

# **MISSISSIPPI WOOD PELLETS**

**Clean Renewable Energy for Generations**



**An Environmental and Economic Opportunity  
Leading to Energy Independence**



## **Introduction**

Mississippi faces many questions regarding energy, the environment and the economy. The three most important questions are:

1. How do we improve our economy and create jobs?
2. How do we make our environment cleaner?
3. How can we achieve energy independence?

While there may be several solutions to these questions, Mississippi has a partial solution it can implement today—not ten years from now. While Mississippi imports \$9 billion of energy annually, it is the steward of large forests. A managed forest can produce biomass energy that is sustainable forever. In addition, Mississippi is home to numerous wood industries, including paper mills and sawmills, which produce wood waste.

The use of wood pellets from Mississippi's forests and wood related industries is a path to long-term job creation, energy independence and a better environment. Wood pellets can be used for the full range of energy applications, from residential heating to electricity generation.

Biomass energy from locally produced wood pellets made from the forests and wood processing wastes of Mississippi has many benefits over other types of energy. Wood pellets are a renewable energy, reducing the burning of finite fossil fuels. The combustion of wood pellets produces less pollution than other fossil fuels, creating no sulfur oxides, and it is carbon neutral. Wood pellets can provide reliable electric power compared to other forms of alternative energy.

Wood pellets are cleaner than coal, from a renewable Mississippi source and will provide jobs within Mississippi. Wood pellets are today's answer to energy independence and a cleaner environment and can contribute to a thriving local economy.

## **What Is Biomass Energy?**

Biomass refers to living matter. Agricultural crops are biomass and have a value as both food and energy. The non-edible portions of crops, such as corn stover, can be used for animal feed or for energy. Energy crops, such as switchgrass, could provide a biomass resource, but switchgrass hasn't been established in sufficient volume to be a reliable energy source. Forest residue and other wood wastes are biomass that is suitable for energy production and not for food or feed. Wood wastes from sawmills, paper mills and other wood industries are readily available biomass.

Given proper forest management, biomass is an indefinitely sustainable, plentiful source of clean and renewable energy from the forests of Mississippi.

## **What Are Wood Pellets?**

Wood pellets are a refined and densified biomass fuel. They can be made from material rejected by wood product manufacturers. By pelletizing residual forest waste, sawdust, and used

wood pallets, millions of tons of waste can be put to work for the Mississippi economy while enhancing the environment at the same time. Agricultural by-products such as cornstalks and straw can also be pelletized.



## **Where Can Wood Pellets Be Used?**

Wood pellets can be burned in residential stoves or can be co-fired in industrial, institutional or electric generation boilers that currently burn coal. Wood pellets are readily transportable from forested areas to anywhere in the state.

Nine electric utility coal fired boilers are in operation in Mississippi. Using wood pellets matched to the boiler will make it possible for these boilers to take advantage of co-firing biomass.

## **Wood Pellets Can Be Co-fired with Coal**

Electric utilities burn coal to make electricity. In 2006, 39% of Mississippi electricity was generated from coal!

