ENVIRONMENTAL PRODUCT DECLARATION

Low Carbon Concrete Solid Wall Element

IN ACCORDANCE WITH EN15804+A2 & ISO14025 / ISO 21930

EPD HUB, HUB-0758
Publishing date
13 October 2023, last updated on 13 October 2023, valid until 13 October 2028

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Tenel Oy
Address	Tehontie 45, 45200, Kouvola
Contact details	jani.julin@tenel-elements.fi
Website	https://tenel-elements.fi/

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with modules C1-C4, D
EPD author	Elias Tukonen, Tencon Oy
EPD verification	External verification
EPD verifier	Neena Chandramathy, as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

GENERAL
INFORMATION

PRODUCT

Product name	Econcrete ICL50
Product reference	TCL-V001
Place of production	Finland
Period for data	2022
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	Square meter (m2)
Declared unit mass	464 kg
GWP-fossil, A1-A3 (kgCO2e)	4,53E1
GWP-total, A1-A3 (kgCO2e)	4,53E1
Secondary material, inputs (%)	4.34
Secondary material, outputs (%)	0.0
Total energy use, A1-A3 (kWh)	110.0
Total water use, A1-A3 (m3e)	5,66E-1

PRODUCT AND **MANUFACTURER**

ABOUT THE MANUFACTURER

Tenel Oy is a Finnish concrete element producer.
We produce elements in a cost-effective and responsible manner and invest in environmental sustainability.

Our factory has a modern production line, and it operates in the town of Kouvola.
https://tenel-elements.fi/

Tenel Oy is a part of the Avain Yhtiöt group.
https://avainasunnot.fi/avain-yhtiot/

PRODUCT DESCRIPTION

The product is a low-carbon precast concrete solid wall element suitable for indoor use.
Product calculations are made for an element with 20mm thickness.
The wall element is always made to tailor the specific needs of a customer.

Further information can be found at *https://tenel-elements.fi/*

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass-%	Material origin
Metals	1	Norway
Minerals	99	Finland
Fossil materials	<0,01	Finland

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	Square meter (m2)
Mass per declared unit	464 kg

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

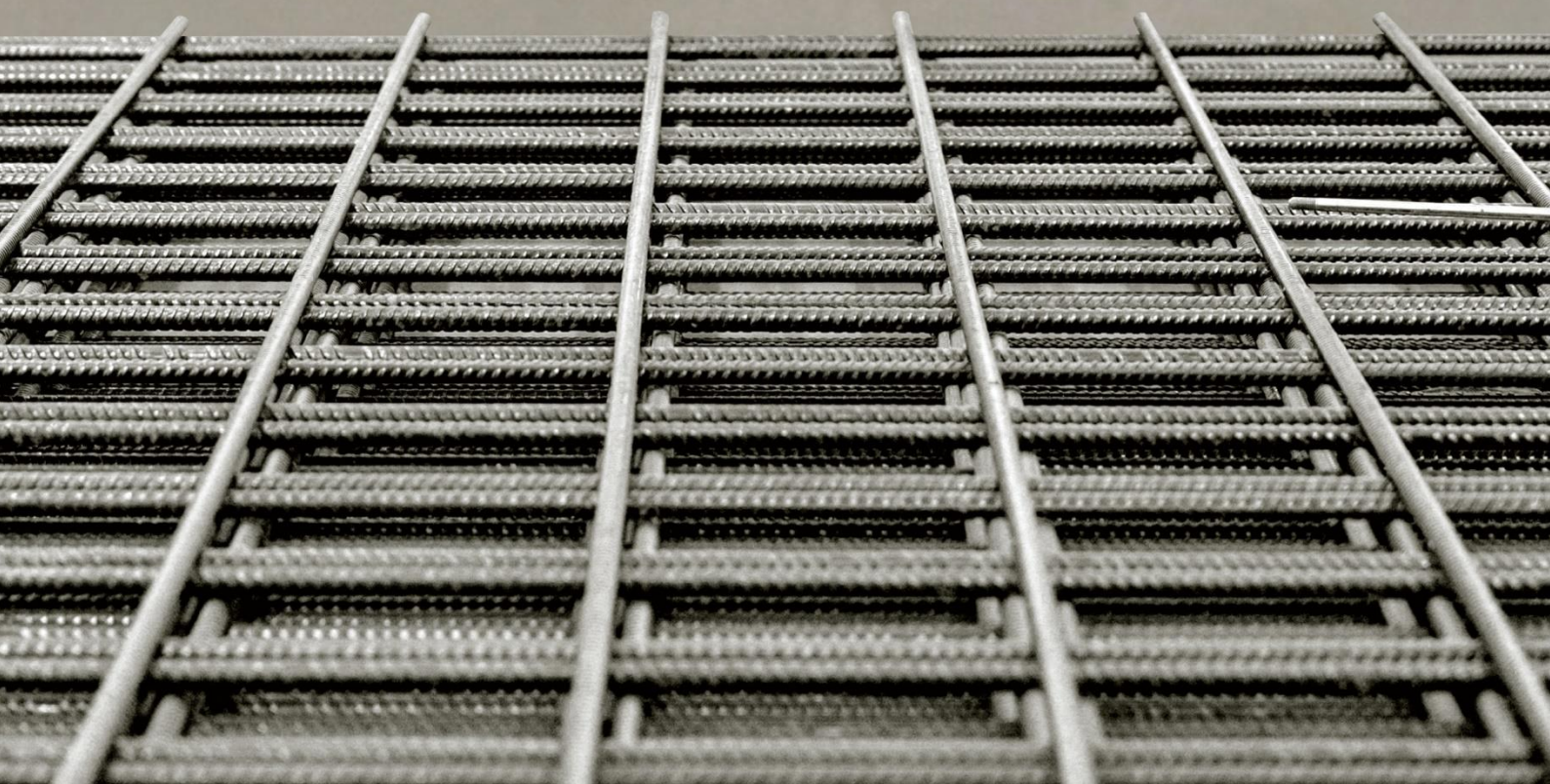
PRODUCT
LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.



