Approaches to Using Biomass for Liquid Fuel Production

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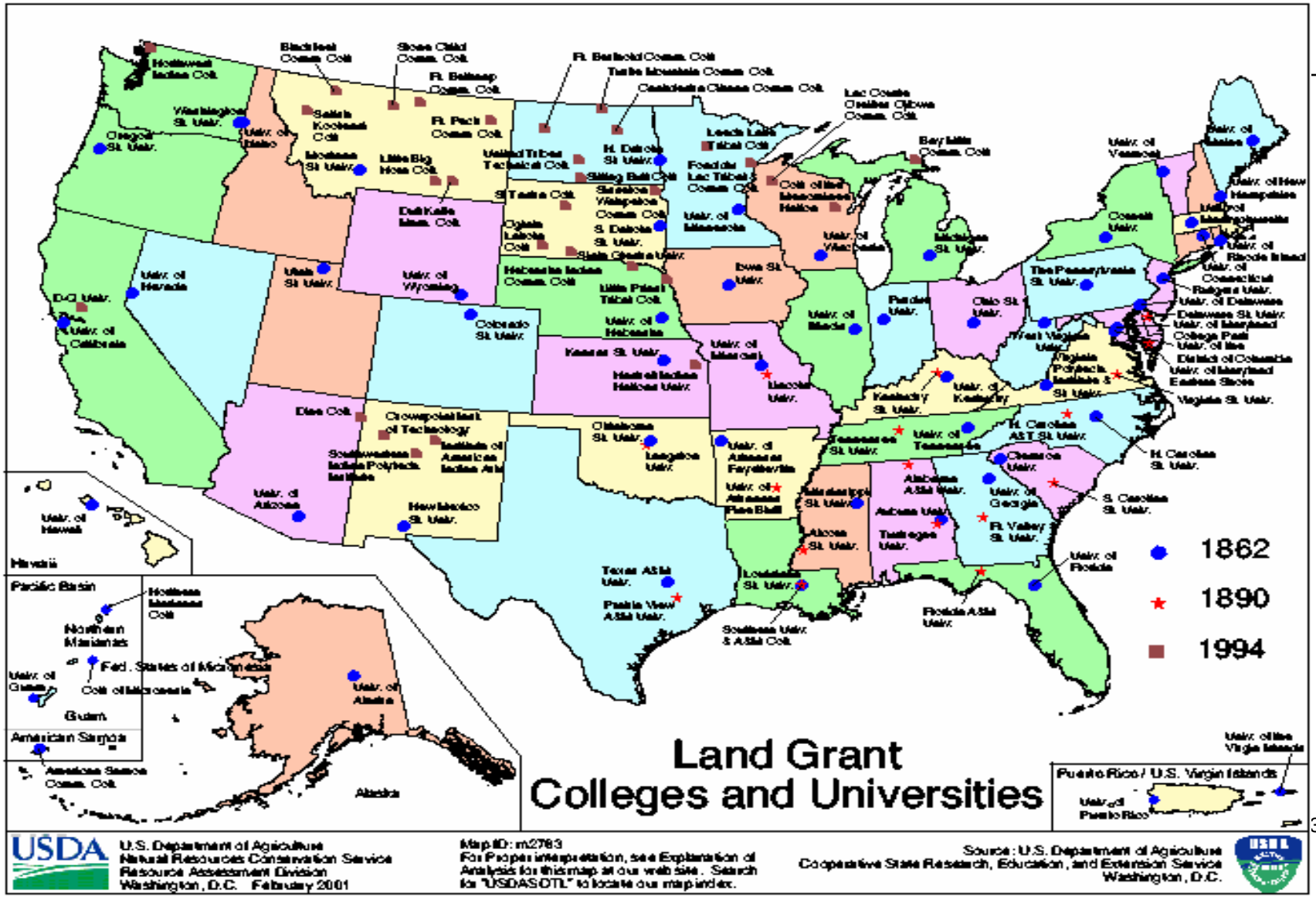
Sun Grant Initiative

- Land Grant Institutions
  - 1862
  - 1890
  - 1994
- Academic Programs in Agriculture and Engineering
- Agricultural Experiment Stations
- Cooperative Extension Services
- A federal mandate to work with each other

Land Grant Institutions



An Idea

- January 2001
- US Senator Tom Daschle
- Consumer concerns
- National energy security
- The rural economy
- Think Big
  . . . Something Different

