An Environmental Product Declaration

According to ISO 14025:2006 and ISO 21930:2017

A company-specific cradle-to-gate EPD for Element5 Cross-Laminated Timber (CLT)

ELEMENT5 LP – MODERN TIMBER BUILDINGS

ASTM International Certified Environmental Product Declaration

This document is a Type III environmental product declaration (EPD) for Element5 CLT, as manufactured at the Element5 St. Thomas, Ontario facility for the reference year 2021.

This declaration has been prepared in accordance with UL Environment PCR Part A 2018 (1), UL Environment PCR Part B 2019 (2), ISO 21930 (3), ISO 14025 (4), ISO 14040/44 (5), (6), and ASTM General Program Instructions for a Type III EPD (7).

The intent of this document is to further the development of environmentally compatible and more sustainable construction methods by providing comprehensive environmental information related to potential impacts of Element5 CLT in accordance with international standards.

Environmental Product Declaration Summary

General Information	
Owner of the EPD	**ELEMENT5 LP – MODERN TIMBER BUILDINGS** 114 - 67 Mowat Avenue Toronto, ON M6K 3E3 Link (URL): https://elementfive.co/ Element5 is a mass timber manufacturer offering an integrated suite of products and services to support mass timber projects across Canada, the USA and internationally. Element5 serves a community of forward-thinking architects, owners, developers, and general contractors to help affect change by providing timber construction cost consulting, design consulting, engineering, fabrication, and assembly services. *The owner of the declaration is liable for the underlying information and evidence.*
Manufacturing Site	70 Dennis Rd, St. Thomas, Ontario N5P 0B6
Product Group and Names	CSI code 06 17 19, Cross-Laminated Timber (CLT)
Product Definition	CLT is a proprietary engineered wood product that is prefabricated using several layers of kiln-dried lumber, laid flat-wise, and glued together on their wide faces. Panels typically consist of three, five, seven, or nine alternating layers of dimension lumber. The alternating directions of the CLT laminations provide it with high dimensional stability (8).
Product Category Rule (PCR)	UL Environment PCR Part B 2019 for North American Structural and Architectural Wood Products (2).
Certification Period	12/15/2022 – 5-year validity
Declared Unit	One cubic meter (1 m^3) of CLT manufactured at St. Thomas, Ontario facility
ASTM Declaration Number	EPD – 408

EPD Information	
Program Operator	ASTM International https://www.astm.org/products-services/certification/environmental-product-declarations/epd-pcr.html

Declaration Type

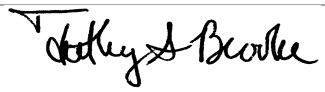
This company specific "cradle-to-gate" production stage EPD applies to Element5 CLT products. Production activities covered include *the extraction and upstream production, transport to factory and manufacturing* (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.

Applicable Countries

Canada and United States

Product Applicability

Element5's CLT can be used in many structural applications including floors, walls, roofs, shearwalls, elevator cores, and stairs.

This EPD was independently verified by ASTM in accordance with ISO 14025 and the ISO 21930:		 Tim Brooke 100 Barr Harbor Drive West Conshohocken, PA 19428-2959, USA https://www.astm.org/
Internal	**External** **X**	

EPD Project Report Information	
EPD Project Report	A Cradle-to-Gate Life Cycle Assessment of Cross-laminated Timber (CLT) and Glued-laminated Timber (Glulam) Manufactured by ELEMENT5, November 2022.
Prepared by Athena Sustainable Materials Institute	Lindita Bushi PhD, Grant Finlayson, and Jennifer O'Connor Athena Sustainable Materials Institute 280 Albert St, Suite 404 Ottawa, Ontario, K1P 5G8, Canada info@athenasmi.org www.athenasmi.org
This EPD project report was independently verified by and in accordance with ISO 14025, ISO 14040/44, and ISO 21930:	Thomas P. Gloria, Ph.D. Industrial Ecology Consultants 35 Bracebridge Rd Newton, MA 02459-1728
EPD explanatory material	For any explanatory material, regarding this EPD, please contact the program operator: ASTM International Environmental Product Declarations 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, http://www.astm.org

1 PRODUCT IDENTIFICATION

1.1 PRODUCT DEFINITION

CLT is a proprietary engineered wood product that is prefabricated using several layers of kiln-dried lumber, laid flat-wise, and glued together on their wide faces. Panels typically consist of three, five, seven, or nine alternating layers of dimension lumber. The alternating directions of the CLT laminations provide it with high dimensional stability (9).

