# GREENHOUSE GAS EMISSIONS IN CANADIAN FORESTRY

## Energy use and emissions created by different stages of manufacturing

It is an interesting time to be looking at the topic of emission of greenhouse gases (GHGs) in Canadian forestry, as 2015 marks the target year, announced in 2007, by which the forest industry had planned to achieve industry-wide carbon neutrality without the purchase of offsetting carbon credits.[1] Whether this goal has been achieved will not be known until late 2016.

Overall, the industry is found to have improved immensely in its emissions intensity, as BC Federation of Labour Executive Director Jim Chorostecki has pointed out.[2] Three trends are highlighted here: fuel switching, improved energy efficiency, and energy systems optimization.

Forestry remains a significant contributor to the Canadian economy. The combination of harvesting, wood manufacturing, and paper manufacturing contributed nearly $20 billion (roughly 1.25%) to Canadian GDP in 2014.

Trade globalization has impacted and will continue to impact the industry. While the United States has traditionally been the largest purchaser of Canadian forestry products, the rapid growth in demand from the Chinese economy is effectively leading to the evolution of a global marketplace in forestry products. Nevertheless, the industry's relevance to Canada's overall economy has diminished of late.

The rate of deforestation in Canada is among the lowest in the world and the forest industry is legally bound to reforest all logged areas.

## GREENHOUSE GAS EMISSION PROCESSES

By nature, forestry has a unique influence on the net transfer of carbon dioxide (the most emitted GHG) to the atmosphere.

Sequestration is an important concept to understand: it is the process by which trees (and other plants) soak up and store carbon dioxide ($CO_2$). The net contribution of $CO_2$ from forestry is directly impacted by the net balance of trees that are taken out of Canadian forests.

Fortunately, Natural Resources Canada (NRC) reports that the rate of deforestation in Canada is among the lowest in the world and that the forest industry is legally bound to reforest all logged areas.

Forestry is also a source of GHG emissions. This happens primarily through the energy consumption

of the industry's production processes, through the use of fossil fuel, natural gas, electricity (indirectly), or biofuels. The discussion is a complicated one as the forest industry is diverse and made up of multiple production processes in multiple sectors.

# THE FOREST INDUSTRY'S PRODUCTION CHAIN

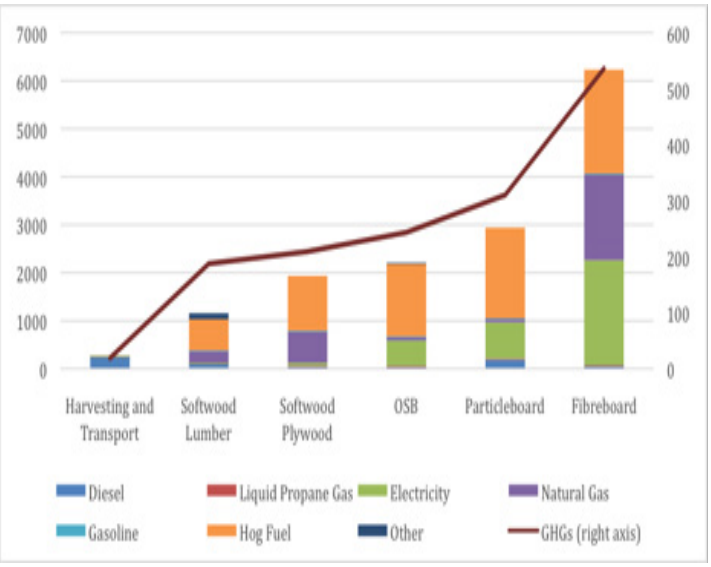
## Harvesting

Harvesting is a significant activity in the forest industry's production chain, contributing roughly $4 billion to Canadian GDP in 2014. Further, though deforestation in Canada is reported to be negligible from forestry, the contribution of harvesting activities to net GHG production is significant. Once harvested, felled trees are transported to the respective plants and mills that will process them into intermediate or finished objects. This is a fossil-fuel-intensive process and the largest source of pre-mill emissions.[3]

## Pulp and paper

Environment Canada reports that the Canadian pulp and paper industry is the world's largest exporter of market pulp and paper and generates 57,500 direct and 250,000 indirect jobs. In the processes of pulping, energy is used to power the equipment, through either mechanized operations or the heating and cooling applications (the generation of steam or hot water, for example).

