Environmental Product Declaration

In accordance with ISO 14025:2006 and
EN 15804:2012+A2:2019/AC:2021 for:

LVL (Laminated Veneer Lumber)

by

Stora Enso

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14, v1.2.5. Construction products (EN 15804:A2). Sub-PCR- 006, Wood and wood-based products for use in construction (EN 16485). UN CPC 314*
PCR review was conducted by: *The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.*
Life Cycle Assessment (LCA)
LCA accountability: *Product Sustainability, Stora Enso – Division Wood Products*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Martin Erlandsson, IVL Swedish Environmental Research Institute*      Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

Please note: *EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.*

Company information

Owner of the EPD: Stora Enso
Contact: Product Sustainability – Division Wood Products
Description of the organisation: Part of the global bioeconomy, Stora Enso is a leading provider of renewable products in packaging, biomaterials, wooden construction and paper, and one of the largest private forest owners in the world. We believe that everything that is made from fossil-based materials today can be made from a tree tomorrow. With renewable materials at the foundation, our solutions for paper, packaging, wooden construction and biomaterials are today found across continents and industries. We are active in sectors such as building, retail, food and beverages, manufacturing, publishing, pharmaceutical, cosmetics, confectionary, hygiene and textiles.

The Wood Products division is the largest sawn wood producer in Europe and a leading provider of renewable wood-based solutions for the construction industry. Our growing Building Solutions business offers building concepts to support low-carbon construction and sustainable designs. We develop digital tools to simplify the designing of building projects with wood. We also offer applications for windows, doors and for packaging industries, and our pellets provide a sustainable heating solution.

All our mills run an integrated management system, which is certified in accordance with Chain of Custody (FSC® and/or PEFC), quality management (ISO 9001), environmental management (ISO 14001), health and safety (ISO 45001), and energy management (ISO 50001) requirements.

Product-related or management system-related certifications:
ISO 9001:2015 Quality Management System
ISO 14001:2015 Environmental Management System
ISO 45001:2018 Occupational Health and Safety Management System
ISO 50001:2018 Energy Management System
FSC® and PEFC Chain of Custody multi-site certificates
Due Diligence System standard (FSC® Certified Wood, PEFC, Sustainable Biomass Program)

Name and location of production site(s):

Mill name	Location	LVL annual capacity
Varkaus LVL Mill	Taipaleentie 15, P.O. Box 169, FI-78201 Varkaus, Finland	85 000 m^3

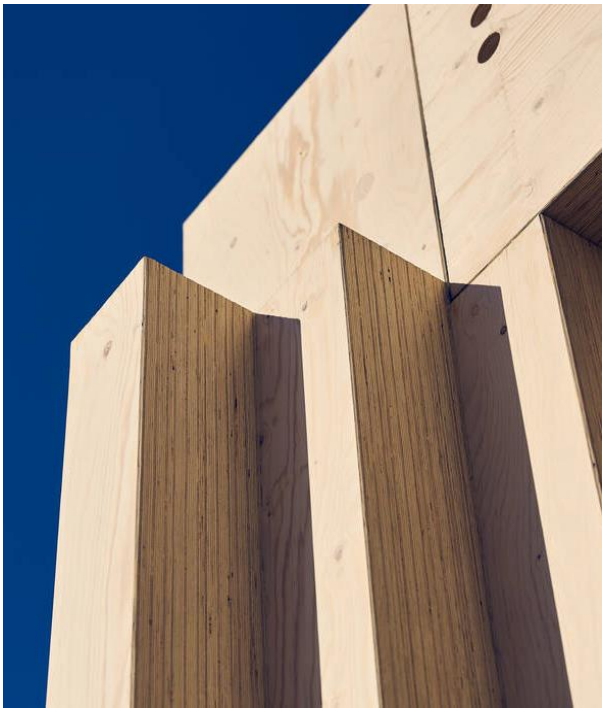
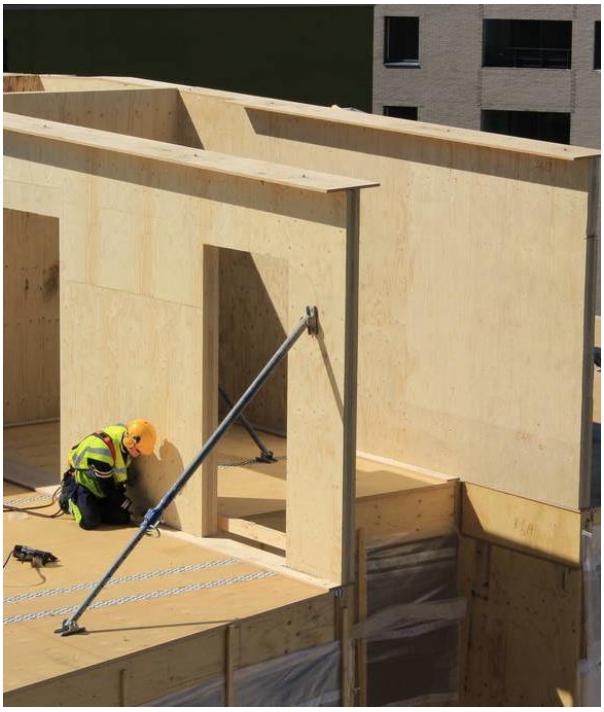
This EPD covers 100 % of the LVL by Stora Enso production (volume). Life Cycle Impact Assessment results are weighted averages of the production volumes of the reference year of data.

