WOODY BIOMASS ENERGY OPPORTUNITIES IN ALABAMA

The unit shown is a BioMax15®, a transportable, fully automated, and environmentally friendly downdraft gasifier system suitable for small businesses, rural homes, and schools. Photo is courtesy of National Forest Products Laboratory and Community Power Corporation. (Auburn University has a newer BioMax25® model demonstration unit on a movable trailer.)

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Making Alabama Better for People

www.forestry.alabama.gov

P.O. Box 302550, Montgomery, AL 36130 (334) 240-9300

TO: Government and Industry Leaders, School Superintendents,
Industrial Development Boards, Regional Planning Councils

FROM: Linda Casey, Alabama State Forester

DATE: June 8, 2009

SUBJECT: Federal Stimulus Grants to install Wood-Using Furnace and Boiler Systems

Alabama is receiving millions of federal dollars to conduct energy audits, develop energy efficiency and conservation strategies, conduct feasibility studies, perform energy efficiency retrofits, and install renewable energy technologies such as energy efficient furnace and boiler systems. The Alabama Department of Economic and Community Affairs (ADECA) – Energy Division is coordinating the distribution of these funds in Alabama. This is a great opportunity to replace an old furnace or boiler with a new efficient heating system that uses woody biomass (fuelwood) or pellets.

This new publication, ***"Woody Biomass Energy Opportunities in Alabama"*** contains useful information and additional resource links that will help you decide whether or not to invest in a new system.

You may also visit our agency website, ***www.forestry.alabama.gov***, and click on the "***Market and Informational Resources***" button for additional information. We are adding new information to our website as these emerging markets, price trends, new information and technology improvements, and energy systems develop.

Please call our office if after reviewing this information you would like our assistance to further pursue installing a new system.

Thank you for your consideration.

WOODY BIOMASS ENERGY

OPPORTUNITIES IN ALABAMA

INTRODUCTION

Public perception and concern that increased CO_2 is elevating global temperatures has resulted in a national emphasis to replace fossil fuels and coal with clean renewable fuels to supply our future energy needs. The Alabama Forestry Commission believes that using woody biomass to produce heat and energy will not only offset CO_2 buildup, but will also improve Alabama's economy and keep our forests healthy.

Woody biomass is a renewable product typically left in the forest during harvests or produced as manufacturing waste products. This material is typically called fuelwood. Using some of this material will not only help replace fossil fuels with renewable fuels, but will also reduce the risks of destructive wildfires, insects, and disease, and have increased capacity to support wildlife. When fuelwood is burned it generates lower levels of hazardous emissions than traditional fuel sources.

This publication provides information on the woody biomass materials available in Alabama, timber harvest and price trends and per unit cost comparisons with traditional energy sources. It also contains references to further information that investors should find useful when deciding whether or not to install wood-using energy systems. References are provided to manufacturers of wood-using energy systems, grant sources, tax credit incentives, and case studies of others who have installed successful systems. You may also visit our agency website, ***www.forestry.alabama.gov***, and click on the "***Market and Informational Resources***" button for additional information, which is being periodically updated.

Our hope is that you will invest in this technology to utilize Alabama's forest and agriculture resources instead of relying on traditional, non-renewable fuels to supply your energy needs.

ALABAMA'S FOREST & AVAILABLE WOODY BIOMASS[1]

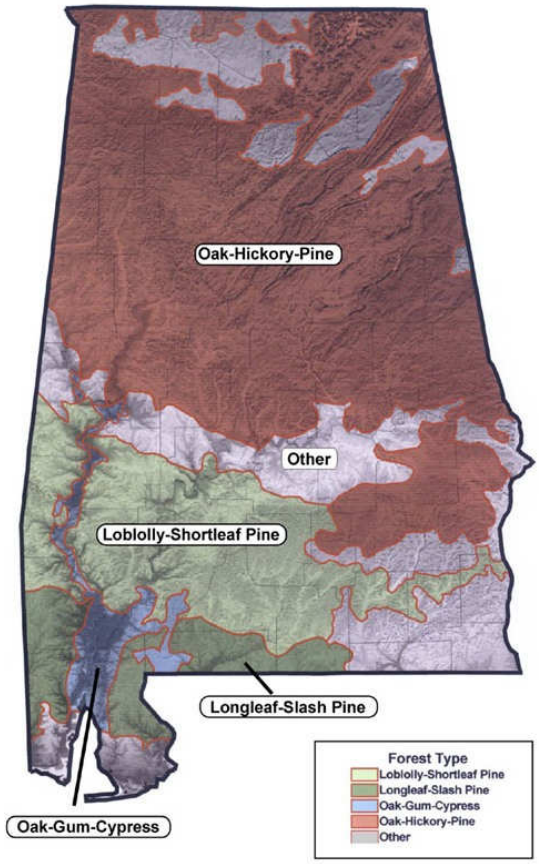
Alabama's forests cover 70 percent of the state or 22.7 million acres. Surveys show that our forests are increasing in timber volume, including biomass. Alabama's forests produce 2½ times more timber volume now than fifty years ago. The forests continue to grow and become more productive even with a strong forest industry and timber market. Most of the forestland is being managed to ensure the wise use and sustained management of our natural resources for future generations.

