WASTETOENERGY

SYSTEMS

*fueled by* bioHearth®

bioHearth®

The affordable, sustainable waste to energy solution.

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## Our Facility

## Our Vision

Waste to Energy Systems, LLC changes the way waste is treated and energy is created. We turn your problem into an asset.

## Our Mission

Waste to Energy Systems, LLC (WES) is your solution to reducing the waste from your business, farm, resort, community or town and converting that waste into energy.

## Our History

WES is located at 30380 Payne Alley, Tickfaw, LA 70466. It is majority owned and operated by Richard Woods, who also owns Albany Woodworks Inc. (AWW), a millwork company operated since 1980. In the interest of efficiency, Richard began researching methods of converting his wood waste into a viable energy source in 2009.

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## Our System

After five years of research, testing, analysis and development, WES has a commercially viable Down Draft Gasifier System, bioHearth®, in operation at Albany Woodworks. Our bioHearth® will soon be supplying the electricity to run the plant and the heat for curing wood. Supplying our advanced Down Draft Gasifier, bioHearth®, combined with the necessary ancillary equipment, WES is the key to converting waste to sustainable energy

## Feedstock

Our laboratory will design and test your feedstock to ensure you are provided with the best delivery system for your new bioHearth®.

The briquette delivery system is best suited for finer feedstock.

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## Auger

The auger delivery system option is best suited for larger feedstock such as wood chips and agricultural byproducts.

## Briquetter

The briquetter is used for finer feedstock to produce a consistent fuel size and density for the bioHearth® gasification system.

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## Gas Cooling

The gas cooling system serves as a polishing and cooling system for the gases. Our patent pending design provides you with clean gas, whatever your application.

## Gas Filtering

Our uniquely designed filtering system allows you to use organic feedstock as a filter component. The resulting product can be used as fuel for the system; thus, making filter disposal easy and simple.

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# Particulate Removal System

Particulate Auger Transition

Particulate Auger Collection

Our patent pending particulate removal system is fully automated and collects particulate from the major components of the system. This keeps labor costs down and minimizes maintenance. The collected particulate becomes fuel for your bioHearth® gasification system!

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# Safety & Automation

Our state of the art, fully automated system is designed to minimize labor and maximize safety. With automated valves, flow sensors and pressure differential sensors, you can rest easy knowing that your system is running safely at full efficiency.

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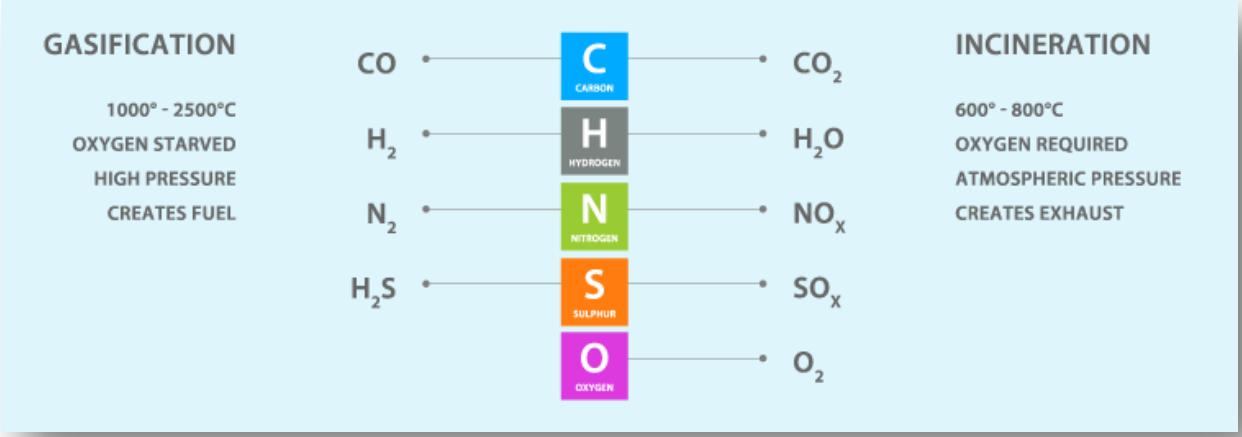
# Clean Fuel, Heat and Energy




This chart proves that gasification releases no harmful compounds unlike incineration. Gasification makes incineration obsolete in efficiency and environmental safety.

# Clean Burning = Carbon Neutral

An inside view of gasification in process, reaching temperatures of over 2300 F ensures maximum energy production from your feedstock.

