CANADA'S WOOD PELLETS

MEETING CLIMATE CHANGE GOALS

The Role of Wood Pellets

For decades, wood waste from manufacturing was burned in beehive burners. Unwanted logs, branches, and tops from harvesting were either left on site, creating a fire hazard and potential insect infestation, or burned in piles, releasing carbon dioxide (CO_2) and fine particulate without generating any economic or energy benefit.

> Today, an increasing amount of that waste is being turned into wood pellets in Canada. Those pellets are used around the world to produce renewable, low carbon energy and to displace fossil fuels—supporting efforts to meet important global climate change targets.

Biomass, particularly wood pellets, is part of the climate change solution as we transition away from fossil fuels. The energy industry is increasingly using wood pellets to replace fossil fuels to substantially lower greenhouse gas (GHG) emissions. For example, reports to the UK energy regulator indicate that at Drax Power Station, wood pellets reduce GHG emissions by more than 80 percent compared to coal[1], even after accounting for fossil fuel emissions from harvesting, manufacturing, and transportation.

Power producers are not the only ones supporting energy from biomass. The United Nations Intergovernmental Panel on Climate Change (IPCC), the world's leading authority on climate change, has recognized the significant GHG mitigation potential of biomass—as much as 80 to 90 percent—provided that it is developed sustainably and used efficiently. [2] The European Commission's Joint Research Centre has also affirmed this position in a report on the implications of energy and climate policies worldwide.[3]

The need for sustainably sourced fuel is a strong argument for Canadian wood pellets. Canadian wood pellets are produced entirely from the residuals of responsibly managed forests, backed by a comprehensive regulatory framework and globally recognized independent certification.

WOOD PELLET ASSOCIATION OF CANADA

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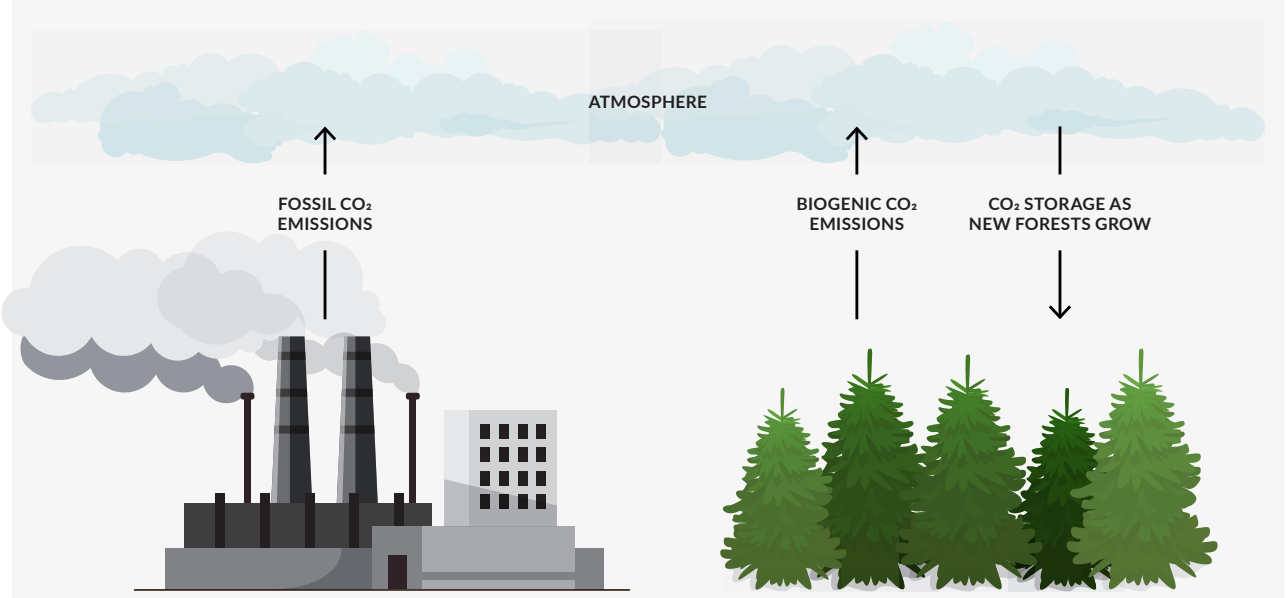
CO_2: FOSSIL FUELS VERSUS BIOMASS

While both fossil fuels such as coal and biological materials like wood pellets emit CO_2, it's ultimately the source of the CO_2 that determines the impact it will have on the atmosphere. Coal is a very efficient fuel, in that it provides more energy per kilogram than biomass, but it is not a renewable fuel. Coal is mined from carbon sinks that took millions of years to form, so when it is burned to produce energy it increases the total amount of CO_2 and other potent GHGs in the atmosphere. In Canada, energy made from woody biomass is generally derived from carbon that trees have absorbed from the atmosphere over the past 150 years. Much of this carbon remains stored in long-lived forest products, while harvested areas are reforested. Newly planted seedlings begin absorbing CO_2 from the atmosphere within a year of harvesting. Those factors make woody biomass a renewable energy source and an important alternative in the transition away from fossil fuels (see Figure 1).