SunGrant INITIATIVE

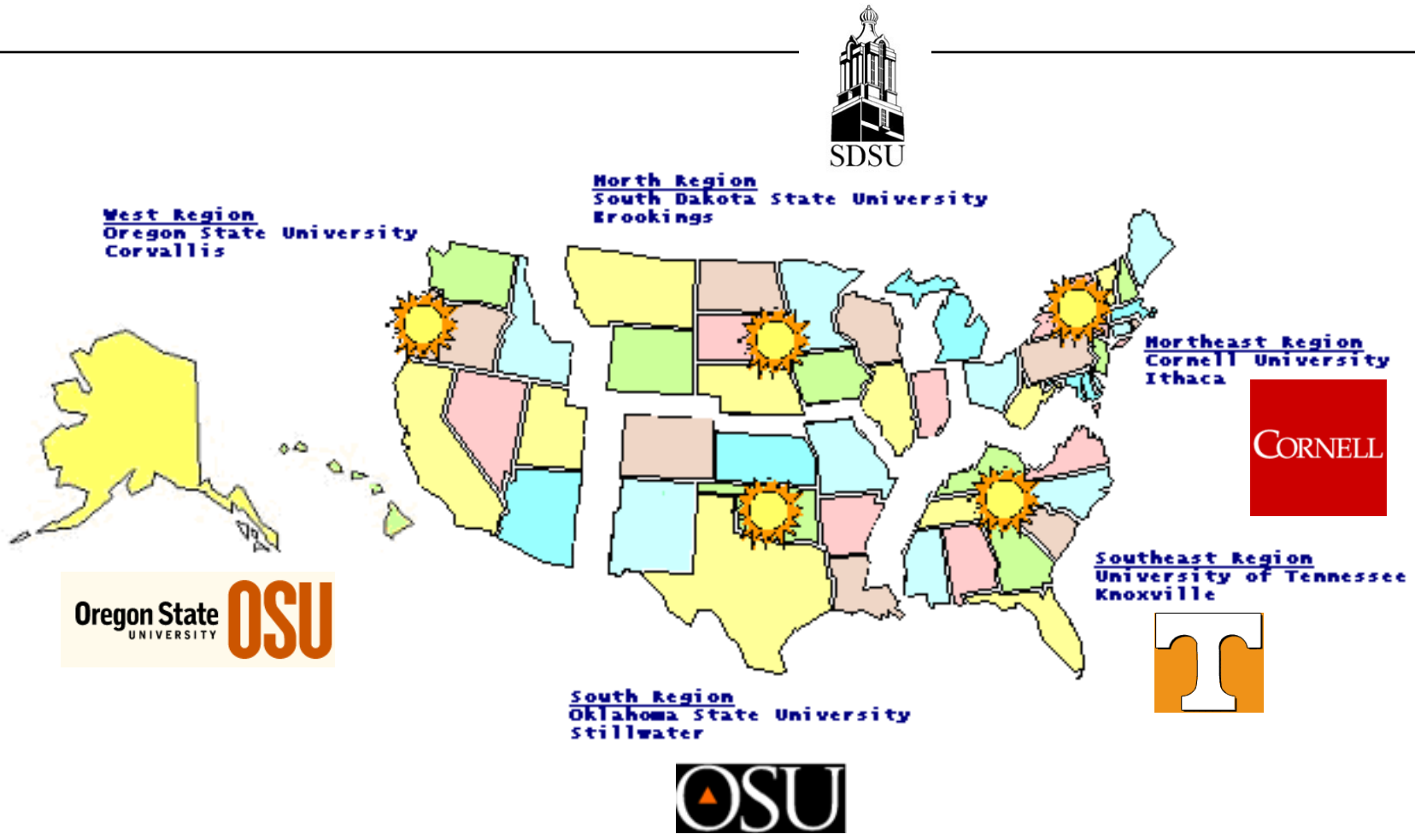
Mission

- Enhance national energy security through development, distribution and implementation of biobased energy technologies.
- Promote biobased diversification and environmental sustainability of America's agriculture.
- Promote opportunities for biobased economic diversification in rural communities.
- To enhance the efficiency of bioenergy and biomass research and development programs through improved coordination and collaboration between USDA, DOE and the land-grant colleges and universities

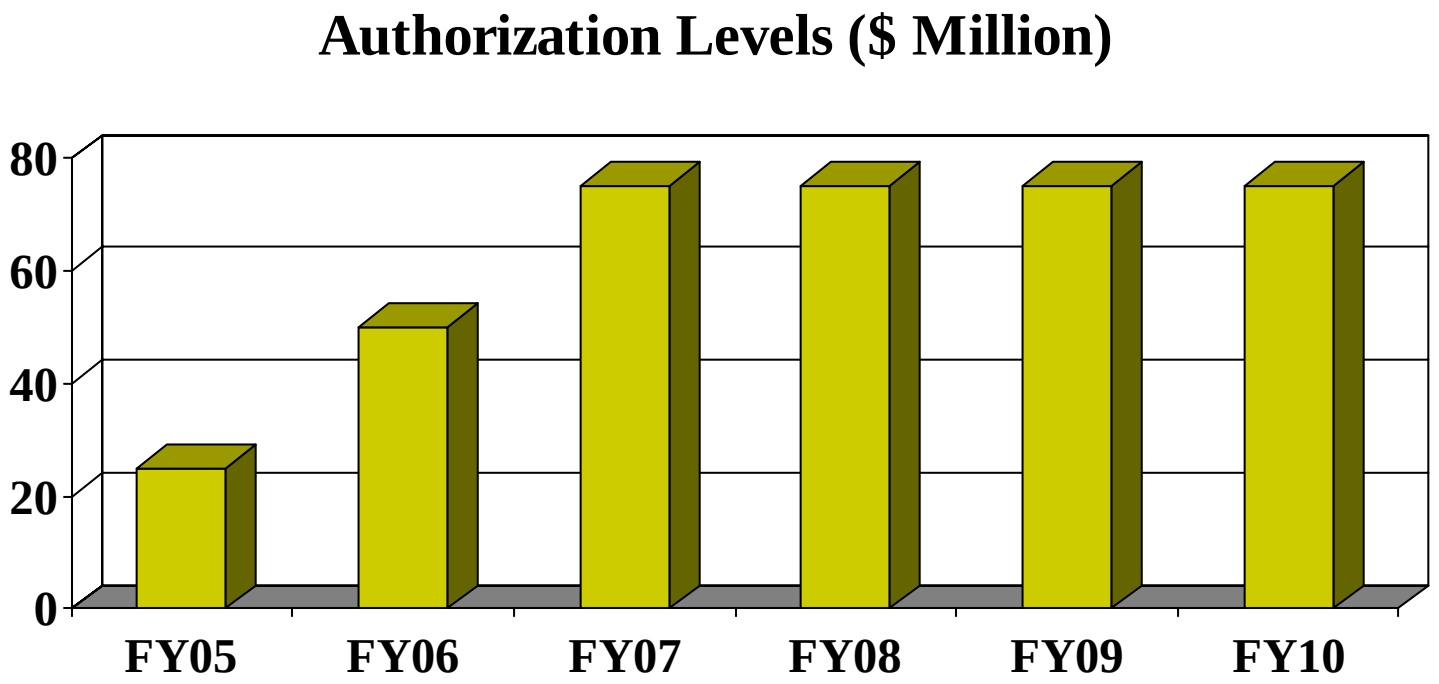
Sun Grant Research Initiative Act of 2003

