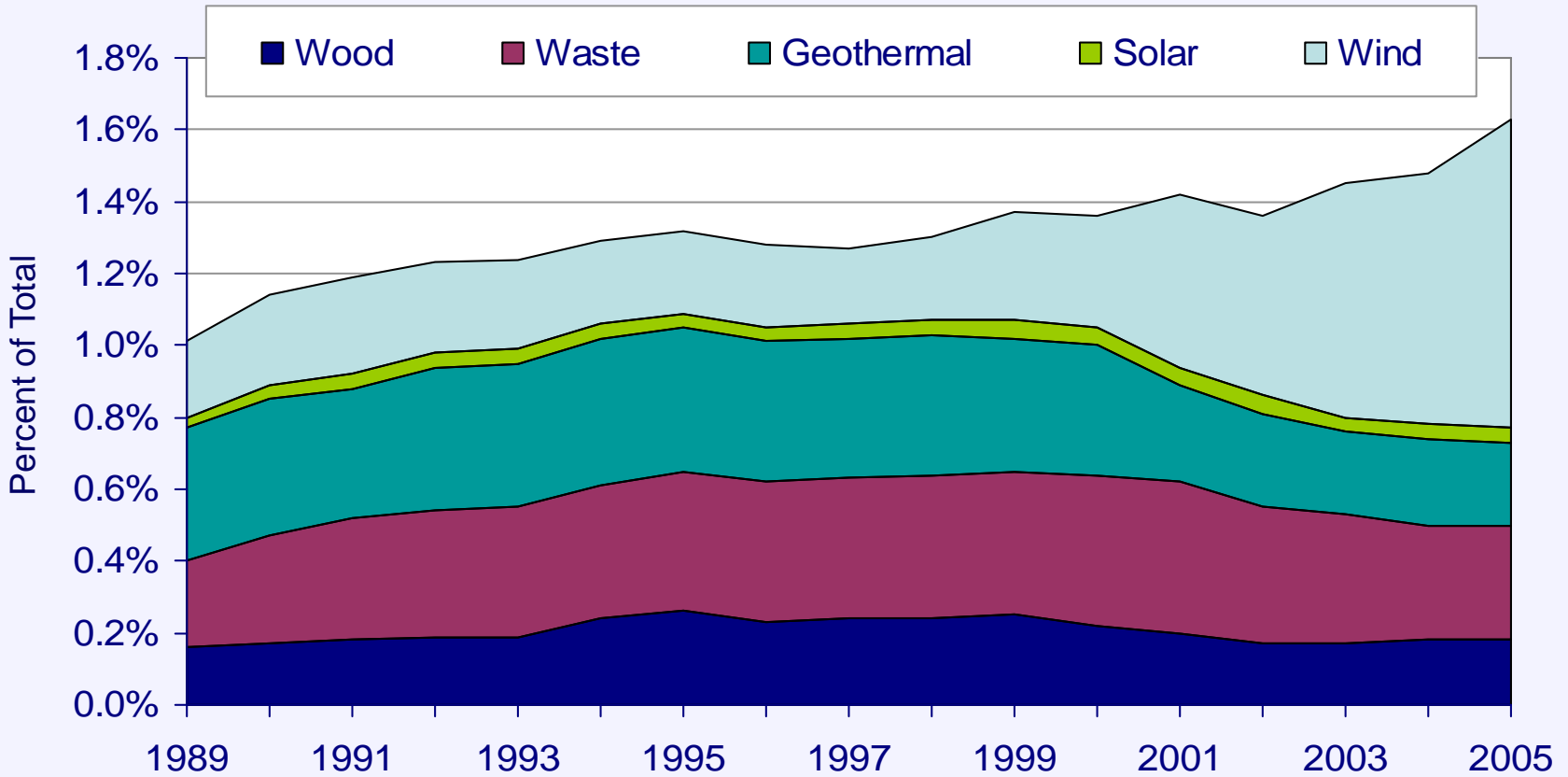
Renewable energy has fallen as a share of total U.S. power generation.



Non-hydroelectric renewable energy has increased as a share of total U.S. power generation.

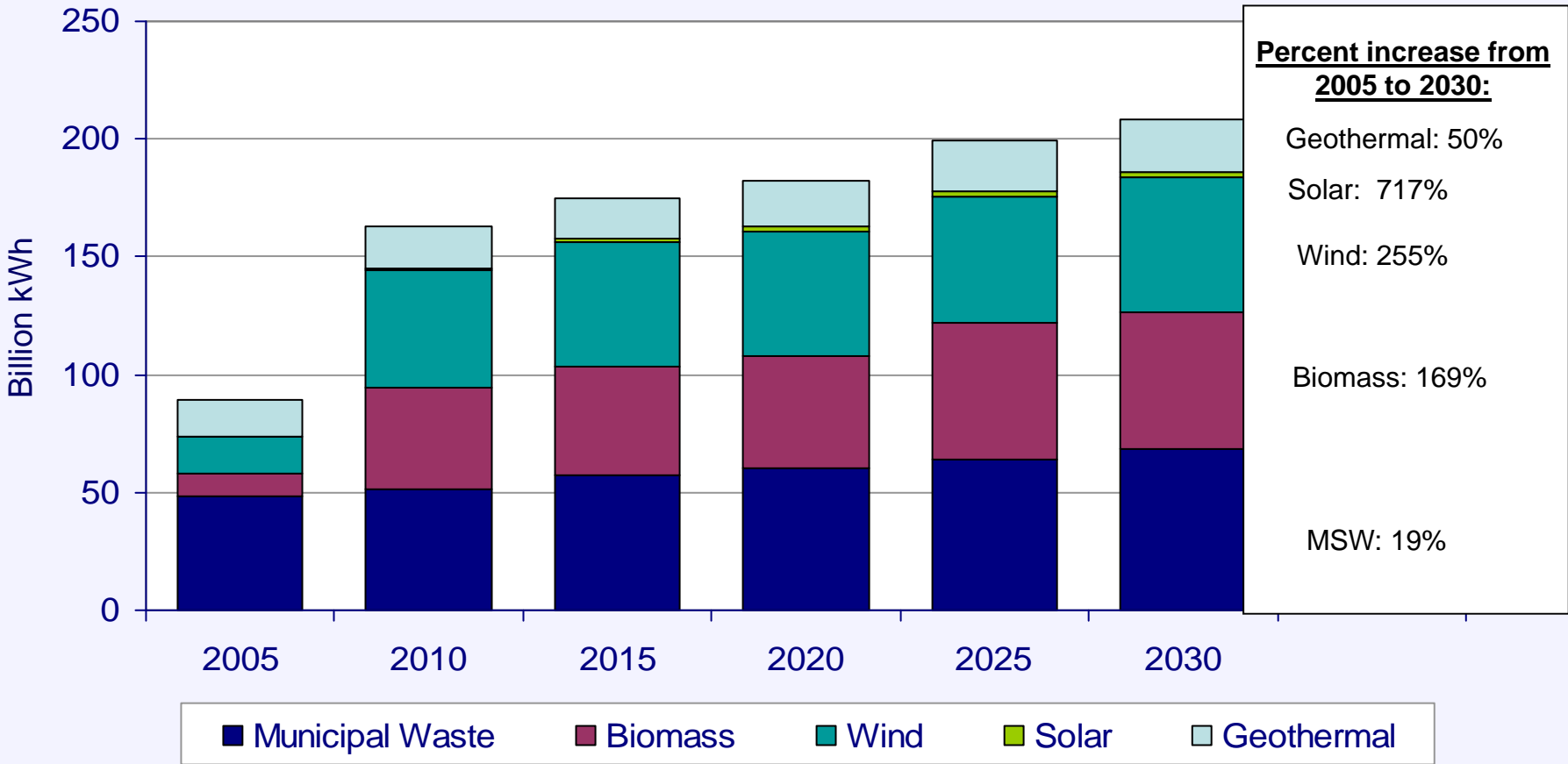


Wind energy is rapidly become the renewable energy resource of choice at the margin.