Figure 1 Biogenic Versus Fossil CO_2 Emissions



MORE TO CO_2 AND PELLETS:

CO_2 is not the only GHG, nor the most potent one. The chart below, based on IPCC data, shows some naturally occurring gases, such as methane, have a much higher global warming potential than CO_2.

GREENHOUSE GAS	GLOBAL WARMING POTENTIAL OVER 100-YEAR TIME HORIZON
Carbon dioxide (CO_2)	1
Methane (CH4)	28
Nitrous oxide (N_2O)	265

Ash content—the material left behind after combustion—is another important consideration. Ash content is carefully monitored in the wood pellet sector and must meet strict customer requirements. The ash content of coal can be as high as 30 percent whereas industrial wood pellets have an ash content of less than three percent meaning wood pellets leave behind less waste after combustion.

SUSTAINABLE FOREST MANAGEMENT AND CARBON STORAGE

Like wood pellet customers, other consumers of forest products want to ensure those products come from sustainable sources. Canada's forest sector depends on responsibly managed forests to make lumber, panel products like plywood and oriented strand board, and pulp and paper products like tissue, cardboard, and printing paper. Per the Government of Canada, only 0.2 percent of Canada's forests are harvested annually,[4] and overall Canada's forests are growing faster than they are being harvested.

It is a fundamental requirement of sustainable forest management that the carbon stock in forests remains stable or increases over time. Forest professionals manage whole forests by dividing them into hundreds of individual forest stands or sections. As one plot is being harvested, another is being planted, another is being thinned, while in yet another, crews are removing competing brush to allow the trees to grow faster. While this is happening, the stands are being managed for other important values such as biodiversity, recreation, and cultural heritage. Since only a small fraction of the total forest is harvested each year, growth in the hundreds of adjacent stands adds up to at least the same, but most often more than the amount harvested. Newly planted stands sequester only small amounts of carbon, but will store more and more carbon over time until they reach maturity. At maturity, both growth and carbon sequestration slow until finally the trees are harvested and the cycle begins again. This concept is important in understanding forest carbon accounting.

When a single forest stand is harvested, about half of the carbon ends up being stored in long-lived forest products. In North America, 2x4 lumber is used to build 90 percent of North American houses, which last for many decades. Paper products (which are recycled up to seven times) also store carbon. Canada's approach to sustainable forestry ensures its forests as a whole act as a carbon sink. New engineered wood products are allowing wood to store carbon in even longer-lived structures, including high-rises. Figure 3 illustrates this carbon cycle in a typical sustainable forest management in Canada where timber is used to make lumber, pulp and paper products, and wood pellets.

WHY PELLETS?

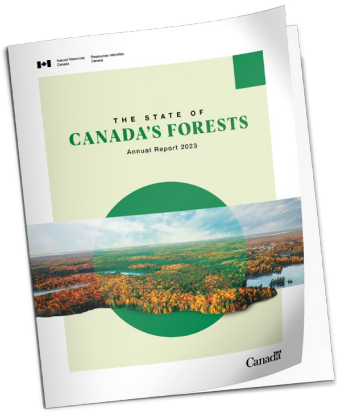
Canadian wood pellet manufacturers receive raw material in the form of sawdust, chips, and low-quality logs with up to 50 percent moisture content.

Wood pellet manufacturing consists of removing moisture from incoming wood fibre, grinding the fibre into dust, and compressing the dust into the shape of a pellet. Heat causes lignin—that naturally occurs in wood—to act as a glue to hold the compressed particles together. The result is a dry, highly compressed product that can be transported efficiently for very long distances.

With electric power plants, pellets are handled the same as coal. Pellets are ground back to dust, the dust is combined with air, and the resulting mixture is fed continuously to a flame which creates steam to generate electricity.