Product information

Product name: LVL by Stora Enso, LVL G by Stora Enso
Product identification: Produced and monitored according to the harmonised standard EN 14374 in Finland.
Product description: Laminated veneer lumber (LVL) is an advanced wood product developed for the demands of today's building and construction industry. It consists of 3 mm spruce veneers glued together and is engineered to be relatively stronger than steel, yet lighter than concrete, while being highly workable and durable.

This massive wood product harnesses the power of Nordic Spruce. LVL by Stora Enso and LVL G by Stora Enso, which comprises multiple LVL panels glued together, have proven their value as the preferred choice for a wide range of structural applications.
It is suitable for floor, roof and wall panels, studs, post and beam frames.

LVL by Stora Enso is the preferred choice for structural applications such as beams and columns when the ideal solution looked for is strength, dimensional stability, and high load-bearing capacity.
LVL by Stora Enso delivers high technical performance and predictable results with standard woodworking tools thanks to its homogeneous and consistent quality.

LCA information

Functional unit / declared unit: 1 m³ of LVL by Stora Enso or LVL G by Stora Enso with a moisture content of 9 %.

Reference service life: The reference service life (RSL) is understood as the period of time until the structure is replaced, rebuild, renovated or restored. If properly installed, the service lifetime of LVL by Stora Enso is equal to the lifetime of the building, and thus 50 years is the default reference service life. Wood products can reach over 100 years' service life in service classes 1 and 2.

Time representativeness: Data for the study was collected from the production site and represents year 2022. This data includes raw material supply, transport operations, fuels, energy consumption, packaging, produced LVL by Stora Enso and LVL G by Stora Enso, by-products and waste.

Database used: ecoinvent 3.8 (November 2021)

LCA software used: SimaPro 9.3.0.3

Description of system boundaries:

Cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules).

Target group: business to business and business to consumers.

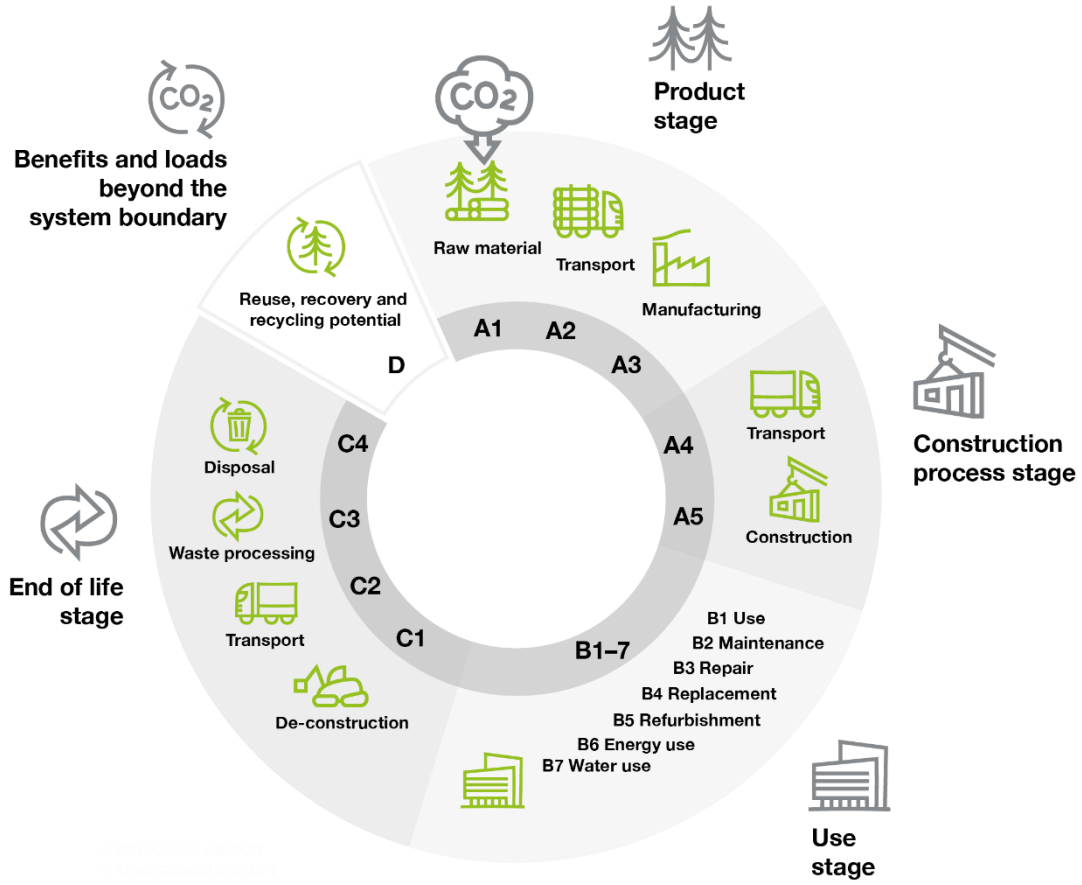
Allocation: Environmental impact from forestry operations is allocated to the roundwood only and nothing to forestry residues such as branches and tops.

