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## Executive Summary

At present, the Canadian forest sector converts sustainably managed, renewable forests into solid wood products, pulp and paper, heat, and power. However, this model is under stress. Some products are facing structural decline, while others are facing competition from low-cost producers overseas, or heavily reduced demand due to slow economic recovery. The highly integrated nature of the industry also means that the decline of one product line can negatively affect others.

New product lines need to be identified to supplement and strengthen the existing forest sector and to generate new revenue and jobs. It is necessary for the new Canadian forest sector to profitably transform its resource into a full suite of valuable products that includes high-value chemicals and materials as well as heat, power, and transportation fuels. This Bio-energy and Bio-chemicals Synthesis Report aims to identify the opportunities and challenges offered by integrating bio-energy and bio-chemical product streams as part of conventional wood product operations.

### Summary of findings:

1. Integrating conventional forest product operations and supplementary novel bio-products, with the goal of maximizing product value and fibre recovery at each step of the value chain, offers the greatest potential for success. For example, a company is likely to only produce heat and power after it has extracted all higher value materials.
2. In addition to the need to develop high-value products, forest companies will also need to develop new industrial partnerships and customer relationships for the novel bio-products they manufacture.
3. Many higher value bio-products will mean smaller markets, which will be a challenge to the forest sector because it is used to delivering high volumes of commodity products. Moving up the value curve may mean dealing with a larger number of smaller customers, each likely to request its own unique set of product performance attributes.
4. Given the impact of the effort required and costs associated with biomass collection and the relatively low cost of fossil fuels, as well as the uncertainty surrounding carbon taxes, incentives, price stability and volatility, this report identifies two possible pathways forward.
  - It is unlikely that large-scale bio-product greenfield or brownfield projects will be adopted by the forest industry in the short term, given constrained financial resources. A step-wise approach, beginning with smaller commercial applications attached to existing infrastructure will serve two purposes – to prove concepts and to develop markets. Given ongoing historically low energy prices, these projects will have to include a high-value, non-energy component. As high-value means low volumes, an appropriate fit would be something between the scale of a demonstration plant or smaller mill add-on and establishing an initial set of reliable customers. Rapid deployment of novel, high-value products is feasible and shows promise for improving the economics of existing forest product installations while displacing or supplementing fossil fuel-based products. However, identifying local users of energy products may be a limiting factor on the marketing front, as many forest operations are in rather remote locations.

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- Should competing fossil fuel-based power and transportation fuel costs increase as expected, larger scale bio-energy and bio-chemical projects may be possible. It may be viable to consider stand-alone energy or fuel systems where scale is only limited by biomass collection costs and not by market size. However, low uptake by local users may still be a limiting factor. Longer term, there is an opportunity to move to higher levels of bio-fuels usage, which can contribute to lowering Canada's greenhouse gas emissions, particularly in jurisdictions with a higher proportion of fossil fuel-based energy consumption. However, a constraining factor with this high level of fossil fuel substitution is that it will require larger portions of a forest company's annual allowable cut and possibly significant levels of residuals from forest harvesting operations.
5. Industry cannot accomplish integration of profitable bio-energy and bio-chemical endeavors alone. It will require strong partnerships among industry and various levels of government working together to identify, demonstrate and commercialize the lowest hanging fruit as it relates to bio-energy and bio-chemical products. This may include support for capital costs and consideration of policy changes to encourage the forest industry to develop and expand into production of these novel bio-products.

### Learn more

To find out more about the Bio-pathways II project and how Canada's forest industry is moving up the forestry value chain: [www.fpac.ca/bio-pathways](http://www.fpac.ca/bio-pathways), [www.fpinnovations.ca/bio-pathways](http://www.fpinnovations.ca/bio-pathways).



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