

Biomass, bioenergy, bio-mess

Many of the biomass projects being announced now may never come to fruition, but those that do will put pressure on the price for pulp wood over the next decade.

BY CINDY MACDONALD, EDITOR

While the demand for some types of paper will decrease in the next decade, the many other uses for wood fibre will lead to dramatic increases in global demand for this resource, according to a new report from PricewaterhouseCoopers

The idea of bioenergy competing with pulp and paper for access to wood fibre is looking more likely as government policies favoring renewable sources gain ground, and global population growth creates more demand for goods and food.

There isn't likely to be any imminent battles over fibre in Canada. In recent years, we've cut less than our annual allowable cut and the annual harvest has dropped to its lowest level in 19 years, going from a sustained high of about 1 million m³ per year to 0.681 million m³ in 2008. However, once the U.S. housing starts revive, Canadian sawmills ramp up their production, and the B.C. beetle-killed wood peters out, conditions will be different.

PricewaterhouseCoopers' Canadian Forest, Paper and Packaging Leader Bruce McIntyre explains the global situation: "Companies from a diverse array of industries — energy, utilities, chemicals and potentially many more as biomaterials evolve — will compete with forest, paper and packaging companies for control of forests, or at least access to their fibre, and the best economic use of the resources they provide."

As a result, demand will outpace supply and increasing competition for fibre will be a key factor of future supply chains.

In the EU for instance, 340-420 million m³ of woody biomass per year is forecast to be needed solely for energy purposes by 2020, if current government policies continue. That level of demand could lead to a forest fibre deficit of 200-260 million m³ by 2020, according to PricewaterhouseCoopers. That deficit is roughly equal to Canada's annual allowable cut.

Pellets now, biofuels later

In the bioenergy sector, two very different timelines are at play. A global market for wood as a solid fuel, i.e. pellets, has been established. Much of the strength of this market derives from EU policies favoring renewable sources for fuel, heat and power. This market already has its supply chain entrenched in the North American forest products scene. However, another form of bioenergy, liquid biofuels from cellulose, is still mostly in the pre-commercial stage of development, and won't be a major consumer of fibre for another ten years, according to a recent study published by

Forisk Consulting and the Schiamberg Group.

The impact of a wood-based transportation fuel industry on U.S. timber markets appears minimal, the authors conclude. The effect on wood raw material markets represents just over 3% incremental wood use relative to the existing U.S. forest products industry.

But while the additional wood demand may only be 3%, wood supply is highly location-specific, and that has the power to disrupt supply for existing pulp and paper facilities.

Another implication for the forest products supply chain is that the pulp and paper industry uses green wood and buys by the tonne, the energy industry wants dry wood and buys by energy content.

Biopower in Canada

In northern Ontario, the provincial electrical utility, Ontario Power Generation (OPG), is proceeding with the conversion of the Atikokan Generating Station from coal to woody biomass. If the necessary approvals are granted before autumn, construction for the changeover would begin in the spring of 2012.

Current estimates are that the facility will use about 90,000 tonnes of biomass per year. That represents roughly 1% of the 31 million m³ allowable annual wood harvest in Ontario.

"The use of biomass on this scale is an industry first and will generate a lot of attention, around the world," Jane Todd, program manager for OPG's Northwest Fossil division, told the *Atikokan Progress* in March.

Also in Ontario, a biofuel project in



Specialized equipment can bundle logging waste for bioenergy applications. Photo courtesy John Deere.

White River is currently under consideration for a proposed wood supply of 1.1 million m³ per year of Crown timber.

Rentech, Inc. announced that its proposed Olympiad Renewable Energy Centre is in the running for a wood supply composed primarily of forest waste and unmerchantable species. The material would be used to produce renewable RenJet®, Rentech's clean certified low-carbon jet fuel.

The Olympiad Project, scheduled to be in service in 2015, uses the company's Rentech-ClearFuels biomass gasification system and the Rentech Process to produce approximately 85 million litres of RenJet fuel, plus 43 million litres annually of renewable naphtha, a chemical feedstock.

