

DEVELOPING THE VALUE OF FOREST BIOMASS

February 2009

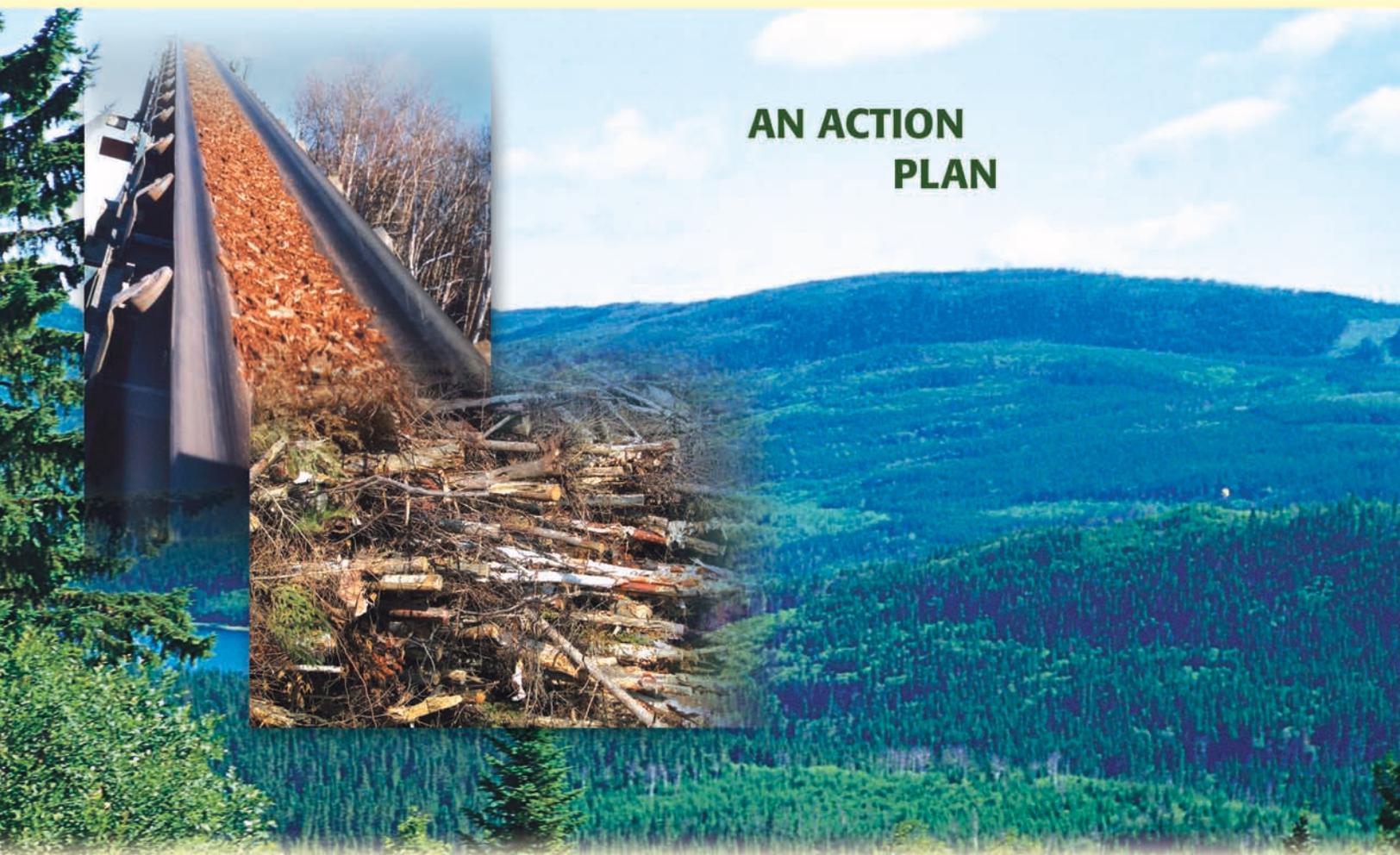
AN ACTION
PLAN



DEVELOPING THE VALUE OF FOREST BIOMASS



AN ACTION PLAN



For further information, please contact

Direction du développement de l'industrie des produits forestiers
Ministère des Ressources naturelles et de la Faune
880 chemin Sainte-Foy, Suite 7.50
Québec City, Québec G1S 4X4

Telephone: 418-627-8644, ext. 4106
Fax: 418-643-9534
Email: prodfor@mrrnf.gouv.qc.ca

This publication is available at
www.mrrnf.gouv.qc.ca/forets/entreprises/entreprises-transformation-strategie-energie.jsp

Legal deposit– Bibliothèque et Archives nationales du Québec, 2009
ISBN 978-2-550-56564-2 (PDF version)

© Gouvernement du Québec



The industrial development strategy for high value-added products put forward in *Forests: Building a Future for Québec*, a February 2008 green paper, will spur development and innovation in an industry that creates wealth and sustainable jobs. Long term, it will also help us foster a genuine appreciation in Québec of this material we call wood.