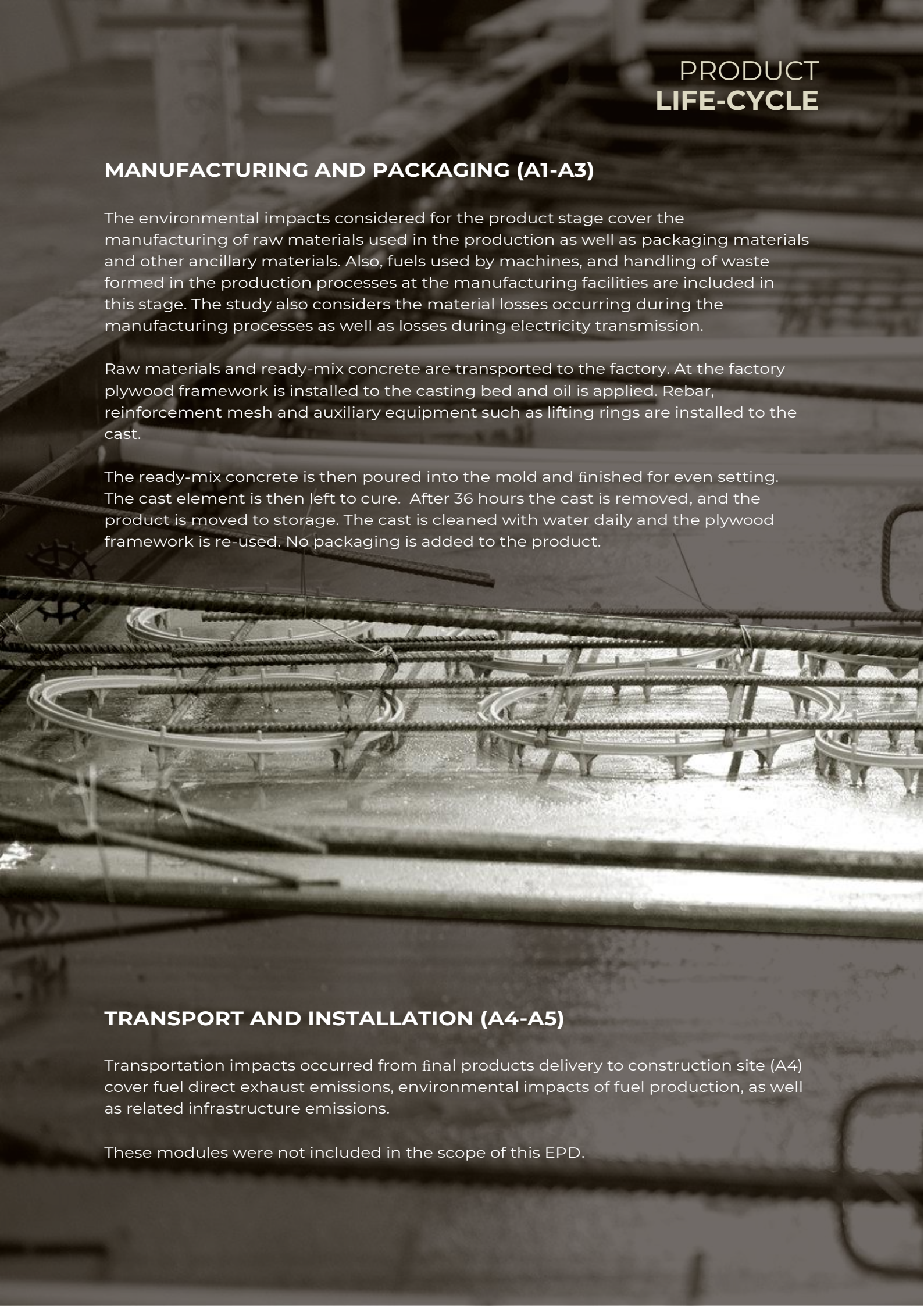
PRODUCT
LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Raw materials and ready-mix concrete are transported to the factory. At the factory plywood framework is installed to the casting bed and oil is applied. Rebar, reinforcement mesh and auxiliary equipment such as lifting rings are installed to the cast.