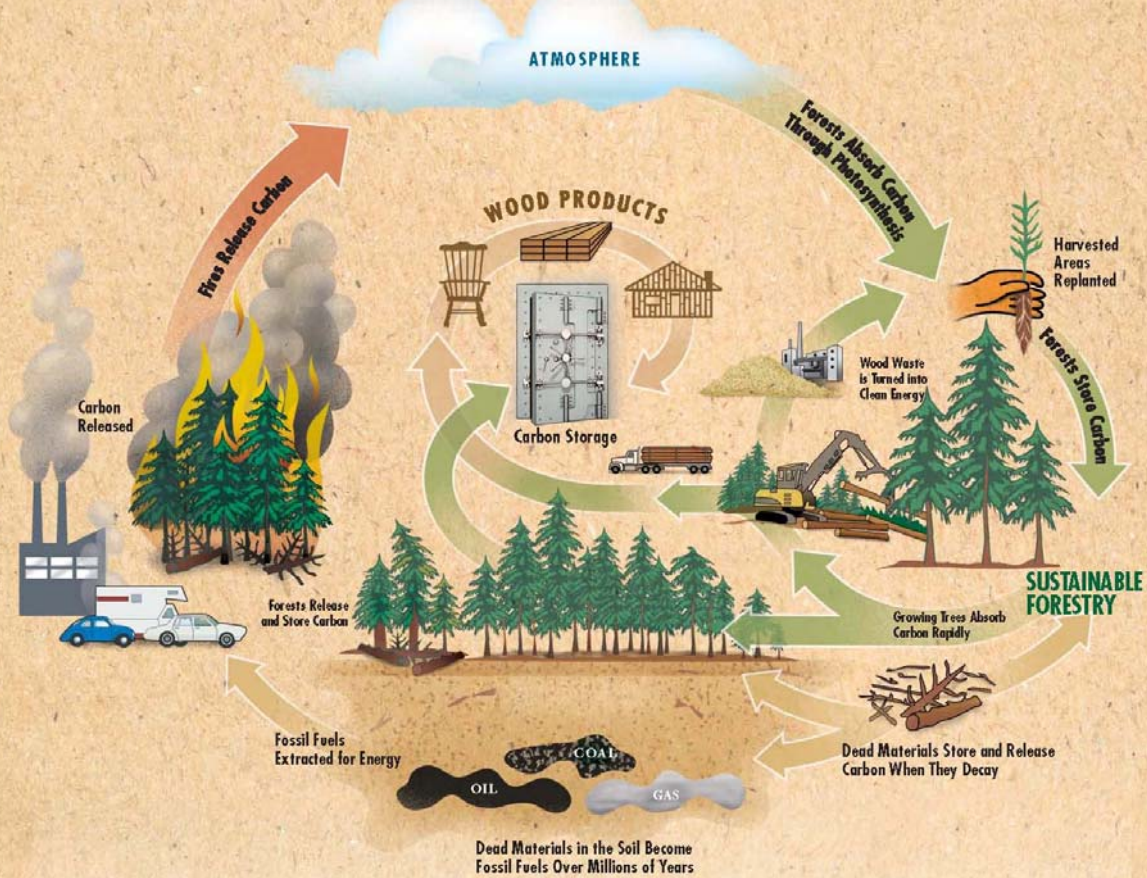
Wood chips are not as efficient a fuel as coal. Coal can be processed, usually by grinding, to improve its efficiency. Wood pellets improve the combustion characteristics and the friability of the wood so that they can be ground and co-fired with coal.

Wood pellets have several desirable features for co-firing with coal. By removing most of the moisture from the wood, wood pellets burn much like coal. The pellets are a consistent product, of a specific diameter and a range of lengths. They have a hard outer surface which makes handling them similar to coal. They are also friable like coal, that is, they break into small particles when processed. That means that they can be mixed with the coal without the need for a separate system.

Depending upon the type of coal boiler, wood pellets can be fed into it in a couple of ways. In some cases, such as a fluidized bed boiler, the wood pellets can be fed with the coal through the same feeder system. In other cases, such as for some stoker coal boilers, a separate storage and injection system is required.

# The Carbon Cycle

FORESTRY NEVER LOOKED SO COOL



### Carbon Released

Carbon is released into the atmosphere from power plants, factories, cars and other fossil fuel users. Although living trees absorb carbon through photosynthesis, they release some of it back to the atmosphere through respiration and when they die and decay. Forests also emit carbon to the atmosphere when they burn. Converting wood waste to clean energy reduces the need for fossil fuels. The amount of carbon in the atmosphere is higher now than at any time in the last 650,000 years.

### Carbon Absorbed

Trees absorb carbon through photosynthesis over their lifetime. For a period after harvest or fire, decomposing tree trunks, roots and other material release more carbon into the atmosphere than can be absorbed by new trees. As they grow, the trees again will absorb more carbon than is released, and the cycle repeats as long as forests occupy the site. Forests lose their ability to absorb carbon when forestland is converted to non-forest uses such as development.

