Community Biomass Energy Short Business Description – Dec 2012

Community Biomass Energy (CBE) intends to operate as a LLC selling locally supplied, locally marketed alternative energy fuel. We take a new approach to an old source of energy - biomass - and create a new product to fit our rural community – agricultural pellets – utilizing a new market – micro combined heat and power (CHP).

Pellets

Most people are familiar with the age-old form of biomass still used the world over – firewood. Fuel pellets are made from chopped and ground biomass (from a variety of sources) heated with steam under pressure, extruded through holes in a die, and cut into short lengths by a familiar, simple technology long used for animal feed. Pellets eliminate the moisture, variability, mold, fungus, insect content, splitting, stacking, and toting problems of firewood. They convert high bulk materials difficult to store and transport, such as hay bales or cord wood, into an extremely dense, flowable fuel that can be fed continuously, as opposed to the intermittent loading of logs on the fire. Pellet heating technology is relatively recent and was developed from woodchip boiler technology.[1] Pellets are oriented to smaller systems, both residential and commercial, and eliminate the mechanized bulk handling of woodchips. Residential pellet stoves and boilers have higher combustion efficiency than their cord wood counterparts because the fuel is drier and denser and the appliance allows a better, more consistent fuel to air ratio. Pellet stove emissions are so minimal that the EPA does not regulate them.[2] Pellet stoves are automated, can be connected to a thermostat, and need only a small amount of electricity to run.

Agricultural Pellets

Agricultural pellets can be made from agricultural residues such as straw, as they are in Europe,[3] or energy crops such as switchgrass or reed canary grass as they are in Canada.[4] Agricultural sources for pelleting can be grown on marginal land that does not compete with food since they don't require a high quality soil or a lot of amendments. Pellets most often seen on the market today are made from compacted wood sawdust waste from lumber-related industries or ground from low-value trees, which take years to grow. But wood pellets can compete for raw materials with other products such as fiberboard, particleboard and oriented strand board.[5] Cost and

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[1] Pellets for Small Scale Domestic Heating Systems, AEBIOM, May 2007

[2] Consumer Reports.org, Buyer's guide to pellet- and wood-burning stoves: The pros, cons and costs vs. natural gas, oil, and coal, August 2009

[3] Agri-pellets: Perspective of Pellets from Agricultural Residues: How to heat at low cost

[4] http://www.reap-canada.com/bio_and_climate_3_2.htm

[5] The Art of Biomass Pelletizing, Biomass Magazine, Ryan C. Christiansen

availability of pellets can be stabilized by making them available from multiple sources. Agricultural pellets can be made from materials produced across a broad spectrum of rural landowners and farmers. Harvesting equipment needed is widely available in rural communities. Agricultural pellets make particular sense when used within the communities that produce them, reducing transportation costs and keeping profits local.

Native Weeds and Grasses

One common agricultural residue in our area is from old fields going to brush. Native weeds and grasses are perennial plants and a fast growing renewable resource. They start growth early in the spring, take only one season to mature, and repeat the process the next year. Pellets made from these residues have nearly the same BTUs as those from wood - about 8000 BTU/lb[6]. These weedy fields going to brush are the lowest strata of economic value, not even utilizable as bedding or mulch, and otherwise inaccessible because they come from many diverse parcels across many diverse owners. The CBE concept is to begin with field weeds and native grasses harvested from the fields of a cooperative of rural landowners, augmented with low quality hay from old hay fields, already mowed and often left standing.

Environmental Benefits

Lack of economic value does not mean absence of value. Environmentally these fields provide cover as bird, insect, and small animal habitat. The undisturbed weeds feed the soil as they decompose in the fall and winter. Near stream beds they provide a filter for pollutants. Luckily, mowing fields for fuel is complementary to environmental goals and works well with conservation oriented planning. Grass for fuel requires harvesting circumstances opposite to those for harvesting feed. Fuel grass is best harvested in the fall after the wildlife breeding has occurred and young are raised. It is best rained on after it is mowed so nutrients leach back in the soil and best not fertilized so nitrogen content is low. Mowing fields for fuel keeps a good mix of field and woods. It halts the gradual slide into brush as exotic species such as bramble rose and honeysuckle take over, or field to forest succession closes in what used to be open space and cleared farmland. Yet native grasses and weeds which provide for a biodiversity of flora and fauna, can, at the same time, provide in 2 to 4 acres the BTUs necessary to heat a home.