Projected Alternative Energy Generation

**Alternative energy is expected to increase significantly in the next 25 years.
Solar leads on percentage basis; wind leads on absolute basis.**





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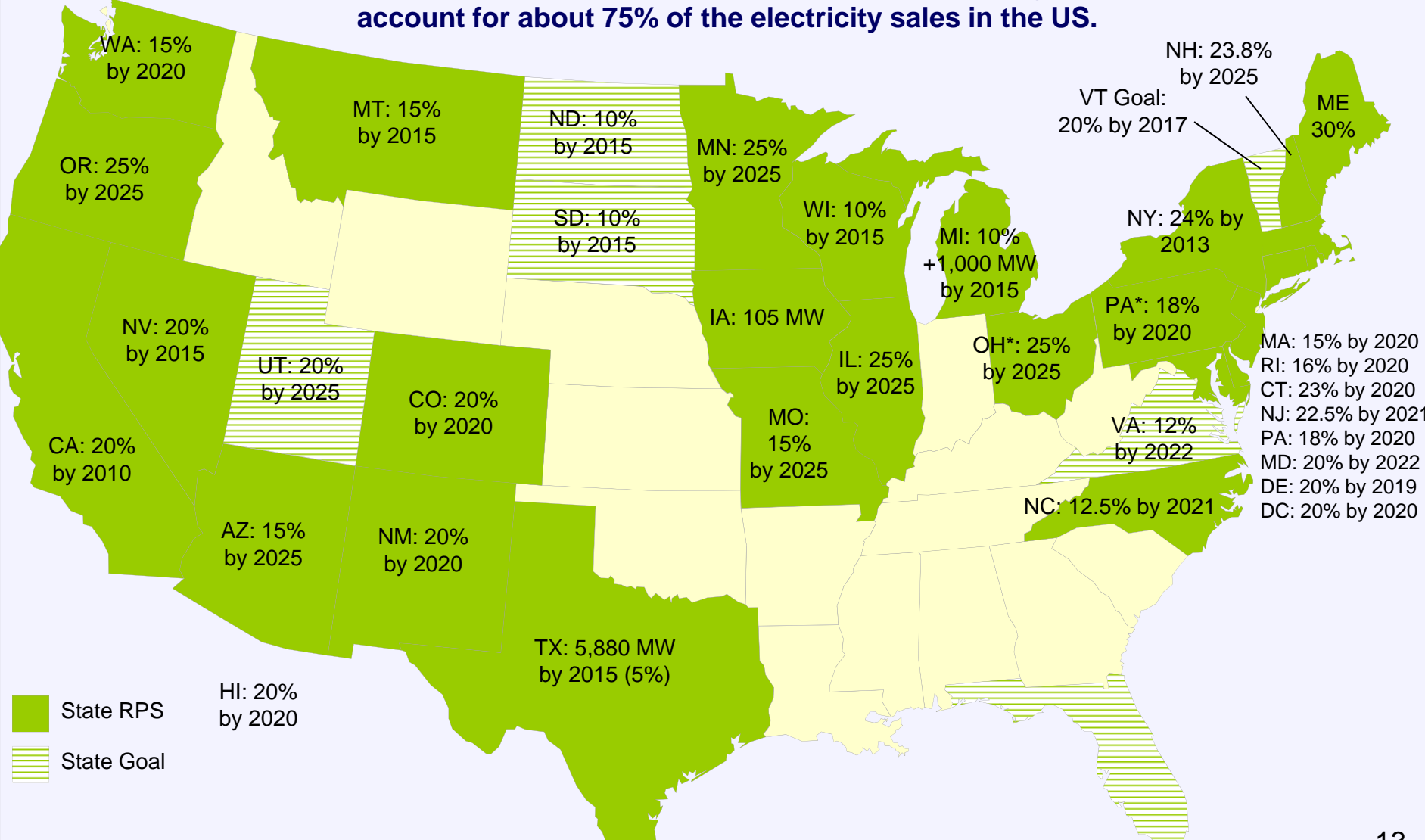
Policy Mechanisms for Alternative Energy

- **Voluntary Markets for Alternative Energy:** renewable energy attributes are now assigned property rights and can be traded.
- **Power System Bypass:** interesting getting off the grid.
- **Federal Tax Credits:** several statutes offering tax incentives.
- **Renewable Portfolio Standards:** state-level renewable generation mandates.

A renewable portfolio standard (RPS) is a state policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources by a certain date.

States with Renewable Portfolio Standards

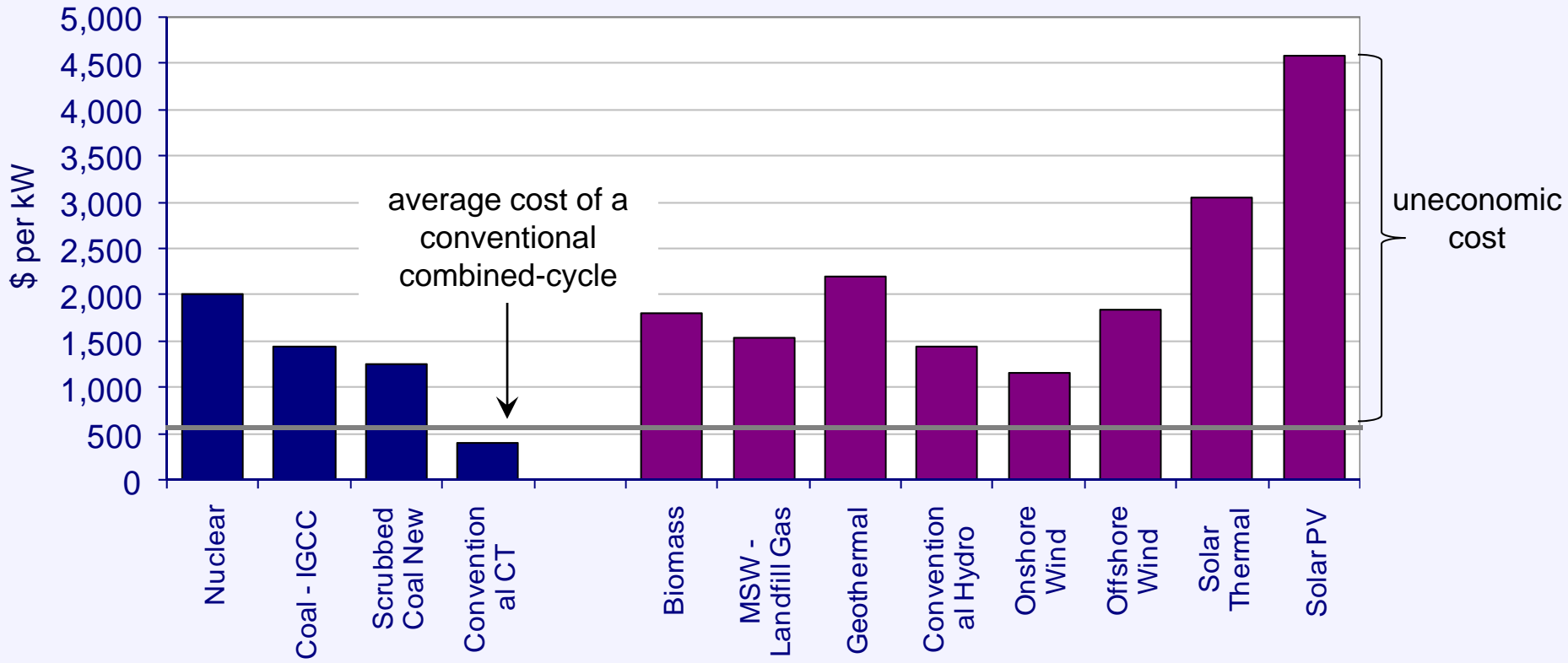
Currently there are 33 states that have RPS policies in place. Together these states account for about 75% of the electricity sales in the US.



Note: As of February 2009; *Ohio and Pennsylvania include separate tier of non-renewable 'alternative' energy resources.
 Source: Database of State Incentives for Renewables and Efficiency.