### Carbon Stored

As a tree grows, it stores carbon in its trunk, branches and roots. Through careful management, a forest's carbon storage can be enhanced. Durable wood products such as lumber and furniture continue to store the carbon absorbed by trees. Managing forests sustainably, retaining forestlands in forest uses and producing wood products efficiently can all enhance the role of forests and wood products in offsetting carbon emissions from the burning of fossil fuels.

Oregon Forest Resources Institute

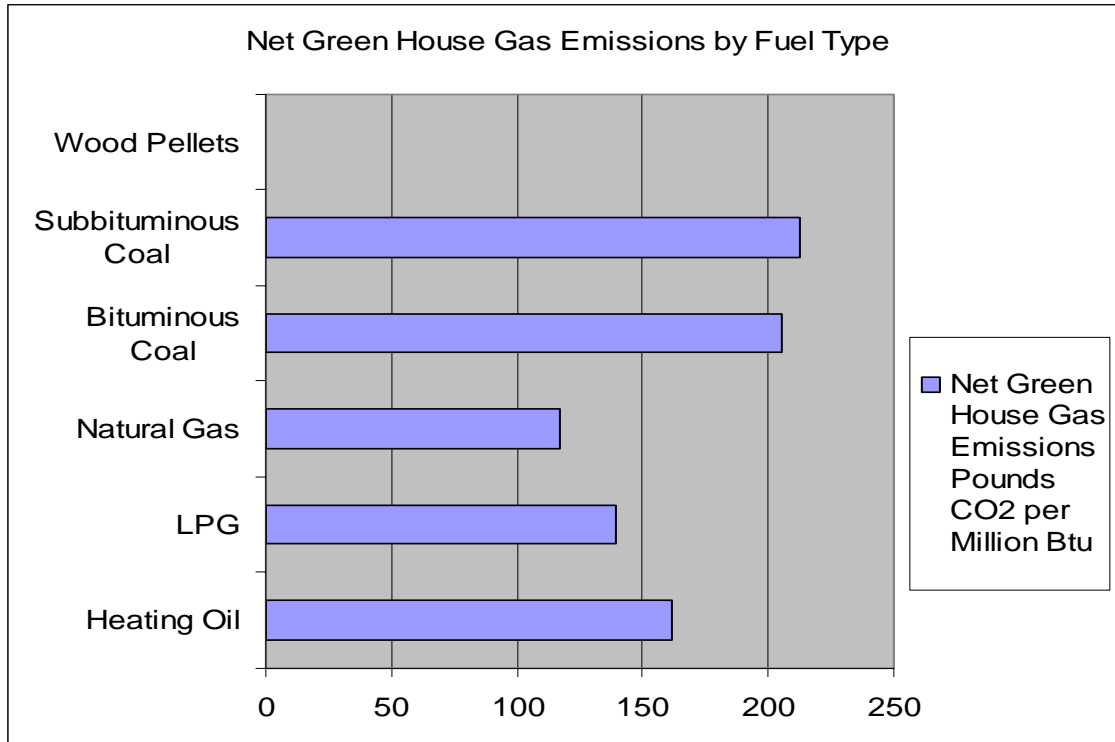
[www.oregonforests.org](http://www.oregonforests.org)



Artwork courtesy of The Forest Foundation

## The Environmental Benefits of Wood Pellets

Biomass has several advantages over coal as a fuel. The growth of biomass captures CO<sub>2</sub> from the air. When the biomass is burned, it recycles the carbon into CO<sub>2</sub> that is available for new-growth biomass to capture. On the other hand, the burning of coal releases carbon which has been stored for millions of years.