Element5 CLT is manufactured in the St. Thomas plant (a Forest Stewardship Council (FSC) certified facility) using sustainably sourced wood from northern Ontario forests. At 3.5m maximum width, the St. Thomas press produces the widest panels available in Canada, delivering enhanced efficiency to any build. The fully automated, state-of- the-art factory in St. Thomas, Ontario produces visually superior, edge glued CLT panels made from sustainably sourced spruce-pine-fir (SPF) lumber. CLT can be used in many structural applications including floors, walls, roofs, shearwalls, elevator cores, and stairs (10).

Figure 1 shows the CLT specifications. Additional product properties and characteristics for CLT can be viewed and downloaded from Element5's website (10).

Table 1. Element5 CLT- Product Specifications

Product Properties	Amount	Unit
CLT		
CLT	448.0	kg/m^3
Moisture Content	12.0+/-3%	%
Cross Laminated Timber (CLT) characteristics		
Stress grade	V2, E1	
Service Condition	Dry use	
Uses	Floor and roof slabs, Wall panels, Shearwalls, Stairwell & elevator cores, other applications	
Appearance grades	Industrial and architectural	
Species	Spruce-Pine-Fir (SPF), other species upon request	
Number of layers	3, 5, 7 and 9	
Thicknesses	Maximum Panel Thickness - 380 mm (15")	
Maximum width	3.2m visual, 3.5m non-visual	
Lengths	Various, up to a maximum of 16.0m (52 ft)	

1.2 APPLICABLE STANDARDS

The Element5 CLT products follow the applicable standards identified in Table 2.

Table 2. CLT Standards

Products	Applicable Standards
CLT[1)]	ANSI/APA PRG 320-2019 Standard for Performance-Rated Cross-Laminated Timber (2) ASTM D9-12: Standard Terminology Relating to Wood and Wood-Based Products (2)

Note:
[1)] The St. Thomas, Ontario, Canada facility is 3rd party certified to meet the certification requirements of the certifying body to manufacture cross laminated timber.

2 DECLARED UNIT

The declared unit is defined as the quantity of a construction product for use as a reference unit in an EPD based on LCA for the expression of environmental information in information modules (3). The declared product is one cubic meter (1 m^3) of CLT manufactured at the St. Thomas, Ontario facility – see Table 3.

Table 3. Declared Unit – CLT

Property	CLT
Declared unit	1 m^3
Density (kg/m^3)	448.0
Moisture Content (%)	12.0
Weighted average thickness (mm)	148

3 MATERIAL CONTENT

The material content by input material (in %) per 1 m^3 CLT is provided in Table 4.

Table 4. Material content – 1 m^3 CLT

Material content	CLT
Softwood lumber	98.7%
Adhesives and hardener	1.3%
Total weight	100.0%

4 LIFE CYCLE STAGES

Figure 1 shows the life-cycle stages and information modules that are included within the cradle-to-gate LCA system boundary of this EPD. The boundary is “cradle-to-gate,” which includes the *Production stage* (A1 to A3 modules). *Construction, Use, and End-of-Life stages* are excluded from the system boundary. The Element 5 CLT manufacturing line and *Production stage* system boundary is shown in Figure 2.