Total Overnight Cost for New Plants

Resources are typically uneconomic without additional support



These differentials will have to be recovered from various funding sources

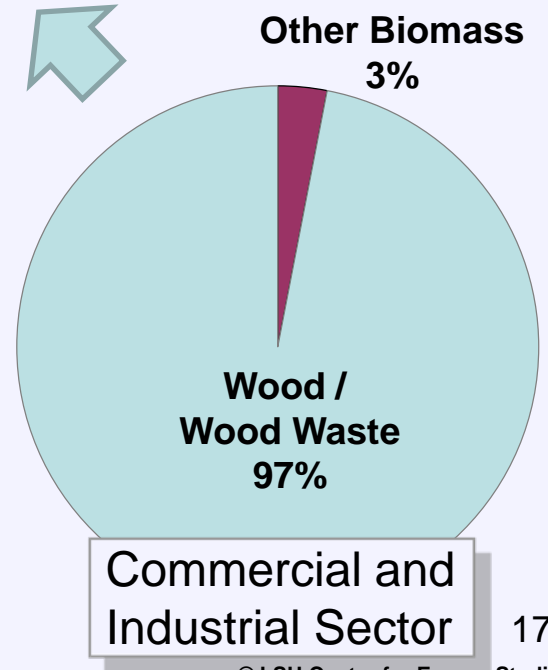
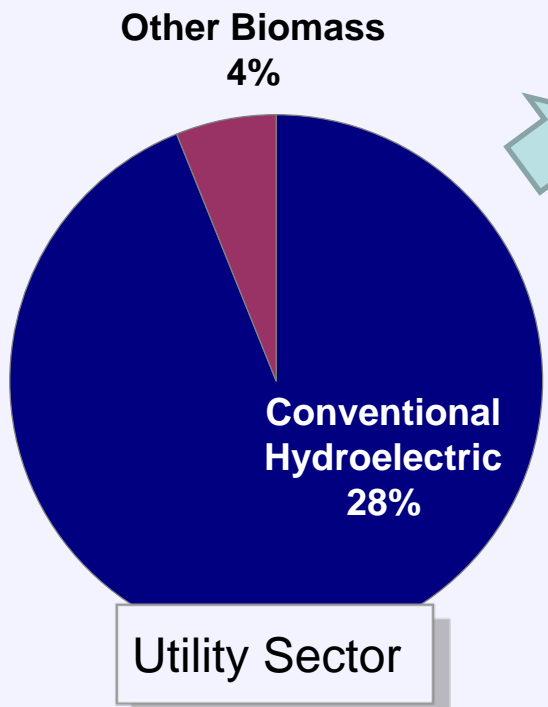
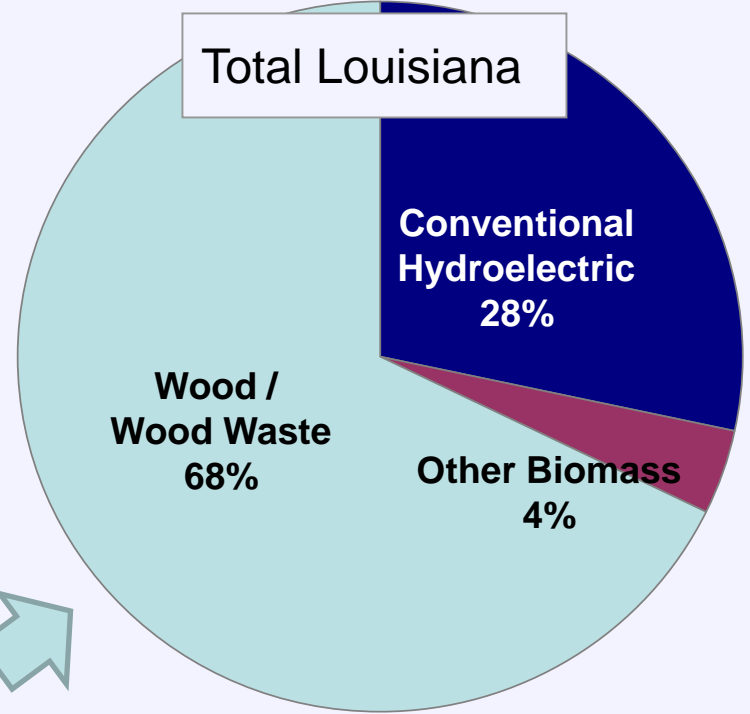
- New federal legislation, if approved, will require retail electric suppliers (with sales >4 MWh) to meet a certain percentage of their load with electricity generated from renewable resources and electricity savings.
- The combined renewable electricity and electricity savings requirement begins at 6% in 2012 and gradually rises to 20% in 2020.
- Up to one quarter of the 20% requirement automatically may be met with electricity savings
- Defines renewable energy resources to include wind, biomass, solar, geothermal, certain hydropower projects, marine and hydrokinetic renewable energy, and biogas and biofuels derived exclusively from eligible biomass. Other qualifying energy resources include landfill gas, wastewater treatment gas, coal mine methane, and qualified waste-to-energy.
- Requires retail electric suppliers to submit Federal renewable electricity credits (REC) and electricity savings each year equal to the combined target for that year times the supplier's retail sales. (1 REC = 1 MWh)
- Retail electric suppliers may submit, in lieu of a renewable electricity credits and demonstrated electricity savings, an alternative compliance payment equal to \$25 per credit.



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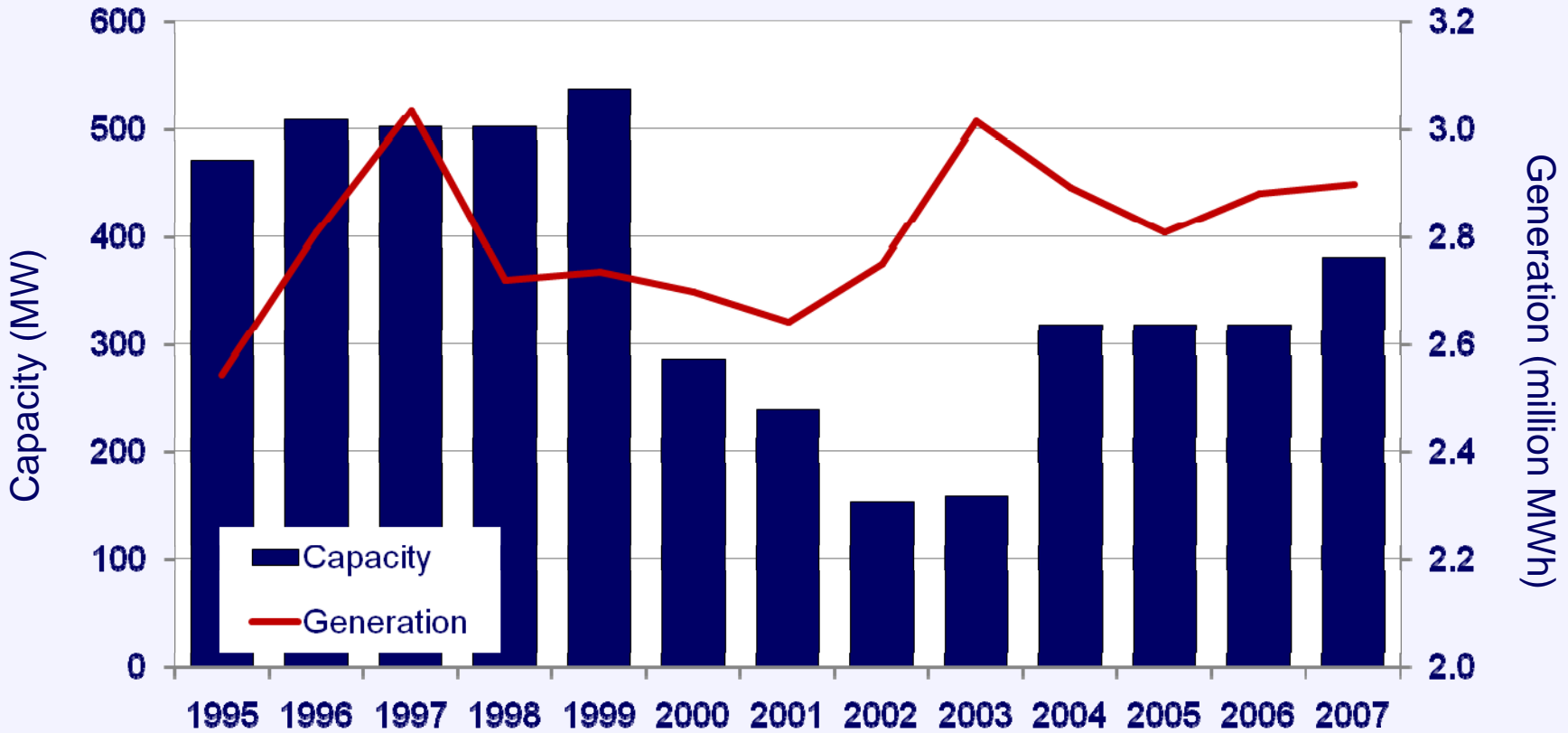
Current Louisiana Resources

Louisiana Renewable Net Generation



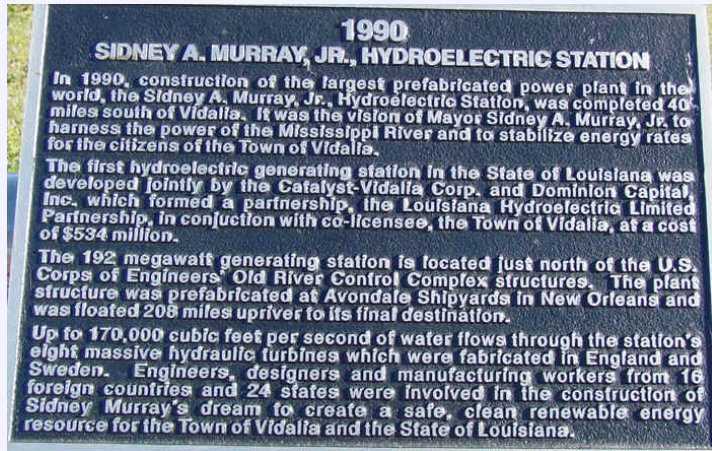
Wood Generation Trends: Historic Louisiana Capacity and Generation

Since 2002, electric generation capacity from wood and wood-derived fuels in Louisiana has increased 148 percent. Generation increased 10 percent between 2002 and 2003; it has remained between 2.8 and 3 million MWh since.



