Tom Kimmel
4671 E. Hillcrest Dr.
Berrien Springs, MI 49103
(269) 473-6221
georgethomaskimmel@gmail.com

April 20, 2014

Wood Gasification

Wood gasification and steam power have nothing at all in common. Neither are they related in any way except in both being alternative fuel possibilities the chemistry and physics of which are poorly understood by the general populace who continuously gets them confused. Because it is the purpose of this website to raise the level of consciousness of the general populace, we are bringing the subject up and addressing it directly.

The advantage of wood gas is that many people have used it over the years; mostly during WWII in Sweden and Japan and it uses a conventional gasoline internal combustion engine thus requiring little modification or manufacturing of the basic mechanism.

Here is how it works: wood or walnut shells or some other cellulose based fuel is smoldered in an oxygen poor environment while being heated up. This makes for lots of smoke, carbon monoxide, and other volatiles; all of which are combustible in an engine. The general rule is that a gasoline engine will produce half of its potential horsepower when burning wood smoke.

This appears to be relatively easy except for the fact that there is a lot of tar in the smoke that gums things up and there are lots of little abrasive particles in the smoke that will abrade things. Therefore a lot of filtering needs to be done before running the smoke into an engine. This can be done except that the tar and little abrasive particles clog up the filters, as one might imagine.

In spite of this many very intelligent people have spent much time working on the gasification issue and it is almost practical.

Besides turning bio-fuel into power wood gasification leaves the by-product charcoal which is elemental carbon. When this is ground up and incorporated into soil, particularly a laterite tropical soil, the cation exchange capacity goes up making it a very fertile soil. This all seems like a wonderful idea until one thinks of the logistic issues of hauling all of this cellulose to a central power station and then grinding the charcoal and hauling it back to the fields, spreading it, and incorporating it into the soil. All of this logistic work needs to be done with steam powered vehicles to make it practical.

There is another and more philosophical issue to be made when comparing wood gasification and steam power. To begin with, what we are expecting to do with steam power is to burn wood completely and cleanly to make heat to make steam to make power. The philosophical problem with wood gasification is that much of the cellulose is used to make heat necessary to boil out the volatiles and to make carbon monoxide. When this is done absolutely none of the heat is used to make power. In fact, most of these wood gasification things use an inter-cooler to cool off the wood gas before running it into the IC engine. Thus every bit of the heat generated is wasted, lost, not used, an unwelcome by-product of the process.

And so the bright person will say: why do we not use the heat to make steam and run that through a steam engine? And the answer is that it is very difficult to make a steam power plant because no one is mass producing steam engines or steam generators and thus every part of a steam power plant has to be designed and hand crafted. Therefore there is no reason to make a small steam power plant to use part of the heat of cellulose combustion when it would cost no more to make a larger steam power plant and thus avoid all of the wood gasification problems.

If a person is absolutely committed to making carbon to put in the soil, that can be done in a steam engine burner as easily or more easily than in a wood gasification producer thing.

And so; wood gasification has nothing at all to do with steam power. And steam power has nothing to do with burning water to make power. These things are all heat engines and they all run on one or the other of the standard well-known thermodynamic cycles. It is because they are based on thermodynamic cycles that they are poorly understood by the general populace, hence this explanation cum diatribe.

Wood Gasification - Wayne Keith

Website: www.driveonwood.com

Coal gasification is sometimes called "clean coal" because it can be used to generate electricity without belching toxins and carbon dioxide into the atmosphere. But it's still based on a nonrenewable fossil fuel. And it still requires mining operations that scar the Earth and leave behind toxic wastes of their own. Wood gasification -- or **biomass gasification**, to be more technically correct -- may provide a viable alternative. Biomass is considered a renewable energy source because it's made from organic materials, such as trees, crops and even garbage.

Biomass gasification works just like coal gasification: A feedstock enters a gasifier, which cooks the carbon-containing material in a low-oxygen environment to produce syngas. Feedstocks generally fall into one of four categories:

- Agricultural residues are left after farmers harvest a commodity crop. They include wheat, alfalfa, bean or barley straw and corn stover. Wheat straw and corn remnants make up the majority of this biomass.

