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BioEnergy and the Forest Products Industry in the Atlantica Region

by Thor Olesen

The Atlantica BioEnergy Task Force was established in response to a unifying challenge—how to ensure the future sustainability and prosperity of the forest products industry across three jurisdictions, New Brunswick, Nova Scotia, and Maine, which constitute the Atlantica region. The task force is comprised of regional governments, industry, utilities, federal and regional organizations, and postsecondary institutions.

There are opportunities to revitalize the forest industry and its competitiveness by making use of the available wood feedstock—a renewable asset—for the production of bioenergy, biofuels, biochemicals, and other bioproducts in an environmentally conscious manner. At present, there is no connected bioenergy strategy in the region that unites the key players behind a common set of objectives. It also remains unclear how much wood feedstock is actually available for use in bioproducts and at what cost this can be brought to market. This uncertainty also acts as an investment suppressor to those technologies that could make the biggest difference to the forest industry.

The task force identified the need for a comprehensive “best practices” study as a foundational next

step. As a result, PricewaterhouseCoopers LLP was commissioned to complete a study that evaluated a number of biomass technologies and renewable energy policies being used or developed around the world for their potential impact on the Atlantica region.¹ In the end, four technologies and a number of potential government policies were reviewed in the form of case studies. The task force has identified opportunities that will promote the use of renewable energy technologies within the region’s forest products industry.

VISION FOR THE REGION

Atlantica is rich in forests and has historically depended on the forest industry to drive its economy. Recent economic pressures, such as increases in energy costs and decreases in the demand for forest products, however, have affected the competitiveness of this industry. Over the past decade, the region’s competitive advantage has gradually deteriorated to a point where the industry struggles to attract new investment. These challenges include high log and wage costs and energy costs that are above average.

Without new investment, the business prospects for the region’s forest products sector are rather bleak, leaving little scope to improve energy efficiency or develop new technologies. This could lead to an accelerated shrinkage in the region, which, in turn, could severely reduce its logging sector and biomass-harvesting capacity. Industry stakeholders are in the process of repositioning themselves to lead in the development of new value-added products that will complement the industry’s current range of activities. This undertaking is a major challenge, requiring vision, determined leadership, and enlightened public policies.

BIOMASS AVAILABILITY

Although each of the three jurisdictions produces and uses biomass, the maturity of the biomass market varies between those regions. During the study, it became apparent that there is not universal agreement as to the volume of biomass available to be removed from the forests, or of the forest management practices that would ensure sustainable production.

Research into the existing biomass infrastructure has also revealed that there is no agreement about the benefits to the existing pulp and paper industry in some areas, due to concerns about the potential impact of increased competition for wood fiber.

Maine has a mature biomass market and a pulp and paper industry running at full production, which means significant competition for the available wood fiber. In New Brunswick, however, pulp and paper facilities and sawmills are running at reduced capacity, and there is biomass available to meet current and planned opportunities. In Nova Scotia, a similar decline to New Brunswick means there is enough biomass available to supply both current and planned requirements. Additional hardwood biomass could be available if the low-value hardwood in Nova Scotia could be economically and sustainably harvested.

ENERGY BACKGROUND

The Atlantica region is a net energy importer with little fossil fuel production other than offshore operations in Nova Scotia. At the same time, world energy costs are rising and environmental concerns are adding a price to emissions. The forest products industry produces large amounts of energy for its own use, but in general it relies on aging capital stock with low overall energy efficiency. These factors contribute to the need for a bioenergy strategy for the region.

Maine has no fossil fuel reserves or petroleum-refining capacity, but it has substantial renewable energy potential in the form of hydroelectric, wood-fired, and wind-powered generation. Due to its energy-intensive forest products industry, Maine is the only New England state in which industry is the leading energy-consuming sector. Compared to the national average, Maine is a relatively energy-dependent and greenhouse-gas-intensive state. Maine's residential electricity use is low compared with much of the U.S., with over 80 percent of the homes heating with oil. Rising costs have led to an increase in the use of firewood for home heating, an inefficient use of biomass and a source of local air pollution. Maine participates in two open electricity markets. Wholesale prices are set based on competitive supply-and-demand forces. Maine has nine biomass electricity-generating facilities,

which receive federal production tax credits and tradable renewable energy credits.

New Brunswick has an energy-intensive economy that also produces greenhouse gas emissions above the national average on a per capita and GDP (gross domestic product) basis. New Brunswick has minimal coal and fossil fuel, but it does have refining capacity and large hydro and nuclear electricity-generating facilities. Home heating in New Brunswick is largely electric, with electricity generation and transmission primarily provided by the provincial crown corporation, NB Power. New Brunswick has no stand-alone biomass generation facilities; however, a significant amount of biomass energy is produced by the forest sector for their own use, and one plant sells its co-generated electricity to NB Power. New Brunswick has set a provincial renewable energy target of 10 percent by 2016 from renewable sources. Renewable electricity generation is eligible for federal production subsidies whereas fossil fuel-based electricity generation is expected to have federal greenhouse gas emissions targets in the near term. Large industrial facilities will also be captured under the federal scheme.