The production of LVL by Stora Enso results in several valuable by-products like wood chips used for example in cellulose pulp production, as well as sawdust, bark and dry wood chips that can be used as biofuels.

The environmental impact from the production has been allocated between the main product and by-products based on economic revenue in accordance with EN 15804.

Cut-Off Rule: 1 %. This rule is based on the assumption that the input flows do not have a major impact on the environmental impacts as a whole. In insufficient data cases for such material flows known to have the potential to cause significant emissions into air and water or soil related to the environmental indicators, conservative "worst case" assumptions have been used when filling the data gaps.

System diagram:

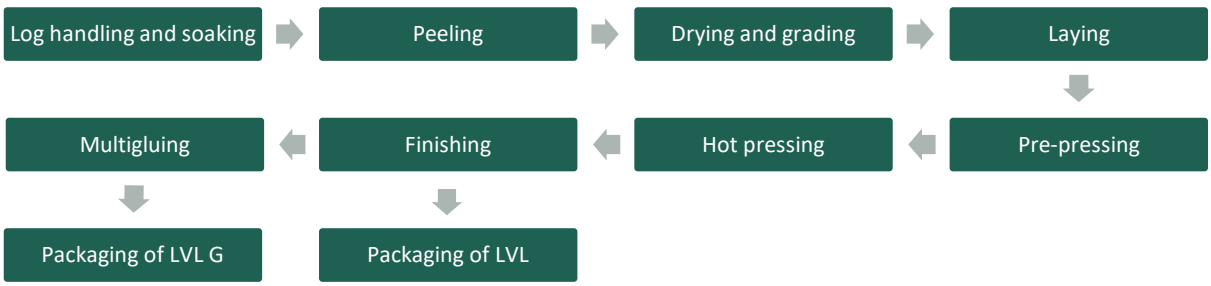


Product stage:

A1: This stage covers the extraction and processing of raw materials, such as forestry operations and glue production. All Stora Enso's wood raw material is sourced through a third-party certified wood traceability system. Stora Enso traceability system is certified according to FSC® and PEFC Chain of Custody systems[1].

A2: This stage covers the transportation of the raw materials to the mill and the fuels needed for on-site transportation. The wood supply operations cover procurement of softwood from Finland. The logs are transported by road with timber trucks.

A3: This stage covers the production of LVL and LVL G by Stora Enso and by-products. Generation of electricity and heat from primary energy resources are counted. Also packaging materials and the treatment of waste not leaving the factory with the product are counted.



More information on the manufacturing process of LVL can be accessed via The making of LVL by Stora Enso - YouTube

[1] FSC® trademark license nr. C125195

Construction process stage:

A4: This stage shows additional information as average figures from the transport to the construction sites. The figures show the impact of 1 m^3 of LVL by Stora Enso delivered to European customers from the Stora Enso's production unit. Transportation distance is a weighted average based on % of sales volumes.

Scenario information	Values and units
Vehicle type used for transport	Transport, freight, lorry >32 metric ton, EURO6
Fuel type and consumption of vehicle	Low sulphur diesel 0,015969 liter/tkm
Distance	614 km
Capacity utilisation (including empty returns)	50 %
Bulk density of transported products	510 kg/m^3

A5: The construction process includes such packaging waste, which relates to the delivered product as well as the lifting of LVL by Stora Enso panels. No assembly of the elements is considered because of the multiple application possibilities, meaning additional metal pieces (fittings, screws) or other materials possibly needed for the installation like glues, sealants, rubbers etc. are excluded from the product system.

Use stage:

B1–B7: There are no environmental impacts expected in the use phase, and at least no harmful substances are released to air, water or ground during the use of the product.

End-of-life scenarios:

C1–C4 and Module D: Four alternative European average scenarios have been presented for the end-of-life stage. Wood has an average content in European Construction and Demolition waste of around 2,3 %. Cascading usage should be applied and therefore re-use and recycling should be preferred over incineration. If this principle can't be followed incineration in general is a treatment with the highest net savings and therefore considered as main scenario in this EPD[2].

Please note: *The end-of-life options are scenario based and the choice of the most appropriate one can vary from situation, country and their legislation, energy and raw material availability. The options should indicate the potential environmental impact. Specific scenarios are available on request.*

See chapter	Environmental information	Additional environmental information		
Scenario	**100 % Incineration with energy recovery**	**100 % Recycling to wood chips**	**100 % Re-Use in coherent form**	**100 % Landfill with energy recovery**
Stage C1	Deconstruction / Demolition of the building. 510 kg which equals the declared unit is collected separately per scenario.			
	Distance is assumed to be 50 km in each scenario.			
Stage C2	Transport to the incineration site	Transport to the sorting platform	Transport to the sorting platform	Transport to landfill
Stage C3	Crushing, site operation and wood combustion. Biogenic carbon flows and energy stored as material are balanced out according to EN 16485.	Sorting and crushing at the platform. Biogenic carbon flows and energy stored as material are balanced out according to EN 16485.	Sorting and preparing at the platform. Biogenic carbon flows and energy stored as material are balanced out according to EN 16485.	-
Stage C4	-	-	-	Landfilling (waste operation, leachate treatment and landfill gas combustion). Biogenic carbon flows and energy stored as material are balanced out according to EN 16485 as if released