The ready-mix concrete is then poured into the mold and finished for even setting. The cast element is then left to cure. After 36 hours the cast is removed, and the product is moved to storage. The cast is cleaned with water daily and the plywood framework is re-used. No packaging is added to the product.



TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

These modules were not included in the scope of this EPD.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

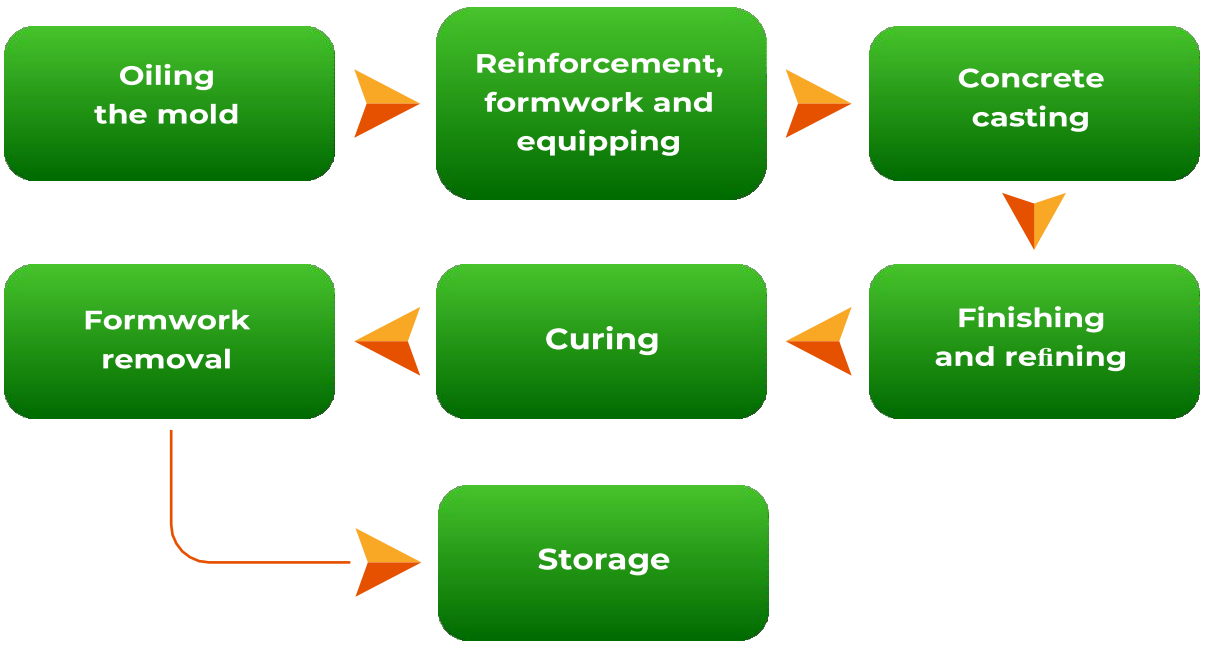
At the end of service life, it is assumed that 100% of demolition waste is collected for construction waste processing. Demolition process consumes energy in diesel fuel form at an assumed rate of 10kWh / ton (C1).