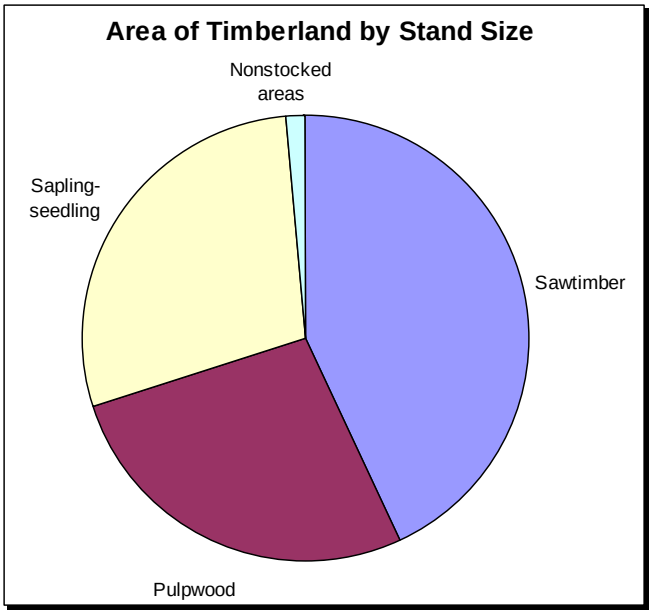
Not only is the volume increasing, but the size and quality of Alabama's timber has improved. Currently, 72 percent of Alabama's forests contain significant pulpwood and sawtimber-sized timber.

Over two-thirds of the pine forests and most hardwood forests are from natural origins. Approximately half of the tree inventory (growing stock) consists of pine and the other half hardwood.

There are 495.7 million tons of softwood inventory and 572.7 million tons of hardwood inventory in Alabama.

From 2001 to 2008, softwood grew by 37.9 million tons annually and hardwood grew by 18.7 million tons annually, for a combined 5.3% increase.