Note: Includes Wood/wood waste solids (including paper pellets, railroad ties, utility poles, wood chips, bark, and wood waste solids), wood waste liquids (red liquor, sludge wood, spent sulfite liquor, and other wood-based liquids), and black liquor.

Source: Energy Information Administration, U.S. Department of Energy



- Largest prefabricated power plant in the world .
- 192 MW generating station.
- Cost \$354 million.
- Plant structure was prefabricated at Avondale Shipyards in New Orleans and was floated 208 miles upriver to its final destination.
- Up to 170,000 cubic feet per second of water flows through 8 massive hydraulic turbines (which were fabricated in England and Sweden).
- Engineers, designers and manufacturing workers from 16 countries and 24 states were involved in the construction.
- Developed jointly by the Catalyst-Vidalia Corporation and Dominion Capital, Inc, which formed a partnership, the Louisiana Hydroelectric Limited Partnership, in conjunction with co-licensee, the Town of Vidalia



- **Agrielectric owns and operates a 13 MW facility.**
- **Located adjacent to a rice mill near Lake Charles.**
- **Generates green power by burning rice hulls (300 tons per day).**
- **Built in 1984 and is a Qualifying Facility under PURPA.**
- **It supplies power to the adjacent rice mill and excess power is sold to the utility at avoided cost.**



- Located in Lacassine, next to facility that processes sugar cane and sweet sorghum
- Capacity: 22.4 million gallon per year, fuel alcohol
- Startup Target: 2009
- Will be first sugar cane-based ethanol plant in U.S.



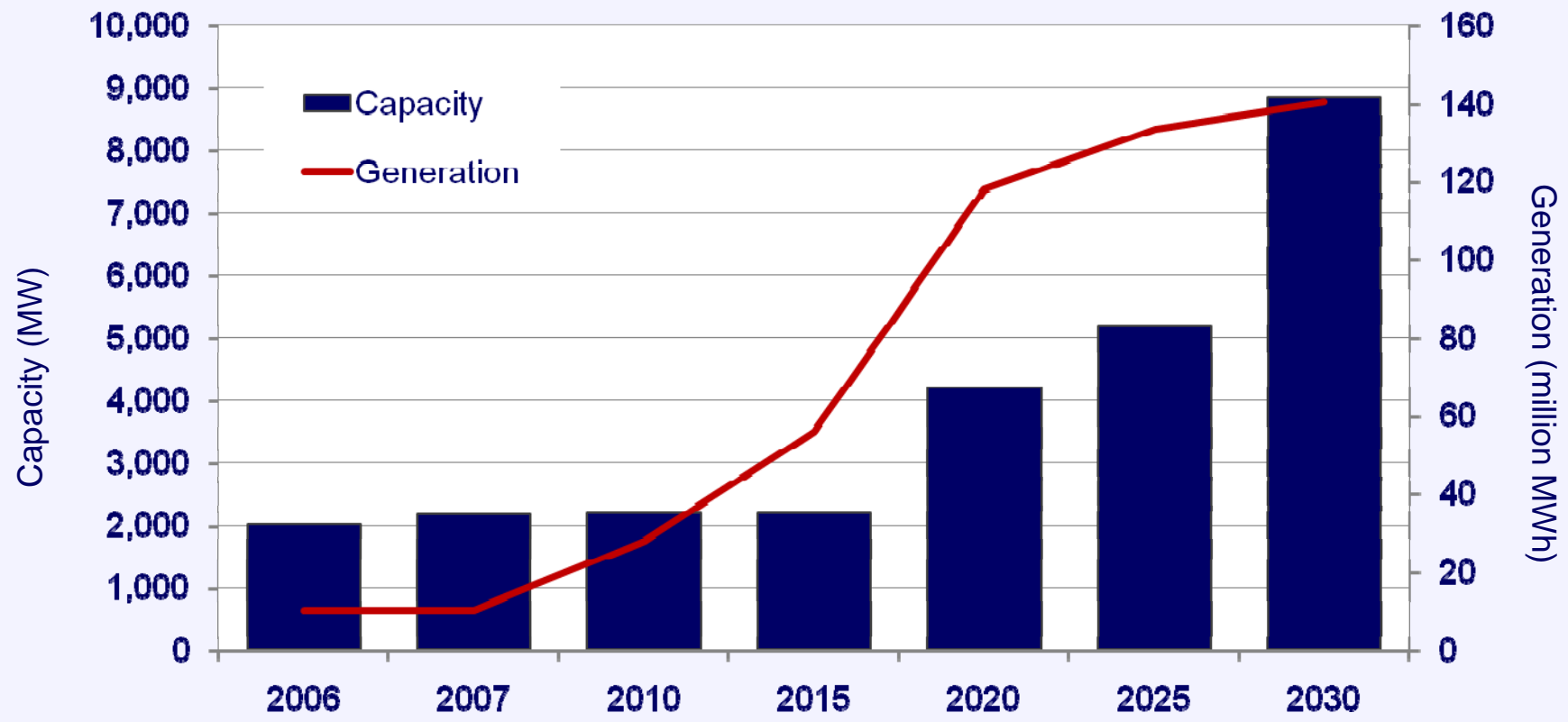


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Louisiana Renewable Generation Opportunities

Wood Generation Trends: Forecast of U.S. Wood Capacity and Generation

The Department of Energy forecasts wood and energy crops generation to increase by 6.3 percent/year: or an increase of 400 percent between 2010 and 2030.

