CANADA'S FOREST INDUSTRY CUTTING WOOD AND CARBON EMISSIONS

By Jean Sorensen

Canada's forest industry is cutting more than timber, it is cutting carbon emissions.

National figures on carbon emissions show that Canada's managed forests and its industry are ahead of the curve, providing an offset credit against climate-changing emissions and poised to play a major role in helping Canada reach its 2030 Paris Agreement climate change targets. Since 1990, Canada's forests have added an absorption credit to the nation's total carbon dioxide (CO_2) or equivalent gases (CO_2e) emissions.

"The Forest Land category has the largest influence on sectoral totals (removals) for all years of the time series," said Canada's 2019 submission (based upon 2017 figures) to the United Nations Framework Convention on Climate Change (UNFCCC), which receives carbon emission reports annually from nations.

There are two aspects at work in Canada's forest—the human impact on managing forests and parks and producing forest products and secondly, the forests affected by natural disturbances such as fire and insects. Natural Resources Canada (NRC) statistics show that human activities relating to Canada's managing forests are actually producing a carbon "sink" pulling greenhouse gases (GHG) from the atmosphere. (Forests and oceans are the largest carbon sinks.)

"Human activities in Canada's managed forests accounted for removals of about 20 (megatonnes) Mt CO_2e in 2016, while large-scale natural disturbances accounted for emissions of about 98 Mt CO_2e, resulting in net emissions of 78 Mt CO_2e," as shown by NRC statistics if straight-line math is followed. (But, that's not the way international carbon credits and emissions are counted today.) The spike in emissions from natural disturbances is credited to BC's fires and the mountain pine beetle.

Figures show that in 2017, BC lost 1.2 million hectares of forest in 2017 to wildfires and in 2018 that figure rose to 1.3 million hectares. BC fires accounted for about 60 per cent of the total burned area in Canada in 2018, compared to an average of 7 per cent over the 1990 to 2018 period. By comparison in 2019 (August), Canada lost 1.8 million hectares.

"2019 was not a bad year for fires," says Dr. Werner Kurz, senior research scientist for the Canadian Forest Service. In BC, the last figures tallied showed only 21,000 hectares in late September. "That is as much as 60 times less than what we saw in 2017 and 2018." Dead or dying trees will continue to be a source of carbon emissions, but if BC has a few years of low fires, keeping insects in check, growing new stands, and deploying new forest management strategies, BC's overall forest health will grow. "It will take a

few years to make up for years of fire and mountain pine beetle," Kurz said, who is an expert on carbon monitoring.

In the big UN picture, Canada's forests are not emitters, but the good guys. The ongoing culprit in the fight against climate change and emissions is the fossil fuel sector used in Canada's buildings, vehicles, and fugitive activities (oil and gas extraction and refining activities). Canada's agricultural and forest industry's buildings contributed only 3 Mt CO_2e in 2017, according to national inventory statistics.

"In 2017, the Energy sector (consisting of Stationary Combustion, Transport and Fugitive Sources) emitted 583 megatonnes of greenhouse gases, or 82 per cent of Canada's total GHG emissions," said Canada's last submission to the UNFCCC. Canada, like other countries agreeing to reduce emissions, reports annually its GHG emissions. To put it in perspective, Canada's carbon inventory showed 716 Mt CO_2 eq produced in Canada in 2017, an increase of 8 Mt over 2016.

"We know that forests historically play a role in removing carbon dioxide and forest management has enhanced that role," said Kurz. But, the reality is that the real impact of Canada's forests will only be felt on the Paris Agreement if Canada first addresses its fossil fuel emissions.

Why and how the UN counts forest carbon

The way that Canada counts carbon domestically isn't the way the United Nations counts carbon emissions as countries move towards honouring their Paris Agreement commitments.

The UN's focus on monitoring GHG emissions is attempting to gauge how human activity impacts, moderates, and mitigates climate change.

Trees absorb carbon storing it in their trunks, limbs and roots. Carbon dioxide and other gases are released when diseased or old trees die (their carbon absorption falls off prior), through forest fires, or through biomass decomposed on the forest floor.

Canada has 9 per cent of the world's forests, according to the NRC. There are managed and unmanaged forests. NRC figures for treed areas (forests through to lots with trees) tallies at just under 400 million hectares with managed forests, those managed for timber and non-timber values such as parks or subject to fire protection, accounting for 226 million hectares. It's the managed forests that the UN tally looks at and for good reason.

The UN's Intergovernmental Panel on Climate Change (IPCC) recognized that large swings by natural disturbances impact the forest emission figures and urged Canada and other forest industry countries to separate them. Canada

changed its counting method in 2017 and figures for forest lands and wood products fall under a broad category known as Land Use, Land Use Change, and Forestry (LULUCF). Canada estimated in its annual report that its forests withdrew 150 Mt of carbon from the atmosphere in 2017.