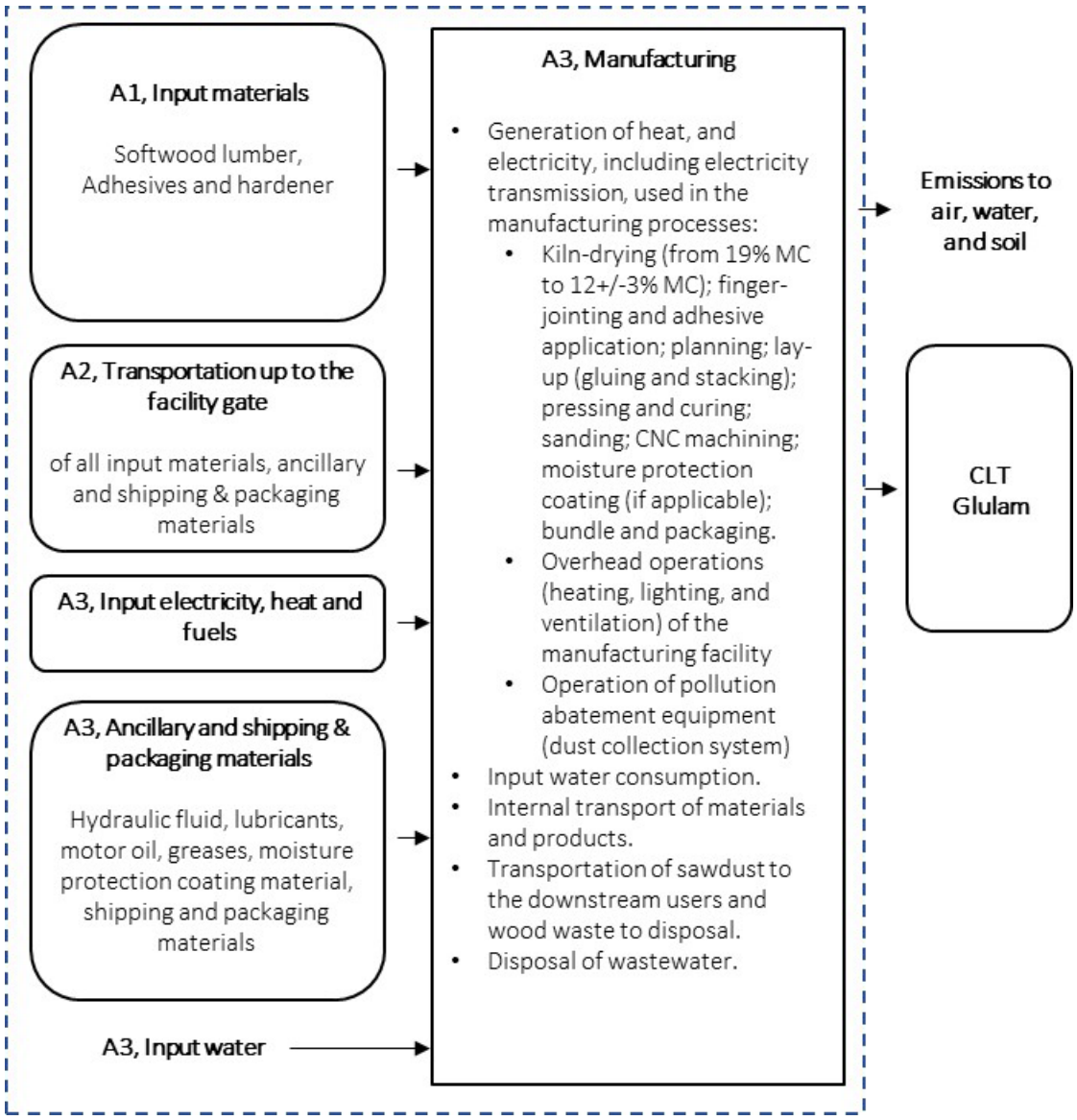
Per ISO 21930, 7.1.7.2.1 (3), *the system boundary with nature (natural environment) includes those technical processes that provide the material and energy inputs into the system and the subsequent manufacturing and transport processes up to the factory gate, as well as the processing of any waste arising from those processes.*

Figure 1 Life Cycle Stages and Modules

Production stage			Construction stage		Use stage							End-of-life stage			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction/ Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X			MND												
X- module is included in system boundary; MND- module is not declared (excluded from system boundary)															

Figure 2 Element5 CLT manufacturing line

Figure 3 Production stage (module A1 to A3) system boundary of Element5 CLT manufacturing



5 LIFE CYCLE INVENTORY

5.1 DATA COLLECTION, SOURCES, AND CALCULATIONS

LCI data collection was based on one customized LCI survey. The LCI survey covered the primary data for the St. Thomas, ON facility for the 2021 reference year (12 consecutive months).

Data calculation procedures follow ISO 14044 (6), and ISO 21930 (3). The LCA model was developed using SimaPro v.9.2 2022 (11). SimaPro LCA software contains recognized databases (e.g., ecoinvent v3.8, 2021 database, Allocation, Cut-off by classification and U.S. LCI Database, 2015) that provide LCI datasets for upstream, core, and downstream material and processes. SimaPro 9.4 2022 also contains the U.S. EPA TRACI v2.1 2012 LCIA methodology (12), CML-baseline version 4.7 2016 LCIA methodology, the Cumulative Energy Demand, LHV (NCV) version 1.0 November 2018, and RECIPE 2016 H which are used for this LCA study. Per ISO 21930, 7.2.2 (3), when transforming the inputs and outputs of combustible material into inputs and outputs of energy, the net calorific value (lower heating value) of fuels is applied according to scientifically based and accepted values specific to the combustible material.