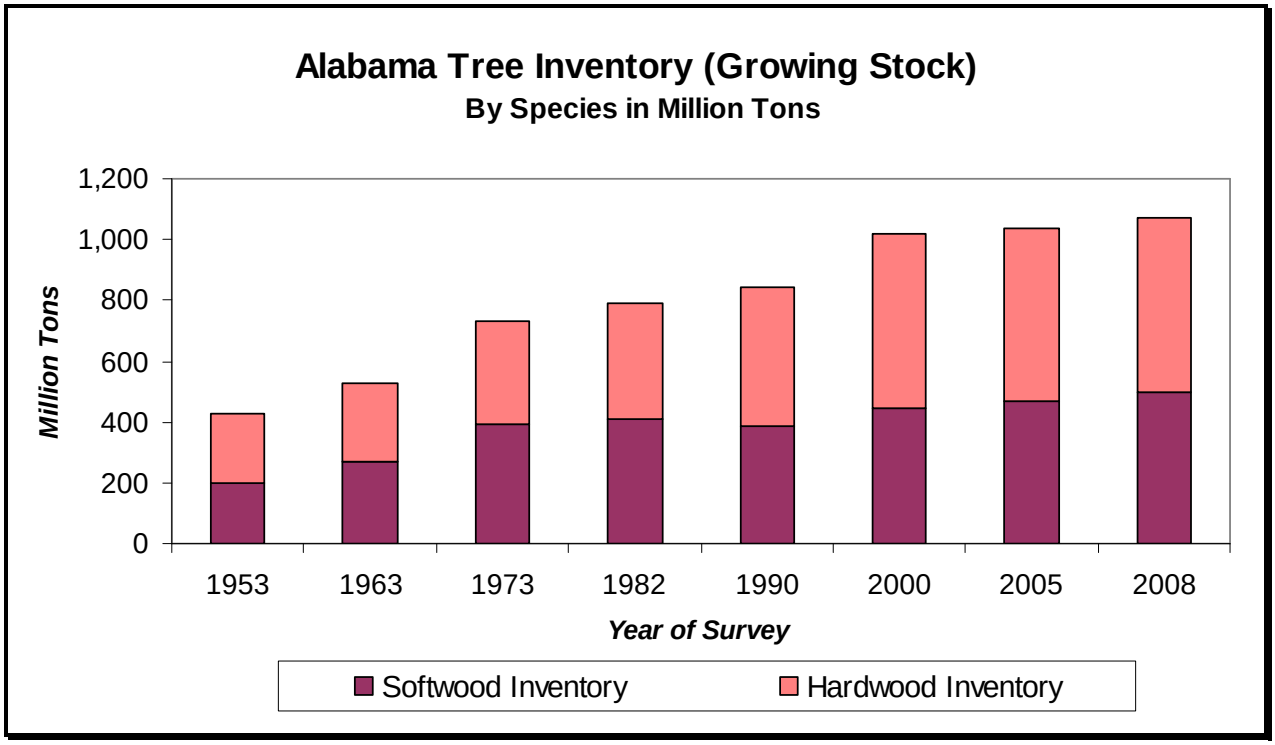




During the same time period, Softwood harvested was 30.2 million tons annually, and hardwood harvested was 12.5 million tons, for a combined 4.0% decrease.

From 2001 to 2008, Alabama's tree inventory **increased** by a net amount of approximately 13.9 million tons annually or 1.3% increase. That's enough additional wood to fill up 142,560 railroad chip containers each year!

[1] *SOURCE: Forest Inventory Analysis (FIA) & Alabama's Forest Severance Tax Data*



Alabama forests contain an average of 75 green tons per acre of tree inventory (woody biomass, pulpwood, sawtimber, poles, etc.). Of this, approximately 10.1 green tons per acre of biomass could be economically recovered if fuelwood markets were available. Based on recent harvests of 840,000 acres in 2008 there was an **estimated 8.5 million tons of available biomass material annually from unused logging residues and cull (low-grade) timber.**[2] This does not include standing pulpwood, sawtimber, or pole inventory products.