The wood use strategy for construction in Québec broke new ground when it was announced in May 2008. We are now entering a new phase more specifically concerned with energy. The core of the action plan for developing the value of forest biomass involves replacing polluting energies with energy that is clean and renewable, thereby reducing greenhouse gas emissions.

Price fluctuations and the environmental costs of fossil fuels illustrate why we need to curtail our dependence on such products. We must reduce our energy expenditures by adopting measures to achieve more aggressive oil savings, better use the electricity Québec generates, and replace heavy fuel oil as industry's energy source.

Our forests are rich with the enormous potential of forest biomass. Once this organic material is harvested and processed, it can be made available for cogeneration and industrial heating. And we have yet to explore other uses of forest biomass, including the heating of institutions and businesses in urban settings, and even entire communities.

The new action plan for developing the value of forest biomass represents a significant change in the way this renewable resource is viewed in Québec. Not unlike the Québec wood use strategy for construction, this action plan asks that we view development through the lens of sustainability in order to innovate and create wealth for all Quebecers.



A handwritten signature in black ink, appearing to read "Claude Bécharde".

Claude Bécharde
Minister of Natural Resources and Wildlife

DEVELOPING THE VALUE OF FOREST BIOMASS

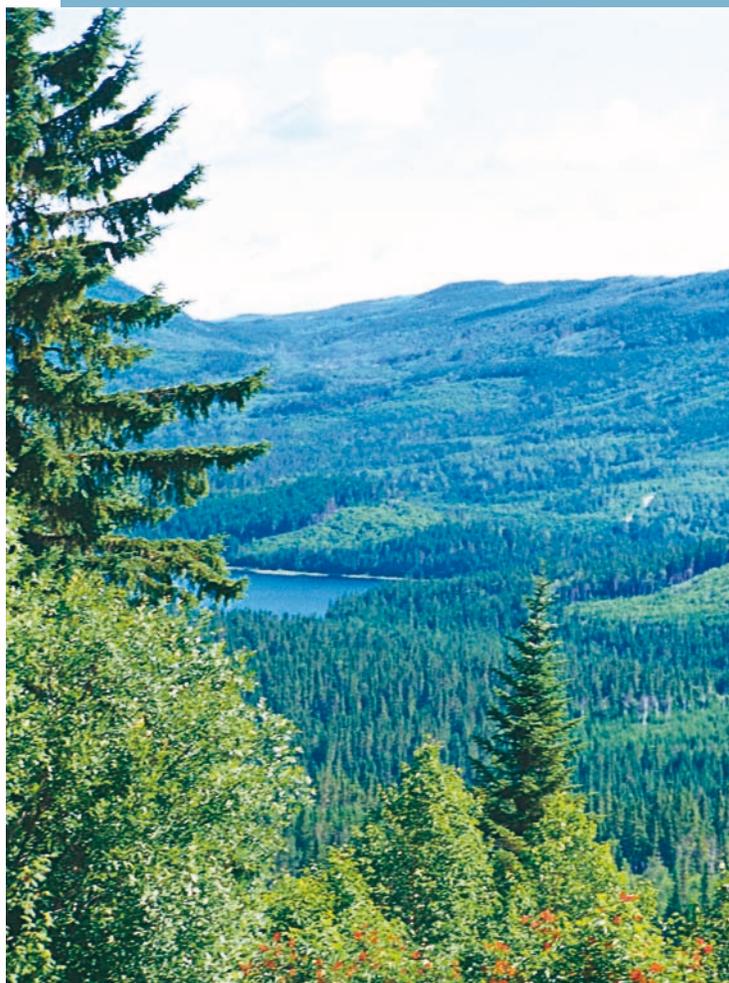


In February 2008 Ministère des Ressources naturelles et de la Faune (MRNF) released *Forests: Building a Future for Québec*, a consultation paper setting out a new policy direction for Québec's forest regime. It put particular emphasis on implementing an industrial strategy for high-value-added products and promoting a new appreciation of wood in Québec.

This strategy calls for intervention in four industrial areas:

- In the wood products sector, encouraging green construction, i.e., construction in which wood—rather than steel and concrete—is the primary material, thereby reducing greenhouse gas emissions (GHG).
- In the energy sector, focusing on replacement of fossil fuels with clean, wood-based fuel so as to reduce GHG emissions.
- In the biorefining sector, producing green oil products to replace those that are oil-based. The focus is on developing various chemical compounds derived from the wood fiber refining process. This sector is also exploring the production of high-value-added products such as cellulose-based chemical and pharmaceutical substances.
- In the primary wood processing industry, developing new technologies in key sectors to achieve new manufacturing efficiencies, without which development will be harder to achieve in the other three sectors.

The cornerstone of this action plan is the energy industry's use of forest biomass. After reviewing the current context, future outlook, and constraints we face, we will present the plan in detail and discuss the impact it is expected to have.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE



CURRENT STATE OF AFFAIRS

Forest biomass : a renewable energy source

For the purposes of this action plan, forest biomass consists of waste products that result from logging and forest management, and of inferior-quality timber that is not suitable for industrial use. This includes trunks, crowns, and branches left in the woods or alongside forest roads.

