



Grass Bioenergy in the Northeast USA

Purpose: The purpose of this publication is to provide an overview of grass pellet biofuel for the Northeast USA, as well as provide an update on the status of this industry.



While relatively little hay is baled and abandoned (above), a very significant acreage of grass is abandoned and not baled in the Northeast USA.

The Northeast USA is a primary component of the “hay and pasture” region of the USA. Grass is well suited to this region. The variable and marginal soil types found in much of the region are not well suited to row crop production. Abandoned fields quickly become mixed grass meadows, with rapid encroachment of woody species if not mowed. New York State has approximately 1.5 million acres of unused agricultural land. Most of this land will not grow row crops profitably, all of this land will support grass production.

Grass Bioenergy

Grass bioenergy is not a new concept, Europe has been utilizing grass energy for decades. Many developing countries use biomass as a very significant portion of their total energy usage. Much of this usage, however, is very inefficient, with potentially dangerous amounts of particulates and chemicals released into the home environment. Pelleting not only provides the densification necessary for economical transportation of bulky biomass, but also allows controlled feeding of the fuel so as to maximize energy efficiency and permits cleaner burning of the feedstock.

Advantages of Grass Pellet Energy

Sooner or later we will have to get serious about alternative energy. Sooner or later carbon credits will mean something in the USA. Grass pellet energy has the following positive characteristics:

- High grower acceptance.
- High rural economic development potential.
- Very efficient conversion.
- Cost effective, requiring no subsidies.
- Efficient use of marginal cropland.
- Compliments nutrient management plans.
- Ideal for soil conservation.
- Compatible with wildlife nesting.
- Ideal for maintaining open spaces.
- Sustainable one-cut harvest system.
- Nearly greenhouse gas neutral.

Basic Crop Management

High producing grasses such as reed canarygrass or switchgrass can be sown specifically for biomass production, or the existing mixture of grass species can be utilized. Animal manure can be spread in the spring or after harvest to increase productivity. Cut forage in mid to late summer, leaving it on the field to allow leaching out of nutrients that will otherwise end up as ash. Baling at normal hay crop moisture allows stable storage of feedstock until pelleting. No further drying is required for pelleting. Additional binders are not required to hold pellets together, although they may improve pellet stability.



Mid-summer is great for haymaking.

Energy Conversion Options

Crops store solar energy and recycle carbon, removing it from the atmosphere during photosynthesis and returning it to the atmosphere as the organic matter is burned or decays. Although it typically takes some fossil fuel to produce perennial grasses, these crops are considered to be around 90% carbon neutral. They do not add significantly to atmospheric carbon dioxide. Fossil fuels, on the other hand, are considered non renewable since they take millions of years to form, and they add huge quantities of carbon dioxide to the atmosphere.

Direct combustion. This is the most straightforward option, and the most energy efficient. Grass pellets can be burned in a few pellet stoves, as well as in some European boilers. Grass has been cofired with coal, with grass making up about 10% of the mixture. Grass can be burned in bales, as a powder, or as densified pellets, briquets or cubes.

Cellulose to Ethanol. Plants are composed mostly of carbohydrates or simple sugars. As soon as an economically viable conversion process is developed this could become a major source of ethanol. A very significant ongoing investment has been made for several decades to refine the cellulose to ethanol conversion process to make it practical.

Electricity or synthetic liquid fuels. A variety of gasifiers have been developed, several of which are potentially capable of utilizing high ash feedstocks, such as grasses. Gasification is not a new concept, the U.S. military had a fleet of gasifier vehicles in the 1940s. Using closely controlled temperatures, combustible

gasses can be released from a feedstock and collected for later combustion in a boiler, turbine or internal combustion engine. The remaining residue is burned to provide the heat source for feedstock drying and for the gasification reaction. Heat, electricity, and liquid fuels are all possible products of gasifiers.



Harman corn stove

Status of the Grass Pellet Industry

Grass pellet bioenergy is one of the few alternative energy options currently available that would require a minimum of government subsidies. Perennial grass managed with one harvest per season offers a litany of environmental benefits. All field equipment is commonly available and management practices are familiar to farmers. Pelleting grass tends to be more problematic than wood pelleting. Residential appliances need some modifications to address potential corrosion issues due to high Cl, K and S in grass.



Reed canarygrass in NY on a marginal site.

The Northeast USA has millions of acres of land suitable for grass biomass, without interfering with traditional agricultural crops. Grass lacks a political lobby, consequently this concept is not supported by state or federal governments. Grassroots support is encouraging but carries with it little political support. Some amount of startup support is needed, along with incentives for the development or modification of appliances that can cope with high ash feedstocks and minimize emissions. A grass biomass industry is possible, but requires a modest investment in the system.

For more information



Cornell University
Cooperative Extension

Dept. of Crop & Soil Sciences
<http://www.GrassBioenergy.org>

J.H. Cherney
E.V. Baker Professor of Agriculture
JHC5@cornell.edu