- **Amendment to Title IX of the Farm Security and Rural Investment Act of 2002**
- **Section 9011 of the Farm Bill**
- **Authorized January 2004**

Sun Grant Research Initiative Act of 2003



Sun Grant Research Initiative Act of 2003



SunGrant INITIATIVE

Sun Grant Research Initiative Act of 2003

Fund Distribution and Use

- Allocated evenly among the five regions
- No more than 25% used directly at the centers
- Remaining 75% distributed competitively in region to land grant institutions
  - research, extension, and educational programs on technology development
  - integrated research, extension, and educational programs on technology implementation
- The minimum allocation to development or implementation is 30%
- multiinstitutional and multistate

Sun Grant Research Initiative Act of 2003

- **Sun Grant Data Analysis Center**
  - **Funded by the regional centers up to $4 million annually**
- **The centers must submit a plan to the USDA Secretary for addressing at the State and regional levels the bioenergy, biomass, and gasification research**

Sun Grant Programs

- **Research programs in renewable energy and biobased non-food products.**
- **Extension programs to connect technology with industry, business, communities, and producers.**
- **Academic programs to populate the biobased industries workforce.**

Next Steps

- ✓ **Authorization bill must be introduced and acted on in 108th Congress**
- **Appropriations process**
- **Continued dialog among land grant institutions and stakeholders**
- **Placement of people**
- **Work toward regional priorities**

DOE Vision Goals - December 2002

- Biopower
  - Increase annually at 2% through 2030
  - 4% of total industrial and generator demand in 2010, 5% in 2020
- Transportation Fuels
  - Biomass fuels, 0.5% in 2001, 4% in 2010, 10% in 2020, and 20% by 2030.
- Biobased Products
  - 5% of chemical and material in 2001, 12% in 2010, 18% in 2020, and 25% by 2030.

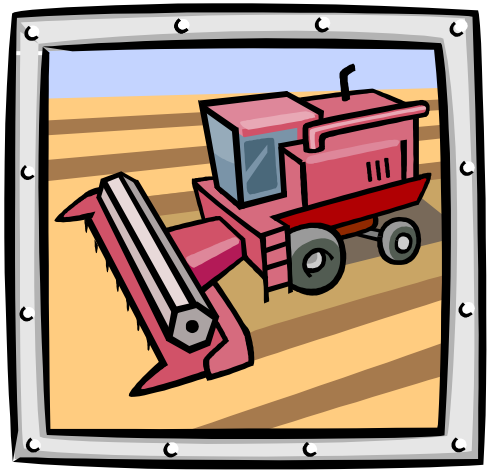
Agricultural Feedstocks

- Starch and sugars (ethanol)
- Oilseeds and animal fats (biodiesel)
- Biomass energy
  - Woody and herbaceous species (lignocellulosic resources)
  - Electrical power generation
- Other
  - Wind Power
  - Geothermal
  - Hydrogen

SunGrant INITIATIVE

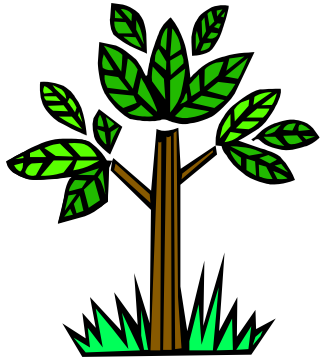
Starch and Sugars

- Corn
- Grain sorghum, barley, wheat
- Sugar beats, sweet sorghum, sugarcane, potatoes