Forest biomass, because of its physical properties, can be used as fuel or transformed into fuel—it is a green energy source that can replace fossil fuel.

Forest biomass can be defined as trees or portions of trees included in the allowable cut that are not subject to allocation or reservation, in addition to the trees, low woody plants, crowns, branches, and leaves that are not part of the allowable cut. Stumps and roots are excluded from this definition within the scope of the forest biomass allocation plan.

Forest biomass is an abundant and renewable resource. In its most easily accessible form, it is the byproduct of commercial-grade timber logging. In Québec public forests, the sustainable yield concept governs timber cutting—that is, logging and growth occur in lockstep, in order to preserve forest resources for future generations. Forest biomass is thus harvested on a sustainable basis, renewing itself at the same pace as the forest does.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE

In the past, forest biomass has not been used to produce energy—other than wood for heating—due to the high cost of logging and legal restrictions that applied to public lands.

The increasing demand for energy

Economic and demographic growth are boosting the demand for energy by 1.2% a year, despite efforts to improve energy efficiency. Increased demand, coupled with climate change and rising fossil fuel prices, is bringing about the development of other energy sources. In 2005 most of the energy used in Québec came from electricity or oil, which supplied 38.7% and 38.5% respectively. Natural gas and non-forest woody biomass¹ accounted for 11.4% and 8.6% respectively of the total. Coal, coke, and nontraditional energy, such as wind power, delivered less than 3% of total energy. The Québec energy strategy forecast for 2016 predicts a change in how these diverse sources divide up the energy pie. Oil usage will diminish, while that of electricity and natural gas will rise. Using forest biomass to provide energy may also hasten the replacement of fossil fuels in the years ahead.

Use of forest biomass to reduce GHG emissions

The main advantage to using forest biomass is the carbon neutrality of wood. The volume of carbon or greenhouse gas emitted when wood is burned is the same as that produced when dead wood decays naturally in the forest. By means of photosynthesis, the subsequent regeneration of that forest harnesses the equivalent of earlier emissions. Thus GHG emissions and the growing forest's capacity to act as a carbon sink cancel one another out, making forest biomass carbon-neutral when used for such energy applications as combustion, production of ethanol or methanol, and so on. In addition to being carbon-neutral, forest biomass products can directly reduce GHG emissions when used in place of fossil fuels such as heating oil or gasoline.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE

¹ Agricultural biomass, heating wood, and wood processing waste products, including bark

Climate change has made the reduction of GHG emissions critically important. This issue was brought to the world's attention by the Kyoto Protocol, and Québec supports this position. In 2006 the Government of Québec developed a Climate Change Action Plan (CCAP) aimed at reducing GHG emissions. By integrating wood-based ethanol into fuel and using forest biomass—instead of oil—as an institutional, industrial, commercial, and residential heat source, GHG emissions could be slashed. For example, using a kilo of wood instead of a half liter of no. 2 oil (light fuel oil) cuts CO₂ emissions by 1.4 kg.

Moreover, the federal government is preparing new regulations on industrial airborne emissions. The new provisions of Canada's *Clean Air Act* are slated to go into effect in 2010. They require businesses to limit their CO₂ emissions. Consequently, the demand for carbon-neutral energy sources and organic materials will continue to grow.

The use of forest biomass would therefore seem inevitable, in light of its physical properties, growing energy demand, and interest in using renewable sources to reduce both fossil fuel reliance and GHG emissions.



JEAN-FRANÇOIS CÔTE



In Québec the commercialization of forest biomass is poised to take off. Prospects for the new market's development will be stimulated by a number of factors, such as its availability as an underutilized resource, fossil fuel prices, institutional research into less-expensive energy sources, and the forest industry's eagerness to slash operating costs.

A widely available, but underutilized resource

Forest biomass is plant material that is abundant, available, and renewable. As Table 1 shows, its total volume is estimated at 6.4 million anhydrous metric tons (AMT) per year.

That volume is made up of tree trunks, in the amount of 3.5 million AMT, and crowns and branches that total 2.9 million AMT. Public forests account for nearly 3.7 million AMT, compared to private forests which yield 2.7 million AMT. Table 1 also breaks down the volume of available forest biomass by form, origin, and species group. Trunks—that is, wood not suitable for industrial use—comprise 55 % of available material, and crowns and branches from logged trees make up 45 %.

