

Environmental Product Declaration

Nordic LamTM

This Type III environmental declaration is developed according to ISO 21930 and 14025 for glued-laminated timber (glulam) manufactured at Nordic Structures. This environmental product declaration (EPD) reports environmental impacts based on established life cycle impact assessment (LCA) methods. The reported environmental impacts are estimates, and their level of accuracy may differ for a particular product line and reported impact. LCAs do not generally address site-specific environmental issues related to resource extraction or toxic effects of products on human health. Unreported environmental impacts include (but are not limited to) factors attributable to human health, land use change and habitat destruction. Forest certification systems and government regulations address some of these issues. The products in this EPD conform to: Forest Management Standards of Quebec and forest certification schemes (Forest Stewardship Council (FSC) and Certification of Forest Management Enterprises (CEAF)). EPDs do not report product environmental performance against any benchmark.

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NORDIC
STRUCTURES

FPIinnovations 

Manufacturer Information



This EPD represents glued-laminated timber produced at Nordic Structures located in Chibougamau, Quebec, Canada. This EPD is based on a life cycle assessment study compiled in 2018 with input and environmental output data gathered for the 2017 calendar year.

Product Description

"Nordic Lam™" is a glue-laminated structural timber product (glulam) made of black spruce and used as beams, headers, rafters, purlins, columns, studs and decking in buildings and other types of construction.

Product composition on the basis of 1m³ of glulam output at the mill gate:

- Wood portion: 1m³ (406 kg on oven dry basis)
- Adhesive: 0.43 kg (Polyurethane and isocyanate)
- Lumber wrap: 0.46kg (HDPE)

Scope: Cradle-to-gate.

Declared unit: 1m³ of glulam at mill gate.

System boundary: Life cycle activities from resource extraction through product (glulam) manufacture.

Geographic coverage: North America

Life Cycle Assessment

Life cycle assessment (LCA) is a rigorous study of inputs and outputs over the entire life of a product or process and the associated environmental impact of those flows to and from nature. The underlying LCA supporting this EPD relied on two LCA data sources: primary data gathered from Nordic's lumber and engineered wood product manufacturing facility located in Chibougamau, Quebec and in-house resource extraction data gathered from harvesting operations occurring in Quebec in 2016.

The system boundary includes all the production steps from extraction of raw materials from the earth (the cradle) through to final glulam product at the mill gate (the gate). See Figure 1. The boundary includes the transportation of major inputs to, and within, each activity stage.

This study followed the information modules defined in the wood products PCR:

- A1 – extraction (removal) of raw materials and processing;
- A2 – transportation of raw materials from an extraction site to a manufacturing site;
- A3 – manufacturing of the wood construction product, including packaging.

Ancillary materials such as hydraulic fluids, lubricants and packaging are included in the boundary. Mass or energy flows are excluded if they account for less than 1% of model flows and less than 2% of life cycle impacts in all categories. Human activity and capital equipment are excluded.