Biodiesel

- Oilseed crops
- Waste oils from food industry
- Rendering plants
- Fish oil

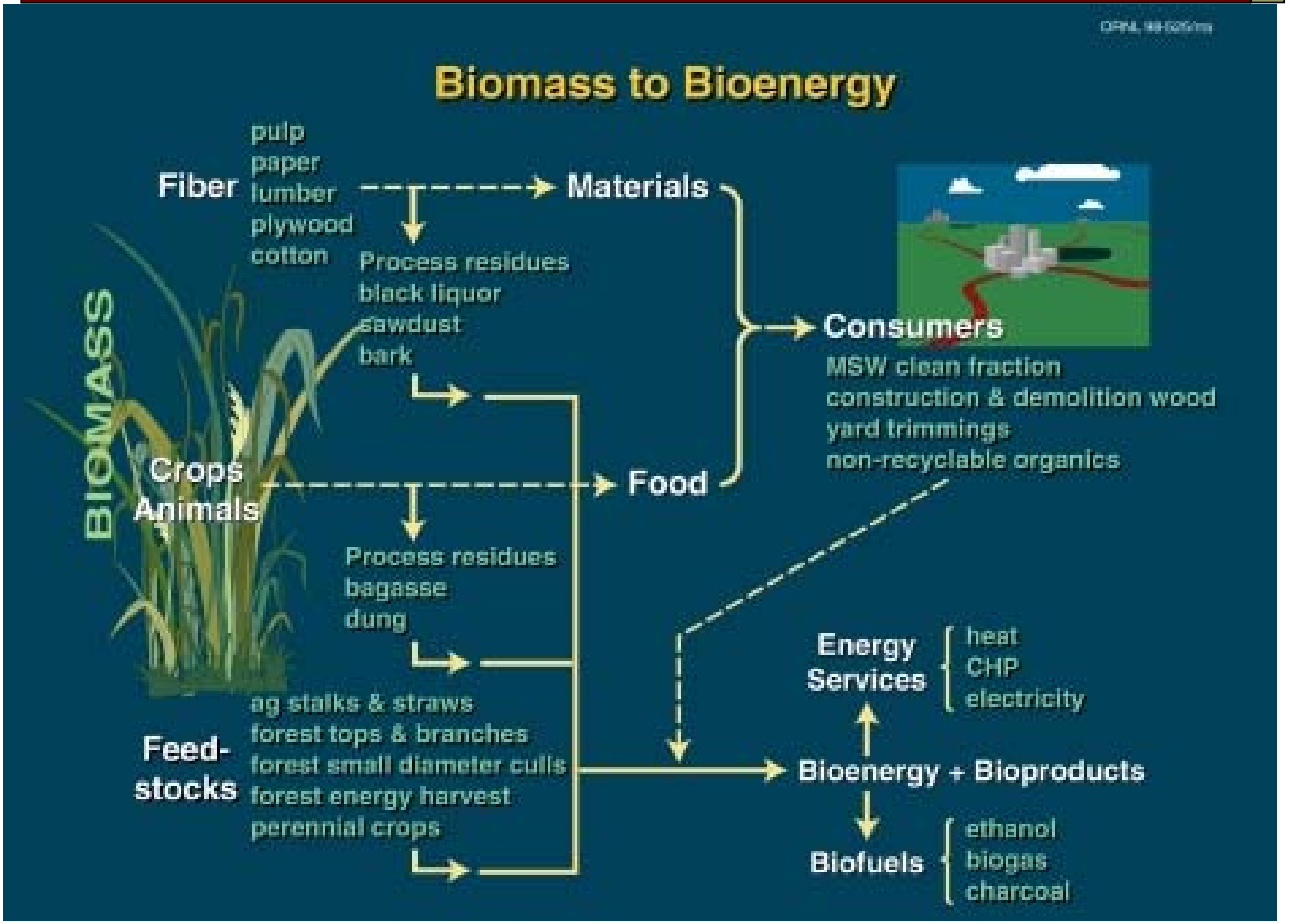


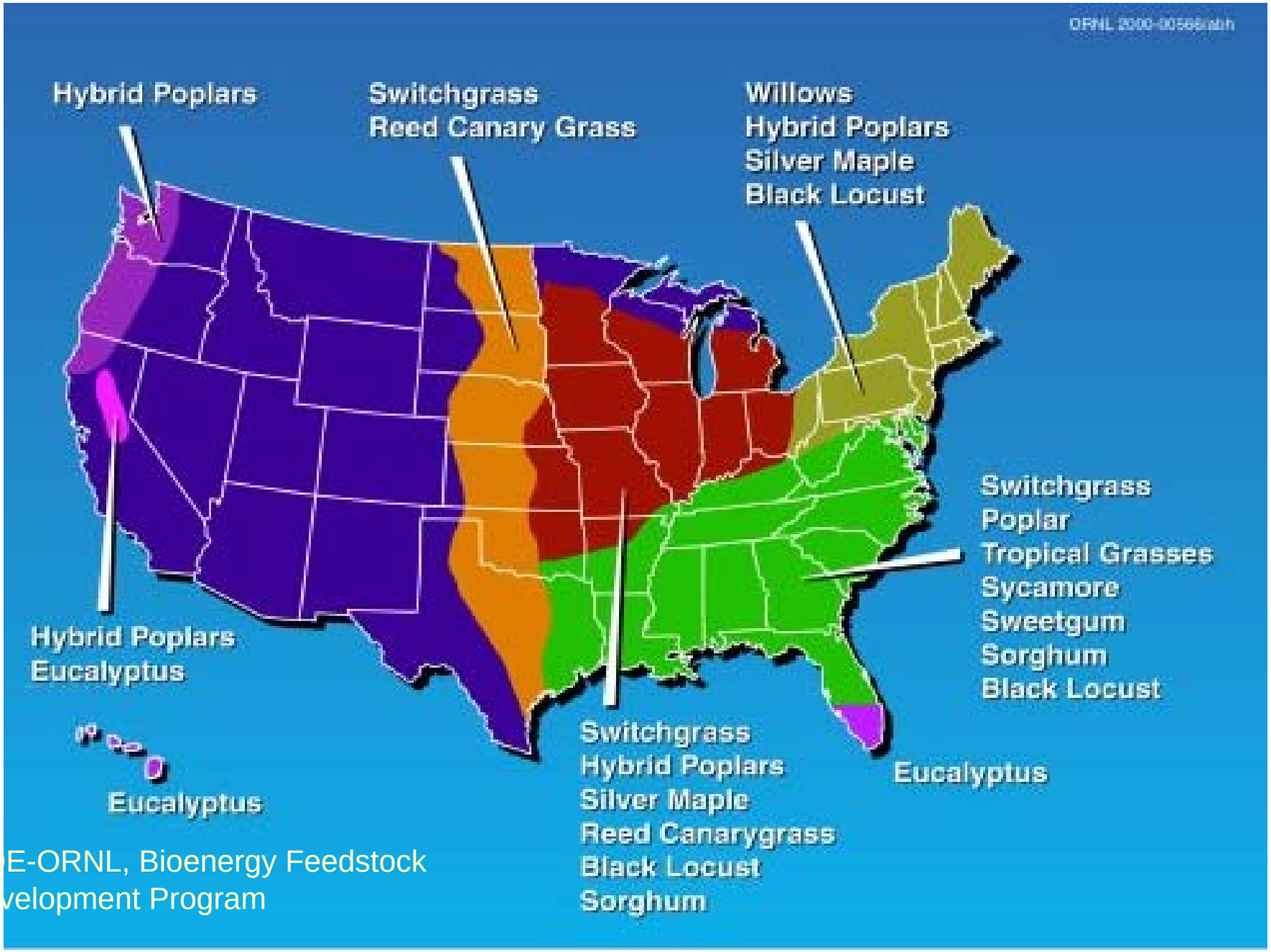
Biomass Feedstocks

- Herbaceous
  - Warm season perennial grasses
  - Switchgrass, Big Bluestem