## Chart 1. Energy Intensity of Select Wood Product Production




Source: Natural Resources Canada (2010)

## Wood products

Softwood lumber production is the largest sector in Canada's wood products industry. The most energy-intensive stage of the lumber production chain is the loading of lumber into kilns and drying to predetermined moisture content.

The composite panel board sector has been called the original recycler of the wood industry for being almost entirely dependent on the by-products of other wood manufacturers for raw material.

In 2009, NRC published a document outlining the energy requirements, wood resource use, and global warming potential of the Canadian wood industry. Chart 1., drawn from the ACW Manufacturing Working Group Report on Greenhouse Gas Emissions in Canadian Forestry summarizes energy requirements per $m^3$ of output and highlights the report's finding that energy requirements per unit of output increased with the complexity of the good being produced. Corresponding with this are higher GHGs per unit of output. These GHGs are produced along multiple stages of the production process both directly (through the consumption of fuel to power machines and kilns) and indirectly (unused wood waste).

## Reforestation

The reforestation that the industry undertakes ensures that net emissions from deforestation are indeed zero.[4] Significant here are the energy requirements for transportation and operation as well as the net change in carbon stored in forests and wood products.

# RECENT PERFORMANCE

While pulp and paper has suffered from a consistent downward trend in demand for its outputs, the demand for wood products – though interrupted by the global recession of the late 2000s – has enjoyed consistent growth in recent decades.

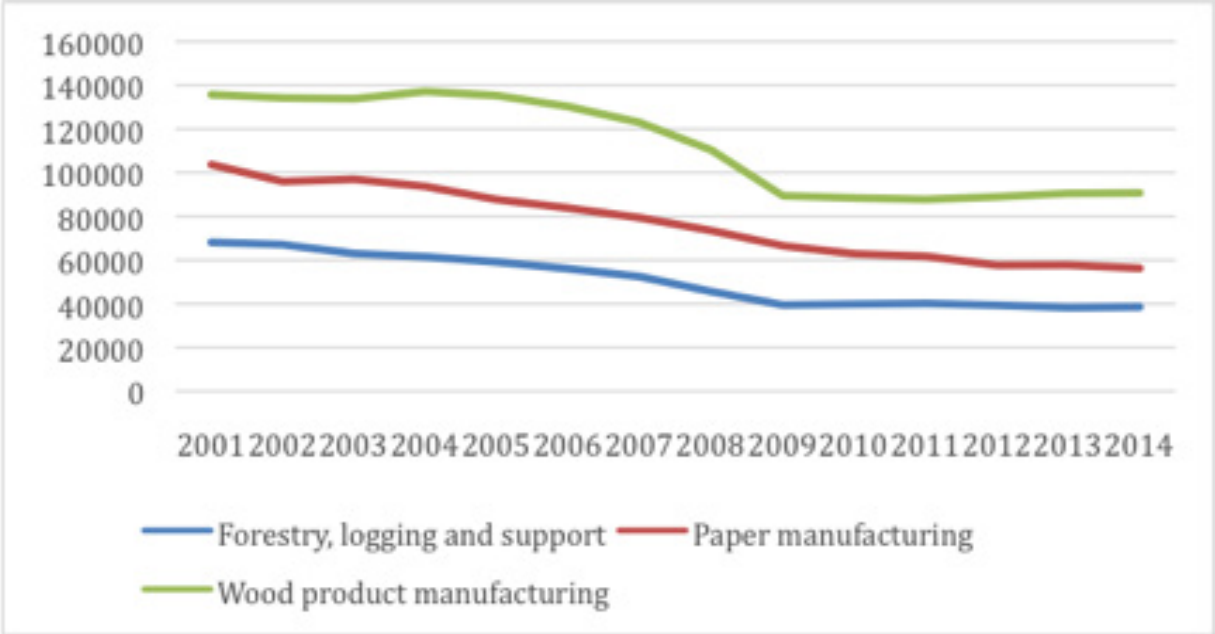
At the same time, the available data indicate that employment in both industries has dropped considerably since its peak in the early 2000s. This could be indicative of efficiency gains in the industry, increased automation, and/or the downturn catalyzing the termination of inefficient practices at both employee and mill levels.

For a variety of reasons, emissions in forestry have fallen considerably in the last quarter century. While some of this is the result of decreases in production, controlling for output (as best we can) illustrates that far more has been going on. Specifically, the emissions intensity of wood and pulp/paper has fallen consistently and significantly (with the exception of a slight increase in wood in recent years).