[2] Damgaard, Anders, et al. "Background data collection and life cycle assessment for construction and demolition waste (CDW) management." (2022).

				immediately without taking into account delayed emissions.
Module D	Avoided impact of electricity production and thermal energy recovery.	Avoided impact of forestry, harvesting, wood chips preparation and drying.	Avoided impact of producing LVL from virgin wood.	Avoided impact of electricity production and thermal energy recovery from landfill gas.
Additional information on Module D scenario	*For the thermal energy recovery, it is assumed that European average heat produced from natural gas is replaced. The replaced electricity is referring to the European average grid mix.*	*Wood chips produced from virgin wood and representing European average market are replaced, considering additional transport and energy to produce wood chips in the same quality from the recycled product.*	*LVL produced from virgin wood and representing Stora Enso's LVL production units, as declared in this EPD, are replaced, considering additional energy for cutting, drilling or sanding of the re-used product.*	*For the thermal energy recovery, it is assumed that European average heat produced from natural gas is replaced. The replaced electricity is referring to the European average grid mix.*

Please note: *Module D declares potential benefits and loads of secondary material, secondary fuel or recovered energy leaving the product system. The information given in Module D lies beyond the system boundary.*

Modules declared and geographical scope:

	Product stage			Construction process stage		Use stage							End-of-life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-Landfill-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	FI	FI	FI	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU	EU

GWP-GHG (A1-A3): specific data used: 28 %, variation - products: 0 %, variation - sites: 0 %.

Technical information

Properties	LVL by Stora Enso	LVL G by Stora Enso (multiglued)
Application	Structural applications; studs, post and-beam frames, wall, floor and roof panels	
Maximum width	2400 mm	2400 mm
Maximum thickness	75 mm	600 mm
Maximum length	24 m	19,9 m
Wood species	Spruce	
Adhesives	Consists of multiple layers of veneers that are bonded together with brown phenolic resin. Top face veneer scarf joints are bonded with clear melamine-formaldehyde resin. Meets the formaldehyde emission class E1 according to standard EN 717-1.	Additional to LVL by Stora Enso: Multiple gluing of single panels with PUR glue and creating big dimension panels.
Moisture content	8–10 % upon leaving the mill	
Surface quality	Intended for non-visual applications. Standard LVL is delivered unsanded with a clear glue line on the top face. Calibration and optical sanding available on request.	
Weight	For determining transport weight: approx. 510 kg/m^3	
Thermal conductivity	0,13 W/(mK)	
Specific heat capacity	1800 J/(kgK)	
Service class	1 and 2	
Reaction to fire	D-s1, d0 (EN 13501-1)	
CE marking	According to European Standard EN14-374	

Content information

Product components	Weight, kg	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/m³
Wood (*Picea abies*)	478,3	-	86 % / 219,40
Phenol-formaldehyde (PF) glue	31,7	-	1,3 % / 3,26
Other	<0,1	-	0 % / 0
TOTAL	**510**	**-**	**87 % / 222,67**

Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Plastic wrap	1,10	0,22	0
Plastic straps	0,08	0,02	0
TOTAL	**1,18**	**0,23**	**0**

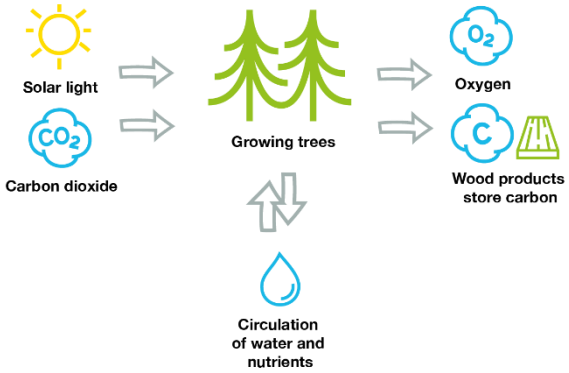
Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per declared unit
Total	-	-	-

Biogenic carbon content at the factory gate

Biogenic carbon content	Unit (expressed per declared unit)
Biogenic carbon content in product	816 kg CO_2 eq. / m^3 = 222,67 kg C / m^3
Biogenic carbon content in accompanying packaging	0 kg CO_2 eq. / m^3 = < 0,1 kg C / m^3
Please note: *1 kg biogenic carbon is equivalent to 44/12 kg of CO_2*	

Carbon sequestration and storage:

The sequestration of carbon dioxide (CO_2) is unique to renewable materials. Biogenic carbon content of a renewable material is an outcome of the CO_2 that has effectively been removed from the atmosphere by photosynthesis of growing trees and other plants and turned into sugars (carbon) and oxygen. The quantity of atmospheric CO_2 has thus been reduced. The longer the CO_2 is not in the atmosphere but stays stored in a material, the greater the environmental benefit.



Biogenic carbon of wood is calculated according to the EN 16485 and 16449 standards. Half of the dry mass of wood is carbon. Each kg of stored biogenic carbon is equal to ~3,67 kg of CO_2, which is effectively removed from the atmosphere. In case of LVL by Stora Enso the biogenic carbon content is -816 kg CO_2 eq./m^3. Biogenic carbon enters the product system in forest (module A1) and for calculation purpose it is assumed to leave latest from the product system in the end-of-life stage (module C). This assumption can be made when wood is sourced from sustainably managed forest.