- Woody
  - Hybrid poplars and willows
  - Silver maple

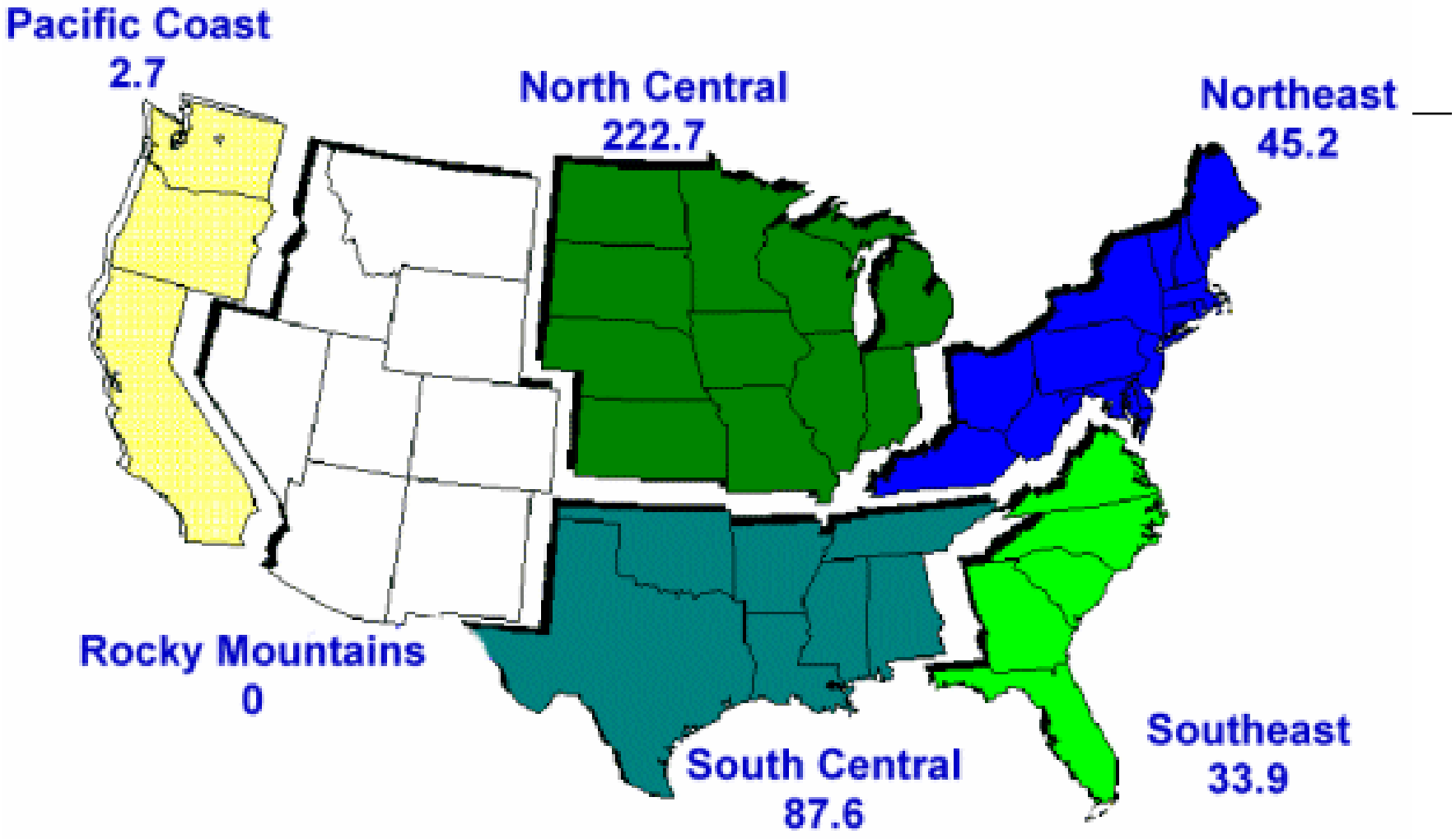
Biomass Feedstocks

- Crop residues
  - Corn stover
  - Straw from wheat and other small grains
  - Many others
- Solid wastes
  - Municipal
  - Livestock manure
  - Industrial