Source: U.S. DOE EIA

Studies show that co-firing 10% biomass with coal reduces NO<sub>x</sub> emissions by approximately 9%. Because biomass contains little if any sulfur, co-firing biomass with coal reduces the amount of SO<sub>2</sub> emissions. Biomass, unlike coal, does not contain mercury that has been accumulating in Mississippi waterways. Co-firing biomass with coal would reduce proportionately the amount of mercury emissions. Biomass generally has less ash than coal and the ash by itself can be used as fertilizer.

### There are several reasons for co-firing wood pellets with coal:

- **Wood pellet energy is carbon neutral.**
- **Coal is a limited resource, while wood is renewable.**
- **Co-firing wood pellets with coal means lower emissions.**

- **Burning wood as pellets means less to landfill.**
- **Coal plants can start burning wood pellets now.**
- **Wood pellets are cleaner to store and provide a safer work place.**
- **Wood pellet storage poses no soil or water contamination risks, nor does it pose a risk of explosion as does propane or natural gas.**

## **The Economic Advantages of Wood Pellets**

In addition to improvements in the air and water quality in Mississippi, co-firing biomass can produce several other benefits. Because lignite is mined for only one of Mississippi's coal plants, using locally grown biomass will reduce the amount of coal imported into the state and improve the state's energy independence. Replacing 5% of the coal burned in the state will utilize one million tons of wood in 7 typical pellet mills. (Specifics are summarized in the Table on the next page.)

Wood pellet mills provide at least part of the solution to the continuing challenge Mississippi and many other states are having with sawmill and paper mill closings. The wood supply that those mills used needs a productive place to go. Pellet mills are a big step in the right direction.

A typical pellet mill will produce 70,000 tons of pellets per year. This is enough to supply one 250 MW generating plant with 5% of its fuel as co-fired biomass. A 70,000 ton per year wood pellet mill will provide 10-15 high paying full time permanent jobs with a projected payroll of about \$500,000 per year. These are long term positions that can never be outsourced.

Nearly one hundred new related jobs will be created by a typical pellet plant as loggers respond to the opportunity to provide wood biomass to the plant. The plant will require delivery of up to 6,000 truckloads of wood biomass and will ship approximately 2,500 truckloads of wood pellets out to customers per year. The plant will consume up to 150,000 tons of wood and wood waste per year. The income from this feedstock will initially be earned by regional landowners, truckers and loggers and others supplying wood to the plant, however, the economic effect on the area surrounding the plant will be multiplied by approximately 2.4 times. All types of local businesses from local restaurants, shops and stores to larger businesses will benefit.

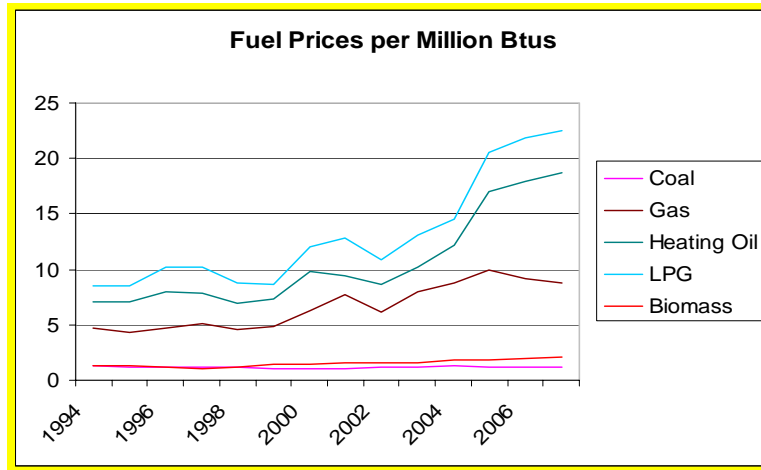
Finally, the initial plant construction will infuse millions of dollars into the region for wages, associated equipment and material, and once in operation the plant will be a significant taxpayer in the state and local area in the form of property taxes, sales tax and worker's compensation.

