

## The Use of Woody Biomass in North Carolina

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## Biomass Fuels

Source: Distributed Energy Program Report: Combined Heat and Power Market Potential for Opportunity Fuels. August 2004. Resource Dynamics Corporation. U.S. Department of Energy.

## Flowchart of Biomass Fuels

Source: Distributed Energy Program Report: Combined Heat and Power Market Potential for Opportunity Fuels. August 2004. Resource Dynamics Corporation. U.S. Department of Energy.

## Biomass Fuels

Boiler Fuel	Ethanol	Biomass Gas	Anaerobic Digester Gas	Landfill Gas
Crop Residue	Crop Residue	Crop Residue	Crop Residue	Crop Residue
Farm Waste	Farm Waste	Farm Waste	Farm Waste	Farm Waste
FPW (dry)	FPW	FPW (dry)	FPW (wet)	FPW
MSW (dry)	MSW	MSW	MSW	MSW
Sludge (dry)	Sludge	Sludge	Sludge	Sludge
Wood & Black Liquor	Wood	Wood & Black Liquor	Wood	Wood

Source: Distributed Energy Program Report: Combined Heat and Power Market Potential for Opportunity Fuels. August 2004. Resource Dynamics Corporation. U.S. Department of Energy.

## Biomass to Bioenergy

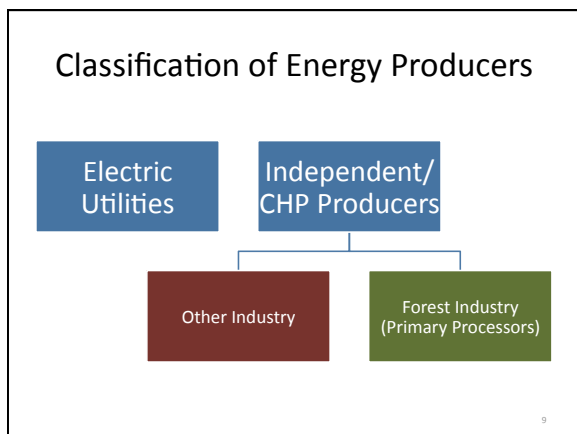
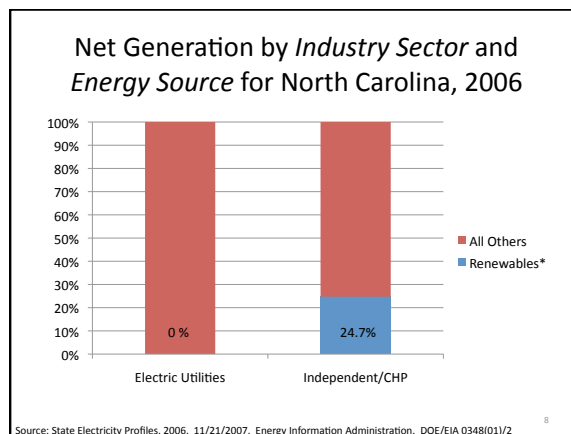
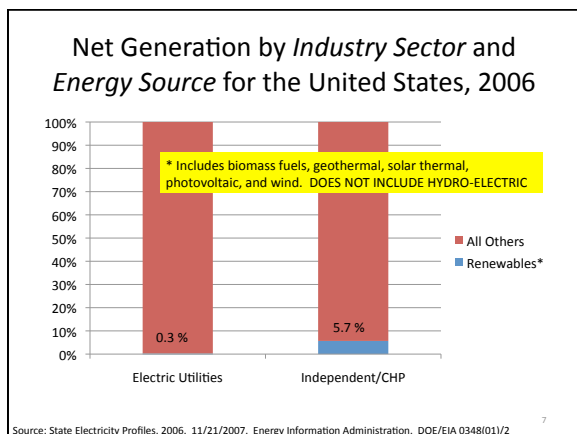
Source: Biomass to Biopower Diagram at <http://epa.gov/CHP/basic/renewable.html>

## Net Generation by Industry Sector, 2006

United States  
4,065 million MWH

North Carolina  
125 million MWH

Source: State Electricity Profiles, 2006. 11/21/2007. Energy Information Administration. DOE/EIA 0348(01)/2



