Logging & Sawmilling Journal

# UNBC at the centre of bioenergy innovation

**The University of Northern B.C. is at the centre of a number of innovative bioenergy initiatives, including a wood biomass gasification system and developing a concrete-type product that uses beetle-killed lodgepole pine**

*By Jim Stirling*

If Prince George is the centre for bioenergy in British Columbia then the University of Northern British Columbia (UNBC) is its heart.

UNBC has responded to changes in the regional forest economy by developing a practical education and demonstration dimension to support an expanding bioenergy capacity and culture.

Consider some of the recent initiatives. The university has commissioned a wood pellet plant; is in the process of installing a wood biomass gasification system; is helping pioneer groundbreaking forest industry research (see sidebar story); has developed a concrete type product using beetle killed lodgepole pine; and is actively involved in regional bioenergy clusters, all of which augment the range and scope of academic options at the university in the new forestry. The silo concept is an unknown concept around UNBC.

“It makes so much sense to the region for UNBC to be an ingredient in a more sustainable forest industry,” summarizes Robert van Adrichem, vice-president, external relations for the university.

UNBC also has campuses in Terrace, Fort St. John and Quesnel, operations in Prince Rupert and the Nass Valley and outreach capabilities to communities scattered throughout the region.

UNBC is Canada’s green university which is not just a catchy slogan but a licenced trademark. As such, moves by the university toward carbon neutrality are not surprising. In concert with local wood pellet manufacturers and the Wood Pellet Association of Canada, UNBC installed a heating project for the university’s I.K. Barber Enhanced Forestry Laboratory in 2009. Apart from providing heat, the pellet plant is a lynchpin for ongoing study and monitoring of system economies and efficiencies. van Adrichem notes the plant’s emission levels are establishing new high level quality standards.

The federal and provincial governments are funding construction and installation of a $14.8 million Nexterra biomass gasification system. All the core campus buildings will be connected to the system’s 15 MMBtu/hour of net usable hot water heat. It will be fueled by wood residues of up to 60 per cent moisture content sourced from local sawmills and clean construction debris.

The Nexterra plant will require 8,000 green tonnes a year of fuel. It is predicted to displace about 85 per cent of present natural gas consumption, contributing to annual savings of up to $800,000. As well, avoided carbon dioxide emissions are estimated at 3,500 tonnes a year.

Apart from reducing or eliminating the university’s greenhouse gas footprint, the biomass gasification system is anticipated to become a catalyst for learning, training and demonstration opportunities for regional communities.

All contents of this article are copyright© 2009 by Logging and Sawmilling Journal and may not be rerpoduced in any form without express written consent

Logging & Sawmilling Journal

The Nexterra system can also act as a showcase for sustainable bioenergy and forest product diversification.

Diversifying B.C.'s northern economy through innovative wood use is integral to UNBC's mandate.

That type of thinking was illustrated a couple of years ago with development of a concrete product that substitutes mountain pine beetle killed wood for the usual stones and small rocks found in aggregates. It was developed by graduate student Sorin Pasca and his professors at UNBC.

"The original idea was to see if a wood-cement product could be a replacement for drywall or gypsum board," says Pasca. "It's a beautiful product that combines all the structural advantages of concrete with the aesthetic quality of wood."

The product is now finding uses ranging from flooring to countertops.

Another interesting project came in response to a request by the Stellat'en Band near Fraser Lake, B.C., to reduce pollution and lessen their rural community's carbon footprint. A UNBC team led by Stephen Dery, Canada Research Chair in northern hydrometeorology, challenged the approximately 500 band members to shed emissions and particulates in their everyday lives. Diverse strategies have resulted, ranging from improvements in house insulation to a ride-sharing program and a reduction in on reserve slash burning.

UNBC has long been involved in establishing Prince George as a centre for bioenergy knowledge. It's an active participant, for example, in the Northern Bioenergy Partnership. Its diverse members have recently drafted a strategic plan designed to help foster a co-operative approach toward helping Prince George and the region develop a leadership role in bioenergy diversification, says Gail Fondahl, UNBC's vice-president research.

A much-anticipated enhancement to UNBC's commitment to bioenergy and the new economy is taking a more tangible form. The creation of a wood design and innovation centre in Prince George has been a feature of the last three provincial throne speeches. Now, finally, it looks as though its time has come. Official word from the B.C. Liberals was expected that the wood centre will be constructed on the downtown site of the Prince George Hotel, recently purchased by the city for $2.5 million and scheduled for demolition.

A provincial wood innovation and design centre is predicted to mesh well with UNBC's interests in the economic, social and environmental viability of bioenergy and other non-traditional wood uses and products. As a result, it is expected to kick start a new chapter in the university's interrelationship with the forest industry.

## Getting to wood's character

A prototype system developed at the University of Northern B.C. can assess the density and fibre characteristics of OSB and might be used to determine the characteristics of mountain pine beetle-killed wood.

Applying technology for the first time in an industrial prototype application and proving the principle valid all within mere months is the stuff of research scientists' dreams. This one came true.

All contents of this article are copyright© 2009 by Logging and Sawmilling Journal and may not be rerpoduced in any form without express written consent

Logging & Sawmilling Journal

Dr. Matt Reid, a physics professor at the University of Northern British Columbia (UNBC) in Prince George, and his team developed a prototype system using high energy terahertz rays to assess the density and fibre characteristics inside mats of oriented strand board (OSB).

The elctromagnetic spectrum is occupied by different frequencies like X-ray and laser sectors. But there's been a lack of technology until now to use the terahertz spectrum for industrial applications, explains Reid. The appeal of terhertz waves is they allow researchers to see through objects in real time without health risks. Consider the implications for wood product mill managers, for example, if terahertz technology is applied to reveal the detailed internal characteristics of mountain pine beetle killed wood.

Reid set to work with the help of graduate students and industrial partners like WolfTek Industries of Prince George to divine a terahertz scanning system along every millimetre of an OSB mat. Reid says the OSB application resulted from a market study of prototype possibilities.

Project partners came on board to fund the approximately $1 million prototype development. They included Western Economic Diversification Canada; the Northern Development Initiative Trust; Del-Tech Manufacturing Inc; the College of New Caledonia in Prince George and UNBC. "It took a lot of teamwork and we couldn't have achieved what we have without it," says Reid.

The prototype terahertz scanner was installed at Ainsworth's 100 Mile House OSB plant. "We had all the usual problems with installing something new," reports Reid "Including scanning issues." They want it to reach the point where it can be used to make process changes and be of economic benefit to the mill, he adds. "The next step is to fix the problems identified and incorporate them into a second round prototype," he explains.

"It's been unbelievable, given where we've come from in a short period of time, to have developed a prototype, the first ever with this technology."

All contents of this article are copyright© 2009 by Logging and Sawmilling Journal and may not be rerpoduced in any form without express written consent