Standardization and Testing

The caveat to these generally ideal attributes is that grass pellets burn under more restricted conditions than wood. They generate more ash and have a larger percentage of naturally-occurring chemicals, such as chloride and nitrogen, that can be potentially harmful. Emissions are determined by the fuel and how the fuel is combusted. More complete combustion within the

[6] BTU is a British Thermal Unit – the amount of heat energy needed to raise the temperature of one pound of water by one degree Fahrenheit

burning appliance reduces what goes up the stack. Many residential pellet appliances have been tested for wood not grass, but there is a new class of multi-fuel pellet stoves and boilers now entering the market which can burn both. We are working with Cornell University to set standards[7] and establish a testing plan for burning agricultural biomass in residential stoves. The current status quo is to make an appliance that burns "premium" wood pellets rather than accommodating the appliance to the longer term sustainable goal of burn burning lower quality waste. To meet an increased use of non-wood fuels, there is a need of technical development and of increased knowledge to improve performance. "Development is needed with respect to improved fuel and load flexibility to avoid sintering, fouling, corrosion and high emissions".[8] The best use to fit each type of fuel has to be determined as well.

Market niche for agricultural pellets – CHP

The ideal market niche we see for these pellets is as a fuel for generating CHP (Combined Heat and Power) on a micro to mini scale - 5 to 250,000 kWh. CHP, or cogeneration, is a more efficient way of utilizing fuel for power generation because it captures the heat wasted in the electricity making process and uses it for heating or cooling purposes. With biomass CHP the emphasis is on the heat and turning the excess heat into power. The small-scale fits in a rural environment that does not lend itself to a more densely populated large-scale use.

One thermal process for doing CHP is gasification. Gasification treats biomass materials with limited oxygen and higher temperatures without combustion to produce gases. These gases can be utilized as a fuel for heating in a more efficient 2-step cycle or be captured as a synthetic natural gas-like biogas (syngas or bio-SNG) to feed a gas turbine or IC engine connected to an electrical generator. Gasification lends itself to a less high quality fuel "because the high-temperature process refines out corrosive ash elements such as chloride and potassium allowing clean gas production from otherwise problematic fuels."[9] Providing power generation from the heated gases, like providing heated domestic water with space heating, contributes a "sink" that levels out the highs and lows of demand allowing a more consistent rate of complete combustion. The European Renewable Energy Council states that, given sustainable biomass is limited, bio-SNG/biomethane and rapid development of small scale CHP seem some of the most promising target functions of biomass in the long term. [10] Our research partner, SUNY/Cobleskill, is working on one such appliance. They will be developing prototypes for retrofits to outdoor wood boilers (OWB) that would allow them to utilize grass pellets and generate electricity and

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[7] Grass Pellet Quality Index: A tool to evaluate suitability of grass for small scale combustion systems, Jerome H Cherney, Vijay Kumar Verma, Journal of Applied Energy, October 2012, available on line.
[8] Development of test methods for nonwood small-scale combustion plants, G. Eder, W. Haslinger, L. Carvalho, Berichte aus Energie- und Umweltforschung 49/2009
[9] Biorefinery: From Biomass to Chemicals and Fuels. edited by Michele Aresta, Angela Dibenedetto, Franck Dumeignil, Walter de Cruter GmH&Co, KG, Berlin/Boston, 2012,page 297.
[10] http://www.erec.org/renewable-energy/bioenergy.html, 2012.

distributed energy back to the power grid. A by-product of gasification is bio-char, which may also have a beginning market as a soil amendment

Customers

Our market targeted customer is two-fold: (1) Environmentally conscious rural newcomers overlapping an aging population of farmers and other rural residents off the natural gas grid, who wish to replace the problems associated with burning firewood or fuel oil with more automated, low-cost, efficient heating systems. (2) High energy users, such as farmers, greenhouses, and small grain producers, who would utilize much of the heat and energy generated on-site as well as distribute energy back to the grid. Other users could be institutions or even individual residences if New York State institutionalized group net-metering which allowed multiple residences to use power generated in one place. In Europe micro CHP is just starting to gain a market. Depending on the system used, the amount of energy produced, and the fuel replaced, the return on initial investment can be as short as two years for pellet stoves and ?? years for residential CHP.

Community oriented

In order to encourage farmers to have the market confidence and gain the background knowledge to grow a sustainable "energy crop", we intend to use what already exists in abundance in our area – weedy goldenrod fields going-to-brush and native grasses from marginal land. To do this we will utilize "Land Bank Cooperatives.[11]" These cooperatives make fields parcelized among multiple, rural landowners accessible for harvest. They also allow a "grass roots" approach by involving many people in the project. We are working with village energy committees and planning committees and our goal is to spread both environmental and economic benefits across a wide base.

Economic Benefits

Our vision is to initiate the startup of a new agricultural sector revolving around the transformation of low-value agricultural biomass feedstocks into value-added fuel products, and the manufacture of the appliances that use and create them. As a result, community wealth is built on multiple levels - energy creation, transport, manufacturing, agriculture – for both producers and consumers. Distributed energy creation adds an opportunity for rural areas off the natural gas grid to replace expensive fossil fuels and electric with cheap heat and power, and help stem spiraling costs for farmers. We see the synergies of an agricultural biomass industry contributing to rural economic development, energy independence, and new job creation. We plan to start on a small scale to gain experience and a market presence, then search out and build on the most appropriate uses for our product. Once the success of our model has been established we plan to reproduce it in other rural areas.

[11] See Danby Land Bank Cooperative