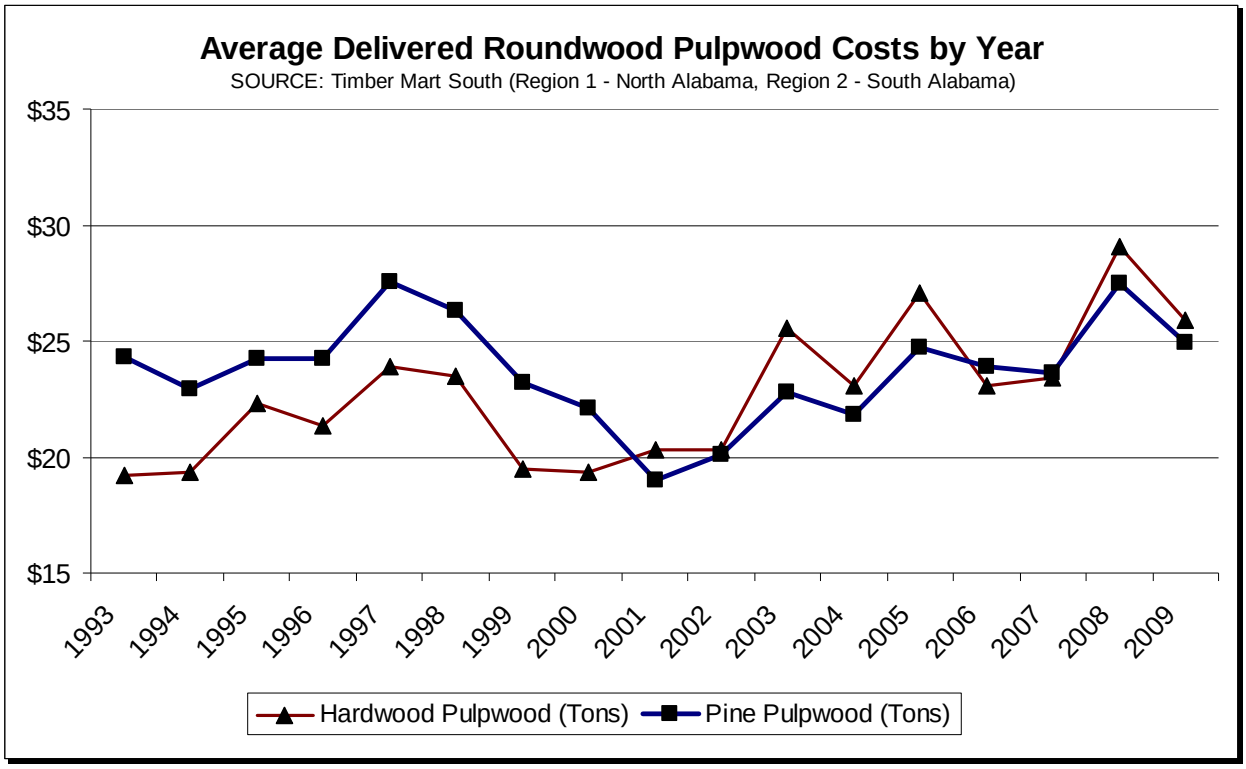
COMPARATIVE UNIT COST OF FUELWOOD

Future use of fuelwood as a replacement for traditional fossil fuels is influenced by the future costs of fossil fuels, the comparative costs of fossil fuels with fuelwood (on a equal BTU basis), and government tax credits and grant incentives to promote the use of fuelwood. Future stumpage prices as well as harvesting, transporting, and processing costs will also affect fuelwood supply, and should be considered in any decision to use fuelwood as an alternative energy source.

While there is not an established service that tracks fuelwood markets in the Southeast, it is believed that as new energy systems are installed where woody biomass is readily available, fuelwood prices could become comparable to roundwood and chip pulpwood prices. Timber Mart South publishes historic roundwood pulpwood prices, as shown in the graph on the following page. Delivered chip prices are typically a few dollars per ton higher than roundwood because of the extra processing costs involved. Currently future fuelwood price predictions are speculative.

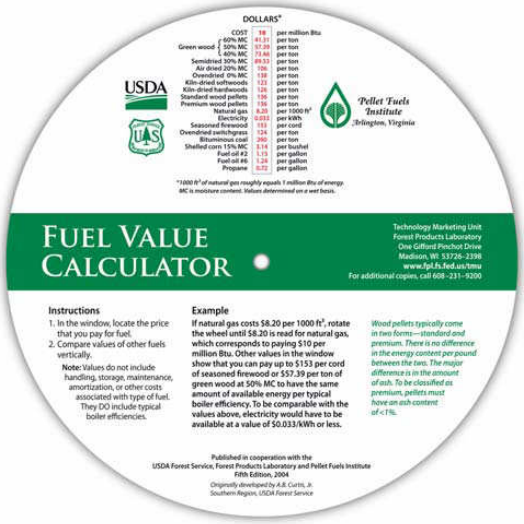
[2] *Based upon recent FIA, Timber Product Output (TPO), and harvest utilization studies conducted by the USDA Forest Service Southern Forest Research Station biomass availability was revised to an average of 10.1 tons per merchantable acre.*

Delivered pellet prices are significantly higher because of the additional processing costs of drying and compressing the biomass into pellets. But pellets have a much higher gross heating value and allow for greater consistency of burning in the furnace. Pellet manufacturers have just recently started to emerge in Alabama, and pellet availability should be researched before purchasing a unit requiring pellets as a fuel source. The Alabama Forestry Commission will assist you with this research.



It is critical that estimated costs for woody biomass as fuelwood be compared with other traditional fuel costs used to produce energy, and this must be done on an equivalent basis, such as cost per million BTUs generated. The USDA Forest Service has developed a ***Fuel Value Calculator*** that makes this cost comparisons. (*http://www.fpl.fs.fed.us/documnts/techline/fuel-value-calculator.xls)*

A summary comparison is shown in the table on the following page. The table shows what the delivered cost of the fuelwood must be to equal a certain cost per million BTUs of traditional energy sources.



As an example, for delivered fuel equivalents costing $3/million BTUs, the information in the table indicates that you can buy green wood (at 50% moisture content (MC) on a wet basis) with the same heat content as natural gas or electricity for $17.22/ton compared with $2.46/1,000 ft³ for natural gas or $0.010/kWh for electricity.

Efficiency, Heating Values (Gross and Net), and Cost Comparisons for Various Fuel Types