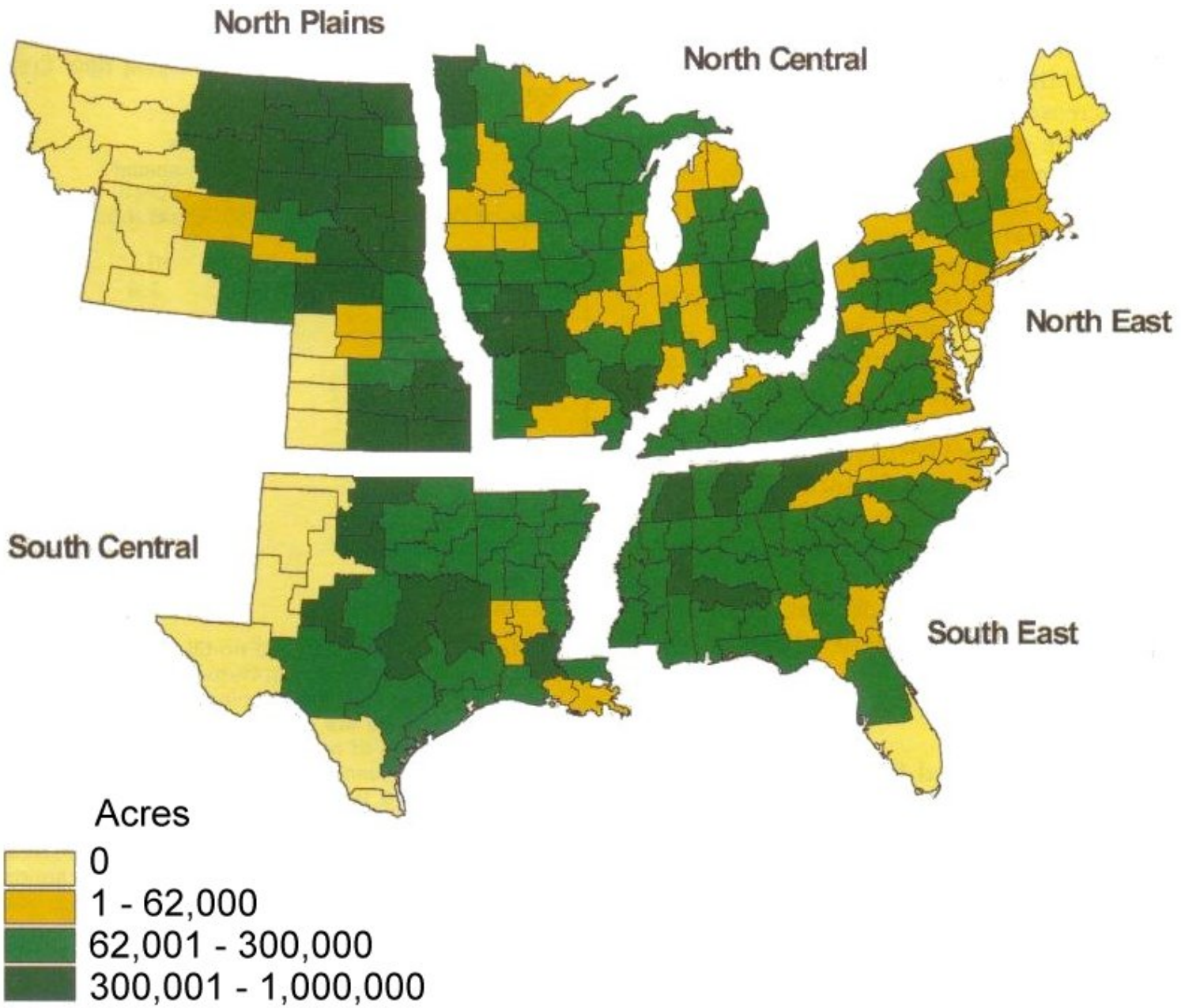

Biomass to Bioenergy
Fiber
pulp
paper
lumber
plywood
cotton
Materials
Process residues
black liquor
sawdust
bark
Consumers
MSW clean fraction
construction & demolition wood
yard trimmings
non-recyclable organics
BIOMASS
Crops
Animals
Food
Process residues
bagasse
dung
Energy
Services
heat
CHP
electricity
ag stalks & straws
forest tops & branches
forest small diameter culls
forest energy harvest
perennial crops
Feed-
stocks
Bioenergy + Bioproducts
Biofuels
ethanol
biogas
charcoal



DOE-ORNL, Bioenergy Feedstock Development Program

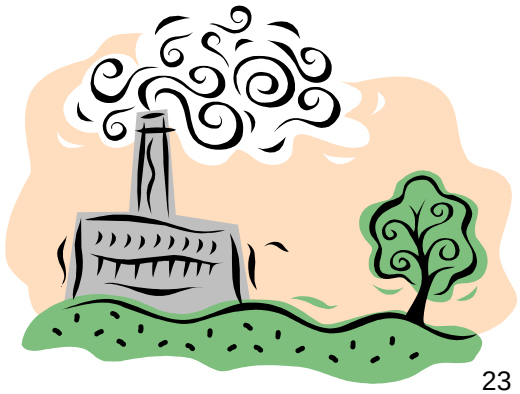


392 million acres of land is potententially available/suitable for energy crops


North Plains
North Central
North East
South Central
South East
Acres
0
1 - 62,000
62,001 - 300,000
300,001 - 1,000,000