- ### North Carolina's Top Five Electric Utilities
- Duke Energy Carolinas, LLC
  - Progress Energy Carolinas, Inc.
  - Virginia Electric & Power Co.
  - Energy United Electric Member Corp.
  - Public Works Commission – City of Fayetteville
- Source: State Electricity Profiles, 2006. 11/21/2007. Energy Information Administration. DOE/EIA 0348(01)/2

### Number of Independent/CHP Facilities in North Carolina by Energy Source and Industry Type

	Other Industry	Forest Industry (PP)
Natural Gas	5	
Hydroelectric	14	
Coal	15	2
Distillate Fuel Oil	11	
Landfill Gas	1	
<b>Wood/Wood Waste</b>	<b>152</b>	<b>44</b>
<b>Black Liquor</b>		<b>3</b>
Municipal Solid Waste	1	
Other	1	

Source: Inventory of Nonutility Electric Power Plants in the United States, 2000. January 2003. Energy Information Administration. DOE/EIA-0095(2000)/2. Analysis of data provided by NC Division of Air Quality on Facilities with Wood Fired Boilers, 2007. NC Division of Forest Resources Primary Processor database.

### Number of Independent/CHP Facilities in North Carolina by FIA Region and Industry Type

	Other Industry	Forest Industry (PP)	Total Facilities
Mountain Region	60	3	63
Northern Coastal Plain	3	13	16
Piedmont	84	19	103
Southern Coastal Plain	5	12	17
<b>TOTAL</b>	<b>152</b>	<b>47</b>	<b>199</b>

Source: Inventory of Nonutility Electric Power Plants in the United States, 2000. January 2003. Energy Information Administration. DOE/EIA-0095(2000)/2. Analysis of data provided by NC Division of Air Quality on Facilities with Wood Fired Boilers, 2007. NC Division of Forest Resources Primary Processor database.

Throughput (thousand tons) of Independent/CHP Facilities in NC by FIA Region and Industry Type

Region	Other Industry	Forest Industry (PP)
Mountain Region	361	483
Northern Coastal Plain	563	1,204
Piedmont	534	977
Southern Coastal Plain	3	982
<b>Total</b>	<b>1,461</b>	<b>3,646</b>

5.1 Million Tons

Source: Inventory of Nonutility Electric Power Plants in the United States, 2000. January 2003. Energy Information Administration. DOE/EIA-0095(2000)/2. Analysis of data provided by NC Division of Air Quality on Facilities with Wood Fired Boilers, 2007. Analysis of data on North Carolina's Timber Product Output and Use, 2005. USDA, Forest Service. SRS. 13

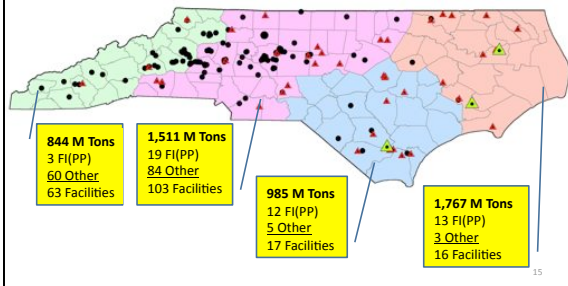
Throughput (thousand tons) of Independent/CHP Facilities in NC by Region for the Forest Industry (PP)

Region	Pulp & Paper Mills	Other Forest Industry	Throughput (thousand tons)
Mountain Region		3	483
Northern Coastal Plain	2	11	1,204
Piedmont		19	977
Southern Coastal Plain	1	11	982
<b>TOTAL</b>	<b>3</b>	<b>44</b>	<b>3,646</b>

Other Forest Industry: Sawmills, Veneer/Plywood Mills, OSB facilities

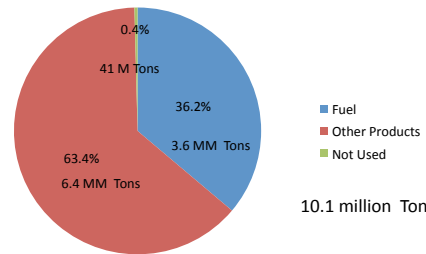
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Independent/CHP Facilities in NC  
Throughput and Number of Facilities by FIA Region