Farther west, in High Level, Alta., Tolko and Ensyn Corp. are building a rapid pyrolysis plant that will be integrated with Tolko's sawmill. Using dry sawmill residue, the 440 t/day Ensyn RTP® pyrolysis unit will produce pyrolysis oil for the production of electricity and heat, as well as phenolic chemicals used in the manufacture of wood panels.

Pellets and biofuels compete for round wood

The Canadian wood pellet sector is facing some challenges. Worldwide supply is growing faster than demand, with huge new plants underway in the U.S., Russia, Norway and Brazil. As of late 2010, 20 new plants were in various stages of planning or construction in Canada.

The sector is strongly export oriented; the Canadian domestic market is virtually undeveloped. Biomass energy can't compete with low natural gas and coal prices in North America. As well, says Gordon Murray, executive director of the Wood Pellet Association of Canada, the weak renewable energy lobby in Canada is being outmuscled by traditional energy interests (oil, coal, and natural gas).

Looking ahead, Murray notes that economies of scale are increasing as plant sizes move into the range of 500,000 tonnes and over. These larger plants are increasingly using round wood as a feedstock.

Resource availability is crucial for bioenergy projects, says Brooks Mendell of Forisk Consulting. According to a Forisk report in March 2011, 445 wood-using bioenergy projects had been announced in the U.S. All of these are competing in some way with the pulp and paper sector for resources. But, Mendell predicts up to 50% of the announced bioenergy projects in the U.S. will fail.

Mendell's group screens projects based on:

- technology (proven or unproven, is it operating at scale?);
- status (is project under construction or operating, does it have permits, contracts, agreements?);
- type of wood raw material needed.

Using their screening process, Forisk expects 292 of the announced projects to succeed, so the expected additional demand for biomass is 68.5 million tons/year.

Bioenergy is not new

Of course, the pulp and paper industry was a producer and user of bioenergy well before biofuels and pellets entered the arena. Think black liquor and "green" electricity. Now there's an opportunity for an extension of that cycle, without the need for any additional biomass.

A demonstration plant in Thunder Bay, Ont., is now producing lignin pulled from the black liquor of Abitibi-Bowater's Thunder Bay kraft pulp mill. The demo is a partnership between FPIInnovations, the Centre for Research and Innovation in the Bio Economy (CRIBE), Natural Resources Canada, and AbitibiBowater.

The lignin demonstration plant ties directly into the black liquor stream of the mill. When fully operational, it will produce up to 100 kg of lignin per day, which will be shipped to a network of R&D labs across Canada that are developing novel uses for wood products.

Metso's Lignoboost process serves the same function on a larger scale. The LignoBoost pilot plant operating near the Bäckhammar mill in Sweden takes 5-20% of the mill's black liquor, precipitates the lignin from it, and returns weak black liquor back to the pulp mill. Lignin from this facility has been used as a solid, dry fuel, mixed with oil to burn, and used as the basis for carbon fibre.

The battle for fibre

The PricewaterhouseCoopers report, *Growing the Future*, suggests that new methods of accessing available fibre may emerge in response to the growing pressures. PwC sees international fibre exchanges and the emergence of a new biomass aggregation industry as two possibilities, but there may be others as well.

"Technologies can help, but those businesses that control, or have secure access to, competitive sources of fibre will be the best positioned for growth," says PwC's McIntyre.

So while the fight for biomass may not happen within our borders, its repercussions will rock the North American pulp and paper industry. **PPC**

340-420 million m³ – amount of biomass per year forecast to be needed for energy by 2020 in the EU ((Source: PricewaterhouseCoopers)

141.29 million m³ – Canadian wood harvest, 2008 (Source: National Forestry Database, Canadian Council of Forest Ministers).

100 million m³ – China's roundwood equivalent imports in 2009 (Source: PricewaterhouseCoopers)

1.1 million m³ – forecast annual biomass consumption of Rentech's biomass-to-jet fuel project in White River, Ont. (Source: RenTech)

1.3 million tonnes – annual production of Canada's 33 wood pellet plants (Source: Wood Pellet Association of Canada)

90,000 tonnes – forecast annual biomass consumption of Ontario Power Generation's Atikokan generating station (Source: OPG)