by James E. Houck and Lyrik Y. Pitzman

Ashes to Ashes

Corn Field.

Given the sheer magnitude and diversity of biomass fuels available, there surely are opportunities on which the hearth industry can capitalize.

- ✓ *Biomass fuel is everywhere, no matter where you live.*
- ✓ *There are agricultural, forestry and urban resources.*
- ✓ *The current world's production of biomass for human use is 170 billion metric tons per year.*
- ✓ *Biomass fuel has been touted as a domestic, sustainable resource; unlike fossil fuels, its use would have minimal climate change impacts.*
- ✓ *With the urgency of the energy crisis, the political value of a domestic energy supply and Green awareness, biomass fuel is topical.*
- ✓ *However, with the exception of cordwood and wood pellets, which are significant in their own right, minimal amounts of biomass are currently used for residential space heating in North America.*

Where does the hearth industry stand in the rush to use biomass?

First, one needs to temper the rush to biomass with the fact that much of the current enthusiasm is focused on manufacturing liquid fuels, such as ethanol and biodiesel for transportation needs and for the production of biogas, not solid biomass fuels for residential space heating.

Second, innovative high-tech processes and research get the limelight and fanfare. Conversely, the hearth industry's relationship with biomass is quite basic; we primarily burn chunks of biomass – both big chunks (logs, bricks, briquettes) and little chunks (wood chips, pellets) – and occasionally we burn bulk seeds (corn, wheat, cherry pits).

The simple burning of wood for heating and cooking is as old as civilization itself but is still going strong even in North America. In developing countries, especially, agricultural and forestry materials are the predominant fuels burned in low-tech cook stoves. Globally, new-found interests into such things as cellulosic ethanol and cogeneration power plants have introduced new competitors for the same biomass resources, and for some biomass, such as corn or wheat, there is a conflict between food and fuel end uses.

Even with these caveats, there are opportunities and a role for innovative approaches for the hearth industry. Perhaps the biggest opportunity simply lies in the shear magnitude and diversity of biomass fuels available. Some opportunities are organizational, such as strategies associated with feedstock acquisition and logistics. Some opportunities are technical, such as novel fuel preparation techniques and the development of heaters capable of burning various biomass fuels.

There already have been some commercial successes. These include manufactured firelogs that have been made with a variety of biomass materials, besides wood, that have included nut husks and shells, various straws, coffee grounds, palm oil, tallow, cardboard, corn wastes, scrap paper and molasses. Successes have included pellets that have had other biomass materials added to extend their primary sawdust component. And there have been multi-fuel heaters that can burn wood pellets, corn, cherry pits, olive pits, grains, soy beans, and processed silage.

Biomass fuels do have some unique challenges. Biomass acquisition and logis-

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Switch grass


Wheat


Flax


Flax Log


Cherry pits

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Wood chips


Bagasse


Wood pellets


Corn


Olive pits

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tics can be an issue since much biomass is seasonal and, after harvesting, must be stored until needed. Further, most biomass has low energy content per unit mass as compared to other fuels, and costs to transport it long distances can be relatively more significant than for other fuels.

Many biomass fuels have a high moisture content. It takes energy to dry them. Some biomass fuels, such as those of animal or waste origins have a cultural stigma against them. Many biomass fuels have a high salt content (namely sodium or potassium chlorides and sulfates), that can leave a lot of bottom ash after combustion, can form clinkers in pellet burners, and can cause corrosion in both heaters and their venting systems.

Many biomass fuels have high concentrations of organic nitrogen, which along with chloride in the salts, can form acid gases, again causing corrosion. Some biomass materials have a high abrasive grit content that can wear out pellet- and log-making dies.

Finally, the combustion of solid fuels in general produce more traditional air pollutions and more creosote than standard liquid fuels such as heating oil or kerosene, or gaseous heating fuels such as natural gas or liquid petroleum gas (LPG).

So what does the future hold and can the hearth industry benefit from biomass fuel utilization?

There are a lot of biomass Btus out there. We already use a little of it for home heating. Without the aid of a psychic it is difficult to predict the future of fossil fuel prices and availability, but it does not appear good. We put a man on the moon nearly 39 years ago; a successful polio vaccine was announced to the world 53 years ago; most homes in North America have a powerful computer in them, and most of us drive in complex internal combustion vehicles almost everyday.

We should be able to make something as simple as a home heater that economically burns wheat stubble and make some money doing it.

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BIOMASS RESOURCES

Agricultural	
Plant-Based Residues	Canola, corn, wheat, soybeans, cotton, sorghum, barley, oats, rice, rye, beans, peas, peanuts, potatoes, safflower, sunflower, sugarcane, flaxseed, orchard prunings, nut shells, fruit pits, and aquatic plants.
Energy Crops	Switchgrass, miscanthus, short rotation woody crops (willow and hybrid poplar), hemp, corn, sorghum, sugarcane, oil palm, and eucalyptus.
Animal-Based Residues	Cattle, swine, and poultry manure, bedding material, and rendering byproducts.
Wood-Based	
Traditional Fuelwood	Hardwood and softwood.
Forest Residues	Bark, tree tops, branches, dead trees, damaged trees, and slash.
Primary Mill Residues	Slabs, edgings, trimmings, sawdust, veneer clippings and cores, and pulp screenings.
Secondary Mill Residues	Wood scraps from sawdust from woodworking shops (furniture, millwork, truss manufacturing, wood containers, and pallets) and wholesale lumberyards.
Urban Wood Wastes	MSW wood, pallets, yard wastes, utility tree trimming and/or private tree companies, and construction/demolition wood.
Municpal Wastes	
MSW	Paper, leaves, grass, dirt, brush, greens, cardboard, rags, leather, and misc. associated combustible non-biomass materials (plastic, rubber, oils, paints, etc.)
Sewage	Biosolids.

TAX CREDIT FOR BIOMASS HEATERS

Federal lawmakers have provided an incentive for highly efficient biomass home heaters with a $300 tax credit. This credit was provided as part of the economic rescue legislation (H.R. 1424) signed into law Oct. 3, 2008. Unfortunately, the current state of the technology is such that really only owners of wood pellet-fueled units can clearly take advantage of the credit. (There is some debate on how to define "a thermal efficiency rating of at least 75 percent." Other biomass stoves, notably cordwood-fueled stoves, also may be eligible for the credit depending on how the thermal efficiency rating is finally defined.)

Excerpts from: H.R. 1424, SEC. 302. CREDIT FOR NONBUSINESS ENERGY PROPERTY defining eligible stoves and biomass fuel:

(F) a stove which uses the burning of biomass fuel to heat a dwelling unit located in the United States and used as a residence by the taxpayer, or to heat water for use in such a dwelling unit, and which has a thermal efficiency rating of at least 75 percent.

(6) BIOMASS FUEL- The term "biomass fuel" means any plant-derived fuel available on a renewable or recurring basis, including agricultural crops and trees, wood and wood waste and residues (including wood pellets), plants (including aquatic plants), grasses, residues and fibers.