TYPE OF FUEL	Wood				Softwood (kiln dried)	Hardwood (kiln dried)	Wood pellets	Natural gas	Electricity	Firewood (seasoned)	Switchgrass	Bituminous coal	Shelled corn	Fuel oil		Propane
	Green (50% MC)[a]	Semidried (30% MC)[a]	Air-dried (20% MC)[a]	Ovendried (0% MC)	(13% MC)[a]	(8% MC)[a]	(premium)[b]			(20% MC)[a]	(ovendried)		(15% MC)	#2	#6	
GROSS HEATING VALUE	8,600,000 Btu/ton	12,040,000 Btu/ton	13,760,000 Btu/ton	17,200,000 Btu/ton	15,824,000 (Btu/ton)	15,996,000 (Btu/ton)	16,400,000 (Btu/ton)	1,025,000 (Btu/1000 ft³)	3,412 (Btu/kWh)	20,000,000 (Btu/cord)	15,500,000 (Btu/ton)	30,600,000 (Btu/ton)	392,000 (Btu/bu)	138,800 (Btu/gal)	150,000 (Btu/gal)	91,300 (Btu/gal)
EFFICIENCY	67%	74%	77%	80%	78%	79%	83%	80%	98%	77%	80%	85%	80%	83%	83%	79%
NET HEATING VALUE	5,740,000 Btu/ton	8,950,000 Btu/ton	10,560,000 Btu/ton	13,800,000 Btu/ton	12,300,000 Btu/ton	12,600,000 Btu/ton	13,600,000 Btu/ton	820,000 Btu/1000 ft³	3,340 Btu/kWh	15,300,000 Btu/cord	12,400,000 Btu/ton	26,000,000 Btu/ton	314,000 Btu/bu	115,000 Btu/gal	124,000 Btu/gal	71,900 Btu/gal
$/million Btu	*$/ton*	*$/ton*	*$/ton*	*$/ton*	*$/ton*	*$/ton*	*$/ton*	*$/1000 ft³*	*$/kWh*	*$/cord*	*$/ton*	*$/ton*	*$/bu*	*$/gal*	*$/gal*	*$/gal*
1.0	5.74	8.95	10.56	13.77	12.30	12.62	13.61	0.82	0.003	15.35	12.40	26.01	0.31	0.11	0.12	0.07
1.5	8.61	13.43	15.84	20.66	18.45	18.94	20.42	1.23	0.005	23.02	18.60	39.02	0.47	0.17	0.19	0.11
2.0	11.48	17.91	21.12	27.55	24.60	25.25	27.22	1.64	0.007	30.70	24.80	52.02	0.63	0.23	0.25	0.14
2.5	14.35	22.38	26.40	34.44	30.75	31.56	34.03	2.05	0.008	38.37	31.00	65.03	0.78	0.29	0.31	0.18
3.0	17.22	26.85	31.68	41.32	36.90	37.87	40.84	2.46	0.010	46.05	37.20	78.03	0.94	0.34	0.37	0.22
3.5	20.08	31.33	36.96	48.21	43.05	44.18	47.64	2.87	0.012	53.72	43.40	91.04	1.10	0.40	0.43	0.25
4.0	22.95	35.81	42.24	55.10	49.20	50.50	54.45	3.28	0.013	61.39	49.60	104	1.25	0.46	0.50	0.29
4.5	25.82	40.29	47.52	61.98	55.35	56.81	61.25	3.69	0.015	69.07	55.80	117	1.41	0.52	0.56	0.32
5.0	28.69	44.75	52.80	68.87	61.50	63.12	68.06	4.10	0.017	76.74	62.00	130	1.57	0.57	0.62	0.36
5.5	31.56	49.24	58.08	75.76	67.65	69.43	74.87	4.51	0.018	84.42	68.20	143	1.72	0.63	0.68	0.40
6.0	34.43	53.72	63.36	82.64	73.80	75.74	81.67	4.92	0.020	92.09	74.40	156	1.88	0.69	0.74	0.43
6.5	37.30	58.19	68.64	89.53	79.94	82.06	88.48	5.33	0.022	99.77	80.60	169	2.04	0.74	0.80	0.47
7.0	40.17	62.67	73.92	96.42	86.09	88.37	95.28	5.74	0.023	107	86.80	182	2.20	0.80	0.87	0.50
7.5	43.04	67.15	79.20	103	92	95	102	6.15	0.025	115	93.00	195	2.35	0.86	0.93	0.54
8.0	45.91	71.62	84.48	110	98	101	109	6.56	0.027	123	99.20	208	2.51	0.92	0.99	0.57
8.5	48.78	76.10	89.76	117	105	107	116	6.97	0.028	130	105	221	2.67	0.97	1.05	0.61
9.0	51.65	80.57	95.04	124	111	114	123	7.38	0.030	138	112	234	2.82	1.03	1.11	0.65
9.5	54.52	85.05	100	131	117	120	129	7.79	0.032	146	118	247	2.98	1.09	1.18	0.68
10.0	57.39	89.53	106	138	123	126	136	8.20	0.033	153	124	260	3.14	1.15	1.24	0.72
11.0	63.12	98.48	116	152	135	139	150	9.02	0.037	169	136	286	3.45	1.26	1.36	0.79
12.0	68.86	107	127	165	148	151	163	9.84	0.040	184	149	312	3.76	1.37	1.49	0.86
13.0	74.60	116	137	179	160	164	177	10.66	0.043	200	161	338	4.08	1.49	1.61	0.93
14.0	80.34	125	148	193	172	177	191	11.48	0.047	215	174	364	4.39	1.60	1.73	1.01
15.0	86.08	134	158	207	184	189	204	12.30	0.050	230	186	390	4.70	1.72	1.86	1.08
16.0	91.82	143	169	220	197	202	218	13.12	0.054	246	198	416	5.02	1.83	1.98	1.15
17.0	97.55	152	180	234	209	215	231	13.94	0.057	261	211	442	5.33	1.95	2.10	1.22
18.0	103	161	190	248	221	227	245	14.76	0.060	276	223	468	5.64	2.06	2.23	1.29
19.0	109	170	201	262	234	240	259	15.58	0.064	292	236	494	5.96	2.18	2.35	1.37
20.0	115	179	211	275	246	252	272	16.40	0.067	307	248	520	6.27	2.29	2.48	1.44
30.0	172	269	317	413	369	379	408	24.60	0.100	460	372	780	9.41	3.44	3.71	2.16
40.0	230	358	422	551	492	505	544	32.80	0.134	614	496	1040	12.54	4.58	4.95	2.87
50.0	287	448	528	689	615	631	681	41.00	0.167	767	620	1301	15.68	5.73	6.19	3.59
60.0	344	537	634	826	738	757	817	49.20	0.201	921	744	1561	18.82	6.87	7.43	4.31