Table 1
Available Forest Biomass by Form, Origin, and Species Group
in Anhydrous Metric Tons (per thousand) and as a Percentage of the Total

| Form | Public Forests | | | Private Forests | | | Total | | |
|--|----------------|--------------|--------------|-----------------|--------------|--------------|--------------|--------------|--------------|
| | Softwood | Hardwood | Total | Softwood | Hardwood | Total | Softwood | Hardwood | Total |
| Anhydrous Metric Tons, in thousands | | | | | | | | | |
| Trunks | 130 | 1 446 | 1 576 | 344 | 1 626 | 1 970 | 474 | 3 072 | 3 546 |
| Crowns and branches | 1 269 | 838 | 2 107 | 415 | 381 | 796 | 1 684 | 1 219 | 2 903 |
| Total | 1 399 | 2 284 | 3 683 | 759 | 2 007 | 2 766 | 2 158 | 4 291 | 6 449 |
| Percentage | | | | | | | | | |
| Trunks | 2,0 | 22,4 | 24,4 | 5,3 | 25,2 | 30,5 | 7,3 | 47,6 | 55,0 |
| Crowns and branches | 19,7 | 13,0 | 32,7 | 6,4 | 5,9 | 12,3 | 26,1 | 18,9 | 45,0 |
| Total | 21,7 | 35,4 | 57,1 | 11,8 | 31,1 | 42,9 | 33,5 | 66,5 | 100,0 |

Source: Ministère des Ressources naturelles et de la Faune, November 2008.

This woody material was not used in the past, primarily because of its fairly high recovery costs. It has now become a more accessible resource as a result of improved logging methods, better organized forest work sites, and fossil fuel price increases.

Fossil fuel prices

Oil product prices have been climbing for years. Between 2000 and the second quarter of 2008, average prices rose nearly 100% in the case of light fuel oil, 82% for diesel fuel, and 66% for regular unleaded gasoline. The price of heavy fuel oil has soared 105% since 2004. While there have been periods of extreme fluctuation, the upward trend in oil product prices threatens to persist over the years ahead.

Since energy from forest biomass competes with that from fossil fuels, long term trends to higher fossil fuel prices mean that higher biomass harvesting costs can be recovered. And as these costs are more stable over time than worldwide oil prices, energy produced by forest biomass could offer more price stability over the course of medium term agreements, proving more advantageous for users than other energy sources.

Forest industry benefits from lower production costs

For the forest industry to develop key sectors, it must continuously improve its competitiveness by reducing its production and supply costs. Energy is a big cost variable in many industry sectors. Using forest biomass instead of fuels like oil or natural gas may prove to be a more economical solution.

Medium term, developing and converting forest biomass will make it possible to segregate on the basis of quality. Wood fiber would thus become available for manufacturers of engineered wood products, wood pulp and paper, wood pellets, etc., depending on their quality requirements. Forest biomass therefore offers mills new opportunities for diversification.

Additionally, the harvest and sale of biomass by forest companies or through partners can bring the forest industry incremental revenue and allow certain overall supply costs to be shared.

Institutional energy demand

The increase in energy prices, particularly since 2006, has driven operating costs up for institutions such as school boards, municipalities, and health-care facilities, in turn unleashing demand for new, less expensive energy sources. Forest biomass is the fuel of choice in many cases, due to its availability, greenness, and increasingly competitive price when compared to other energy sources.





CONDITIONS TO BE MET

Certain conditions must be met for forest biomass to become a reliable and competitive energy supply source. The new market's development environment will be influenced primarily by adherence to sustainable development principles, full utilization of current sawmill byproducts², and the financial profitability of projects.

Adhering to sustainable development principles

From a standpoint of sustainable development, the use of forest biomass as an energy source makes eminent good sense in Québec. From an environmental point of view, forest biomass availability must be sustainable—in other words, harvested amounts must be available year in and year out, with no negative impact on forests. In addition, precautions must be taken, specifically to protect fragile soils and to monitor the impact that extracting forest biomass has on wooded ecosystems.

A well-grounded approach to soil fertility

- 30% to 50% of forest biomass is left on the ground during logging activities
- Environmental monitoring is implemented
- Certain areas may be excluded

Methods for harvesting wood and biomass require that at least 30% of woody material be left in place to help nourish the ecosystem. In addition, harvesting biomass from logging and piling areas creates a positive effect by reducing losses in productive areas. The use of biomass must, moreover, be based on efficient combustion technologies and compliance with regulations affecting airborne particulate emissions.



FP INNOVATION-FERIC

² Woodchips, sawdust, wood shavings, and bark.

airborne particulate emissions. For society, using biomass creates lasting employment in rural areas. From an economic perspective, developing the value of biomass engenders new economic activity and gives certain key industrial sectors the benefit of new supply sources.

At present, sawmill byproducts are fully utilized

The forest products industry uses wood and its byproducts—such as chips, sawdust, shavings, and bark obtained during processing—to create a wealth of materials. Byproducts are used to produce pulp and paper, engineered wood, heating pellets, and compressed logs, and in the cogeneration of electricity. Companies often use byproducts to provide thermal energy for various industrial processes. Thus all processing byproducts are fully utilized, with no surplus remaining for potential new applications.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE



Key Prerequisites to Developing the Value of Forest Biomass

1 - Make the resource available

- *Forest Biomass Allocation Program for public lands*

2 - Encourage the replacement of fossil fuels

- *Heavy Fuel Oil Consumption Reduction Program*

3 - Support investment

- *Actions arising from Measure 15 of the 2006–2012 Québec Action Plan on Climate Change*

4 - Support innovation

- *Program to Promote Energy Efficiency*
- *Technoclimat Program*

5 - Stimulate demand for forest biomass

- *Hydro-Québec call for tenders for biomass cogeneration*
- *Forest biomass awareness campaign*

Compiled by Ministère des Ressources naturelles et de la Faune, November 2008

Given the broad potential for forest biomass, MRNF has implemented an action plan designed to foster its commercial development. The plan's primary objectives are to

- Make forest biomass available from public forests
- Encourage the replacement of fossil fuels
- Support investment
- Support innovation
- Stimulate demand for forest biomass

Many of the plan's policy instruments target increases in energy efficiency and reductions in GHG emissions. Forest biomass projects fit squarely within the objectives of these programs. These measures represent the primary means of support for private ventures.