Environmental Information

Below tables are describing the environmental indicator results of 1 m³ LVL and LVL G by Stora Enso along its life cycle. INCINERATION as the most representative end-of-life scenario in Europe is applied. The incineration scenario is describing the dismantling and chipping of LVL before incineration and is replacing average European heat produced with natural gas and average European market high voltage electricity. Other end-of-life scenarios have been made available in the chapter "Additional environmental information".

Mandatory impact category indicators according to EN 15804+A2

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso													
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	7,54E+1	1,87E+1	2,64E+1	**1,21E+2**	2,72E+1	6,08E+0	0,00E+0	4,01E+0	2,22E+0	1,51E+2	0,00E+0	-3,30E+2
GWP-biogenic	kg CO_2 eq.	-8,16E+2	1,21E-2	5,76E-1	**-8,15E+2**	1,08E-2	7,50E-4	0,00E+0	6,98E-4	8,81E-4	8,17E+2	0,00E+0	-9,26E-1
GWP luluc	kg CO_2 eq.	1,37E+0	1,04E-2	4,71E-2	**1,43E+0**	1,02E-2	4,11E-4	0,00E+0	3,97E-4	8,32E-4	4,91E-3	0,00E+0	-3,42E-1
GWP total	kg CO_2 eq.	-7,39E+2	1,88E+1	2,70E+1	**-6,93E+2**	2,73E+1	6,08E+0	0,00E+0	4,01E+0	2,22E+0	9,68E+2	0,00E+0	-3,31E+2
ODP	kg CFC 11 eq.	1,00E-5	4,90E-6	2,48E-6	**1,74E-5**	6,79E-6	8,55E-7	0,00E+0	8,49E-7	5,53E-7	2,73E-6	0,00E+0	-3,53E-5
AP	mol H^+ eq.	5,00E-1	7,61E-2	3,05E-1	**8,81E-1**	8,68E-2	2,04E-2	0,00E+0	2,00E-2	7,07E-3	2,46E-1	0,00E+0	-9,16E-1
EP-freshwater	kg P eq.	7,86E-3	2,23E-4	2,04E-3	**1,01E-2**	1,94E-4	1,35E-5	0,00E+0	1,32E-5	1,58E-5	1,84E-4	0,00E+0	-1,54E-2
EP-marine	kg N eq.	1,65E-1	1,90E-2	9,59E-2	**2,80E-1**	1,91E-2	7,93E-3	0,00E+0	7,75E-3	1,55E-3	1,12E-1	0,00E+0	-1,44E-1
EP-terrestrial	mol N eq.	1,45E+0	2,11E-1	1,24E+0	**2,90E+0**	2,12E-1	8,71E-2	0,00E+0	8,52E-2	1,73E-2	1,26E+0	0,00E+0	-1,63E+0
POCP	kg NMVOC eq.	3,51E-1	7,22E-2	2,44E-1	**6,67E-1**	8,36E-2	2,46E-2	0,00E+0	2,41E-2	6,81E-3	3,33E-1	0,00E+0	-4,81E-1
ADP minerals&metals[3]	kg Sb eq.	1,33E-3	5,59E-5	1,32E-4	**1,52E-3**	6,52E-5	2,15E-6	0,00E+0	2,04E-6	5,31E-6	4,17E-5	0,00E+0	-1,72E-4
ADP-fossil[3]	MJ	1,64E+3	3,34E+2	2,64E+3	**4,61E+3**	4,43E+2	5,49E+1	0,00E+0	5,45E+1	3,61E+1	1,54E+2	0,00E+0	-6,26E+3
WDP[3]	m^3	9,77E+1	1,18E+0	1,89E+1	**1,18E+2**	1,48E+0	8,51E-2	0,00E+0	7,77E-2	1,21E-1	2,71E+0	0,00E+0	-3,45E+1
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption												

Additional mandatory and voluntary impact category indicators

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso													
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[4]	kg CO_2 eq.	7,63E+1	1,88E+1	2,69E+1	**1,22E+2**	2,72E+1	6,08E+0	0,00E+0	4,01E+0	2,22E+0	1,51E+2	0,00E+0	-3,31E+2