"Net removals have fluctuated between 160 Mt to a minimum of 150 Mt over the period between 2005 and 2017, as forests recover from peak harvest rates and low-level insect disturbances occurring in the early 2000s," according to Canada's UN report in the LULUCF section.

But, the LULUCF section also estimates emissions from Harvested Wood Products (HWP), those products reaching long-term end of life decades after harvesting, decomposing forest products and short term, either through pulping or burning and found emissions ranged from 140 Mt to 130 Mt (approximately 125 Mt net) in 2017. The total net difference from managed forests and HWP amounted to an estimated removal of about 26 Mt of CO_2 in 2017. (Figures are rounded.)

Forest industry ahead of curve

When the federal government committed to reducing GHGs by 30 per cent by 2030 over 2005 levels, the Forest Products Association of Canada (FPAC) in 2016 issued its industry *30 X 30 Climate Change Challenge* looking to reduce 30 Mt of carbon or 13 per cent of the federal goal by 2030.

Derek Nighbor, FPAC president and chief executive officer, said his association was the first to announce such a plan in 2016 and the forest industry has worked on all fronts to curb emissions. "Men and women working in mills help produce product that stores carbon and that is good for the environment," he said, as long-life products such as cross-laminated timbers can extend wood shelf life but also replace concrete and steel. The pulp and paper industry has reduced GHG emissions 70 per cent since the early 1990s, turning to co-generation, while sawmills are using bark and residual wood for power generation. (Bioenergy is 54 per cent of the forest industry's energy stream.)

Nighbor calls those employed in the industry the greenest workforce in Canada. "We are a renewable industry and sustainable as we replace what we harvest when compared to other industries." Canada's forests are managed by professions ensuring multiple values are recognized as well as sustainable. When it comes to certification of sustainable forests, Canada leads, said Nighbor. "We are number one in the world." Canada has 166 million hectares of forest independently certified or 40 per cent of all the certified forests in the world.

In BC, the Council of Forest Industries (COFI) has seen significant GHG reductions; in its 2016 report to the BC government on climate change and carbon taxing, COFI provided statistics showing that in 1990 the forest industry contributed 7.8 per cent (or 13.6 Mt CO_2) to BC's total output of 57.2 Mt CO_2 but in 2014 that figure dropped to 2.7 per cent (4.2 Mt CO_2) of BC's total output of 64 Mt CO_2.

"Over the past two and a half decades, the sawmilling and pulp and paper subsectors have each reduced their greenhouse gas (GHG) emissions by 62 per cent, largely by converting to biomass fuel. The GHG reductions per unit of product produced are also significant at 57 per cent. This compares to the province as a whole which has experienced an increase in emissions of 12 per cent over the same period," the COFI report said.

Mosaic Forest Management, which manages the BC forest lands of Island Timberlands (100 per cent private lands) and TimberWest (two-thirds private forests), has undertaken a forest-to-freighter carbon accounting for TimberWest to be carried out by KPMG and certified by the UK based Carbon Trust. The goal is to achieve carbon neutrality. The intention is to undertake a similar exercise for Island Timberlands. TimberWest has committed to reach carbon neutrality in the next decade.

"We are the only forest company to do this in the world," said Mosaic's VP of Forest and Sustainability and Chief Forester, Domenico Iannidinardo. Tracing and reducing the carbon footprint was done to enhance the BC forest product to a world market and demonstrate the company's concern regarding both sustainability and the competitiveness of carbon sequestering wood to carbon intensive products such as concrete and steel.

"From an emissions perspective, the best way to minimize the emissions is to make sure to utilize the forests as much

as possible," Iannidinardo said, adding that forest residuals or pulp logs go into products and there are efforts to reduce slash pile burning. "We always look for fuel efficient machinery and encourage our contractors to do the same," he said. The company stresses video conferencing to reduce travel to meetings. Other measures include vehicle idle time management programs, incentives to make contractors operate more efficiently, and intermittent operating engines that automatically shut down.

Transportation

Canada's transportation sector was responsible for 28 per cent (201 Mt) of Canada's 2017 emissions with road transportation contributing the lion's share or 144 Mt. (Passenger transportation contributes 54 per cent to total emissions, freight emissions are 41 per cent of total and off-road is 5 per cent, according to Natural Resources Canada.)

BC's forest industry, as part of the transportation sector, has moved as far as it can go without more technological advances. In spring 2019, BC passed the *Zero Emissions Vehicle Act (ZEVA)* which will require all new light-duty cars and trucks sold in the province to be zero-emission vehicles by 2040. This target uses a phased-in approach: 10 per cent of new light-duty vehicle sales by 2025, 30 per cent by 2030 and 100 per cent by 2040.