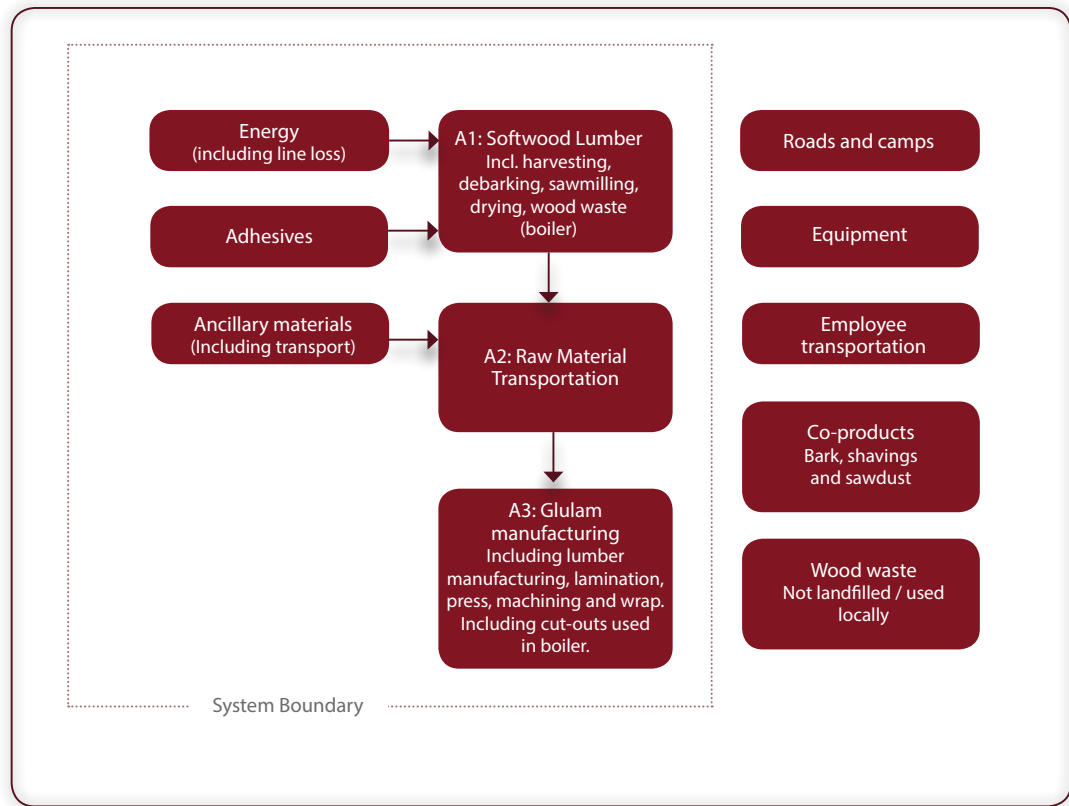


Figure 1: System Boundary and Process Flows

Environmental Performance

The U.S. Environmental Protection Agency's TRACI (Tool for the Reduction and Assessment of Chemical and other Environmental Impacts) life cycle impact assessment methodology is applied to calculate the environmental performance of glulam. Per declared unit energy and material resource consumption, waste and impact indicator results are presented in Table 1. Impact indicators used are global warming potential (GWP), acidification potential, eutrophication potential, smog potential, and ozone depletion potential. The LCA model is designed to track all carbon fluxes in the GWP measure: the carbon stored in glulam and all carbon emissions, including those from biomass combustion throughout the cradle-to-gate life cycle. A summary of the carbon balance at each life cycle stage is depicted in Table 2 on page 4.

Table 1: Environmental performance, 1m³ of Nordic Lam™ by life cycle stage – absolute values

Impact Category	Unit	Total	Resource Extraction	Resource Transport	Product Manufacturing
			A1	A2	A3
Global Warming	kg CO ₂ eq	100.38	35.97	49.35	15.07
Ozone depletion	kg CFC-11 eq	1.39E-06	3.99E-07	1.12E-08	9.77E-07
Acidification	kg SO ₂ eq	1.01	0.47	0.29	0.25
Eutrophication	kg N eq	0.08	0.03	0.02	0.03
Smog	kg O ₃ eq	30.99	14.40	7.89	8.70
Total Energy	MJ eq	2259.79	553.24	662.91	1043.64
Fossil	MJ eq	1423.32	543.60	661.81	217.92
Nuclear	MJ eq	23.91	0.80	0.28	22.84
Biomass	MJ eq	241.38	0.38	0.08	240.92
Other renewable*	MJ eq	571.17	8.47	0.75	561.95
<i>Material resource consumption</i>					
- Non-renewable materials	kg	5.16	0.47	0.15	4.54
- Renewable materials (wood)	kg	406.00			406.00
- Fresh water	m ³	0.04	2.10E-03	3.63E-04	0.03
<i>Waste generated</i>					
- Hazardous waste	kg	0.00	0.00	0.00	0.00
- Non-hazardous waste	kg	1341.76	1003.45	0.00	338.30
Feedstock energy	MJ**	8282.40			8282.40

Note: *Other renewables include solar, wind, geothermal and hydro

**Higher heating value basis

Additional Environmental Information

Sustainable Forestry

Nordic is committed to sustainable forestry and strictly applies government rules and regulations pertaining to forestry in order to ensure that forestry operations are carried out in a sustainable manner. In addition, the cutting strategy of Nordic is based on development plans aimed at minimizing the impact of forestry operations on soils from felling and skidding that, in turn, encourage native regeneration. Overall, these management practices aim to ensure the new stand stocking is at least 10% greater than the former stocking.