[a]Wet basis.

[b]Presently, wood pellets come in two forms—standard and premium. There is no difference in the energy content per pound between the two. The major difference is the amount of ash. To be classified as premium, pellets must have an ash content less than 1%.

Updated 07/04

FUEL COST CALCULATOR (Source: USDA Forest Service)

Before deciding to install a new furnace or boiler system, potential investors should evaluate the local market for the sustainable supply of fuelwood. Transportation costs may limit the benefits of burning fuelwood, as hauling it from outside a 50-mile radius is usually not economical. The Alabama Forestry Commission can assist with this analysis.

Typically in Alabama, wood-using facilities either purchase timber directly from a forest landowner or through wood dealers or loggers. There are many factors involved in purchasing timber and fuelwood. Written timber purchase contracts should always be used. The Alabama Forestry Commission can also provide information to users who have never purchased timber or woody biomass products.

CONVERSION FROM FUELWOOD TO ENERGY[3]

Fuelwood can be used to produce energy in a variety of methods, but fall into three main categories: thermal energy, electricity, and transportation fuels. Fuelwood can be used to generate direct heat (such as in a furnace, fireplace, or pellet stove) or produce steam in wood-using boilers that is then distributed or directed to a generator to produce electricity. Many existing wood-using facilities have thermal energy systems already in place. Fuelwood can also be mixed with coal as a "co-firing" process inside a furnace at existing power-generating facilities. Liquid fuels produced from wood include bio-diesel, pyrolysis oil, ethanol, synthetic gas (syngas), methanol, and butanol.

Electrical power generation with fuelwood generally requires higher capacity installations of 10 to 20 MW or more of electricity. Although such plants use larger quantities of fuelwood, smaller applications offer greater opportunities for implementation in the short term.

Small to medium thermal systems could be installed in residential homes, schools, small industrial/commercial buildings, public facilities, hospitals, prisons, brick factories, greenhouses, foundries, and shopping centers. Actual installations have proven these systems to be cost effective.

Initial costs of a woody biomass energy system are generally 50% greater than that of a fossil fuel system due to the fuel handling and storage system requirements.

[3] *SOURCE: USDA Forest Service National Forest Products Laboratory (http://www.fpl.fs.fed.us/documnts/tmu/biomass_energy/primer_on_wood_biomass_for_energy.pdf)*
Pictures in this section are courtesy of New Horizon Corporation, Englander, and Home Depot.

The costs of installation is highly variable because of the different types and capacities of equipment, as well as whether equipment is new or used or already in-place and can be converted to use fuelwood. An important aspect of wood energy is that a fossil fuel backup is typically installed for commercial units because of the required reliability.

Providing cost estimates for wood energy systems requires flexibility and a technical understanding that, depending on the site requirements and present site capabilities, costs fluctuate widely. The cost estimates shown in the table below are meant as a guide for medium to large energy systems.