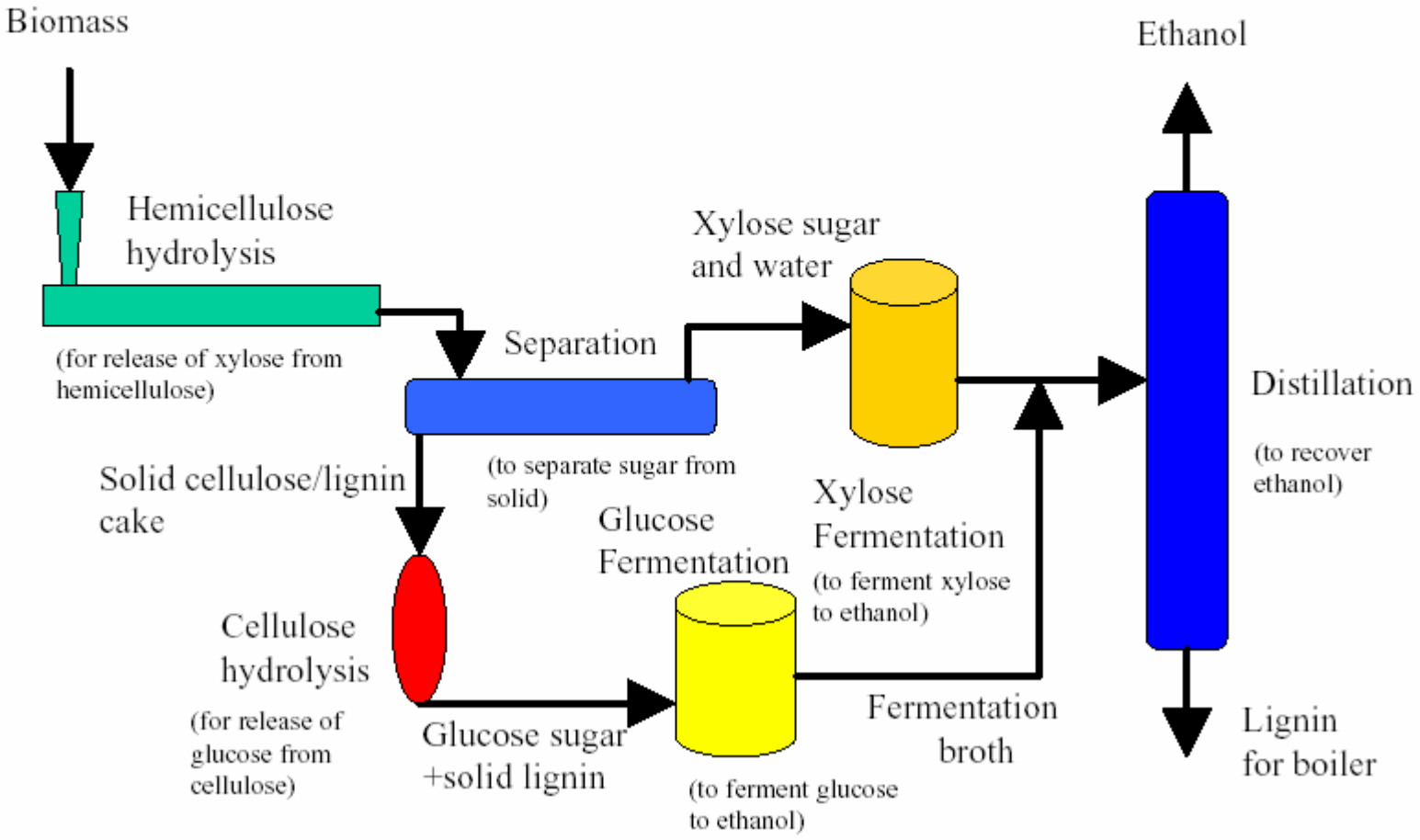
Biomass Conversion

- **Fermentation**
  - **Ethanol**
  - **Anaerobic Digesters - Biogas**
- **Pyrolytic**
  - **Gasification - Syngas**
  - **Liquification - Bio-oil**
- **Combustion**
  - **Co-firing**