5.2 DATA QUALITY REQUIREMENTS AND ASSESSMENTS

A detailed description of collected data and the data quality assessment regarding ISO 14044 (6), ISO 21930 (3) and UL PCR Part B (2) is provided in the LCA project report. Data quality is assessed based on its representativeness (technology coverage, geographic coverage, time coverage), completeness, consistency, reproducibility, transparency, and uncertainty (Table 5).

Table 5. Data Quality Requirements and Assessments

Data Quality Requirements	Description
Technology Coverage	Data represents the prevailing technology at St. Thomas's manufacturing plant in Ontario, Canada. Whenever available, Canadian, or North American typical or average industry LCI datasets were utilized for all upstream and core material and processes. *Technological representativeness is characterized as "high".*
Geographic Coverage	The geographic region considered is Canada. Whenever available, for all upstream and core material and processes, geographic specific LCI datasets were utilized. *Geographical representativeness is characterized as "high".*
Time Coverage	Activity data are representative. - CLT manufacturing and in-bound/ out-bound transportation data- primary data collected for reference year 2021 (12 months) - Eastern Canadian Surfaced Dry Softwood Lumber - primary data collected for reference year 2016 (12 months) (13). - Generic data: the most appropriate LCI datasets were used as found in the ecoinvent v.3.8 database for US and global and US LCI Database, and modeled in SimaPro LCA software v.9.4, 2022 (11). *Temporal representativeness is characterized as "medium" to "high".*

Data Quality Requirements	Description
Completeness	All relevant, specific processes, including inputs (raw materials, energy, and ancillary materials) and outputs (emissions and production volume) were considered and modeled. The relevant background materials and processes were taken from the ecoinvent v.3.8 LCI database for Canada, North A and global, and US LCI Database and modeled in SimaPro LCA software v.9.4, 2022 (11). The completeness of the cradle-to-gate process chain in terms of process steps is rigorously assessed and benchmarked for CLT and documented in the project report.
Consistency	To ensure consistency, the input/output LCI modeling of the CLT used the generic LCI modeling structure, which consisted of input raw, secondary, ancillary, and packaging materials, intermediate products, energy flows, water resource inputs, product outputs, co-products, by-products, emissions to air, water and soil, and solid and liquid waste disposal. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the facility level to maintain a high level of consistency.
Reproducibility	Internal reproducibility is possible since the data and the models are stored and available in *Athena Element5 LCI database* developed in SimaPro, 2022. A high level of transparency is provided throughout the reviewed LCA project report as the LCI profile is presented for the declared product. Key primary (manufacturer specific) and secondary (generic) LCI data sources are summarized in the supporting LCA project report.
Transparency	Activity and LCI datasets are transparently disclosed in the LCA project report, including data sources.
Uncertainty	A *sensitivity check* was conducted to assess the reliability of the EPD results and conclusions by determining how they are affected by uncertainties in the data or assumptions on calculation of LCIA and energy indicator results. The LCA background report includes the results of a *sensitivity analysis* and *Monte Carlo uncertainty analysis of background data sets.*

5.3 ALLOCATION RULES

The St. Thomas, ON manufacturing facility produces both CLT and Glulam, therefore allocation was necessary. Per UL PCR Part B, 3.5 (2), mass is used as the basis for co-product allocation.

"Mass" based, plant specific data for 1 m^3 of CLT were used to calculate the input raw materials consumed. "Mass" was used as the physical parameter for allocating flows between the CLT and Glulam to calculate the input energy flows (electricity, natural gas, and propane), ancillary, shipping and packaging materials used at the facility, total water consumption, process emissions to air and water (if applicable), and waste flows. The LCI modeling accounts for the manufacturing yield. The manufacturing process does produce wood waste that is stockpiled and picked up for disposal. No environmental burden has been allocated to wood waste. Allocation related to transport is based on the mass of transported inputs and outputs. An explanation of the allocation methodology of upstream surfaced dry softwood lumber production is provided in the lumber LCA report (13). In conformance with UL PCR Part B, 3.5, the cradle-to-gate surfaced dry softwood lumber data (based on mass allocation) are used in this EPD project.