Nova Scotia is the only jurisdiction in the Atlantica region with fossil fuel production capacity. Its offshore natural gas production is shipped to New Brunswick and then on to other jurisdictions in Canada and the U.S. Nova Scotia imports a significant amount of coal for electricity generation. Heating oil is the primary source for home heating, with wood and electricity also used in significant amounts. Nova Scotia Power—a provincially regulated company—primarily supplies Nova Scotia's electricity market. Nova Scotia has set renewable energy standards that require five percent of energy to come from post-2001 renewable sources by 2010 and 10 percent by 2013. As in New Brunswick, Nova Scotia companies are subject to federal production subsidies and regulations.

TECHNOLOGY

There are several emerging bioenergy and biofuel technologies that could allow the forest products sector to reposition itself for the future. Following a review of 25 different technology options, the task force determined that four pose the greatest opportu-

nity for the forest products industry in Atlantica. As part of the evaluation, reference mills—typical of mills found in this region—were simulated to develop case studies on the potential for these technologies with companies currently operating in New Brunswick, Nova Scotia, and Maine. The case studies clearly showcased the opportunity for the following four recommended technologies.

The first technology involves the development of integrated biomass refineries across the region. The increased thermal efficiency will generate significant energy savings and reductions in greenhouse gases and increase revenue and market diversification for the host mills. Implementing this technology has the potential to increase the economic value-added by between 47 percent and 66 percent over the current situation, creating 600 to 1,000 jobs and reducing greenhouse gases by between 60 percent and 90 percent per project.

The second technology involves a chemical pre-treatment of wood chips prior to pulping for the thermomechanical pulp (TMP) process. The chips are impregnated with an oxalic acid solution before refining, reducing the energy needed to produce pulp by up to 40 percent. Implementing this technology increases the economic value added by five percent and reduces greenhouse gas emissions by 30 percent per project.

A third technology, adding value prior to pulping for hardwood kraft mills, involves a pre-treatment of hardwood chips in order to extract a naturally occurring fermenting sugar that can be converted to value-added products such as ethanol and acetic acid. Implementing this technology increases the economic value-added by 10 percent over the current situation and creates about 190 new jobs per project.

The fourth recommended technology is torrefaction, which is a thermal pre-treatment technology. It creates a solid product that weighs 30 percent less than the original woody biomass, but the original energy content is only reduced by 10 percent. This results in a clean-burning feedstock with a similar calorific value to coal. Torrefaction could be used across the region to create new economic activity by producing a cleaner “green” fuel (biocoal), which could be used to offset use of fossil fuels. Torrefaction plants can be established either as a stand-alone or integrated into an existing

surplus heat producer such as a sawmill or a power plant. The stand-alone option produces incremental added value of around \$7 million per plant along with 60 to 100 new jobs per project.

ALTERNATIVE ENERGY POLICY FRAMEWORK

Governments are being pressed to manage the source, cost, and environmental effects of energy. There is a growing movement to decrease reliance on fossil fuels, reduce costs, and increase energy independence. Many jurisdictions around the world are creating policy frameworks to manage and create incentives for changes in the energy supply. At the same time there is a significant opportunity to add value to the forest products industry through the production of green energy and the development of advanced biomass products such as biofuel and biochemicals.

Developments in energy policy and alternative energy technologies are expected to continue despite the recent volatility in energy prices. Current policy conditions in the Atlantica region support the use of fossil fuel sources to produce energy because it is less expensive than the cost of producing energy from renewable sources such as biomass. Without a change in policy to support the shift from fossil fuel-based energy to renewable energy, it is unlikely the market will respond on its own.

The task force examined policy initiatives that encourage use of renewable energy from selected areas from around the world. We picked these areas based on their similarity to the Atlantica region in population, existing forest base, and availability of biomass. We determined that several regions have comprehensive policy frameworks that support the development of renewable energy. These areas use various policy levers to achieve renewable energy targets, which include the following: forestry management practices; legislated targets—renewable portfolio standards (RPS); feed-in tariffs; renewable energy certificates (RECs); capital financing; research and development; tax incentives; efficiency targets; and standards and regulations.

The task force made numerous technical recommendations, beyond the scope of this essay, which are based on a number of guiding principles, including a

commitment to ensure all biomass is used in areas with the highest value uses and highest energy-efficiency processes; that there is a long-term stakeholder commitment to the process; and that priority should be given to opportunities that add to the value and competitiveness of the forest sector industries. Recommendations cover the areas of sustainable forest management, biomass management, energy policy, education, research and development, and technology implementation, with the aim to make the Atlantica region a leader in the renewable energy economy and a sustainable bio-sensitive economy.

ENDNOTE

1. *The Atlantica BioEnergy Task Force Report* was issued in December 2008, and may be downloaded at http://www.atlanticabioenergy.com/index.php?option=com_docman&Itemid=31&lang=en



Thor Olesen is executive director of the Atlantica BioEnergy Task Force, a partnership between the state of Maine and the provinces of Nova Scotia and New Brunswick with a mandate to create a framework for increased use of biotechnologies in the region's forest industry. Olesen owns businesses in the Fredericton area and has held positions with Volkswagen Canada. He serves on a number of boards, including the Volkswagen Canada Advisory Board and the Fredericton Chamber of Commerce.