connexxion tours

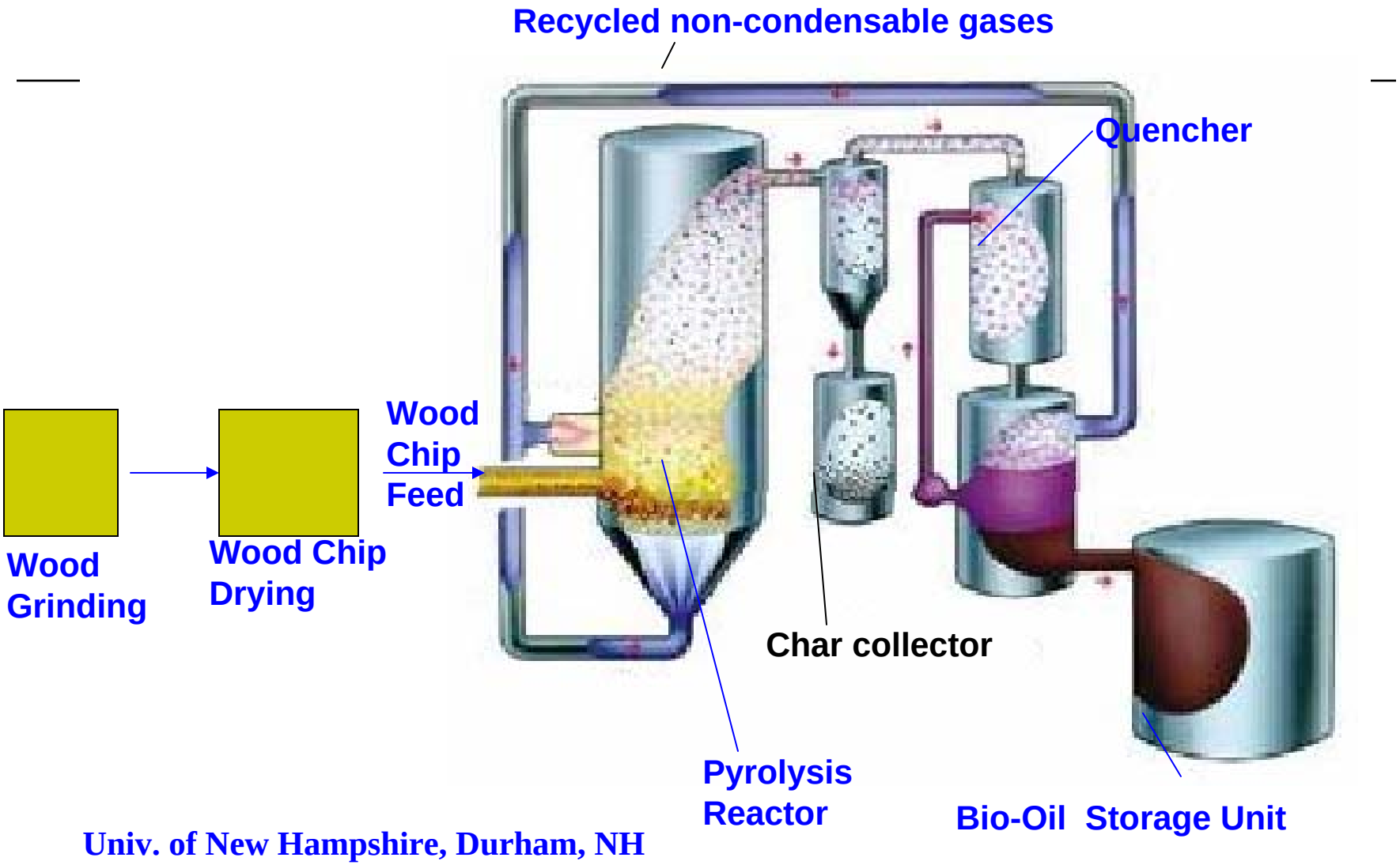
BC International
Ethanol from Biomass



Bio-Oil:Promise of the Future

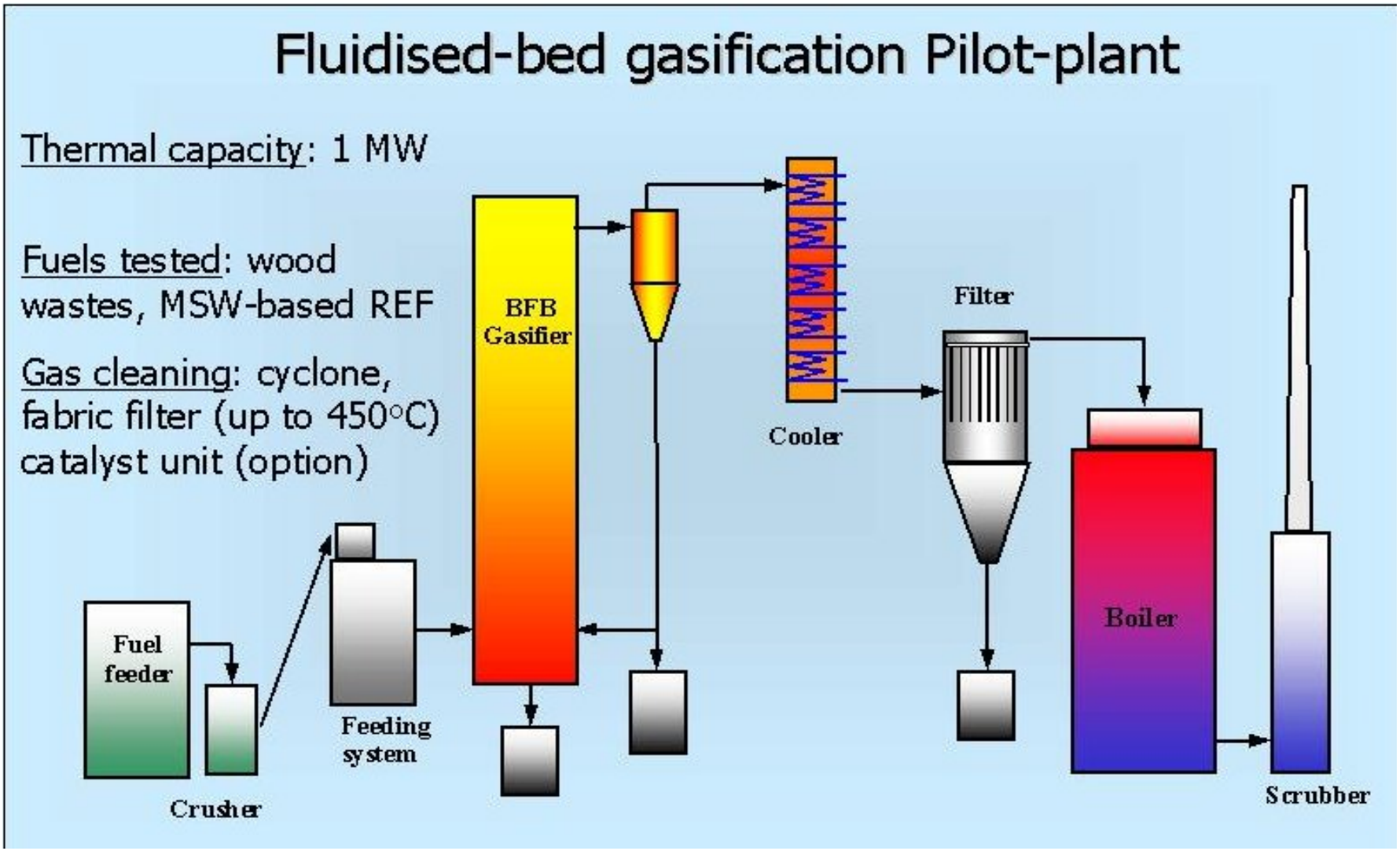
- Closing of the Berlin-Gorham paper mills
- Faltering wood chip electric plant
- Many left unemployed
- Excess low grade wood in NH

Pyrolysis Process



Univ. of New Hampshire, Durham, NH

Gasification



Thank You

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