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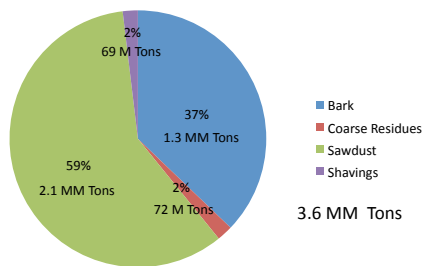
NC Forest Industry Residues by Product Class



Other Products: Sawn products, mulch, fiber board, particle board, charcoal/chemical wood, and other misc. products.

Source: Analysis of data on North Carolina's Timber Product Output and Use, 2005. USDA, Forest Service. SRS. 16

NC Forest Industry Residues Disposed as Fuel



Source: Analysis of data on North Carolina's Timber Product Output and Use, 2005. USDA, Forest Service. SRS. 17

What's on the Horizon?

### Proposed Biomass Facilities

Project	Location	Timeframe	Throughput	Cumulative
Coal to Biomass Conv. Coastal Carolina Clean Power	Duplin Cty, NC	Sept 2008	57,000	57,000
Wood Pellets Carolina Wood Pellets	Macon Cty, NC	2008/2009	Unknown	57,000
DFO to Biomass Conv. Bio-Gen Energy Projects	Various NC counties	2008	177,000	234,000
DFO to Biomass Conv. Bio-Gen Energy Projects	Various NC counties	2009	217,000	451,000
Co-Fire conversion Duke Energy	Various under consideration	2009/2010	1,000,000*	1,451,000
Wood Energy Plant Ameresco Federal Solutions	Onslow Cty, NC	2010	65,000	1,516,000
Co-Fire conversion Progress Energy	Moncure, NC	2010/2011	125-250,000	1,766,000

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### Proposed Biomass Facilities

Project	Location	Timeframe	Throughput	Cumulative
Co-firing Project University of NC	Orange Cty, NC	2010/2011	Unknown	1,766,000
Wood Energy Plant Hertford Renewable Energy	Hertford Cty, NC	June 2011	500,000	2,266,000
Export Pellet Mill MultiTrade Biomass	Emporia, VA	2011/2012	800,000	3,066,000
Export Pellet Mill MultiTrade Biomass	Martinsville, VA	2011/2012	900,000	3,966,000
Biomass to Steam Plant MultiTrade Biomass	Danville, VA	2012	200,000	4,166,000
New Power Plant Novi Energy	Halifax Cty, VA	2012	550,000	4,666,000
New Power Plant MultiTrade/Progress Energy	Caswell Cty, NC	Unknown	500,000	5,166,000

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### Thanks for your time!

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### Coal to Biomass Conversion

- Coastal Carolina Clean Power, LLC
- Located: Duplin County near Kenansville, NC
- Consumption: 57,000 tons of construction debris and other wood waste products
- Timeframe: September of 2008
- Other
  - 32 Megawatt capacity
  - Pending approval from NC Utilities Commission
  - Could be operational by late August/September 2008.
  - Managed by Topaz Power
  - Plant formerly owned by Cogentrix, Progress Energy, and Green Power Energy Holdings
  - No fuel contracts in place

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### Wood Pellets Facility

- Carolina Wood Pellets
- Location: Macon County near Franklin, NC
- Consumption: Unknown
- Timeframe: 2008/2009
- Other
  - Will be located adjacent to Steve's Custom Log Homes, which will be a primary source of wood scraps.
  - Lumber mills and flooring companies in and around Macon County also are expected to supply raw materials
  - \$350,000 invested by the N.C. Rural Economic Development Center

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### Natural gas/DFO to Woody biomass conversion Projects

- Bio-Gen Energy Projects
- Location: Raleigh, Winston-Salem, Cofield, Greensboro
- Consumption: Will use 177,000 Tons of logging residues
  - Raleigh (60K tons)
  - Winston-Salem (40K tons)
  - Cofield (25K tons)
  - Greensboro (53K tons)
- Timeframe: Late 2008
- Working on at least 5 other projects in NC
  - 217,000 tons
  - 2009/2010 timeframe

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## Coal and Woody Biomass Co-Firing

- Duke Energy
- Location: Across NC
- Consumption: At blend rates of 5-10%, up to 1 million tons of woody biomass could be consumed across the seven (7) NC coal stations operated by Duke Energy
- Timeframe: 2009/2010
- Other
  - Is currently testing and evaluating co-firing coal with biomass at its Lee Station in South Carolina.
  - Possibility exists to re-power some or all of these facilities with biomass.