COMPARISONS OF MEDIUM TO LARGE-SCALE THERMAL, ELECTRICAL, AND COMBINED HEAT AND POWER FACILITIES *(Source: USDA Forest Products Laboratory, 2004)*

	Size (MW)	Fuel use (green ton/yr)	Capital cost (million $)	Operating & Maintenance cost (million $)	Efficiency (%)
ELECTRICAL					
Utility plant	10-75	100,000-800,000	20-150	2-15	18-24
Industrial plant	2-25	10,000-150,000	4-50	0.5-5	20-25
School campus	N/A	N/A	N/A	N/A	N/A
Commercial/institutional	N/A	N/A	N/A	N/A	N/A
THERMAL					
Utility plant	14.6-29.3	20,000-40,000	10-20	2-4	50-70
Industrial plant	1.5-22.0	5,000-60,000	1.5-10	1-3	50-70
School campus	1.5-17.6	2,000-20,000	1.5-8	0.15-3	55-75
Commercial/institutional	0.3-5.9	200-20,000	0.25-4	0.02-2	55-75
COMBINED HEAT AND POWER (CHP)					
Utility plant	25 (73)[a]	275,000	50	5-10	60-80
Industrial plant	0.2-7 (2.9-4.4)	10,000-100,000	5-25	0.5-3	60-80
School campus	0.5-1 (2.9-4.4)	5,000-10,000	5-7.5	0.5-2	65-75
Commercial/institutional	0.5-1 (2.9-7.3)	5,000	5	0.5-2	65-75

[a] Sizes for the CHP facilities are a combination of electrical and thermal; the first figure is electrical and the figure in parentheses is thermal. (1MW = 3.413 million Btu/h)

Additional information, published by the National Forest Products Laboratory, and can be found at *http://www.fpl.fs.fed.us/documnts/techline/wood-biomass-for-energy.pdf*. Information for wood energy on a residential, commercial, and industrial scale in the United States can be found at *http://www.fpl.fs.fed.us/documnts/techline/biomass-for-small-scale-heat-and-power.pdf*. This website also has a partial listing of system manufacturers.

The best way to find a system that matches your need is to type "**wood**", "**biomass**", "**bioenergy**", "**furnace**", "**boiler**", and/or "**energy systems**" in most internet search engines. Pellet stoves can be found by typing in **"pellet stove"** and **"wood stove"** in most internet search engines.

HOW TO GET STARTED:

There are several steps you should probably take in deciding whether or not to invest in a biomass to energy heating system:

1. Decide if there is a need to replace an existing energy system or install a new system.

2. If so, compare the installation and annual costs with traditional fuel systems.

3. Search out federal, state, or local financial and technical assistance available.

4. Review the various systems available, and decide which energy system to purchase. (The Internet is a good research tool for identifying the manufacturers of these systems.)

5. Contract with local woody biomass suppliers. Long-term contracts are desirable where considerable volumes will be purchased.

6. Purchase the system. Have the manufacturer install the system 'turnkey'.

7. Track all costs, fuel usage, energy output, and other required information in order to claim any available tax credits (non-governmental entities). File for tax credits.

ADDITIONAL INFORMATION:

There are many government agencies, universities, and private firms that have published information on their websites. This information includes biomass to energy research, equipment manufacturer lists, cost trends, and case studies of successful installation of biomass to energy systems. Some of these sources are listed below:

- **U.S. Department of Energy (DOE)**

  The U.S. Department of Energy (DOE) (*http://www.energy.gov*) is a major provider of funding for basic and applied research for converting biomass resources to biofuels. Many financial assistance opportunities are available for small to large-scale research activities. The Department of Energy oversees implementation of the Energy Acts and related energy laws passed by Congress. There are many grant, loan and tax credit programs listed on the Department of Energy's E-Center (*http://e-center.doe.gov*) as well as on *http://www.grants.gov.*

  There are many branches within the DOE concentrating on specific programs relating to renewable energy development. The Office of Energy Efficiency and Renewable Energy (*http://www1.eere.energy.gov/biomass*) and The National Renewable Energy Laboratory (NREL) (*http://www.nrel.gov*) provide important renewable energy research and development (R&D) information. They also contain information on demonstration projects throughout the country.

  The Energy Information Administration (EIA) (*http://www.eia.doe.gov*) website provides a variety of energy statistics, including use by energy source, cost trends, projected future needs, and other related statistics on national and state energy levels.

- **Database of State Incentives for Renewable Energy (DSIRE)** (*http://www.dsireusa.org*) Established in 1995, the Database of State Incentives for Renewables & Efficiency is an ongoing project of the North Carolina Solar Center and the Interstate Renewable Energy Council (IREC) funded by the U.S. Department of Energy. This website is perhaps the most comprehensive source of information on state, local, utility, and federal incentives (grants, loans, and tax credits) that promote renewable energy and energy efficiency. Instead of listing these incentives in this publication, the reader is directed to the DSIRE website.