- Energy crops are grown solely for use as feedstocks. They include hybrid poplar and willow trees, as well as switchgrass, a native, fast-growing prairie grass.
- Forestry residues include any biomass left behind after timber harvesting. Deadwood works well, too, as do scraps from debarking and limb-removal operations.
- Urban wood waste refers to construction waste and demolition debris that would otherwise end up in a landfill. Pallets -- flat transport structures -- also fall into this category.

The choice of feedstock determines the gasifier design. Three designs are common in biomass gasification: updraft, downdraft and crossdraft. In an **updraft gasifier**, wood enters the gasification chamber from above, falls onto a grate and forms a fuel pile. Air enters from below the grate and flows up through the fuel pile. The syngas, also known as **producer gas** in biomass circles, exits the top of the chamber. In **downdraft**or **crossdraft gasifiers**, the air and syngas may enter and exit at different locations.

The choice of fuel and gasifier design affects the relative proportions of compounds in the syngas. For example, wheat straw placed in a downdraft gasifier produces the following:

- 17 to 19 percent hydrogen gas
- 14 to 17 percent carbon monoxide
- 11 to 14 percent carbon dioxide
- Virtually no methane

But charcoal placed in a downdraft gasifier produces the following:

- 28 to 31 percent carbon monoxide
- 5 to 10 percent hydrogen gas
- 1 to 2 percent carbon dioxide
- 1 to 2 percent methane

[source: Rajvanshi].

Now you're ready to make your own wood gasifier. Keep clicking to see how.

Note:
BETTER GAS(IFICATION) MILEAGE
Believe it or not, one of the main uses of wood gasification has been to power internal combustion engines. Before 1940, gasification-powered cars were occasionally seen, especially in Europe. Then, during World War II, petroleum shortages forced people to think about alternatives. The

transportation industries of Western Europe relied on wood gasification to power vehicles and ensure that food and other important materials made it to consumers. After the war, as gas and oil became widely available, gasification was largely forgotten. A future petroleum shortage, however, may revitalize our interest in this old technology. The car driver of the future may ask to "fill 'er up" with a few sticks of wood instead of a few gallons of gas.

GEK Gasifier

http://www.gekgasifier.com/

Wood gas, Syngas, Biogas, Producer Gas

Gasification is the use of heat to tranform solid biomass or other carbonaceous solids into a synthetic “natural gas like” flammable fuel. Through gasification, we can convert nearly any dry organic matter into a clean burning fuel that can replace fossil fuel in most use situations. Whether starting with wood chips or walnut shells, construction debris or agricultural waste, gasification will transform common “waste” into a flexible gaseous fuel you can use to run your internal combustion engine, cooking stove, furnace or flamethrower.

Sound impossible?

Did you know that over one million vehicles in Europe ran onboard gasifiers during WWII to make fuel from wood and charcoal, as gasoline and diesel were rationed or otherwise unavailable? Long before there was biodiesel and ethanol, we actually succeeded in a large-scale, alternative fuels redeployment– and one which curiously used only cellulosic biomass, not the oil and sugar based biofuel sources which famously compete with food.

This redeployment was made possible by the gasification of waste biomass, using simple gasifiers about as complex as a traditional wood stove. These small-scale gasifiers are easily reproduced (and improved) today by DIY enthusiasts using simple hammer and wrench technology. The goal of this GEK is to show you how to do it, while upgrading the engineering and deployment solutions to something befitting the digital age.

Re:Char

http://www.re-char.com/

Hosted by CIAT (International Center for Tropical Agriculture) and the University of Nairobi, hundreds of the foremost soil scientists in the world gathered in Nairobi this past week to discuss the interlinked issues of tropical soil degradation, poor yields, and environmental sustainability. At the center of a number of the discussions was how biochar fits in to the ISFM framework.

ISFM (Integrated Soil Fertility Management) is a holistic approach to agriculture with strong focuses on productivity, sustainability, and scientific rigor. The aim of ISFM is to create integrated farming systems rather than looking at individual farming practices as separate and somehow not intrinsically linked. Sustainably (and increasingly) productive farms require utilization of the symbiotic relationships that occur in nature, efficient application and use of nutrients (organic when available, inorganic when not), resilient seeds, and proper soil and landscape management.

When all of these things come together you see explosions in agricultural productivity such as those that have been observed throughout the western world over the course of the last century. Food security and environmentalism don’t have to be mutually exclusive endeavors as so many have made them out to be. This is especially the case when biochar use is adopted and implemented within an ISFM framework.