ZEVA regulations are still forthcoming but a BC's Ministry of Energy, Mines and Petroleum Resources email said that "it is anticipated that it would apply only to on-road light-duty vehicles, with weight ratings of less than 3,856 kilograms. This would include cars, crossovers, SUVs and light pickup trucks (e.g. Ford F150), but not heavier, medium- and heavy-duty trucks (e.g. Ford F250, buses, transport trucks and medium-duty delivery vans). Crossovers and SUVs like the Honda CR-V and Chevrolet Tahoe would be included."

The pickup is a mainstay of forest communities and workers. Blair Qualey, president of the New Car Dealers Association (NCDA), said, "Regrettably the (electric) technology for pickup trucks is not there yet although there is a lot of talk." The vehicles selling are electric or hybrid passenger vehicles (spurred by a $5,000 federal grant and a $3,000 provincial grant). The difficulty lies in battery capacity able to power a pickup truck and loads. Currently, the NCDA is seeing electric or hybrid vehicle sales at 7 per cent of the 2025 goal. If manufacturers do not meet the 10 per cent goal on non-emission car sales, they can be assessed a penalty by the province. That's a concern, said Qualey, since if the technology doesn't appear to power a good pickup, manufacturers may withdraw from that market.

Natural gas is seen as a bridge fuel, transiting away from diesel and running 30 per cent cleaner with renewable natural gas running 80 per cent cleaner as a fuel source. "We have got 850 trucks (medium to heavy duty, plus transit and other service vehicles) running on compressed natural gas and liquid natural gas (LNG)," said Arvind Ramakrishnan, Fortis senior manager, natural gas business growth. They are mainly in larger urban centres and there's no cross over into the forest industry.

The difficulty lies in finding an engine manufacturer willing to provide an engine powerful enough to handle capacities needed by logging trucks both on and off the highway, he said, adding the largest available natural gas engine is only able to handle 80,000 pound loads. There are pickup trucks that can use natural gas conversion kits, but access in remote areas to refuelling is limited, although Fortis is expanding its network. He said Fortis does have conversion incentives and is open to discussion on innovative projects.

Off-highway equipment and trucks are reported as part of Canada's national inventory of carbon under the industry sector and Canada uses emission counts from a Tier 3 engine. Canada committed to establishing emission regulations under the *Canadian Environmental Protection Act 1999* for new off-road engines that aligned with the *US Federal Environmental Protection Act* and California Air Resources Board requirements. In the period before the regulations were promulgated, Environment Canada signed Memorandum of Understandings (MOUs) with 13 engine manufacturers in 2000 leading to the Tier 1 engine standards. Since then more efficient carbon suppression Tier engines have emerged.

"We now have Tier 4 (mandatory on new equipment) and Tier 5," said Max Schultz, manager for Prince George Truck and Equipment Ltd. (Depending

on the equipment, Tier 4 can reduce emissions by as much 80-90 per cent.) Schultz said that these low-emission diesel engines do come with some drawbacks as the life of the engine is shortened and owners are reporting more fires, as not just emissions are held back, but also heat. "I had an insurance fellow in here the other day and he was telling me that there have been 150 fires (claims) in the past two or three years."

BC Bioenergy Network's Scott Stanners, Executive Director, said fuel suppliers today are required to mix biofuels into fossil fuels (under the *Greenhouse Gas Reduction Act* and regulations) with a 5 per cent volume in gasoline and 4 per cent in biodiesel. The CleanBC program will cause BC fuel suppliers to progressively decrease the average carbon intensity of their fuels to achieve a 10 per cent reduction in 2020 relative to 2010 levels, increasing to 20 per cent by 2030. BC is also pushing to increase the BC production of renewable biofuels to 650 million litres by 2030.

Currently, said Stanner, the amount of biodiesel produced in BC is only 11 million litres, and difficulties are faced in both supply, use and production. Biodiesel, derived from spent vegetable oils and grease, does not exist in quantities to displace fossil fuel diesel, and, biodiesel is not effective in colder climates. Also, the US is moving toward more biodiesel and there is a government subsidy promoting its use, making it more attractive to sell spent oil and grease to the US than refine it in BC or Canada.

The critical decade ahead

With carbon emissions increased in 2017 (over 2016) and expected to grow to over 800 Mt because of population increases and industry by 2030, Canada's 7th National Communication and 3rd Biennial Report indicates that Canada will need to shed 232 Mt of carbon to level off at 583 Mt (a 30 per cent reduction) to meet the 2030 Paris Agreement. Canada's forests—if the industry continues managing effectively and innovation leads to new carbon sequestering products—can contribute as much as 20 per cent of the offsets. Or, Canada's forest industry and forests could take 46 Mt carbon from the atmosphere.