5.4 CUT OFF RULES

The cut-off criteria as per ISO 21930, 7.1.8 (3) and UL PCR Part B, 3.6 (2) were followed. All input/output data collected at the St. Thomas, ON facility were included in the LCI modelling developed using SimaPro v.9.4 2022 (11). The cut-off rules are not applied to hazardous and toxic material flows. No material flows of very high concern are identified in the framework of this EPD project. None of the input/output was knowingly excluded from the system boundary. Material Data Sheets (MDSs) were used for hardener, plastic lumber wrap, and moisture protection coating material. Any data gaps in the MDS were filled in with two (proxy) generic LCI datasets, as appropriate (conservative assumptions): Chemical, organic {GLO}| market for | Cut-off, U; Chemical, inorganic {GLO}| market for | Cut-off, U.

This EPD excludes the following processes:

- Capital goods and infrastructure, and
- Personnel related activity (travel, furniture, office operations and supplies).

6 LIFE CYCLE ASSESSMENT RESULTS

Table 6 presents the "cradle-to-gate" LCA results for 1 m^3 CLT.

As per the US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), version 2.1, 2012 (12), (14) impact categories are used as they provide a North American context for the mandatory category indicators to be included in this EPD. *These are relative expressions only and do not predict category impact endpoints, the exceeding of thresholds, safety margins or risks* (6). Per ISO 21930, 7.1.7.1 (3), "individual indicators for information modules A1, A2 and A3 may be aggregated to a total for each indicator in the production stage". The TRACI methodologies are used for North American EPDs and are consistent with UL PCR Part A and B (1), (2).

Table 6 presents the cradle-to-gate LCA results per UL PCR Part A and B (1), (2) and ISO 21930 (3) for CLT. Per UL PCR Part A (1), "*GWP100, ODP, AP, EP, SFP, and ADP_{fossil} impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.*"

Per ISO 21930, 9.5.2 (3) and UL PCR Part B, 5.2 (2), the following mandatory inventory indicators describing resource use, waste categories and output flows are reported as described in Table 6. The total primary energy consumption is tabulated from the LCI results based on the Cumulative Energy Demand method, LHV (NCV) version 1.0 November 2018 (11). Lower heating value (LHV) of primary energy carriers is used to calculate the primary energy values reported in the LCA study. The consumption of freshwater parameter was calculated using the RECIPE 2016 H method (11). Other inventory parameters concerning material use, waste, and biogenic carbon were drawn from the LCI results in accordance with the ACLCA Guidance to Calculating non-LCIA Inventory Metrics in Accordance with ISO 21930:2017 (15). The LCA model was developed using SimaPro v.9.4 2022 (11).

Table 6. Production stage (A1-A3) EPD results for 1 m³ CLT

Impact category and inventory indicators	Unit	CLT
Global warming potential, GWP 100[1)]	kg CO_2 eq	**122.0**
Ozone depletion potential, ODP[1)]	kg CFC-11 eq	**1.3E-05**
Smog formation potential, SFP[1)]	kg O_3 eq	**16.9**
Acidification potential, AP[1)]	kg SO_2 eq	**0.80**
Eutrophication potential, EP[1)]	kg N eq	**0.14**
Fossil fuel depletion, FFD[1)]	MJ surplus	**279.4**
Abiotic depletion potential, fossil ADPf[2)]	MJ	**1,907**
Renewable primary resources used as an energy carrier (fuel), RPR_E	MJ	**2,091**
Renewable primary resources with energy content used as material, RPR_M[3)]	MJ	**8,857**
Non-renewable primary resources used as an energy carrier (fuel), $NRPR_E$	MJ	**3,312**
Non-renewable primary resources with energy content used as material, $NRPR_M$[3)]	MJ	**0**
Secondary materials, SM[3)]	kg	**0**
Renewable secondary fuels, RSF[3)]	MJ	**0**
Non-renewable secondary fuels, NRSF[3)]	MJ	**0**
Recovered energy, RE[3)]	MJ	**0**
Consumption of freshwater, FW[3)]	m³	**4.51**
Hazardous waste disposed, HWD[3)]	kg	**1.1E-05**
Non-hazardous waste disposed, NHWD[3)]	kg	**28.2**
High-level radioactive waste, conditioned, to final repository, HLRW[3)] [4)]	m³	**4.5E-06**
Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW[3)]	m³	**6.3E-06**
Components for re-use, CRU[3)]	kg	**0**
Materials for recycling, MR[3)]	kg	**0**
Materials for energy recovery, MER[3)]	kg	**0**
Recovered energy exported from the product system, EE[3)]	MJ	**0**

Notes:

[1)] Calculated as per U.S EPA TRACI 2.1, SimaPro v 9.4 GWP-100, excludes biogenic CO_2 removals and emissions associated with any biobased products, including bio-based packaging (not applicable). Carbon emissions from calcination, carbon removals from carbonation, and carbon emissions from combustion of waste from non-renewable sources are not applicable to the declared products. 100-year time horizon GWP factors are provided by the IPCC 2007 Forth Assessment Report (AR4), TRACI 2.1 (14). FFD is required in LEED v4.1 MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations (16).