1 - Make forest biomass available from public forests

The current *Forest Act* does not permit forest biomass to be harvested from public lands. A program setting forth conditions under which such harvesting would be possible was approved by the Government of Québec on June 25, 2008.

Forest Biomass Allocation Program

This program spells out rules for forest biomass allocation in public forests. Its objectives are to

1. Create and support new economic development initiatives
2. Reduce Québec's dependence on fossil fuels
3. Facilitate the implementation of forest management strategies
4. Promote regeneration of mixed wood and hardwood forests

Biomass allocation will be carried out by means of a competitive bidding process using set evaluation criteria for various regionally specific projects. Requests for proposal (RFP) will be issued in early 2009 for one or several forest management units. RFPs will specify geographical areas and will include an estimate of the volume available, by biomass type. The RFPs will also set out project evaluation criteria, which will be based on the following points in particular :

- The project's long-term financial viability and promoters' wherewithal
- Environmental gains
- Community support for the project
- Forest biomass to come from private forests
- Economic spinoffs and connections to other wealth-generating projects
- Integration with logging activities
- Prices offered for forest biomass
- Other criteria deemed relevant by the Minister

Promoters whose projects are selected will obtain annual management permits allowing forest biomass to be harvested in amounts sufficient to meet project specifications. The memorandum of understanding between promoters and MRNF may take one of two possible forms :

- An allocation agreement for the long term harvest of available volumes of forest biomass conferring upon the promoter the right to an annual management permit for a period of up to five years

- An agreement for the short term harvest of available volumes conferring upon the promoter the right to a management permit for a fixed period of time of less than five years

The program will thus allow forest biomass harvesting within a flexible and regionally adaptable framework to facilitate the development of this new economic sector. Longer term, the program's provisions may be written into the Forest Act (R.S.Q., c. F-4.1) as with other forest resources.

2 - Encourage the replacement of fossil fuels

Heavy Fuel Oil Consumption Reduction Program

This program, administered by Agence de l'efficacité énergétique and financed by the Green Fund, was introduced on May 23, 2008. It offers companies that use heavy fuel oil a way to reduce their energy consumption and GHG emissions while improving their competitiveness through the power of sustainable development and green energies. Financial aid is available for analytical studies and development of energy efficiency measures, specifically regarding heavy fuel oil or conversion to greener energy sources such as natural gas and forest biomass. This program is a partial response to Measure 1 of the *2006–2012 Québec Action Plan on Climate Change*³.

³ Measure 1: Implement a financing program aimed at energy efficiency for individuals, industries, institutions, companies, and municipalities in Québec

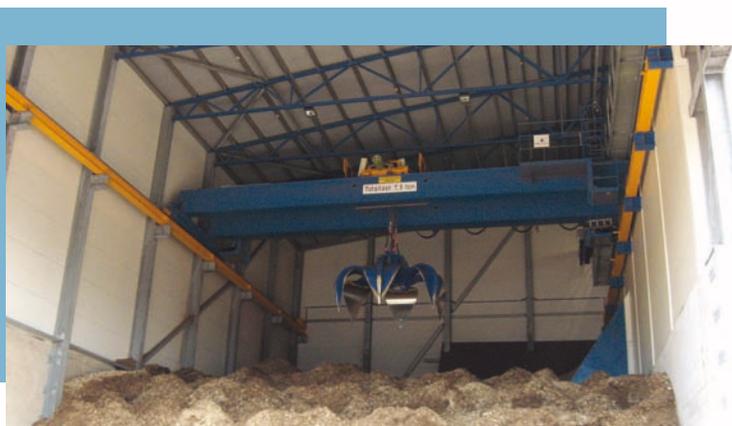
The program is divided into four parts, organized by intervention type. Part B is to replace heavy fuel oil with forest biomass. Its aim is to have machinery and equipment converted from heavy fuel oil to forest biomass, excluding sawdust, shavings, and bark. It includes an analysis component and a conversion assistance component. The goal is to reduce GHG emissions by one million tons per year by the program completion date. According to projections, projects employing forest biomass could achieve approximately 40% of this goal. To complete these projects, approximately 400,000 tons of forest biomass would be required per year, which would allow a corresponding reduction in the volume of GHG emissions.

gas emissions by converting forest, agricultural, and municipal biomass—including organic waste from businesses and factories—into energy. These actions will also address the *Agricultural Operations Regulation* as regards phosphorus. In addition, they will help Québec to implement its energy strategy for 2006–2015, *Using Energy to Build the Québec of Tomorrow*. Forest biomass will thus play an important role in achieving the objectives of APCC Measure 15.