[3] Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

[4] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Resource use indicators

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso													
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	8,97E+3	7,39E+0	6,19E+2	**9,60E+3**	5,64E+0	3,15E-1	0,00E+0	3,07E-1	4,59E-1	4,98E+0	0,00E+0	-5,50E+2
PERM	MJ	7,59E+3	0,00E+0	0,00E+0	**7,59E+3**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	-7,59E+3	0,00E+0	0,00E+0
PERT	MJ	1,66E+4	7,39E+0	6,19E+2	**1,72E+4**	5,64E+0	3,15E-1	0,00E+0	3,07E-1	4,59E-1	-7,58E+3	0,00E+0	-5,50E+2
PENRE	MJ	1,77E+3	3,54E+2	2,66E+3	**4,78E+3**	4,71E+2	5,84E+1	0,00E+0	5,79E+1	3,83E+1	1,65E+2	0,00E+0	-6,76E+3
PENRM	MJ	1,91E+3	0,00E+0	5,45E+1	**1,96E+3**	0,00E+0	-5,45E+1	0,00E+0	0,00E+0	0,00E+0	-1,91E+3	0,00E+0	0,00E+0
PENRT	MJ	3,68E+3	3,54E+2	2,72E+3	**6,75E+3**	4,71E+2	3,83E+0	0,00E+0	5,79E+1	3,83E+1	-1,74E+3	0,00E+0	-6,76E+3
SM	kg	0,00E+0	0,00E+0	0,00E+0	**0,00E+0**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
RSF	MJ	0,00E+0	0,00E+0	0,00E+0	**0,00E+0**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
NRSF	MJ	0,00E+0	0,00E+0	0,00E+0	**0,00E+0**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
FW	m^3	4,23E+0	4,81E-2	8,18E-1	**5,10E+0**	4,88E-2	3,02E-3	0,00E+0	2,75E-3	3,97E-3	2,94E-1	0,00E+0	-2,64E+0
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water												

Waste indicators

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso													
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,73E-3	8,13E-4	8,17E-1	**8,20E-1**	1,07E-3	1,52E-4	0,00E+0	1,49E-4	8,74E-5	4,56E-4	0,00E+0	-5,16E-3
Non-hazardous waste disposed	kg	1,10E+1	2,13E+1	5,68E+0	**3,80E+1**	4,14E+1	1,62E+0	0,00E+0	7,28E-2	3,37E+0	4,51E+0	0,00E+0	-1,11E+1
Radioactive waste disposed	kg	2,84E-3	2,25E-3	4,02E-2	**4,53E-2**	3,00E-3	3,78E-4	0,00E+0	3,76E-4	2,44E-4	7,64E-4	0,00E+0	-2,44E-2

Output flow indicators

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso													
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+0	0,00E+0	0,00E+0	**0,00E+0**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Material for recycling	kg	0,00E+0	0,00E+0	0,00E+0	**0,00E+0**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Materials for energy recovery	kg	0,00E+0	0,00E+0	0,00E+0	**0,00E+0**	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	5,10E+2	0,00E+0	0,00E+0
Exported energy, electricity	MJ	0,00E+0	0,00E+0	1,53E+1	**1,53E+1**	0,00E+0	6,56E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
Exported energy, thermal	MJ	0,00E+0	0,00E+0	3,72E+0	**3,72E+0**	0,00E+0	1,26E+1	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0

Additional environmental Information – alternative end-of-life scenarios Re-Use / Recycling / Landfill