[2)] Calculated as per CML-IA Baseline v3.05, SimaPro v 9.4. ADP_f is also required in LEED v4.1 MR2 Credit: Building Product Disclosure and Optimization – Environmental Product Declarations (16).

[3)] Calculated as per ACLCA ISO 21930 Guidance (15), respective sections 6.2 to 10.8.

[4)] It should be noted that the foreground system (Element5 CLT manufacturing process) does not generate any HLRW or ILLRW. High, intermediate, or low-level radioactive waste is generated by electricity production (spent fuel from reactors, routine facility maintenance and operations)" (ISO 21930:2017, clause 7.2.14). High-level radioactive waste, e.g., when generated by electricity production, consists mostly of spent fuel from reactors." (ISO 21930:2017, clause 7.2.14).

7 BIOGENIC CARBON INVENTORY PARAMETERS

To ensure transparency, Table 7 shows additional inventory parameters related to biogenic carbon removal and emissions. The carbon dioxide flows are presented unallocated to consider co-products leaving the product system in information module A3. Even though the system boundary of this study included only the information modules A1-A3, in accordance with ISO 21930 Biogenic Carbon Emission from Packaging (BCEK) was reported in A5 and Biogenic Carbon Emission from Product (BCEP) of the main product in C3/C4.

Per ISO 21930, the flows of biogenic carbon expressed in CO_2 in bio-based materials that are reused, recycled, or combusted as the end-of-life scenario will result in zero net contribution to GWP when GWP is considered over the whole life cycle (information modules A1 to C4). The net carbon emissions across the entire life cycle of Element 5 CLT are zero. It is assumed that all carbon removed from the atmosphere is eventually emitted to the atmosphere as CO_2. Net GWP Bio includes biogenic carbon emissions and removals from information modules A1-A3, A5 and C3/C4, leading to a net zero contribution of biogenic carbon to GWP Bio.

Table 7. Biogenic carbon inventory parameters for 1 m^3 of Element5 CLT (A1 to C4)

Additional inventory parameters	Unit	Total	A1	A2	A3	A5	C3/C4
BCRP: Biogenic Carbon Removal from Product[1)]	kg CO_2	-865.9	-865.9	0	0	0	0
BCEP: Biogenic Carbon Emission from Product[1)]	kg CO_2	865.9			90.3[2)]		775.6[3)]
BCRK: Biogenic Carbon Removal from Packaging	kg CO_2	0	0	0	0	0	0
BCEK: Biogenic Carbon Emission from Packaging	kg CO_2	0	0	0	0	0	0
BCEW: Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production	kg CO_2	0	0	0	0	0	0
Net GWP Bio	**kg CO_2**	**0**					

Notes to Table 7:
1) Biogenic CO_2 emissions are calculated on an oven-dry weight basis; Biogenic C content of the biomass is assumed 50%. To convert the amount of biogenic C to CO_2 emissions, the 44/12 molecular weight ratio is applied.
2) Biogenic CO_2 emissions of the biomass leaving the CLT manufacturing system in A3.
3) Biogenic CO_2 emissions of the declared products at the end-of-life (assumed to be reused, recycled, or combusted).

7.1 CRADLE-TO GRAVE CARBON SEQUESTRATION

Table 7 presents the biogenic carbon inventory parameter results assuming the declared products are reused, recycled, or combusted at the end of life (carbon neutral approach). This assumption excludes the permanent sequestration of biogenic carbon if the LCA were to consider the typical end-of-life treatment for wood products in North America: landfilling.

UL PCR Part B (2) includes an addendum that estimates the emissions from landfill of wood products. The carbon sequestration addendum is based on the US EPA WARM model and aligns with the biogenic accounting rules in ISO 21930, 7.2.7 and 7.2.12. Because the end-of-life fate of the declared product is unknown, the default disposal pathway from UL PCR Part A, 2.8.5, 100% landfill, is applied.