4-Support innovation

Program to Promote Energy Efficiency

The goal of the Program to Promote Energy Efficiency (PPEE) from Agence de l'efficacité énergétique is to finance projects in various stages of the innovation chain in order to promote the development of new energy efficiency and energy production technologies. The stages are as follows: research and development, experimentation, demonstration, measurement, pre-commercialization, valorization, transfer, and distribution. Projects that develop the value of forest biomass qualify under this program.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE

3-Support investment

Actions arising from Measure 15 of the 2006–2012 Québec Action Plan on Climate Change (APCC)⁴

Actions are currently being planned in response to Measure 15 of the *2006–2012 Québec Action Plan on Climate Change*. They will seek to reduce greenhouse



MARC-ANDRÉ GRENIER

⁴ Measure 15: Set up support programs for manure processing and for the energy valorization of agricultural, forest, and municipal biomass.

Technoclimat Program

Technoclimat is a green technologies demonstration program for reducing GHG emissions. It is run by Agence de l'efficacité énergétique. An outgrowth of APCC Measure 20⁵, Technoclimat has a \$110 million budget, courtesy of the Green Fund. Its objective is to finance demonstration projects for innovative technologies and processes with good potential for reducing GHG emissions in Québec. Technoclimat also fulfills development strategy objectives for Québec's environment and green technologies industry, as well as those set forth in the Québec energy strategy for 2006–2015, *Using Energy to Build the Québec of Tomorrow*.

New technology demonstration projects that use forest biomass energy and help reduce GHG emissions can qualify for financial aid under the Technoclimat Program.

5-Stimulate demand for forest biomass

Hydro-Québec call for tenders for biomass cogeneration

In spring 2009, Hydro-Québec Distribution will issue a call for tenders for the purchase of one 125 MW block of electrical energy generated from biomass. The call for tenders is intended to encourage heavy industry to use biomass—particularly the forest variety—and to provide Hydro-Québec Distribution with a new, renewable-energy electricity source.

Forest biomass awareness campaign

MRNF wishes to ensure that prospective users—in other words, engineers and those in the industrial and commercial sectors who have the authority to award contracts—have the technical knowledge they need to use forest biomass. Hydro-Québec and Agence de l'efficacité énergétique can each play an equally important role with prospective forest biomass customers.

⁵ Measure 20: Implement a program to support technological research and innovation for the reduction and sequestration of GHG.



The use of forest biomass is expected to have two major impacts. First, it will engender new economic activity in rural communities. Second, it will allow Québec to improve its track record with energy use.

jobs created based on different types of usage. An annual utilization rate of 22.6% is projected for 6.4 million AMT of available forest biomass. The assumptions used are presented below.

The case for forest biomass

Assuming use of forest biomass between now and 2016, Table 2 shows forest biomass volumes, energy production, and GHG emission reductions, as well as

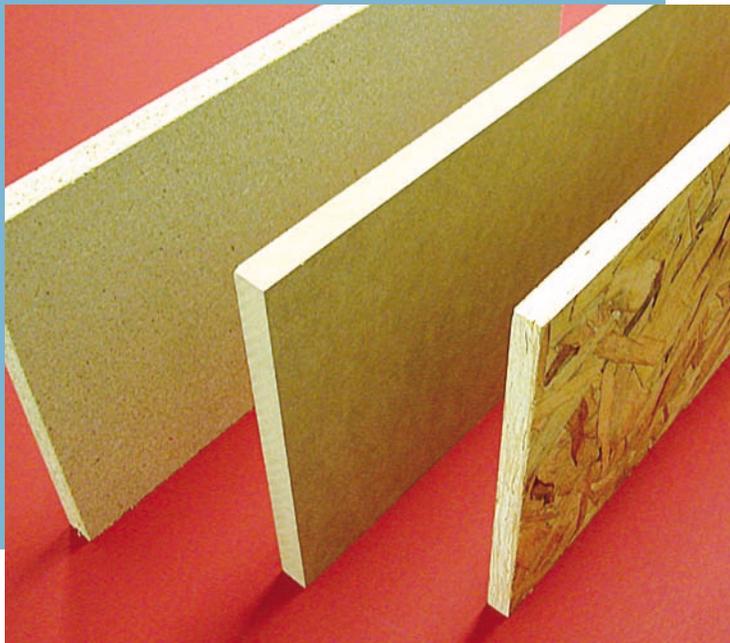
| | Forest Biomass | Energy Production | Reduction of GHG Emissions | Jobs Created⁽²⁾ |
|--|-----------------------|--------------------------|-----------------------------------|-----------------------------------|
| | AMT | Gigajoules | Tons | Number |
| Engineered Wood | 58 559 | | | 75 |
| Heating Pellets | 88 400 | | | 67 |
| Industrial Heating | 230 000 | 3 220 000 | 314 409 | 100 |
| Cogeneration | 170 000 | 2 210 000 | 215 790 | 68 |
| Institutional and Commercial Heating | 428 571 | 5 999 994 | 585 512 | 173 |
| Cellulosic Ethanol | 484 167 | 3 307 924 | | 371 |
| Total | 1 459 697 | 14 737 918 | 1 115 711 | 854 |
| <i>Forest Biomass Utilization Rate</i> | <i>22,6 %</i> | | | |