According to ASTM D7612, the company's wood fiber sources fall into the following category:

- Certified sources of Nordic's wood fiber comes from FSC certified forests

Carbon Balance

The carbon that is part of the molecular composition of wood. This carbon, which is removed as trees grow, is a consideration in greenhouse gas calculations and carbon footprints for wood products. The carbon content of 1 m³ of glulam (cradle-to-gate) is presented in Table 2.

Table 2: Carbon balance

Impact Category	kg of CO ₂ eq.
Forest carbon uptake	-741.36
Life cycle GHG emissions	100.38
Unaccounted biogenic carbon emissions in GWP reporting	26.70
Net GWP	-614.27

Note: *Carbon content in wood 49.8% on oven dry basis
(Hunt, et. al., 2010)

Glossary

Primary Energy Consumption

Primary energy is the total energy consumed by a process including energy production and delivery losses. Energy is reported in megajoules (MJ).

Global Warming Potential

This impact category refers to the potential change in the earth's climate due to accumulation of greenhouse gases and subsequent trapping of heat from reflected sunlight that would otherwise have passed out of the earth's atmosphere. Greenhouse gas refers to several different gases including carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). For global warming potential, these gas emissions are tracked and their potencies reported in terms of equivalent units of CO₂.

Ozone Depletion Potential

This impact category addresses the reduction of protective ozone within the atmosphere caused by emissions of ozone-depleting substances such as chlorofluorocarbons (CFCs). Reduction in ozone in the stratosphere leads to increased ultraviolet-B radiation reaching earth, which can have human health impacts as well as damage crops, materials and marine life. Ozone depletion potential is reported in units of equivalent CFC-11.

Acidification Potential

Acidification refers to processes that increase the acidity of water and soil systems as measured by hydrogen ion concentrations (H⁺) and are often manifested as acid rain. Damage to plant and animal ecosystems can result, as well as corrosive effects on buildings, monuments and historical artifacts. Atmospheric emissions of nitrogen oxides (NO_x) and sulphur dioxide (SO₂) are the main agents affecting these processes. Acidification potential is reported in terms of SO₂ mole equivalent per kilogram of emission.

Eutrophication Potential

Eutrophication is the fertilization of surface waters by nutrients that were previously scarce, leading to a proliferation of aquatic photosynthetic plant life which may then lead to further consequences including foul odor or taste, loss of aquatic life, or production of toxins. Eutrophication is caused by excessive emissions to water of phosphorus (P) and nitrogen (N). This impact category is reported in units of N equivalent.

Smog Potential

Photochemical smog is the chemical reaction of sunlight, nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the atmosphere. Ground-level ozone is an indicator, and NO_x emissions are a key driver in the creation of ground-level ozone. This impact indicator is reported in units of NO_x equivalent.

Source: Bare et al, 2003

References

ASTM D7612-10(2015) Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources, ASTM International.

Bare, Jane C., Gregory A. Norris, David W. Pennington and Thomas McKone. 2003. TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. *Journal of Industrial Ecology*, Vol.6 No.3-4.

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Hunt, S., Gordon, A. and Morris, M., 2010. Carbon Stocks in Managed Conifer Forests in Northern Ontario, Canada, *Silva Fennica* 44(4): 563–582.

About this EPD

PCR: North American Structural and Architectural Wood Products v2. June 2015 (Interim Version). Prepared by FPInnovations and available at www.fpinnovations.ca. PCR panel chaired by Thomas P. Gloria, Industrial Ecology Consultants.

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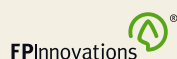
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EPDs based on cradle-to-gate information modules using a declared unit shall not be used for comparisons. For additional information on this EPD, please contact Julie Frappier - Director of technical services.

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EPDs from different programs may not be comparable
EPD is based on LCA done by FPInnovations
EPDs do not address all issues of relevance to sustainability

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EPD Review:

Independent verification of the declaration and data, according to ISO 14025 (please circle or check):

Internal External ☒

Third party verifier:

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