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# Our Process

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# Gas Analysis

University of Maine
Process Development Center



## GAS COMPONENT ANALYSIS

**Done in comformance with ASTM 1945**

**Sample Log #** 07172013

**Project Description:** Regular testing
**Date Received:** July 16, 2013
**Date Tested:** July 17, 2013
**Operator:** Jon Spender

| | | Enter Sample ID.1 |
|---|---|---|
| COMPONENT | Conc. Unit | WTE |
| Methane | % | 2.2 |
| Carbon dioxide | % | 8.1 |
| Nitrogen | % | 52.1 |
| Hydrogen | % | 15.9 |
| Carbon monoxide | % | 20.8 |
| Ethane | % | 0 |
| All Others including: Argon, Acetylene and Propylene | % | 0.920 |

*** Calculation is based on all major components listed.**

**NOTE: All major component concentrations are reported as a moisture and $C_2$ plus free basis and are normalized to 100%. Oxygen and Argon cannot be separated; therefore, the oxygen result includes a small amount of Argon.**

**For the sake of reference, if analysis indicates an additional component of significance, it will be reported here.**

**Standard conditions: 60 °F and 14.73 psia**

**Original document can be provided upon request. **

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# Environmental Solutions

At WES, we know the realities of the world energy demand and the resulting global warming. Our solution is to turn waste into energy without increasing the carbon in our atmosphere. (See the following article on Gasification.) Burning or incinerating our waste is a major contributor to the increased CO2 levels. Our bioHearth® downdraft gasifier converts biomass waste into energy without environmental damage. Eliminating waste and pollution while generating high demand energy is what makes WES the right step toward a cleaner future.

# Positive Public Relations

A bioHearth® waste to energy system will greatly enhance your public image. This demonstrates your commitment to community, innovation and sustainable energy. General Electric, Marriott and Bacardi Rum are just a few companies that are working hard to enhance their environmental image by positive Green Initiatives. These corporations know that awareness increasingly influences the daily choices we make. The ability to show your waste is now energy is a huge public relations image enhancement for any company, school, or resort.

# Balance Sheet Result

Converting your waste into energy is always positive financially. Removing the cost of disposal, decreasing your own energy cost by creating heat and/or power always goes to the plus side of any company's balance sheet. Your local cost of energy will determine the exact return of investment on a purely dollars and cents formula. The full result enhances those calculations when factoring the public relations and environmental effects. WES offers a truly win-win solution. Come see how we can make a difference for you.

# How is Gasification Carbon Neutral?

Study: Carbon dioxide in biomass gasification increases efficiency

By Lisa Gibson - Biomass Magazine

When carbon dioxide is used in biomass gasification, it increases the conversion efficiency and offers a solution for processing carbon dioxide on a global scale, according to a recent study by Columbia University researchers.

The study, "CO2 as a Carbon Neutral Source via Enhanced Biomass Gasification," is featured on the Web site of the Journal of Environmental Science and Technology and can be seen at pubs.acs.org/journal/esthag. The researchers processed 50 different kinds of biomass including beach grass, pine needles, poplar wood and municipal solid waste, along with coal, at temperatures of 25 to 1,000 degrees Celsius (77 to 1,832 degrees Fahrenheit) at rates of 1-100 degrees Celsius per minute in pure carbon dioxide and in a mixture of steam nitrogen gas and carbon dioxide, according to the university. They found that a carbon dioxide-steam mixture significantly increased the conversion of biomass to volatile products at lower temperatures.

The team used about 30 percent carbon dioxide by volume of biomass and typically between 20 micrograms and two grams per second of biomass, said researcher Marco Castaldi, assistant professor of Earth and Environmental Engineering. The only difference in the syngas produced is the ratio of hydrogen to carbon, which is adjustable, he added.

When carbon dioxide and steam are present in gasification, the carbon dioxide reacts first to convert the solid fuel to syngas, leaving the steam to carry out the water-gas shift exothermic reaction, liberating some energy, according to the university. The researchers found that by replacing 30 percent of the steam

with carbon dioxide, the overall process is more efficient because the carbon dioxide is more reactive than steam and can readily access the carbon char for conversion into syngas. "It seems pure carbon dioxide is best," Castaldi said.

The use of carbon dioxide in biomass conversion on a global scale has the potential to process tens to hundreds of megatons of carbon dioxide per year, the researchers believe. According to their calculations, using carbon dioxide during gasification of biomass fuel results in better emissions reduction than just the use of biofuels alone. For example, the incorporation of carbon dioxide in the low-temperature gasification of beach grass on a global scale could create a beneficial use for 437 million metric tons (482 million tons) of carbon dioxide, based on estimated transportation needs in 2008, according to the university. That's the equivalent of taking about 308 million typical vehicles producing 6 metric tons of carbon dioxide or more per year off the road.

Carbon dioxide for gasification can be diverted from a variety of industrial sources, including power plant exhaust, future power plants that use syngas and compressed carbon dioxide, or from food and beverage manufacturers that emit carbon dioxide as a byproduct, researchers said. The use of industrial carbon dioxide will lead to further emissions reductions.  The next step in the research is to further develop and understand the process and look at different waste streams, such as agricultural waste, to determine where catalysts can be incorporated to refine the resulting biofuel, according to the university. The researchers would like to commercialize their process and are searching for the necessary funding, Castaldi said.

# Our Contact Info


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