⁽¹⁾ Per year
⁽²⁾ Includes 681 forest jobs

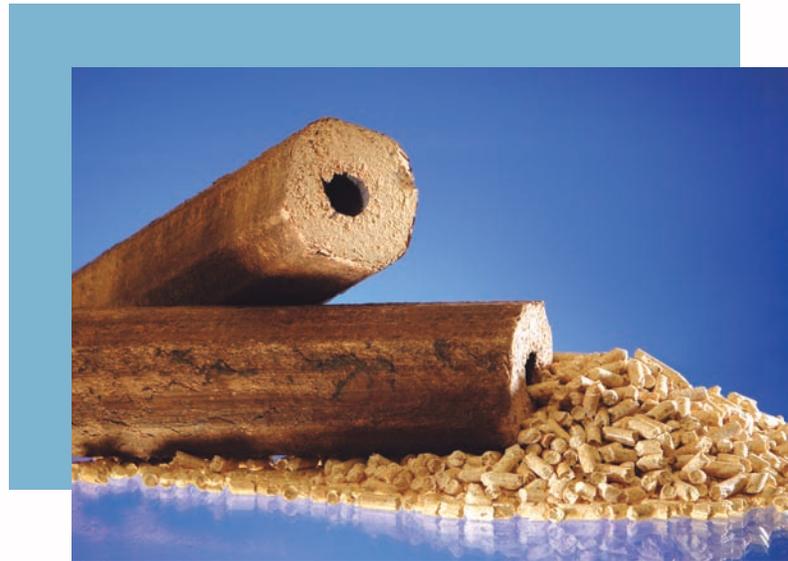
Source : Ministère des Ressources naturelles et de la Faune, November 2008

Engineered wood products

One possible application for forest biomass is as a replacement for other inputs used in industrial processes. Given the nature of forest biomass, the extent to which it replaces organic materials (sawn timber byproducts) currently used by industry will depend, over the medium term, on the production technologies employed. In the engineered wood product industry, forest biomass has replacement potential in the medium term. It will vary according to the type of products produced—that is, particleboard, medium density fiberboard (MDF), and high density fiberboard (HDF). For production of engineered wood products, nearly 60,000 AMT of forest biomass would be required.



FPIINNOVATIONS-FORINTEK



MARC-ANDRÉ GRENIER

Heating pellets

Whether forest biomass is used to produce heating pellets hinges more on export markets than domestic markets. Pellets are a mature market in the U.S., and the imminent opening of very high volume mills will limit opportunities for Québec pellet exports. However, Europe is striving to double its green energy consumption by 2010, which will create an attractive market for forest biomass pellets. At present nearly 47,000 tons of pellets are exported. On the basis of Europe's goals for green energy consumption, Québec exports to the continent could rise significantly—as much as 100%—over the next five years. The amount of forest biomass required to increase heating pellet exports to Europe would be approximately 90,000 AMT.

Industrial heating and cogeneration

Implementation of the Heavy Fuel Oil Consumption Reduction Program and Hydro-Québec's call for tenders for energy from forest biomass will help position biomass in the industrial heating field. Interest has come predominately from the pulp and paper sector, where mills typically use heavy fuel oil to generate the great amounts of steam they require. The scarcity of sawn timber byproducts, the high cost of fossil fuels, and future GHG emission regulations limiting heavy fuel oil use are other factors that will spur forest biomass use. Slightly over 127 million liters of heavy fuel oil could be replaced by 400,000 AMT of forest biomass; of this amount, 230,000 AMT would be used exclusively to produce steam and 170,000 AMT to produce steam and electricity through cogeneration.

Commercial and institutional heating

Commercial and institutional building owners are grappling with steadily rising heating costs. Many of these buildings are located near supplies of forest biomass, making it a competitive energy source. One scenario is for forest biomass to replace electricity and light fuel oil in 4,500 institutional buildings. These buildings—which belong to school boards, postsecondary educational institutions, universities, hospitals, and healthcare facilities—consumed approximately 6.58 TWh of energy in 2002. Electricity accounted for 20% of their energy consumption, and light fuel oil and natural gas for 40% and 39% respectively. According to projections, use of forest biomass would reduce electricity and light fuel oil consumption 25% and 50% respectively. The amount of forest biomass required to replace these two forms of energy is approximately 430,000 AMT.

Cellulosic ethanol

The Québec energy strategy seeks to promote the use of renewable fuels such as ethanol and biodiesel. Its goal is to have ethanol comprise up to 5% of gasoline sales on average by 2012, with 1.5% coming from grain corn and 3.5% from forest biomass harvested in urban or forest areas. In this case, 1.75% of cellulosic ethanol from forest biomass could be incorporated into gasoline. The amount of forest biomass required is estimated at over 480,000 AMT.