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso

		Re-use					Recycling					Landfill				
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**	**C1**	**C2**	**C3**	**C4**	**D**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	4,01E+0	2,22E+0	0,00E+0	0,00E+0	-1,14E+2	4,01E+0	2,22E+0	5,99E+0	0,00E+0	-1,72E+1	4,01E+0	2,22E+0	0,00E+0	1,07E+1	-4,79E-2
GWP-biogenic	kg CO_2 eq.	6,98E-4	8,81E-4	8,17E+2	0,00E+0	-1,20E+0	6,98E-4	8,81E-4	8,17E+2	0,00E+0	-1,77E-1	6,98E-4	8,81E-4	0,00E+0	1,08E+3	-1,59E-4
GWP luluc	kg CO_2 eq.	3,97E-4	8,32E-4	0,00E+0	0,00E+0	-1,43E+0	3,97E-4	8,32E-4	5,98E-4	0,00E+0	-1,97E-1	3,97E-4	8,32E-4	0,00E+0	1,14E-3	-5,88E-5
GWP total	kg CO_2 eq.	4,01E+0	2,22E+0	8,17E+2	0,00E+0	-1,17E+2	4,01E+0	2,22E+0	8,23E+2	0,00E+0	-1,76E+1	4,01E+0	2,22E+0	0,00E+0	1,09E+3	-4,81E-2
ODP	kg CFC 11 eq.	8,49E-7	5,53E-7	0,00E+0	0,00E+0	-1,61E-5	8,49E-7	5,53E-7	1,28E-6	0,00E+0	-1,22E-6	8,49E-7	5,53E-7	0,00E+0	1,67E-6	-4,74E-9
AP	mol H^+ eq.	2,00E-2	7,07E-3	0,00E+0	0,00E+0	-8,19E-1	2,00E-2	7,07E-3	6,22E-2	0,00E+0	-1,45E-1	2,00E-2	7,07E-3	0,00E+0	3,94E-2	-1,51E-4
EP-freshwater	kg P eq.	1,32E-5	1,58E-5	0,00E+0	0,00E+0	-1,01E-2	1,32E-5	1,58E-5	1,99E-5	0,00E+0	-2,54E-3	1,32E-5	1,58E-5	0,00E+0	5,45E-5	-2,65E-6
EP-marine	kg N eq.	7,75E-3	1,55E-3	0,00E+0	0,00E+0	-2,52E-1	7,75E-3	1,55E-3	2,75E-2	0,00E+0	-3,75E-2	7,75E-3	1,55E-3	0,00E+0	3,56E-2	-2,28E-5
EP-terrestrial	mol N eq.	8,52E-2	1,73E-2	0,00E+0	0,00E+0	-2,60E+0	8,52E-2	1,73E-2	3,02E-1	0,00E+0	-4,36E-1	8,52E-2	1,73E-2	0,00E+0	1,62E-1	-2,58E-4
POCP	kg NMVOC eq.	2,41E-2	6,81E-3	0,00E+0	0,00E+0	-5,84E-1	2,41E-2	6,81E-3	8,30E-2	0,00E+0	-1,46E-1	2,41E-2	6,81E-3	0,00E+0	1,25E-1	-7,51E-5
ADP minerals&metals[3]	kg Sb eq.	2,04E-6	5,31E-6	0,00E+0	0,00E+0	-1,52E-3	2,04E-6	5,31E-6	3,08E-6	0,00E+0	-1,68E-4	2,04E-6	5,31E-6	0,00E+0	1,54E-5	-2,83E-8
ADP-fossil[3]	MJ	5,45E+1	3,61E+1	0,00E+0	0,00E+0	-4,53E+3	5,45E+1	3,61E+1	8,21E+1	0,00E+0	-3,66E+2	5,45E+1	3,61E+1	0,00E+0	1,21E+2	-9,27E-1
WDP[3]	m^3	7,77E-2	1,21E-1	0,00E+0	0,00E+0	-1,18E+2	7,77E-2	1,21E-1	1,17E-1	0,00E+0	-2,18E+1	7,77E-2	1,21E-1	0,00E+0	5,65E-1	-5,91E-3
GWP-GHG[4]	kg CO_2 eq.	4,01E+0	2,22E+0	0,00E+0	0,00E+0	-1,16E+2	4,01E+0	2,22E+0	5,99E+0	0,00E+0	-1,74E+1	4,01E+0	2,22E+0	0,00E+0	2,94E+2	-4,80E-2
PERE	MJ	3,07E-1	4,59E-1	0,00E+0	0,00E+0	-9,60E+3	3,07E-1	4,59E-1	4,62E-1	0,00E+0	-3,17E+3	3,07E-1	4,59E-1	0,00E+0	5,47E+0	-9,46E-2
PERM	MJ	0,00E+0	0,00E+0	-7,59E+3	0,00E+0	-7,59E+3	0,00E+0	0,00E+0	-7,59E+3	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	-7,59E+3	0,00E+0
PERT	MJ	3,07E-1	4,59E-1	-7,59E+3	0,00E+0	-1,72E+4	3,07E-1	4,59E-1	-7,59E+3	0,00E+0	-3,17E+3	3,07E-1	4,59E-1	0,00E+0	-7,58E+3	-9,46E-2
PENRE	MJ	5,79E+1	3,83E+1	0,00E+0	0,00E+0	-4,70E+3	5,79E+1	3,83E+1	8,72E+1	0,00E+0	-3,91E+2	5,79E+1	3,83E+1	0,00E+0	1,28E+2	-9,96E-1
PENRM	MJ	0,00E+0	0,00E+0	-1,91E+3	0,00E+0	-1,96E+3	0,00E+0	0,00E+0	-1,91E+3	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	-1,91E+3	0,00E+0
PENRT	MJ	5,79E+1	3,83E+1	-1,91E+3	0,00E+0	-6,66E+3	5,79E+1	3,83E+1	-1,82E+3	0,00E+0	-3,91E+2	5,79E+1	3,83E+1	0,00E+0	-1,78E+3	-9,96E-1
SM	kg	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
RSF	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
NRSF	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
FW	m^3	2,75E-3	3,97E-3	0,00E+0	0,00E+0	-5,09E+0	2,75E-3	3,97E-3	4,14E-3	0,00E+0	-6,74E-1	2,75E-3	3,97E-3	0,00E+0	1,52E-1	-4,53E-4
HWD	kg	1,49E-4	8,74E-5	0,00E+0	0,00E+0	-8,19E-1	1,49E-4	8,74E-5	2,25E-4	0,00E+0	-4,28E-4	1,49E-4	8,74E-5	0,00E+0	1,47E-4	-6,95E-7
NHWD	kg	7,28E-2	3,37E+0	0,00E+0	0,00E+0	-3,79E+1	7,28E-2	3,37E+0	1,10E-1	0,00E+0	-3,91E+0	7,28E-2	3,37E+0	0,00E+0	1,05E+3	-1,86E-3
RWD	kg	3,76E-4	2,44E-4	0,00E+0	0,00E+0	-4,47E-2	3,76E-4	2,44E-4	5,67E-4	0,00E+0	-1,65E-3	3,76E-4	2,44E-4	0,00E+0	7,81E-4	-4,12E-6
CRU	kg	0,00E+0	0,00E+0	5,10E+2	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
MFR	kg	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	5,10E+2	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
MER	kg	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0
EEE	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	-1,53E+1	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	2,29E-1	0,00E+0
EET	MJ	0,00E+0	0,00E+0	0,00E+0	0,00E+0	-3,72E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	0,00E+0	4,72E-1	0,00E+0

Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption; PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water; HWD = Hazardous waste; NHWD = Non-hazardous waste; RWD = Radioactive waste; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy, electric; EET = Exported energy, thermal; *

Additional impact category indicators according to EN 15804+A2 – all modules including incineration end-of-life scenario