## Emissions

Considerable progress in emissions mitigation has been made since 1990. Currently, the wood industry has lowered its emissions intensity to 60 per cent of 1990 levels, though there has been a slight shift upwards in recent years. This increase of late is attributed to the increased use of natural gas in production processes.

## Chart 2. Employment in Forestry Related Industries in Canada (2001-2014)




Source: Statistics Canada, Canism table 291-0024

Much of the decrease in emissions intensities in both industries has been attributed to the increasing adoption of fuel switching technologies. Fuel switching is the process of substituting away from more to less GHG-intensive energy sources (electricity and biofuels specifically). Switching to biofuels is an especially attractive strategy in forestry because many of the by-products of their production processes can be burned for energy.

Further emissions reductions have been achieved through systems optimization, gains in energy efficiency, and design-related improvements.

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*Investments in Forestry Industry Transformation (IFIT)*

IFIT's goal was to "de-risk" the adoption of new technologies. With an initial budget of $100 million from 2010 to 2014, IFIT received 107 applications and granted funds for 14 approved projects.

*Pulp and Paper Green Transformation Program (PPGTP)*

A total of 24 different pulp and paper companies were awarded funding for 98 different projects in 38 different communities across Canada. Benefits from the projects include improved energy efficiency, reductions in GHG emissions, and the generation of renewable energies including thermal (steam) and electrical (biofuel).[5]

*Forest Innovation Program (FIP)*

FIP invested roughly $200 million in promoting research, development, and technology transfer activities in Canada's forest sector. The emphasis was

in supporting first-in-kind projects that promoted bio-intensive products and energy processes.

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## EMERGING ISSUES, CHALLENGES AND OPPORTUNITIES

According to industry representatives, one of the biggest obstacles to reducing GHGs in forestry is that most of the possible reductions have already been achieved – though efforts continue unabated.

While the industry is celebrated for making considerable gains in energy and emissions intensity, the emphasis has been on the mill level and the growing reliance of biofuels therein.

A 2011 article by the Canadian Centre for Policy Alternatives (CCPA) suggests that a greater carbon focus is still possible for the industry as a whole.[6] The article emphasizes the larger issue in the forest industry – the production of primary goods and the lengthening of production chains across national and international distances.

The CCPA report questions the viability of the increasing reliance on bioenergy in the industry. Specifically, while bioenergy production is currently reliant on residual products from mill production processes and dead or dying trees, a time is envisioned when the supply of these materials might be stressed.

Manufacturing processes, automation of mill practices, and the stagnation of jobs in the wood products industry are all of particular interest in the evaluation of GHG emissions.

## Endnotes


1. "Canadian Forest Products Industry Aims to be First Canadian Carbon-Neutral Sector", The Forest Products Association of Canada, accessed October 31, 2015, http://www.fpac.ca/canadian-forest-products-industry-aims-to-be-first-carbon- neutral-sector/, paragraph 1.
2. Chorostecki, Jim, "ACW Manufacturing Working Group: Greenhouse Gas Emissions in Canadian Forestry," 30.
3. Brad Upton, Reid Miner and Kirsten Vice, "The Greenhouse Gas and Carbon Profile of the Canadian Forest Products Industry Special Report No.07-09." National Council for Air and Stream Improvement, 2007, 8. http://assets.wwf.ca/downloads/ncasi_canadian_ghg_carbon_profile.pdf
4. Chorostecki, 36.
5. *Pulp and Paper Green Transformation Program- Report on Results,* (Natural Resources Canada, 2012), 2. http://www.nrcan.gc.ca/forests/federal-programs/13141
6. Parfitt, Ben. "Making the case for a Carbon Focus and Green Jobs In BC's Forest Industry." Canadian Centre for Policy Alternatives.


## Further Readings


- Lipsig-Mummé, Carla, and Stephen McBride, Editors. *Work in a Warming World*. Montreal and Kingston, London, Ithica: McGill-Queens University Press, 2015.
- Chorostecki, Jim, "ACW Manufacturing Working Group : Greenhouse Gas Emissions in Canadian Forestry."
- Rob Kozak, "Value-Added Wood Products From British Columbia- Getting Beyond the Rhetoric," *BC Forest Professional Magazine,* Jan-Feb 2007.
- "Climate Change," Canadian Council of Forest Ministers, 2016, http://www.ccfm.org/english/coreproducts-cc.asp


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