- **Alabama Department of Economic & Industrial Development (ADECA)**
  Energy Division - Biomass Program
  (*http://adeca.alabama.gov/C16/Biomass%20Energy%20Program/default.aspx*)

  The Energy Division develops and implements the State Energy Programs that are funded by the U.S. Department of Energy (DOE). Using these funds and other resources, they provide support to communities for increasing the awareness of energy efficiencies and use of renewable fuels to produce energy. Their website has listing of actual installations in Alabama.

  State Energy Program and Energy Efficiency and Conservation Block Grants: Provides technical assistance and grants to governments, colleges, businesses, and non-profits to decrease energy costs and consumption, improve the energy efficiencies of buildings and vehicles, reduce fossil fuel emissions, and spur economic growth using renewable fuels. Funds can be used for feasibility studies, development of improved energy building codes, loans for retrofitting, transportation programs, and **installation of renewable energy systems**. Significant funding for this program was authorized in the 2009 economic stimulus package. Funds can be used community wide, not only for government owned facilities.

  Biomass Energy Program: The program assists businesses by providing up to $75,000 in interest subsidy payments on loans to **install biomass energy systems**. The program also provides technical assistance, conducts feasibility studies, and promotes biomass through educational workshops.

- **US Department of Agriculture (USDA) – Energy** (*http://www.usda.gov/energy)*

  USDA oversees the federal programs, grants, and loans relating to agriculture and woody biomass products. USDA has many programs to assist farmers, rural residents, and the nation to respond to energy-related issues and opportunities. They have an entire webpage devoted to renewable energy. Information ranges from basic scientific research to the development and commercialization of new technologies.

  USDA has developed "The Energy Matrix" (*http://www.energymatrix.usda.gov*) as a navigational aide through their many energy related programs and financial assistance programs.

In addition, under the "Natural Resources and Environment" subtopic, USDA has links to U.S. Forest Service Forest Inventory Analysis (FIA) data, which is the most comprehensive and long-term inventory of our nation's forests. Using the FIA analysis tools, a user can estimate the woody biomass volume within a set distance of a facility or proposed facility. The Alabama Forestry Commission provides this analysis upon request.

- **USDA Forest Service National Forest Products Laboratory**
  (*http://www.fpl.fs.fed.us/partners/tmu/index.shtml*)

  This website contains vast amounts of resource information on developing and installing woody biomass to energy equipment and includes considerations when investing in new wood-using equipment. Some publications that should be of interest include: primer_on_wood_biomass_for_energy.pdf, wood-biomass-for-energy.pdf, and biomass-for-small-scale-heat-and-power.pdf. The ***Fuel Value Calculator*** *(USFSFuelValueCalculator.pdf)* is a spreadsheet tool that can be used to compare typical unit costs of various fuels (oil, coal, natural gas, wood, etc.). The website also publishes information on how to apply for Woody Biomass Utilization Grants.

- **Alabama Department of Agriculture & Industries (ADAI)**
  (*http://www.agi.alabama.gov/alternative_fuels/)*

  The Alabama State Legislature authorized ADAI to serve as a clearinghouse for renewable energy related information for the State. ADAI maintains a website with a variety of useful information relating to renewable energy research, projects, and financial assistance programs. The website also contains the "**The Alabama Bioenergy Directory"** - A listing of bioenergy companies, projects, activities, and services. The site also lists financial assistance provided through USDA.

- **Alabama Development Office (ADO)** *(http://ado.alabama.gov)*

  The Alabama Development Office works with existing business and potential investors for new businesses. Under their "**Advantages**" link on their webpage, they provide several important reasons for conducting business in Alabama: specialized workforce training, up-to-date listing of available facility sites, integrated transportation infrastructure, and a complete listing of state tax incentives. Agency personnel work with investors to utilize tax, grants, and other financial incentive packages uniquely designed for each investment. They have considerable experience working on forestry, utility, and renewable fuels projects. The website contains additional information on forestry and utility business sectors in Alabama. Agency personnel and their partners are ready to work on a variety of projects to make biomass to energy investments proceed as smooth as possible. For ADO assistance, click on their "**Project Assistance"** link.

- **Southeastern United States Biomass Publications**

  Two recently published reports are available as additional information and case studies to help an investor. The "***Southern Bioenergy Roadmap***" can be viewed on the *http://www.saferalliance.net* website. Also, the "***Woody Biomass Desktop Guide and Toolkit***" can be viewed on the *http://www.nacdnet.org/resources/guides/biomass* website.