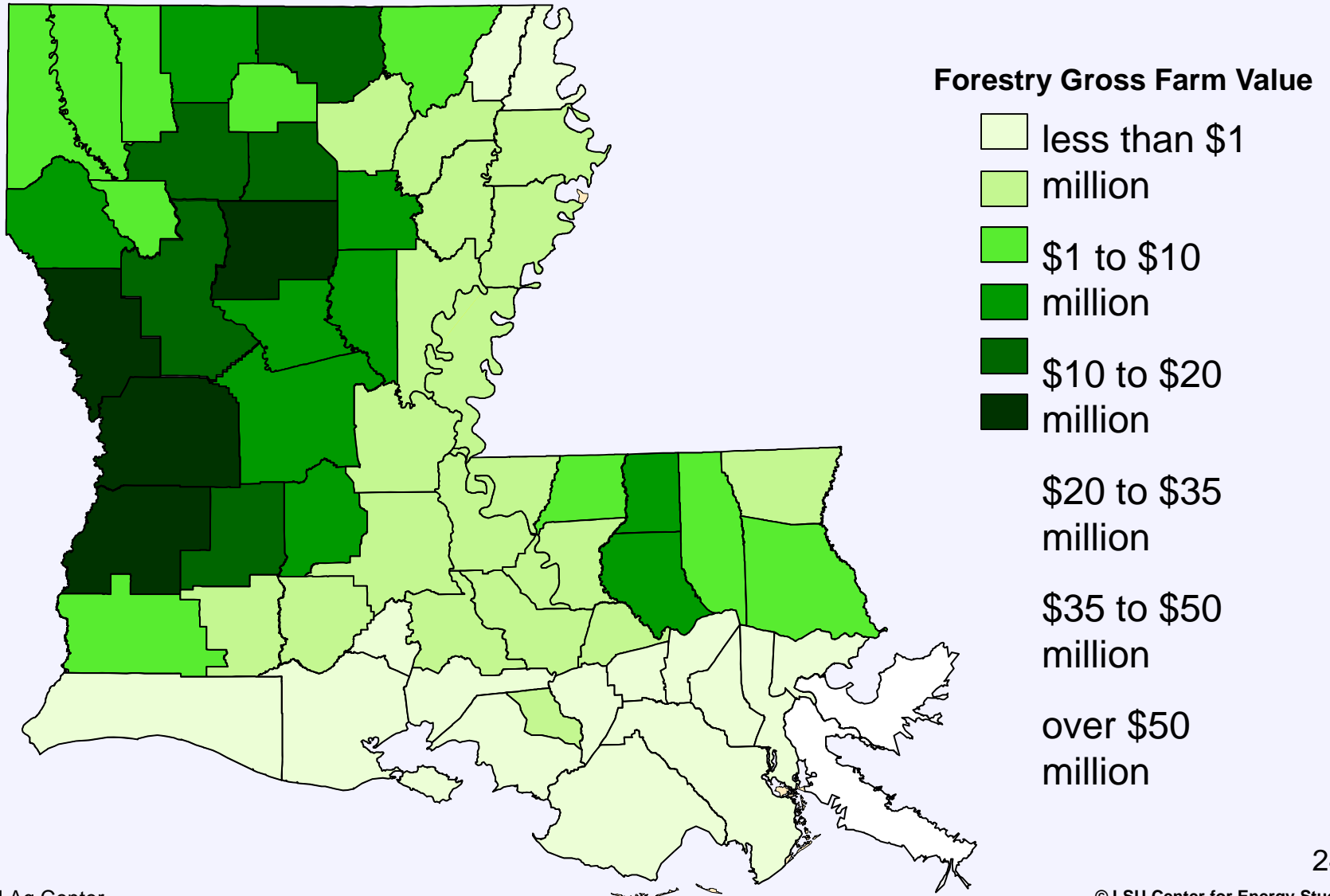


Note: Includes projections for energy crops after 2012. Also, facilities co-firing biomass with coal are classified as coal facilities and are not included in these estimates.

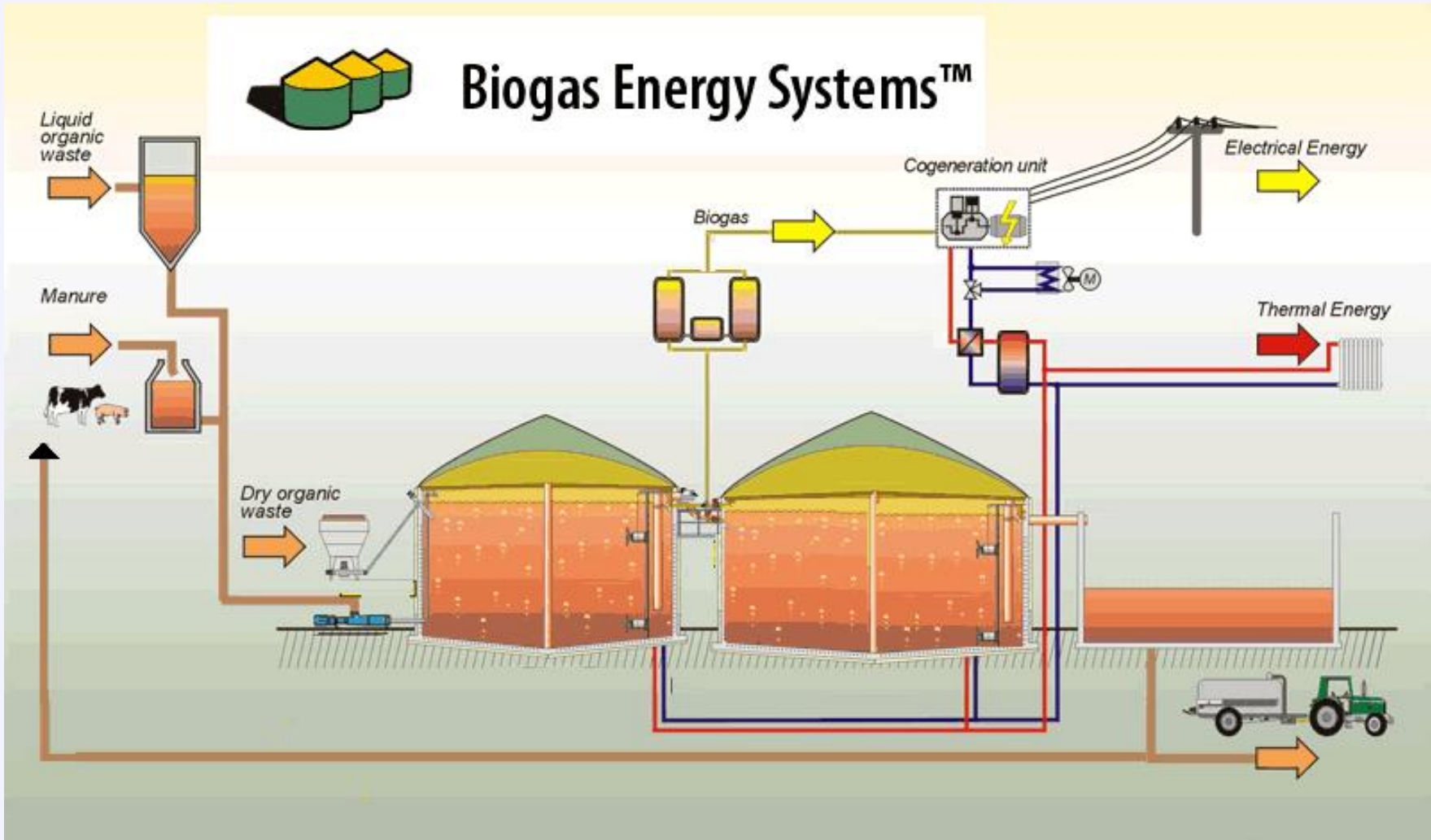
Source: Energy Information Administration, U.S. Department of Energy

Louisiana Forestry Industry: Gross Value by Parish, 2008

In 2008, the total value of Louisiana forestry production was \$3.3 billion.