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## Wood Energy Plant

- Being built by Ameresco Federal Solutions.
- Location: It will be constructed at the USMC Air Station (Camp Lejeune) in Onslow County
- Consumption: 65,000 tons of logging residues
- Timeframe: operational in 2 years, around 2010
- Other
  - Will supplement the current steam plant on site that uses coal and natural gas
  - Ameresco will run it for 20 years. This company is based out LaGrange, Illinois

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## Coal and Woody Biomass Co-Firing

- Progress Energy
- Location: Cape Fear Facility in Chatham County near Moncure, NC
- Consumption: At blend rates of 5-10%, up to 250,000 tons of woody biomass could be consumed annually (if testing and evaluation is successful)
- Timeframe: 2010-2011

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## Coal and Woody Biomass Co-Firing

- Location: University of NC in Orange County.
- Campus expansion driving UNC to consider co-firing woody biomass with coal
- Testing and evaluation to be completed 2009
- Operation would come online in 2010 or 2011.
- Evaluating the use of torrefied wood
- Annual consumption is unknown and will depend on optimum co-firing ratio
  - 10 to 30/40%

ADVANCE SLIDE SHOW TO NEXT SLIDE

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## Wood Energy Plant

- Hertford Renewable Energy, LLC
- Location: Hertford County near Au lander, NC
- Consumption: 500,000 tons of logging residues
- Timeframe: If approved, plant would be operational as soon as June 2011
- Other
  - Decker Energy International
    - Craven County Wood Energy
  - 50 Megawatt capacity

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## Export Pellet Fuel Mill

- MultiTrade Biomass Holdings, LLC
- Location: Emporia, VA
- Consumption: 800,000 tons logging residue
  - 50,000 tons of sawmill residues
- Timeframe: 2011/2012

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### Export Pellet Fuel Mill

- MultiTrade Biomass Holdings, LLC
- Location: Martinsville, VA
- Consumption: 900,000 tons logging residue
- Timeframe: 2011/2012

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### Wood Fired Steam Generation Plant

- MultiTrade Biomass Holding, LLC
- Location: Danville, VA
- Consumption: 200,000 tons of fuel wood
- Timeframe: Could be operational by 2012
- Other
  - New wood fired boiler added to existing facility
  - Facility would generate steam to sell

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### Wood Fired Power Plant

- Novi Energy
- Location: Halifax County, VA
- Consumption: 550,000 tons of wood
- Timeframe: Could be operational by 2012
- Other
  - Company has filed for permits and has financing to build facility
  - Multitrade Biomass Holdings, LLC negotiating to supply wood

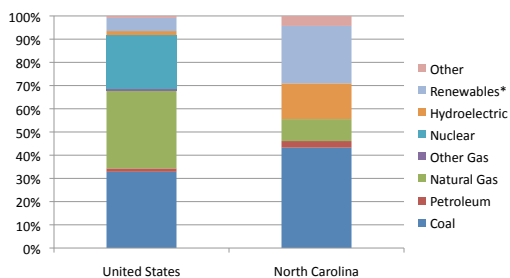
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### Wood Fired Power Plant

- Progress Energy with Multitrade Biomass Holdings, LLC
- Location: Caswell County, NC
- Consumption: 500,000 tons of woody biomass
- Timeframe: Unknown
- Other
  - Proposal submitted by Multi-trade Biomass Holding to Progress Energy for a greenfield 50MW power generation station.
  - First proposal was rejected, Multitrade plans on resubmitting

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Independent Power/CHP Net Generation by Primary Energy Source, 2006



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