

Woody Biomass Boilers: A Local Energy Solution

Energy and climate change are global concerns and these issues don't escape us locally here in Montana. Beyond livelihoods, aesthetics, and recreation, Montana offers a number of renewable energy resources including solar, wind, hydropower, and biomass. As our state and nation looks to diversify our energy portfolios, the potential for biomass is igniting quite a stir and one Montana program continues to carry the flame. Fuels for Schools and Beyond has been an innovative leader in woody biomass energy projects throughout Montana, collaborating with local architects and engineers to implement 7 biomass boiler systems across the state with more on the horizon.

Fuels for Schools and Beyond (FFS&B) was initiated to promote healthy communities and forests by encouraging facilities to utilize waste wood from hazardous fuels reduction projects in the forests. The program provides technical and financial assistance to facilities and involves a partnership among the U.S. Forest Service, state forestry programs throughout Montana, Idaho, Nevada, Utah, Wyoming and North Dakota, and the Bitterroot RC&D. With all six state programs combined we have, to date, aided the implementation of one college campus retrofit, two "whole tree" wood pellet boiler retrofits and one installation in a new school. We have ten additional public school projects completed or in progress, as well as boiler retrofits for both a landfill and correctional facility in progress.

Woody biomass (from forest residues, urban trees, or construction/demolition waste) can provide heating, cooling and energy generation needs at small and large scales for public, residential, commercial, and industrial users. Downtown St. Paul, MN has utilized a district energy system since 1983 and recently added a biomass-based combined heat and power plant fueled by urban wood waste in 2003. Santa Fe, NM and Seattle, WA have shown

good potential for urban and forest biomass-based district energy systems and are moving forward.



The benefits of woody biomass boilers are far-reaching and include:

- *Reduced and stabilized energy costs for facilities*
- *Reduction of net greenhouse gas emissions*
- *Increased energy independence*
- *Diverting wood waste from landfills*
- *Support for local wood fuel economies*
- *Improved forest health*

Furthermore, in line with the green building movement, utilizing woody biomass in facility heating, cooling, and energy generation systems may earn points towards a project's LEED certification. Renewable energy projects are contagious and multiple technologies can be bundled in facilities for maximum energy and cost savings. For instance, upon installation of a biomass boiler heating system, an elementary school in Ely, Nevada gained the attention of Sierra Pacific Power Company who then donated and installed a photovoltaic solar power system at the school. This school is now enjoying substantial savings and is being showcased as a "green school".

There is great potential in Montana for woody biomass-based energy systems from small rural schools, to larger university campuses and residence halls, health care and correctional facilities, as well as commercial and industrial complexes.

The *Biomass Boiler Market Assessment* developed by CTA Architects and Engineers and partners in October 2006 reveals a promising future for biomass energy in Montana. The report shows over 2,100 boilers over 30 years old and 340 boilers in the state that if converted to biomass would see a simple payback in less than 15 years—with 91 of those realizing a payback in less than 10 years. The report also projects that an average of 280 boilers will be installed in Montana each year, some of which will be replacements in existing facilities.



Things to consider when evaluating the installation of a biomass system include: the current fuel type cost and rates of consumption measured against potential savings with biomass, the age of existing boilers, if retrofitting an existing facility—are the distribution systems compatible and is there ample access for wood fuel storage and delivery and finally, is there an economical and reliable supply and supplier in the area.

While the upfront costs of biomass boiler installations can be high, many facilities can meet a 10 year payback with their projected future cost savings. Many FFS&B projects have utilized diverse and creative funding to finance their biomass boiler installations including state and federal grants and loans, performance contracting, and selling carbon emission offsets.

Successful implementation of biomass energy systems requires collaboration between architects, engineers, boiler manufacturers and operators, facility owners and managers, financial organizations, environmental and energy interests, regulatory agencies, and others. With years of collective experience and knowledge, the Fuels for Schools and Beyond Team and their diverse partners provide an invaluable resource of information on implementing biomass boiler systems in smaller-scale public and commercial facilities.



As the FFS&B program is currently moving out of our financial assistance role—and maintaining our role as technical assistance—we are seeking to promote the “wood to energy” concept to architects, engineers, and facilities in communities across the nation. With that, we would like to extend an invitation to “Making Wood Work: Local Energy Solutions: A National Workshop for Implementing Biomass Boiler Systems” held October 16-18, 2007 in Missoula, Montana. This workshop will provide in-depth sessions on how to successfully implement woody biomass boiler systems in public and commercial facilities.

Submitted by Julie Anderson, Montana Department of Natural Resources and Conservation, Fuels for Schools Program Assistant.

Visit www.fuelsforschools.org for more information or contact Angela Farr, Program Coordinator for the Montana Fuels for Schools and Beyond program at (406) 542-4239 or afarr@mt.gov.

Townsend Schools installs a ‘whole tree’ wood pellet boiler system and sells carbon offsets



Wood pellets

CTA Architects and Engineers worked with Big Sky Plumbing and Heating to integrate a wood pellet-fired boiler system for heating Townsend Schools. They are using ‘whole-tree’ pellets from Eureka Pellet Mills which are composed of materials from logging residues that would otherwise have been wasted—destined for piling and burning.

Solagen, the boiler manufacturer, modified the existing boiler to be dual-fuel—burning wood pellets as well as fuel oil which was more affordable than replacing the entire system with new pellet boilers and allows the fossil fuels to remain as back up. Pellet systems are a good option for facilities with limited space for fuel storage or those distanced from forest sources.

Townsend Schools combined creative funding sources to finance their pellet boiler installation including grants from FFS&B, the local conservation district, an additional grant and loan from USDA Rural Development, as well as the sale of carbon offsets. By burning woody biomass from primary forest residues, Townsend Schools’ generation of carbon offsets is tri-fold: One, by replacing fossil fuels, two, by encouraging healthy forest thinning which improves forest health and strengthens its ability to sequester carbon, as well as reducing the risk of wildfire and its smoke pollutants.



Installation of pellet storage silo.

The total project cost was \$425,000 and covered the purchase and integration of two 1.1 mmbtu pellet boilers, a storage silo, and piping the campus together. Utilizing about 250 tons of pellets/yr, the school expects savings of \$19,000 per year on heating fuels.

MAKING WOOD WORK: LOCAL ENERGY SOLUTIONS A National Workshop for Implementing Biomass Boiler Systems

Join us for this opportunity to listen, learn, and engage in in-depth working sessions with:

- **Diverse Panels of Speakers** covering Project Feasibility; Planning and Design; Implementation and Operation; Combustion Technologies; Fuel Sources and Quality; Fuel Processing and Delivery; Environmental Considerations; Financing Opportunities; and Effective Collaboration for Success.
- **Field Tours** of operating biomass boilers, and new forest management technologies
- **Working Sessions and Networking Opportunities**
- **Exhibits of New Products and Technology**

October 16-18, 2007
Missoula, Montana
Holiday Inn Parkside

Connect with the entire biomass boiler project team in one place, at one time—architects, engineers, biomass boiler manufacturers and operators, foresters, wood fuel suppliers, facility owners and managers, financing organizations, and others.

To learn more about the workshop, reserving a booth, becoming a sponsor or advertising contact Bitterroot RC&D, (406) 363-1444 ext. 5 or bitterrootcd@cyber1.com.

Workshop sponsors include the National Association of RC&Ds, U.S. Forest Service, Montana Department of Natural Resources and Conservation and the Biomass Energy Research Center.