Two research bodies behind Climate Action Tracker (CAT), which pulses and rates country progress to reaching 2030 Paris Agreement targets, indicate Canada has only made incremental progress from its federal plan, the Pan-Canadian Framework on Clean Growth and Climate to reach goals. Saskatchewan, Manitoba, Ontario and New Brunswick all have court challenges of the mandatory federal carbon pricing system, and according to CAT have no strategic plan for reducing carbon emissions. (Canada's carbon inventory shows Ontario and Alberta are the largest provincial emitters.)

Forests, according to CAT, are a bright spot and the offsets from the forests in the LULUCF category are an encouraging potential sink. "In its latest 2030 projections, Canada has quantified the extent of that (forest) contribution for the first time," said CAT. "Canada estimates in its projection that forests will contribute a seven to 46 Mt CO_2e reduction towards meeting its 2030 target."

The BC forest industry is not sitting idle but moving forward to deepening Canada's forests sink through more reforestation efforts, rehabilitating burn

areas, greater efforts to control infestations, and increased utilization of biomass waste and longer-lived products. But, they are complex issues.

"On Vancouver Island, we have Western Red Cedar dying in areas," Kurz said, as climate change is shifting geographic growing zones and work is progressing to determine the extent of those shifts to ensure future tree health. Stressed trees become susceptible to infestation and forest fires. There is also the question of determining the best species to plant in the face of climate change and economic conditions.

Slash-pile burning releases an average of 5 Mt of carbon and presents another complex issue, Kurz points out. Utilizing more forest residuals as biofuel can be useful if it offsets a fossil fuel. Yet, there is also value in leaving biomass for the next tree crop health and fauna, but too much forest floor loading contributes to potential forest fires.

Mosaic's Iannidinardo said his company is also contemplating species selection in the face of climate change. "We are working closely with the provincial tree improvement branch and participating with their tree improvement program, which has come out with Climate Based Seed Transfer guidelines," he said.

The questions of what to plant, where to plant and how much to plant are all front and centre with the Western Forestry Contractors' Association as it heads into two major tree-planting seasons.

Bruce Blackwell, president of the Western Forestry Contractors' Association, agrees more consideration should be given to geographic growing zones and species, but there should also be more strategic consideration on how many stems to plant per hectare. "We have our current stocking standards largely based on professional judgment that was made in the late 1980s," he said. In the Interior, where forest fires are most common, he said, perhaps the number of stems can be reduced to reduce crowded-out stems adding fuel to fires.

Currently, BC is into the largest reforestation effort that Blackwell can recall, with more than 300 million trees planted annually over the next two years with an estimated 1,000 extra tree planters needed to ensure roots hit the ground. It's not a panacea for climate change or BC's forests. "We are moving in the right direction," he said, adding it is not the numbers that count but "getting the right tree in the right place" and species that are more resilient to climate change, disease and fire.

He is also not convinced that commonly used computer modeling of forest health presents a real picture. "We need more boots on the ground," he said as forests change. "We are losing sight of what is actually happening on the ground."

The Association of BC Forest Professionals (ABCFP) are also developing a new suite of training options and guidelines in conjunction with BC Wildfire Service to improve the knowledge and use of fire in managing BC's forests. The association received a $400,000 grant from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development and builds on a series of recommendations the ABCFP submitted to the 2017 flood and wildfire review. One of the recommendations advocates making wildfire a specialized area of practice with specific operational professional practice standards on planning, prevention, and rehabilitation of burned forest ecosystems.

The Paris Agreement that resulted in Canada's multi-pronged Pan-Canadian Framework trickles down to BC's 2017 Forest Carbon Initiative (FCI) brought forward by Ministry of Forests, Lands, Natural Resource Operations and Rural Development. BC is partnering with the Forest Enhancement Society of British Columbia, BC Timber Sales, Forests-for-Tomorrow, and others to mitigate climate change. FCI is supported by funding from the federal government's Low Carbon Economy Leadership Fund (LCELF). Together, the province and federal government have committed $290 million to FCI from 2017/18 to 2021/22. CleanBC has a broader scope than the FCI; the FCI focus is on more reforestation, fertilization and planning to deepen BC's forests as a sink.

BC Timber Sales (BCTS) has developed a climate change strategy, said Kerri Brownie, RPF, and BCTS' stewardship officer. The strategy consists of a communications platform to ensure that all across the province, BCTS' offices have best practices and tools to mitigate climate change. It is an all-encompassing program that goes from planning, harvesting, road allocation, and into reforestation.

Brownie said that the concerns around forest fires is also causing BCTS to consider how it offers blocks for harvest with those at greater fire risks considered for harvest while the lay-out of cutblocks are being designed to provide fire breaks where possible.

"I know one of the big areas we are looking at is tree adaption to climate change," she said. "Everyone is paying more attention to what trees are going to be planted."

The bottom line, though, that the past, present and future work by the forest industry from planning, reforestation, tending, harvesting and devising long-term carbon sequestering is all adding up to an industry credit in more than one way.