<b>Permanent Jobs</b>	<b>Typical 70,000 Ton/Year Pellet Mill</b>	<b>7 Pellet Mills for 5% Co-firing by Utilities</b>
Pellet Facility Operators	10-15	70-105
Loggers	30-50	210-350
Local Truckers	<u>5-10</u>	<u>35-70</u>
Total	45-75	315-525
<b>Temporary Jobs</b>		
Construction (Road and infrastructure upgrade jobs not included.)	50	350

## **Other Benefits of Wood Pellets:**

- **Lower Moisture Content**  
The moisture content of pellets is substantially lower than wood chips or cordwood (10% water—compared to up to 60% for green biomass). Less moisture means higher BTU value and easier handling especially in freezing situations with green raw biomass materials.
- **Ease and Cost of Transport**  
The density of wood pellets is substantially higher than raw biomass (40 lbs. per cubic foot versus 10-25 lbs. per cubic foot in raw material form). More fuel can be transported in a given truck space. As a result, trucking fuel cost and vehicular emissions will be reduced.
- **Ease of Handling**  
Their uniform shape and size allows for a smaller and simpler feed system that reduces costs.
- **Safe and Clean Workplace**  
Wood Pellets pose none of the explosion risks or environmental pollution from spills as nonrenewable fossil fuels do.
- **Beneficial Ash Use**  
In cases where wood pellets make up 100% of the fuel the ash residue can be used as a fertilizer.

- **Stable Fuel Price**



Source: U.S. DOE EIA

## What are the Opportunities for the Mississippi Economy?

The Federal government established a National Fire Plan to help reduce the frequency and severity of forest fires. In fiscal year 2007, more than 150,000 acres of forest land was burned as part of the Fuels Treatment program.<sup>2</sup> The forest residue in these areas could be converted to pellets for making electricity rather than burning it.

Without a Mississippi Renewable Portfolio Standard (RPS) that requires electric utilities to generate a portion of their electricity from renewable sources, the utilities are unlikely to change their operations. Biomass co-firing can be specifically addressed and utilities would be required to use Mississippi biomass. When the state passes an RPS, it should require biomass from within Mississippi.

Most RPS legislation applies to electric utilities. Other types of energy users are not required to, nor rewarded for, using renewable energy. From co-firing biomass in industrial or institutional coal boilers to biomass boilers, more Mississippi companies would use renewable energy if they benefited economically in addition to being good stewards of the environment. In conclusion, Mississippi should require in-state biomass and expand the biomass co-firing program to industrial and institutional boilers.

## How Can Mississippi Expand Wood Pellet Use?

The Mississippi Biomass Council (MBC) offers a forum to share information for the purpose of assessing the biomass energy and fuel resources within the state, facilitating the utilization of biomass technology, and encouraging biomass related economic development. Council membership includes representatives from agriculture, forestry, recycling, power generation, state and local government agencies, higher education, research, and manufacturing and individuals interested in reducing the biomass waste stream or increasing economic

opportunities for biomass. MBC was created in 1998 and incorporated in 2000 as a nonprofit corporation.<sup>3</sup>

The only existing market for pellet energy is electric utilities. Some utilities in the U. S have already tested and demonstrated various types of biomass co-firing. The reported challenges with most of the tests could be mitigated by the use of wood pellets or other compacted biomass. The utilities may need requirements or incentives to undertake this change to their operations. Specific pellet legislation would trigger implementation with the resulting benefits to the Mississippi economy and environment.

## **The Bottom Line...**

Setting energy policy requires tough decisions, weighing risks and rewards and even predicting the next turn in world events. Wood pellet fuel should play a part in putting Mississippi ahead in all those areas. It will encourage the economic and energy independence of our communities, reduce costs and clean the air. It is a solution waiting to be implemented today.

Overall, Mississippi is well situated with extensive forest resources to expand the use of biomass through co-firing wood pellets with coal. By establishing a biomass RPS, wood pellet co-firing can be beneficial to Mississippi. The state will be improving its economy through new jobs as well as improving its environment and increasing its energy independence.