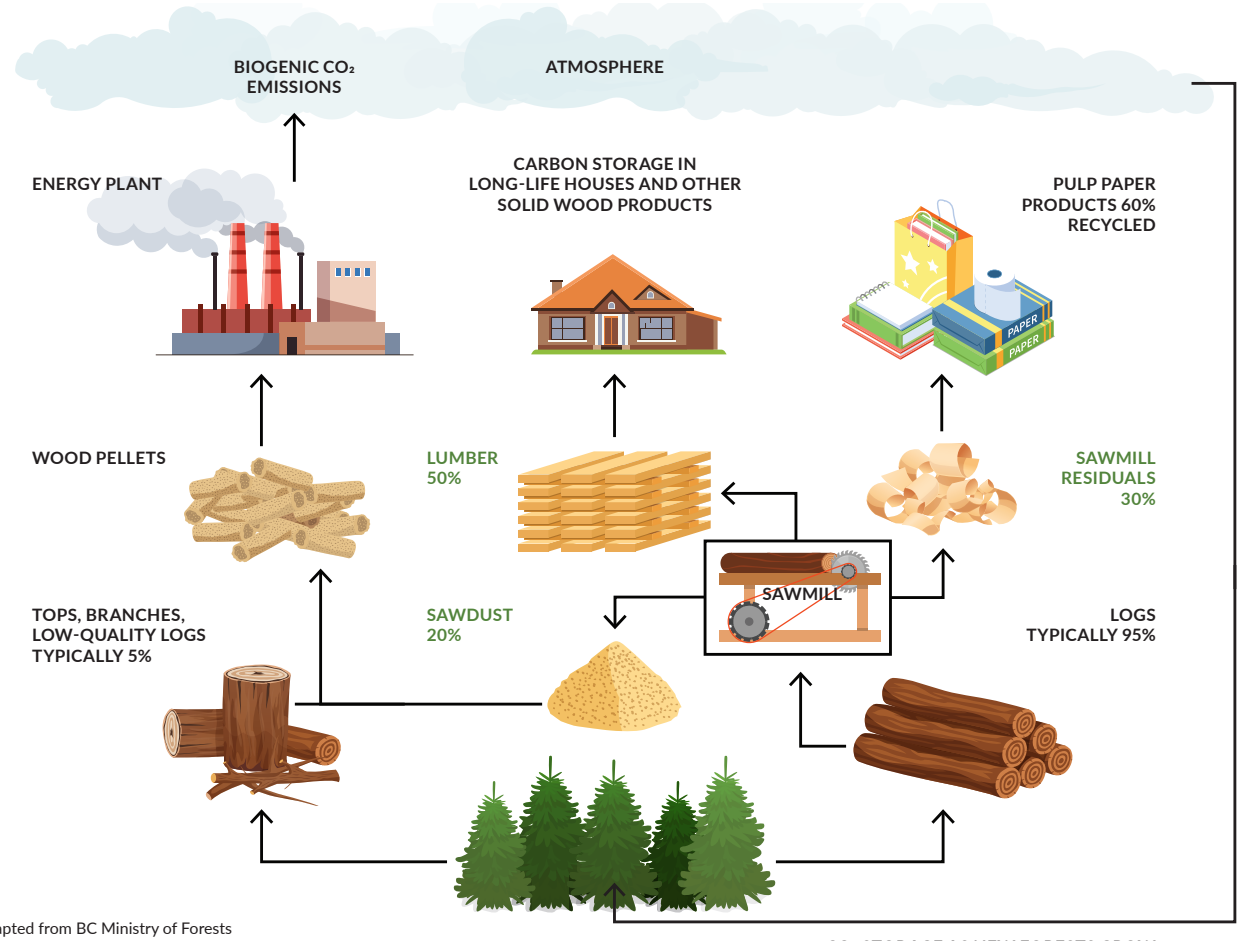
Despite the growing demand for clean energy, only a small amount of biomass makes its way into wood pellets. Canadian wood pellets are produced from the residuals of sustainably managed forests. Taken as a whole, these residuals account for a small amount of the annual harvest in Canada.

STATE OF CANADA'S FORESTS



Natural Resources Canada's 2023 State of Canada's Forests report highlights how sustainable forest management helps mitigates climate change by sequestering carbon through forest regeneration, growth, and timber harvesting. Long-

Figure 3 The Carbon Cycle in a Sustainably Managed Canadian Forest



Adapted from BC Ministry of Forests
2022 Major Timber Processing Facilities in British Columbia

lived wood products like lumber can displace emission-intensive materials such as concrete, steel, and plastic. Young forests grow quickly and absorb carbon efficiently. Residues from forest operations can also be converted into low-carbon biofuels, like wood pellets, which help replace fossil fuels and reduce CO_2 emissions.

Unfortunately, global warming has led to more frequent forest fires, particularly in remote, unmanaged areas, releasing excessive CO_2. In response, investments are being made to reduce wildfire risk by lowering forest fuel loads and improving firefighting capacity. The wood pellet sector contributes by salvaging burnt timber and replanting accessible areas to restore carbon sinks.

While wood pellets already support climate goals, emerging carbon capture and storage (CCS) technology could allow them to achieve net-negative emissions by permanently storing carbon deep underground. As large-scale CCS moves toward commercialization, its future impact looks promising.

Demand for responsibly sourced wood pellets offers two key benefits: it helps lower global GHG emissions and supports the use of the whole tree, helping to maximize domestic economic value. Canadian pellet producers work closely with suppliers to ensure responsible biomass sourcing while reducing waste—aligning with government goals for better utilization of natural resources use and more jobs. It's a natural win for all.

1 Drax ESG Performance Report 2024
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3 European Commission: Joint Research Centre, Keramidas, K., Fosse, F., Aycart Lazo, F.J., Dowling, P., Garaffa, R., Ordonez, J., Petrovic, S., Russ, P., Schade, B., Schmitz, A., Soria Ramirez, A., van Der Vorst, C. and Weitzel, M., Global Energy and Climate Outlook 2024, Publications Office of the European Union, Luxembourg, 2025, https://data.europa.eu/doi/10.2760/9028706, JRC139986.
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