Forest bioproduct innovation:

Reduce the environmental impacts of developing natural resources

Canada's natural resource endowment is vast. The activities of extracting, using and exporting these resources contribute significantly to our economy. However, oil, gas and mining operations also contribute to Canada's greenhouse gas (GHG) emissions and can affect forested landscapes. In 2013, Natural Resources Canada-Canadian Forest Service (CFS) launched an initiative to promote innovation and knowledge exchange between the forestry sector and the oil and gas sectors. The initiative includes ways to accelerate the adoption of forest-based bioproducts as a means to mitigate climate change.

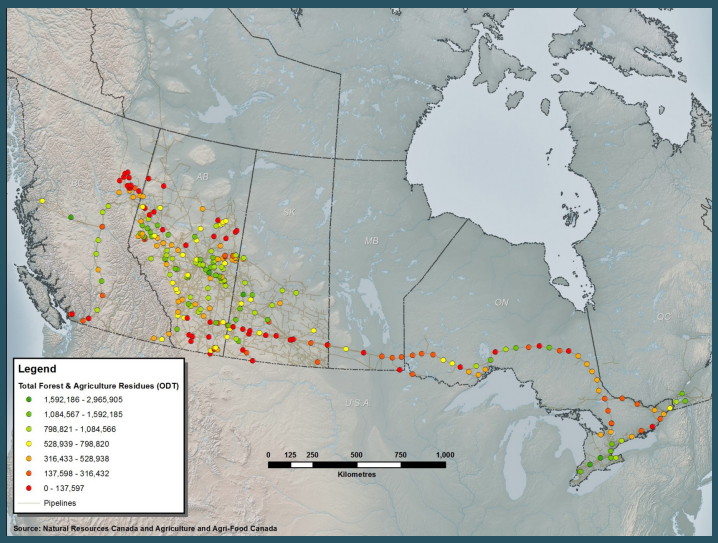
Renewable natural gas research

Renewable natural gas (RNG) is produced by processing organic materials and waste streams through either anaerobic digestion or thermal processes. RNG is an area of interest for further research and development because of its potential for GHG reductions, technological feasibility, efficiency of distribution, and stakeholder interest. It is a convenient "drop-in" fuel because it is compatible with existing infrastructure and can be used in many applications, such as heat, power production and transportation. With 232 million hectares of managed forests, Canada is well positioned to be a global leader in RNG production, in particular through the conversion of forest harvesting and mill residues.

Biomass availability and characterization study

The CFS and Agriculture and Agri-Foods Canada estimated Canada's RNG potential by modelling the annual amounts of forestry harvesting and mill residues and agricultural harvesting residues available around 280 major compressor station sites along Canada's natural gas transmission pipelines. Forest harvest residues include tops, branches and unmerchantable fibre, which are typically burned after harvesting, releasing GHG emissions.

Canada



The annual biomass availability was estimated by using the Biomass Inventory Mapping and Analysis Tool (BIMAT). The greatest amounts of total biomass are found in British Columbia, central Alberta, and northern and southern Ontario. With regard to forest biomass specifically, modelling indicates that nationally 97 large RNG plants could be supplied with a combination of forest harvesting and mill residues feedstocks in a 75-kilometre hauling radius. Quebec has fewer compressor stations than other provinces but has significant potential for RNG production. A separate preliminary analysis suggests that large RNG facilitiies (>275,000 oven-dried tonnes (ODT)/year) can be established along 65 percent of the length of federally regulated pipelines in the province.

Techno-economic assessment of RNG conversion technologies

The technical feasibility and economic viability of emerging technologies for converting biomass into RNG was also investigated. Gasification followed by methanation was identified as the most likely technology pathway for RNG production, although the technology is still in the early stages of development. Analysis indicates that the cost of RNG production currently ranges from C$23 to $35 per gigajoule (GJ). Making optimistic assumptions about technological advancement and low biomass costs, the cost of RNG could go as low as $13/GJ.

Site-specific modelling and carbon footprint assessment

Smaller-scale and site-specific modelling for one major compressor station site in west-central Alberta was then conducted by FPInnovations. In a base case scenario (fuel at $1/litre), it is estimated that about 1.7 million ODT of forest harvesting biomass could be recovered from roadside and delivered to an RNG plant over the course of 10 years, at a rate of about 169,225 ODT/year. The CFS completed a carbon footprint assessment for RNG production at this theoretical site – it is estimated that 30,000 tonnes of fossil carbon dioxide equivalent could be avoided annually.

The CFS continues to promote RNG commercialization by helping advance the development of demonstration projects and by conducting further analysis on biomass availability and sustainability and GHG emissions reductions.

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