MARC-ANDRÉ GRENIER

Creation of new economic activity

Development of the forest biomass industry will allow the creation of forestry jobs. Harvesting 1.5 million AMT of forest biomass annually would create nearly 850 jobs throughout Québec, including 680 within forests, as shown in Table 2.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE

In addition to creating jobs, this new economic activity will produce thermal or mechanical energy. The production value of this can be measured in sales and in cost savings that arise when fossil fuel energy is replaced with a less expensive type. It is estimated that harvesting forest biomass will produce an additional 14.7 petajoules of energy. To produce this energy thermally, 4.1 TWh of electricity would be needed. In terms of installed power, producing this much thermal energy annually would require the equivalent of a 470 megawatt electrical generating plant.

**4.1 TWh of energy = enough to supply
165,000 homes**

Fabricating engineered wood products and heating pellets does not contribute to energy production. In the case of the former, a raw material is substituted in the product's makeup. In the case of heating pellets, additional production is mostly for export and does not result in the replacement of another energy form in Québec.

Using forest biomass for energy production allows energy from fossil sources to be replaced. It is expected that greenhouse gas emissions can be reduced to the order of 1.1 million tons per year.

The impact on Québec's energy track record

Using forest biomass will have a tangible impact on Québec's energy track record, as shown in Table 3.

Doing so would make it possible to replace the equivalent of 10.2 petajoules of oil, which is 1.4% of Québec's forecast oil consumption in 2016 according to its energy strategy.

Using forest biomass will affect another energy source: electricity. Converting forest biomass for institutional and commercial heating would reduce consumption to the order of 80% in the case of oil, and 20% in the case of electricity. The use of forest biomass therefore frees up electricity for other uses, perhaps the equivalent of nearly 1.2 petajoules.



MARC-ANDRÉ GRENIER

Table 3
Québec Energy Consumption by Source for 2005,
with Projections for 2016, Based on Projections for Forest Biomass Utilization

| | 2005 | 2016 | |
|--------------------------------------|----------------|--------------------|------------------------------|
| | | Anticipated Demand | According to the Action Plan |
| Energy Sources | | Petajoules | |
| Electricity | 685,0 | 775,7 | 774,5 |
| Natural Gas | 200,8 | 254,5 | 254,5 |
| Oil | 680,3 | 719,4 | 709,2 |
| Coal and Coke | 15,5 | 33,8 | 33,8 |
| Biomass | 151,2 | 191,5 | 202,9 |
| Nontraditional Energy | 35,4 | 44,9 | 44,9 |
| Total Demand | 1 768,2 | 2 019,8 | 2 019,8 |
| Breakdown According to Source | | % | |
| Electricity | 38,7 | 38,4 | 38,3 |
| Natural Gas | 11,4 | 12,6 | 12,6 |
| Oil | 38,5 | 35,6 | 35,1 |
| Coal and Coke | 0,9 | 1,7 | 1,7 |
| Biomass | 8,6 | 9,5 | 10,0 |
| Nontraditional Energy | 2,0 | 2,2 | 2,2 |
| Total Demand | 100,0 | 100,0 | 100,0 |

Note: This scenario considers only energy production in excess of the Québec energy strategy objective.
Source: Évolution de la demande d'énergie au Québec, Scénario de référence - horizon 2016, July 2005.
Ministère des Ressources naturelles et de la Faune, November 2008.

Once the impact on oil and electricity is included in the calculation, forest biomass use will produce 202.9 petajoules in 2016, compared to the 191.5 petajoules forecast in the Québec energy strategy. Forest biomass's share of the Québec energy mix will therefore grow from 9.5% to 10%.



CONCLUSION

MRNF has consolidated numerous programs and initiatives into an action plan to encourage the startup and development of a new economic activity: energy production by developing the value of forest biomass. The primary goals are the following :

- Make forest biomass available from public forests
- Encourage the replacement of fossil fuels
- Support investment
- Support innovation
- Stimulate demand for forest biomass

The current situation is conducive to projects that develop the value of forest biomass, since forest biomass is a renewable resource that produces green energy, satisfies growing needs and contributes substantially to reducing greenhouse gas emissions.

The widespread availability of this renewable material and the rising cost of competing fossil fuels are paving the way for the development of projects in a multitude of areas. In addition, this green energy is generating interest on the demand side since it is likely to reduce energy bills in the forest industry, businesses, and institutions.

In using forest biomass, we must uphold the principles of sustainable development. Impact on forest ecosystems also must be taken into consideration. In addition, projects must be financially viable so this economic activity can enjoy balanced development.

The action plan could mean the use of 1.5 million AMT of forest biomass—or 22.6% of available volume—per year, resulting in the creation of 850 jobs across Québec, including 680 forest-based positions.



MINISTÈRE DES RESSOURCES NATURELLES ET DE LA FAUNE





Ressources naturelles
et Faune

Québec 

