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Alberta farmers and ranchers lead the way to a sustainable future

Wood is good for heat and power

Integration of wood biomass into Alberta's energy equation

By Martine Bolinger

The chance to see Alberta's forests and woodlots with new eyes is now. Pioneers and woodlot owners alike have long used their deadfall and blown down trees in their fireplaces and wood stoves. The challenge is to expand this thinking to see trees and forests in and around rural communities as a source of affordable and renewable energy for the benefit of energy users within the community.

The report *Energy from Wood Biomass Combustion in Rural Alberta Applications* explores the potential for wood biomass in Alberta. Authors Harald Welling and Thom Shaw show the positive economic and environmental impacts of carbon neutral heat and power, possible from modern wood burning technology. Heat from wood in this context no longer means chopping, splitting and stacking firewood. The use of mobile chipping other small-scale forestry equipment gets the wood from the forest floor to the hopper bin with relative ease.

Driven by fuel cost and environmental concerns, wood has become an attractive source of sustainable energy over the past 40 years, especially in Western Europe. A wide range of technologies has already been developed to utilize the biomass resource, and enhanced technologies continue to evolve. Part of this evolution has been improvements to direct combustion in burner systems; this includes pellet and wood-chip boilers. These systems usually achieve a standard efficiency of over 90 percent.

Automatic boilers are equipped with a silo or other storage rooms containing wood pellets or wood chips. An auger or other feeding system matches fuel input with the output demand of the overall heating system. Great advances have been made over the past 10 years with respect to higher efficiency and reduced emissions from the chimney. Improvements have been achieved particularly in respect of the design of the combustion chamber, combustion air supply, and the automatic control of the entire combustion process.

Despite an often simple construction, most of the automatically fired boilers can achieve an efficiency of 80 to

90 percent and a carbon monoxide (CO) emission of under 100 ppm. For some boilers, the figures are 95 percent and 20 ppm, respectively. An important condition for achieving these high results is that the boiler efficiency during day-to-day operation is close to full load.

The nominal thermal output of various modern boiler systems ranges from 100 kW (341,000 BTU/h) to 5 MW (17 million BTU/h).

Depending on the size of the system, it is scalable to a variety of scenarios including:

- Schools, hospitals, seniors' housing units
- Year-round recreation facilities
- Greenhouses
- Farms, homes, shops
- Hutterite communities
- Municipal and county offices
- District heating

Local feedstocks have potential to fuel local economics

There is a myth that bioenergy feedstocks are free. Using wood from waste streams and the local landscape changes the perception of a currently under-utilized or wasted resource, but it is not something for nothing. There are costs associated harvesting and processing the wood into an acceptable form for high efficiency combustion. Jobs are created for processing and transporting the wood biomass. With renewable energy, the jobs stay in the community. A problem with the conventional energy sector is that every \$1 million invested creates 36.3 jobs in the energy sector while only 7.3 jobs are created locally.

When wood is harvested off private land, it is farm diversification. The wood biomass is a crop to be harvested. This puts dollars in farmers'/forest landowners' pockets when they sell their wood to local energy users. In Europe the wood fuel supply is further secured by long-term contracts with local or regional producers.

The other win for the local economy is the potential for lower energy prices with long-term price stability. Thus rural communities can gain greater energy independence and insulate themselves from fossil fuel price fluctuations with wood biomass.

Beyond the technology and fuel supply, the report gives an overview of Alberta's current energy use, the energy potential of Alberta's existing wood resource and the wood fuel supply chain. It explores how the wood chip supply chain may develop as demand for wood biomass increases. The report advocates an inclusive and holistic approach to industry development that includes rural landowners, forest industry and the citizens of Alberta. A process for preliminary project



Photo courtesy of H. Welling


Fuel from Alberta's forests and woodlots.

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assessments is included, and potential barriers to adoption of these technologies are explored. Some of the barriers highlighted include: wood fuel supply infrastructure, market perception, user bias, lack of renewable energy training, economic barriers, policy and regulations, subsidies to conventional forms of energy, and current practice of leaving forest waste on the forest floor.

To view the full report, *Energy from Wood Biomass Combustion in Rural Alberta Applications*, go to: [www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/apal1648](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/apal1648).

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For answers to your questions about your private forest or woodlot, contact a Woodlot/Agroforestry Specialist directly. In the Peace Region, contact Doug Macaulay at 780-624-6425 or doug.macaulay@gov.ab.ca; elsewhere in the province, contact Toso Bozic at 780-415-2681 or toso.bozic@gov.ab.ca.