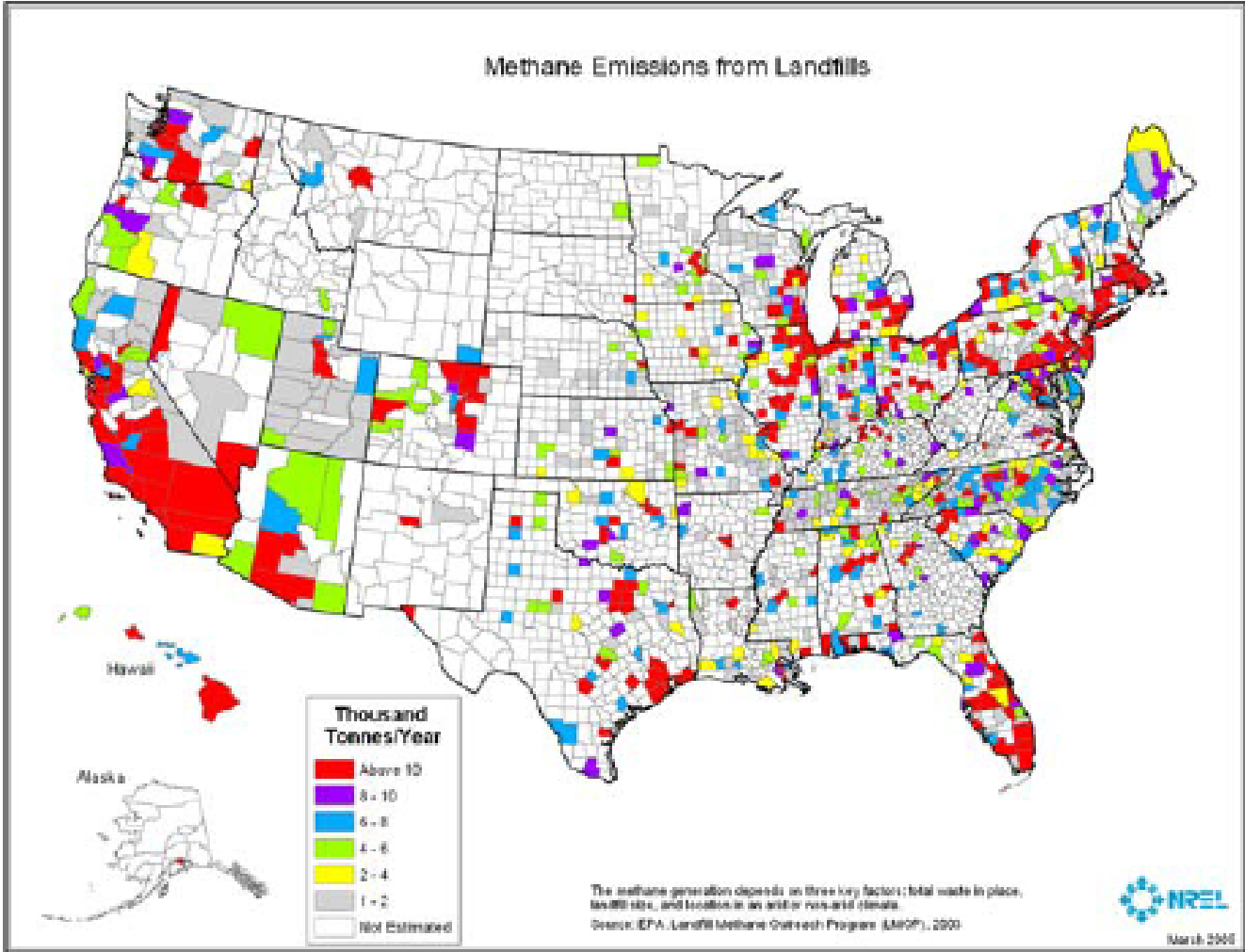


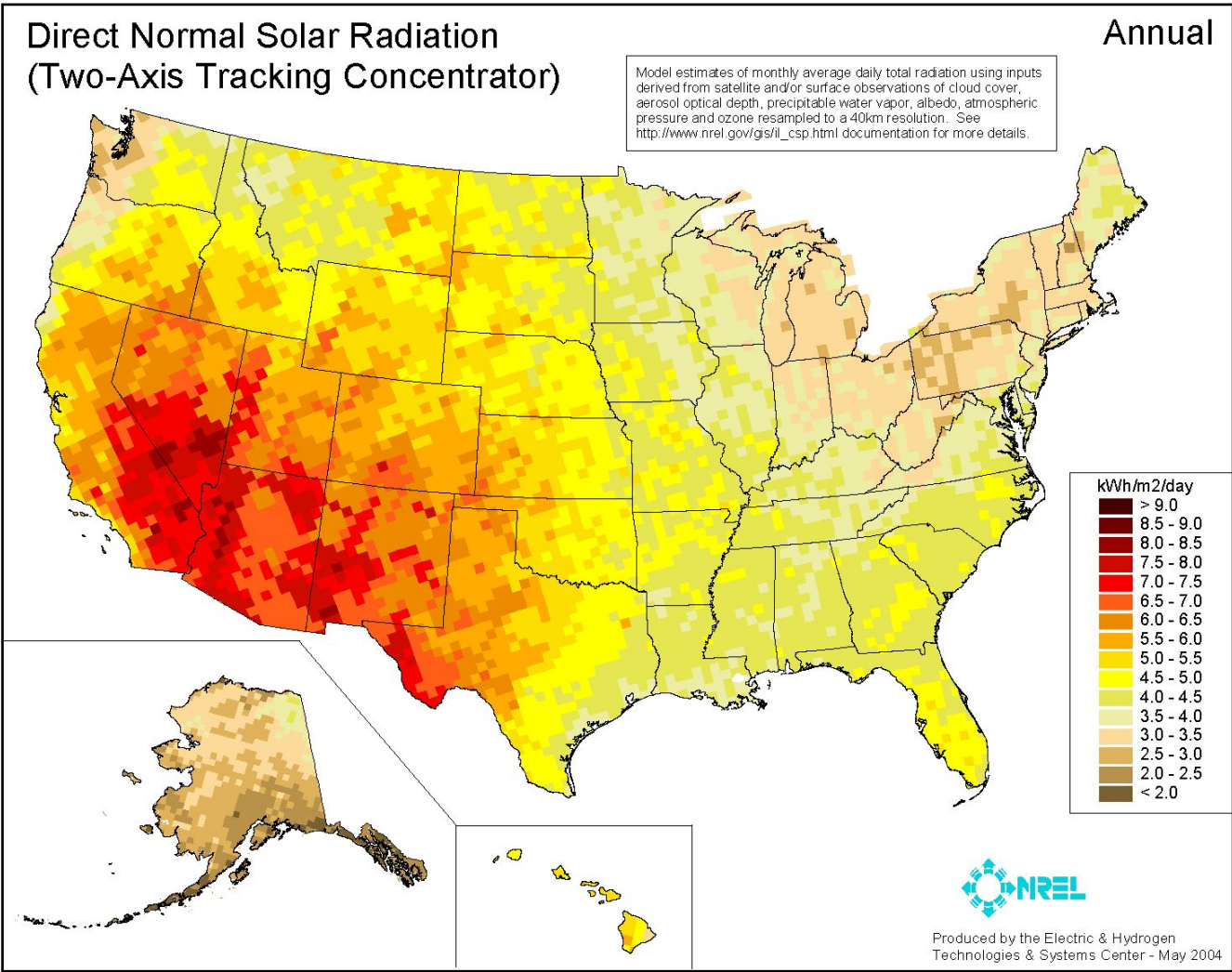
Anaerobic Digestion



Alternative Energy Developments Methane from Landfills

- Three active landfill methane projects in LA.
- Resource availability for LA estimated at 166,000 tons methane per year (NREL, 2005)





Wind Resource of Offshore Louisiana, Mean Annual Wind Speed at 50 Meters

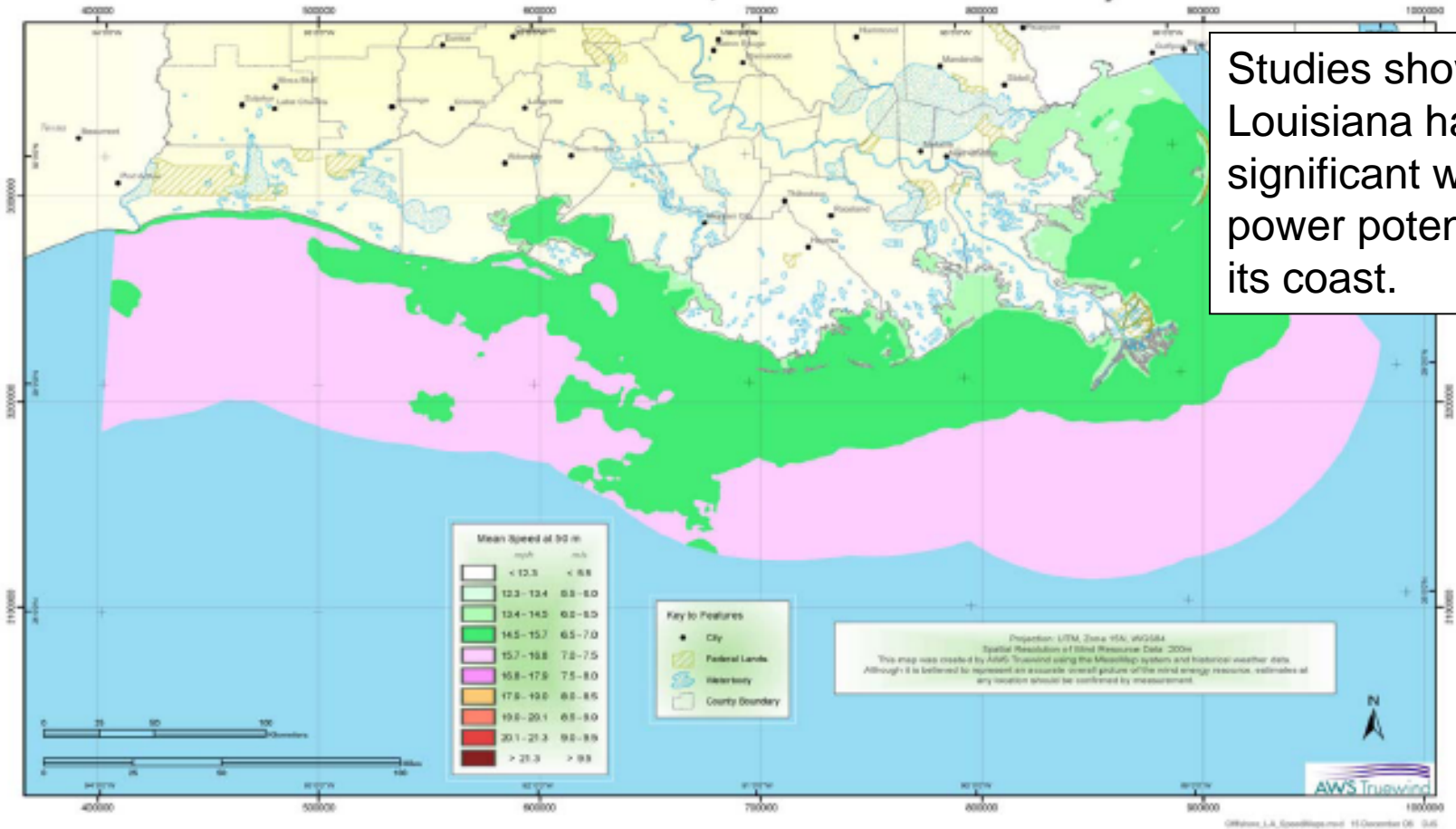
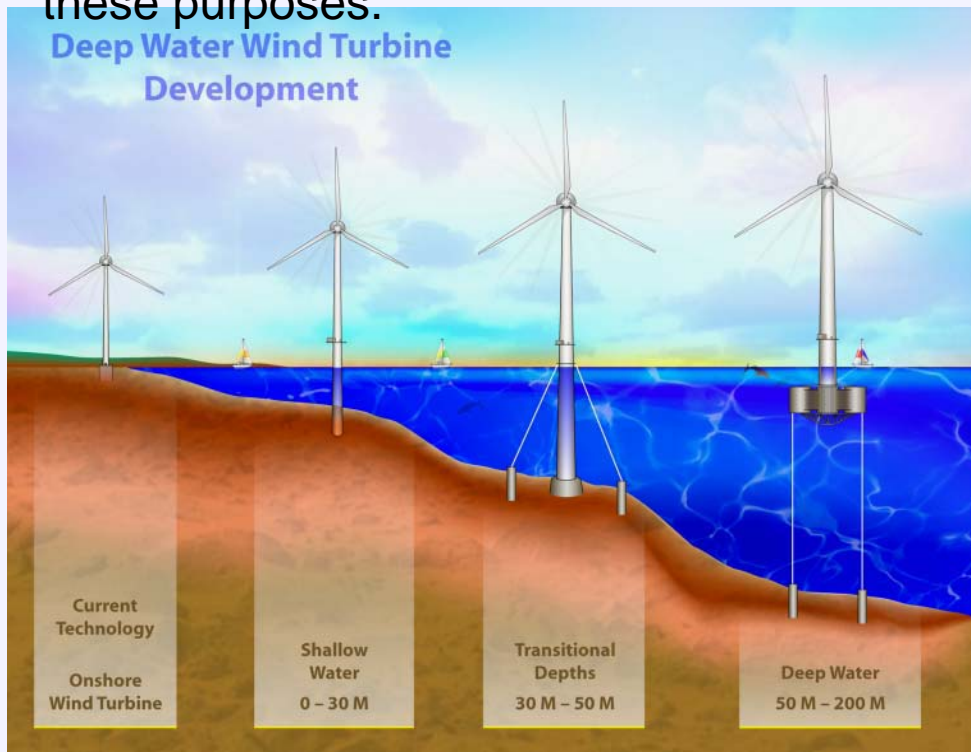


