

Biomass: Nature's Most Flexible Energy Resource



RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

HIGHLIGHTS

- Biomass fuels can be used in place of fossil fuels
- Wood and wood wastes are already a significant energy source in the US
- Biomass can provide extra income to Texas farmers, ranchers and industries with a lot of waste materials

SUMMARY

Biomass is plant materials and animal waste that can be used as a fuel source for our energy needs. It is a chemical energy that is among the most precious and flexible resources on Earth. Biomass has many important uses. It provides food that all animals can eat. Biomass also provides building materials, paper, fabrics, medicines and chemicals. Biomass has been used for energy purposes ever since fire was first discovered. Today, biomass fuels have many

uses such as heating your home, fueling your car and providing electricity to run your computer.

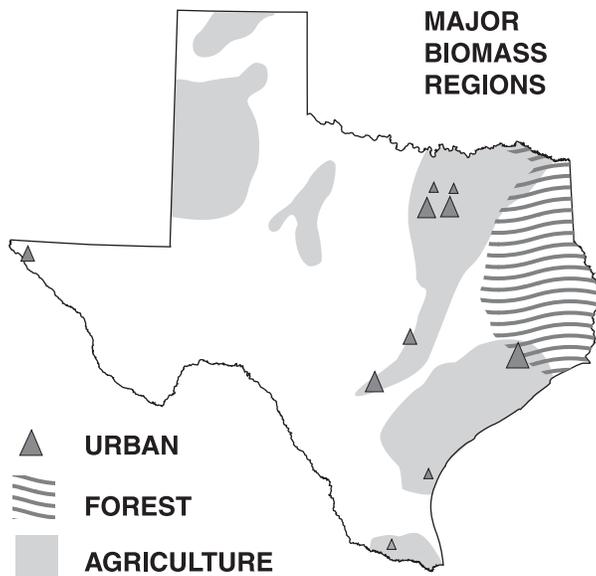
WHAT IS BIOMASS?

Wood may be the best-known example of biomass. Through photosynthesis, trees convert the radiant energy of the sun and combine it with carbon dioxide and water to create plant tissue. When burned, the wood releases the energy the tree captured from the sun's rays.

But wood is just one example of biomass. Rice hulls, waste straw, animal manure, surplus corn, peanut shells and any other plentiful organic material can also be used as an energy source.



AIRPLANE POWERED BY BIOMASS Biomass materials can be converted into fuels capable of just about any energy service, from powering airplanes and cars to making electricity to heating the family living room.



SUMMARY OF TEXAS ENERGY RESOURCE AREAS

Texas' forests, ranches, farms and even cities produce biomass materials that can be used to satisfy many energy needs.

Can you think of other examples of biomass energy sources?

All of the fossil fuels we use – coal, oil and natural gas – are simply ancient biomass. Over millions of years, the earth has buried ages-old plant material and converted it into these valuable fuels. But while fossil fuels have similar contents as those found in fresh biomass – hydrogen and carbon – they are not considered renewable because they take such a long time to create.

The effects on our environment are also different between biomass and fossil fuels. When a plant decays, it releases most of its chemical matter back into the atmosphere. But, fossil fuels are locked away deep in the ground and do not affect the Earth's atmosphere until they are dug up and burned. The negative effect on the environment caused from burning fossil fuels is a good reason to consider biomass and other clean renewable resources.

HOW BIOMASS IS USED

Heat

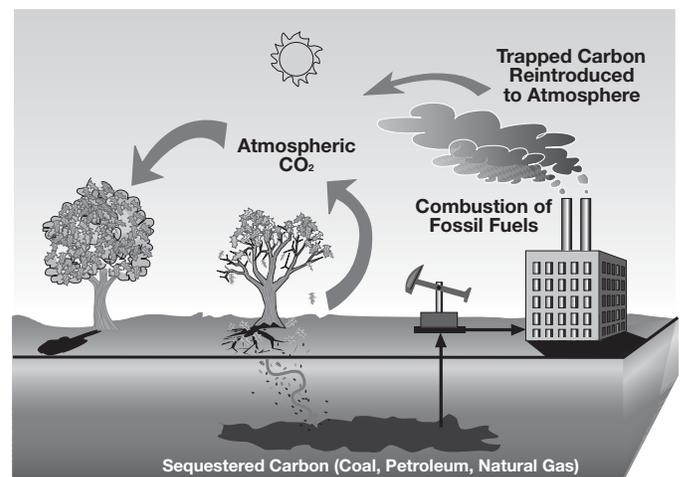
When you burn wood in your fireplace to heat your home, you are using a biomass resource. The use of wood to heat your home may be the most familiar use of biomass. Businesses and factories can use other forms of biomass energy to create heat from biomass fuels.