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso													
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter emissions	Disease incidence	3,80E-6	1,47E-6	4,14E-6	**9,41E-6**	2,38E-6	3,20E-7	0,00E+0	3,13E-7	1,94E-7	3,04E-6	0,00E+0	-2,37E-6
Ionising radiation, human health[5]	kBq U235 eq.	3,21E+0	1,50E+0	1,03E+2	**1,08E+2**	1,92E+0	2,34E-1	0,00E+0	2,32E-1	1,57E-1	5,41E-1	0,00E+0	-2,87E+1
Ecotoxicity (freshwater)[3]	CTUe	2,24E+3	2,58E+2	2,99E+3	**5,49E+3**	3,46E+2	3,38E+1	0,00E+0	3,19E+1	2,82E+1	5,29E+2	0,00E+0	-1,68E+3
Human toxicity, cancer effects[3]	CTUh	1,77E-7	8,68E-9	8,77E-8	**2,73E-7**	9,44E-9	3,91E-9	0,00E+0	3,59E-9	7,69E-10	1,72E-7	0,00E+0	-5,28E-8
Human toxicity, non-cancer effects[3]	CTUh	1,76E-6	2,43E-7	1,06E-6	**3,06E-6**	3,64E-7	2,59E-8	0,00E+0	2,19E-8	2,97E-8	7,12E-7	0,00E+0	-1,35E-6
Land use related impacts / soil quality[3]	dimensionless	5,15E+4	2,89E+2	3,19E+3	**5,50E+4**	5,07E+2	7,40E+0	0,00E+0	6,94E+0	4,13E+1	3,21E+1	0,00E+0	-4,82E+2

Additional impact category indicators according to EN 15804+A2 - alternative end-of-life scenarios Re-Use / Recycling / Landfill

Results per declared unit – 1 m³ LVL or LVL G by Stora Enso																
		Re-use					**Recycling**					**Landfill**				
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**	**C1**	**C2**	**C3**	**C4**	**D**	**C1**	**C2**	**C3**	**C4**	**D**
Particulate matter emissions	Disease incidence	3,13E-7	1,94E-7	0,00E+0	0,00E+0	-7,77E-6	3,13E-7	1,94E-7	1,65E-6	0,00E+0	-5,47E-6	3,13E-7	1,94E-7	0,00E+0	8,45E-7	-3,59E-10
Ionising radiation, human health[5]	kBq U235 eq.	2,32E-1	1,57E-1	0,00E+0	0,00E+0	-1,07E+2	2,32E-1	1,57E-1	3,50E-1	0,00E+0	-2,08E+0	2,32E-1	1,57E-1	0,00E+0	5,59E-1	-4,59E-3
Ecotoxicity (freshwater)[3]	CTUe	3,19E+1	2,82E+1	0,00E+0	0,00E+0	-5,44E+3	3,19E+1	2,82E+1	4,81E+1	0,00E+0	-8,25E+2	3,19E+1	2,82E+1	0,00E+0	1,18E+2	-2,65E-1
Human toxicity, cancer effects[3]	CTUh	3,59E-9	7,69E-10	0,00E+0	0,00E+0	-2,72E-7	3,59E-9	7,69E-10	1,86E-9	0,00E+0	-1,23E-7	3,59E-9	7,69E-10	0,00E+0	3,51E-9	-7,81E-12
Human toxicity, non-cancer effects[3]	CTUh	2,19E-8	2,97E-8	0,00E+0	0,00E+0	-3,03E-6	2,19E-8	2,97E-8	3,49E-8	0,00E+0	-5,30E-7	2,19E-8	2,97E-8	0,00E+0	4,09E-7	-2,12E-10
Land use related impacts / soil quality[3]	dimensionless	6,94E+0	4,13E+1	0,00E+0	0,00E+0	-5,50E+4	6,94E+0	4,13E+1	1,05E+1	0,00E+0	-1,73E+4	6,94E+0	4,13E+1	0,00E+0	3,14E+2	-7,61E-2

[3] Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

[5] Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Differences versus previous versions

Biogenic carbon content of LVL was corrected (previous value 766 kg CO_2 eq.). Resulting updates were made in the content information and environmental information (changes in GWP-biogenic, GWP total). Additional environmental information and additional impact category indicators of the alternative end-of-life scenarios have been updated respectively (changes in GWP-biogenic, GWP total, GWP-GHG, human toxicity non-cancer and module D indicators of the Landfill scenario).

References

EPD International (2021): General Programme Instructions for the International EPD® System. version 4.0 dated 2021-03-29.

EPD International (2018): PCR 2019:14 Construction products, version 1.2.5, dated 2022-11-01

EPD International (2021): C-PCR-006 (to PCR 2019:14). Wood and wood-based products for use in construction, version 2019-12-20

Standards

EN 15804:2012 + A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EN 16485:2014 Round and sawn timber. Environmental product declarations. Product category rules for wood and wood-based products for use in construction

EN 16449:2014 Wood and wood-based products. Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

EN 15942:2012 Sustainability of construction works - Environmental product declarations - Communication format business-to-business

ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures.

ISO 14044:2006 Environmental management. Life Cycle Assessment. Requirements and guidelines.

Detailed product information

More about LVL on our website

Laminated veneer lumber (LVL) - Wood products | Stora Enso

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