Figure 1. Mean Annual Wind Speed for Offshore Region of Louisiana at 50 m

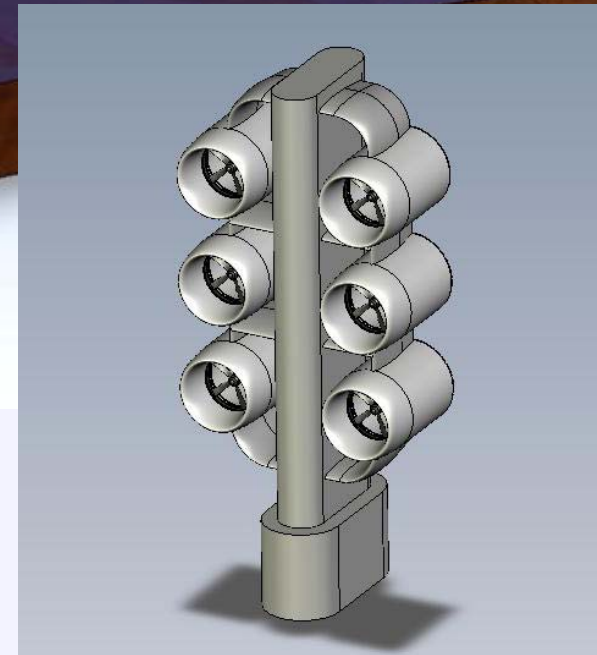
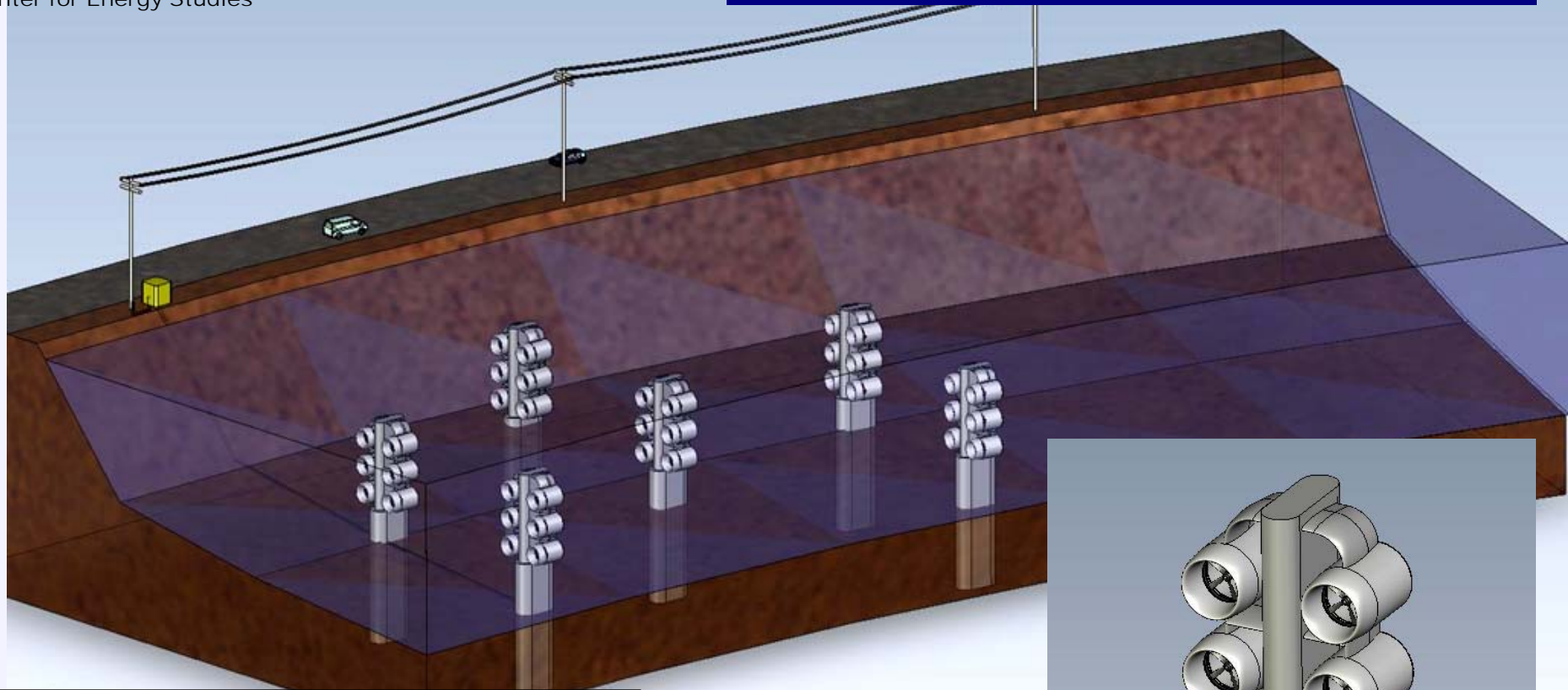
It is possible that a few of the oil and gas platforms decommissioned in the GOM could be used as Electrical Service Platforms in offshore wind farms or as bases for wind turbines for intra-oil field electrical generation. It seems unlikely that large numbers of platforms will be used for these purposes.



A UK energy company announced that the UK Department of Trade and Industry gave its approval for the development of a deepwater wind farm demonstrator project adjacent to the company's oilfield, 25 kilos off the east coast of Ireland.