Let's get started for a:

- Stronger State Economy
- Cleaner Environment
- Cost Effective Renewable Energy
- An Independent Energy Future

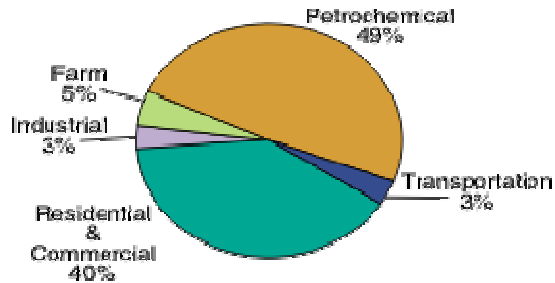
## **...What Can You Do Today?**

Co-firing wood pellets produced from locally harvested wood from Mississippi forests or the wood waste products of Mississippi businesses is a win-win situation for the economy and environment of Mississippi. Whether you are a legislator, administrator, business owner, factory manager, energy consultant, or anyone who wants to help the Mississippi and local economy, protect our environment and advance a very efficient thermal energy—you have a unique opportunity: spread the good news and promote the use of wood pellets for heating and energy generation.

## Appendix

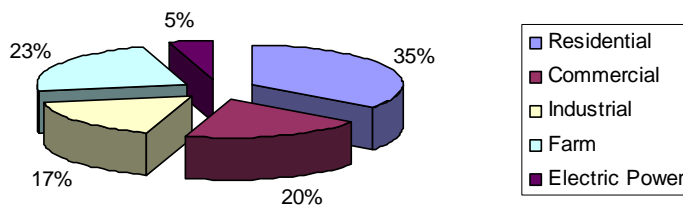
In addition to co-firing wood pellets with coal, replacing high cost fossil fuel use with pellets is economical. Propane and distillate oil are substantially more expensive on a Btu basis than wood pellets. Converting the heater or boiler from these fossil fuels to wood pellets is more expensive than for coal boilers. In some cases, replacing the heater or combustor may be required. In most cases, the fuel cost savings more than offset the cost of conversion. The following charts show the usage of propane and distillate oil by business sector.

### Propane Demand by Sector



Source: American Petroleum Institute, 2006 Sales of Natural Gas Liquids

### Distillate Use by Sector



Source: U.S. DOE EIA, 2006 U.S. Distillate Fuel Oil and Kerosene Sales by End Use

### Pellet Equivalencies

One Ton of Wood Pellets =	1.9	Tons Green Wood
	0.8	Ton Bituminous Coal
	1.0	Ton Subbituminous Coal
	19.0	Gallons Heating Oil
	180.0	Gallons LP Gas
	17.0	Million Btu Natural Gas

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<sup>1</sup> U.S. DOE EIA Mississippi Table 5, Electric Power Industry Generation by Primary Energy Source, 1990 Through 2006

<sup>2</sup> “Fuels Treatment Accomplishments Report: Mississippi for FY 2007”,  
[www.forestsandrangelands.gov/reports/fuel-treatments.cfm?statename=Mississippi&FY=2007](http://www.forestsandrangelands.gov/reports/fuel-treatments.cfm?statename=Mississippi&FY=2007)

<sup>3</sup> Mississippi Biomass Council, ([ms-biomass.org](http://ms-biomass.org)) (6/14/06).

**Sources:**

U.S. DOE EIA ([www.eia.doe.gov](http://www.eia.doe.gov))

Healthy Forests and Rangelands, a portal to information about the *National Fire Plan, Healthy Forests Initiative*, ([www.forestsandrangelands.gov](http://www.forestsandrangelands.gov))

Pellet Fuels Institute ([www.pelletheat.org](http://www.pelletheat.org)) provided photographs

Oregon Forest Resources Institute, Portland, OR, ([www.oregonforest.org](http://www.oregonforest.org))

The Forest Foundation, Santa Barbara, CA, [www.theforestfoundation.net](http://www.theforestfoundation.net)

American Petroleum Institute, Washington, DC, [www.api.org](http://www.api.org)

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