Steam, Electricity and Gases

For many years, mills and factories have burned biomass waste (especially wood waste) to produce steam for heat or electricity. Biomass materials that decay over time, such as garbage in landfills, produce methane, which is similar to natural gas. It can be captured and burned to generate electricity at the landfill or sold as gas that is transported to other areas. New technologies may be developed that can turn biomass into energy even more quickly.

Vehicle Fuels

Biomass can also be turned into alcohol. Ethanol is an alcohol created from biomass. The gasoline that we use in our cars often includes a small amount of ethanol. If we added 10% ethanol to our gasoline, our cars would perform better, and



SIMPLIFIED CARBON CYCLE *Unlike fossil fuels, biomass does not increase atmospheric greenhouse gases when burned.*

they would not produce as much air pollution. Ethanol fuels are usually made from corn. Flex fuel vehicles (FFV) use a mixture of gasoline and an alcohol fuel like ethanol. FFVs can run on a mixture of 85% ethanol and 15% gasoline. This mixed fuel is called E-85. Also, diesel engines with minor changes can use a special type of diesel made from waste vegetable oils or crops such as soybeans. This special type of diesel fuel is called biodiesel.

BIOMASS RESOURCES IN TEXAS

Texas has many materials that can be used for biomass energy. From its forests to its huge grain and fiber farms, the state is rich with biomass resources. Perhaps the best sources are concentrated waste materials. If just half of the available biomass wastes were used to make electricity, they could supply 10% of the state's electric needs. Here are the most promising resources:

Forests

The highly productive forests of east Texas have many biomass resources that can be obtained at a reasonable cost. The sawdust and waste wood from sawmills and pulp mills are already being used. Sawdust and waste wood are burned to generate steam and electricity at many Texas timber-processing plants.

Agriculture

When crops like cotton, rice, peanuts and sugar cane are harvested, there are large amounts of waste material that are left behind. Items such as crop wastes, manure from feedlots and dairies and stalks are left behind. All of these items can be used for fuel.

Urban Sources

All large cities have concentrated biomass sources that could be used for biomass energy. Examples of these sources include sewage

treatment facilities, landfills, furniture factories, breweries, and food packaging plants.

Energy Crops

Crops that grow quickly, like switch grass and cottonwood trees, could be used as fuel and would greatly increase our biomass resources. It is possible that 25% or more of Texas' transportation and electricity needs could be provided from these types of energy crops if more trees are grown.

ADDING VALUE IN RURAL COMMUNITIES

Small biomass energy projects can provide many needed benefits in rural areas that are involved in agriculture. For example, a biomass generator could be installed on a feedlot that uses manure as its energy source. This would solve the feedlot's problem of manure disposal, reduce odors and provide jobs for the community.

WASTE SOURCES	(Quads)
Agricultural Wastes	
Harvest residues	0.081
Processing residues	0.028
Woody Wastes	
Logging residues	0.084
Mill residues	0.066
Biogas	
Animal manure	0.026
Municipal sewage	0.025
Urban	
Landfilled biomass	0.150
TOTAL	0.46

ENERGY POTENTIAL FROM TEXAS BIOMASS WASTE RESOURCES *Waste resources from food and lumber processing facilities are low cost sources of biomass fuel. Examples include rice hulls, cotton boll stems, sugar cane stalks, sawdust and wood chips. (Quad - 1 quadrillion BTUs, 1 kWh = 3,412 BTUs)*

ORGANIZATIONS

Governor's Ethanol Coalition

3118 Emerald Lane, Suite 100
Jefferson City, MO 65109
(877) 485-8595
www.ethanol-gec.org/

National Biodiesel Board

3337-A Emerald Lane
Jefferson City, MO 65110-4898
(573) 635-3893
www.biodiesel.org/

New Uses Council

295 Tanglewood Dr.
East Greenwich, RI 02818-2210
(401) 885-8177
www.newuses.org

Renewable Fuels Association

One Massachusetts Ave., Suite 820
Washington, DC 20001
(202) 289-3835
www.ethanolrfa.org/

RESOURCES

FREE TEXAS RENEWABLE ENERGY INFORMATION

For more information on how you can put Texas' abundant renewable energy resources to use in your home or business, visit our website at www.InfinitePower.org or call us at 1-800-531-5441 ext 31796. Ask about our free Teacher Resource Guides and CD available to teachers and home schoolers.

ON THE WORLD WIDE WEB:

Thorough **Oak Ridge National Laboratory** guide to biomass related information of all types; excellent place to start research.
<http://bioenergy.ornl.gov/>

The National Corn Growers Association site, focusing primarily on ethanol production from corn.
<http://www.ncga.com/ethanol/main/index.asp>

Environmental Protection Agency site, a wealth of information on landfill gas energy.
<http://www.epa.gov/lmop/>

The U.S. Department of Energy's Energy Efficiency & Renewable Energy Biomass Energy Program
<http://www1.eere.energy.gov/biomass/>



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