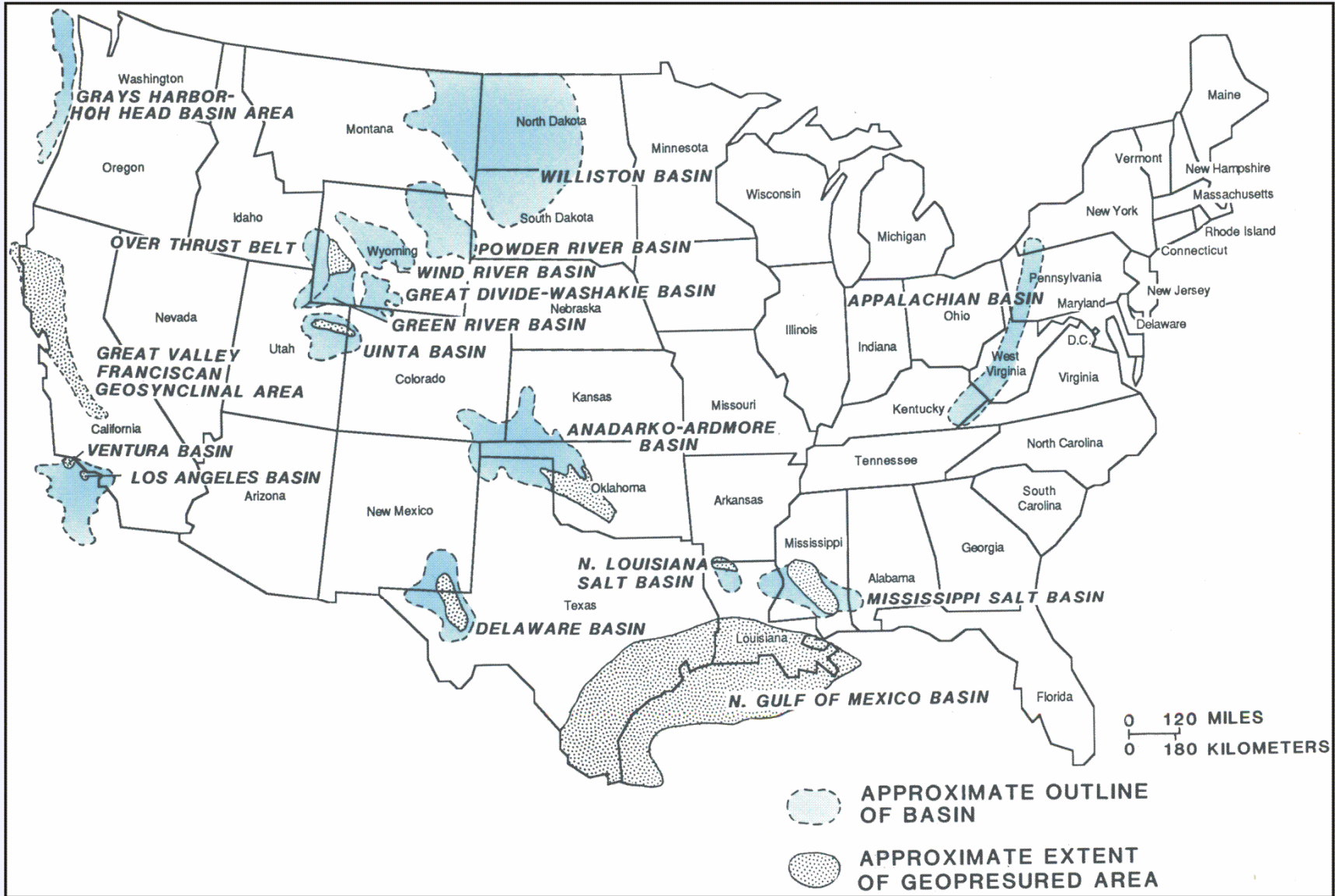
In 2007, a comprehensive report to the US Department of Energy by MIT and the NREL was dedicated solely to the modeling of floating wind turbine systems on the US coast.

Schematic: River Bend Turbine Configuration

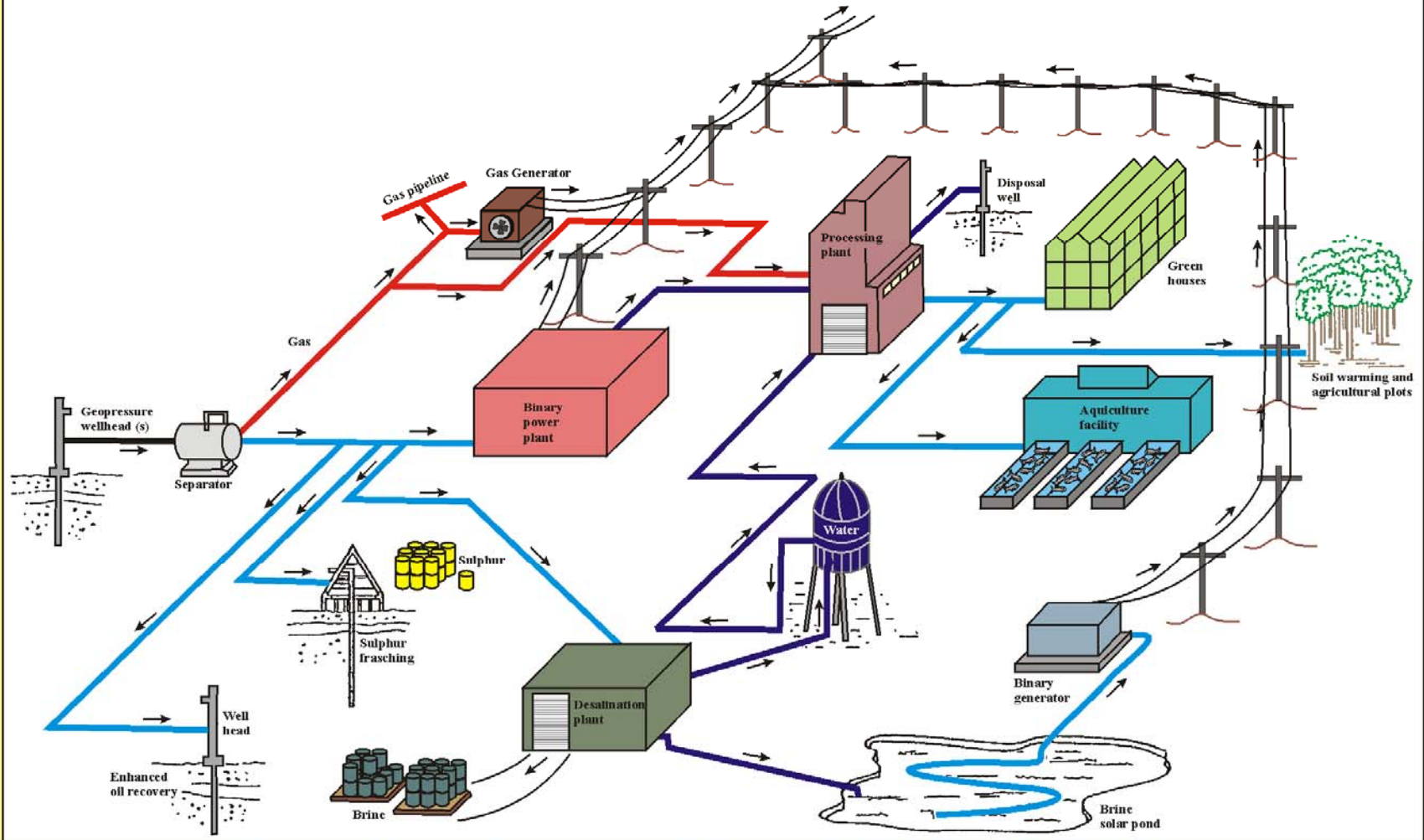


States	Projects	Turbines	Average Capacity (MW)
LA	30	60,650	606.5
LA / MS	6	20,950	209.5
AR / MS	5	22,550	225.5
AR / TN	4	18,100	181.0
TN / MO	2	6,250	62.5
MO / KY	4	13,750	137.5
MO / IL	8	17,100	171.0
Total:	59	159,350	1,593.5

Geopressured basins of the United States (modified after Wallace, 1982)



Geopressed-Geothermal Resource A Multipurpose "green" Potentially Economic Reality Today



Conceptual layout of a geopressed integrated facility (from Lunis, 1990).

**Natural Gas Will Be Choice
Power Generation Fuel**



**Increasing generation,
cogeneration (efficiency) and
end use fuel applications**



**Natural gas will be
needed to back-up
intermittent renewable
generation
applications**



- **New areas of production in Louisiana will require additional natural gas transportation and storage infrastructure.**
- **The area referred to as the Haynesville Shale, is regarded as the 4th largest natural gas field in North America, with the leading exploration company in the play announcing it is projecting the potential of 52 trillion cubic feet of natural gas reserves.**



Conclusions

- Outside of unconventional gas, renewable energy is the fastest growing sector of the energy industry and should be for several years to come.
- Considerable national policy momentum for a federal standard.
- No silver bullet for Louisiana, resource base is more “niche” oriented. Considerable unique opportunities with considerable unique challenges.
- Louisiana has as many opportunities for successful renewable energy development as any other state, provided appropriate support mechanisms are in place.
- Louisiana natural gas production will be an important component of national renewable energy development.

Questions, Comments, & Discussion

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