Cradle-to-grave carbon sequestration calculation for CLT:
1 m^3 CLT = 423.0 oven dry kg = 211.5 kg C = 775.6 kg CO2 eq

Carbon sequestered in CLT at manufacturing gate: - 775.6 kg CO_2 eq

Methane emitted from fugitive landfill gas: 1.5 kg CH_4= 37.3 kg CO_2 eq emission

Carbon dioxide emitted from fugitive landfill gas and the combustion captured landfill gas: 87.2 kg CO_2 eq emission

Permanent carbon sequestration per cubic meter of CLT: - 651.1 kg CO_2 eq

8 INTERPRETATION

The Element5 CLT EPD results represent a "cradle-to-gate" environmental profile per 1 m^3 of CLT as manufactured at its St. Thomas, ON plant for the reference year 2021.

Module A1 Extraction and upstream production contributes the largest share of the LCIA category indicator results, accounting for between 38% ($NRPR_E$) and 92% (RPR_E) of the potential environmental burdens. *Module A2 Transportation* contributed less than 17% to the overall potential impact of CLT production stage. *Module A3 Manufacturing* contributed 39% to GWP 100 and is the second largest contributor to the overall potential environmental impacts of CLT manufacture.

9 ADDITIONAL ENVIRONMENTAL INFORMATION

- The Element5 St. Thomas facility is Forest Stewardship Council (FSC) certified. FSC certification ensures that products come from responsibly managed forests that provide environmental, social, and economic benefits.
- The St. Thomas, ON facility uses a dust collection system.

10 DECLARATION TYPE

This "cradle-to-gate" EPD applies to Element5 CLT. Production activities covered include *the extraction and upstream production, transport to factory, manufacturing* (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.

The CLT EPD falls under the description:
- A product-specific EPD, from one (1) manufacturer's facility.

11 EPD COMPARABILITY LIMITATION STATEMENT

The following ISO 14025, ISO 21930 and UL PCR Part B statements indicate the EPD comparability limitations and intent to avoid any market distortions or misinterpretation of EPDs (4), (3), (2):

- *Environmental declarations from different programmes may not be comparable.*
- *Comparison of the environmental performance using EPD information shall consider all relevant information modules over the full life cycle of the products within the building.*
- *This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 §5.5 are met. It should be noted that different LCA software and background LCI datasets may lead to differences in results for upstream or downstream of the life cycle stages declared.*
- *While this EPD does not address landscape level forest management impacts, potential impacts may be addressed through requirements put forth in regional regulatory frameworks, ASTM 7612-15 guidance, and ISO 21930 Section 7.2.11 including notes therein. These documents, combined with this EPD, may provide a more complete picture of the environmental and social performance of wood products.*
- *While this EPD does not address all forest management activities that influence forest carbon, wildlife habitat, endangered species, and soil and water quality, these potential impacts may be addressed through other mechanisms such as regulatory frameworks and/or forest certification systems which, combined with this EPD, will give a more complete picture of the environmental and social performance of wood products.*
- *EPDs can complement but cannot replace tools and certifications that are designed to address environmental impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, etc.*
- *National or regional life cycle averaged data for raw material extraction does not distinguish between extraction practices at specific sites and can greatly affect the resulting impacts.*
- *Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact when averaging data. Variability was estimated in this EPD by Monte Carlo Uncertainty Analysis.*

11 REFERENCES

1. UL Environment 2018 Product Category Rule (PCR) Guidance for Building Related Products and Services, Part A Life Cycle Assessment Calculation Rules and Report requirement, v3.2.

2. UL Environment (2019) Product Category Rule (PCR) Guidance for Building-Related Products and Services, Part B: Structural and Architectural Wood Products EPD Requirements.

3. ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

4. ISO 14025: 2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.

5. ISO 14040/Amd1:2020 Environmental Management – Life Cycle Assessment – Principles and Framework, International Organization for Standardization, 2006.

6. ISO 14044/Amd1:2017/Amd2:2020 Environmental Management – Life Cycle Assessment – Requirements and guidelines, International Organization for Standardization, 2006.

7. ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions, 04/29/20.

8. Canadian Wood Council, 2022, Cross-Laminated Timber (CLT). https://cwc.ca/en/how-to-build-with-wood/wood-products/mass-timber/cross-laminated-timber-clt/.

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