The demolished concrete wall is transported to a construction waste treatment plant without mass loss. Transport distance from the demolition site to the waste processing facilities is assumed at 50km. Transport method is assumed to be a truck (C2).

At the waste treatment plant, the demolished element materials are separated to steel and concrete. From this process, we assume that 95% of steel and 80% of concrete is obtained for recycling (C3). The rest, 5% of steel and 20% of concrete, are sent to landfill (C4).

The recycled concrete (80%) and steel (95%) can be used as secondary raw materials, collecting benefit from avoiding the production of virgin raw materials.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption.

All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	Not applicable
Ancillary materials	No allocation
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	%

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044.
Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL
IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	4,09E+01	1,40E+00	2,98E+00	4,53E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,53E+00	2,18E+00	3,92E+00	4,85E-01	-1,14E+01
GWP – fossil	kg CO_2e	4,09E+01	1,40E+00	2,98E+00	4,53E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,53E+00	2,18E+00	3,91E+00	4,84E-01	-1,14E+01
GWP – biogenic	kg CO_2e	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP – LULUC	kg CO_2e	1,14E-02	5,17E-04	8,97E-03	2,09E-02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,52E-04	8,03E-04	2,57E-03	4,57E-04	-5,62E-03
Ozone depletion pot.	kg CFC_{-11}e	1,30E-06	3,32E-07	3,85E-07	2,02E-06	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,27E-07	5,01E-07	7,95E-07	1,96E-07	-5,82E-07
Acidification potential	mol H^+e	1,11E-01	6,21E-03	7,80E-03	1,25E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,59E-02	9,22E-03	3,52E-02	4,55E-03	-5,34E-02
EP-freshwater[2)]	kg Pe	3,63E-03	9,71E-06	5,55E-05	3,69E-03	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,07E-06	1,78E-05	8,75E-05	5,08E-06	-5,12E-04
EP-marine	kg Ne	1,28E-02	1,85E-03	1,90E-03	1,65E-02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	7,04E-03	2,74E-03	1,35E-02	1,58E-03	-1,12E-02
EP-terrestrial	mol Ne	4,24E-01	2,04E-02	2,13E-02	4,66E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	7,72E-02	3,02E-02	1,48E-01	1,73E-02	-1,36E-01
POCP ("smog")[3)]	kg NMVOCe	1,05E-01	6,45E-03	6,84E-03	1,18E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,12E-02	9,67E-03	4,11E-02	5,04E-03	-5,57E-02
ADP-minerals & metals[4)]	kg Sbe	4,36E-05	3,54E-06	7,46E-06	5,46E-05	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	7,76E-07	5,10E-06	2,56E-05	1,11E-06	-1,88E-04
ADP-fossil resources	MJ	1,28E+02	2,13E+01	6,38E+01	2,13E+02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,06E+01	3,27E+01	6,38E+01	1,33E+01	-1,18E+02
Water use[5)]	m^3e depr.	7,23E+00	9,79E-02	1,17E+00	8,50E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,54E-02	1,46E-01	5,51E-01	4,21E-02	-7,16E+00

1) GWP = Global Warming Potential;
2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get Po4e;
3) POCP = Photochemical ozone formation;
4) ADP = Abiotic depletion potential;

5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	5,31E+01	2,77E-01	1,54E+01	6,87E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,18E-01	3,68E-01	3,18E+00	1,15E-01	-1,01E+01
Renew. PER as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	5,31E+01	2,77E-01	1,54E+01	6,87E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,18E-01	3,68E-01	3,18E+00	1,15E-01	-1,01E+01
Non-re. PER as energy	MJ	1,63E+02	2,13E+01	6,15E+01	2,46E+02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,06E+01	3,27E+01	6,38E+01	1,33E+01	-1,18E+02
Non-re. PER as material	MJ	2,34E+00	0,00E+00	0,00E+00	2,34E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	-1,87E+00	-4,67E-01	0,00E+00
Total use of non-re. PER	MJ	1,66E+02	2,13E+01	6,15E+01	2,48E+02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,06E+01	3,27E+01	6,19E+01	1,28E+01	-1,18E+02
Secondary materials	kg	2,04E+01	6,20E-03	4,93E-03	2,04E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	8,06E-03	9,08E-03	2,43E-02	2,79E-03	4,78E+00
Renew. secondary fuels	MJ	2,67E+01	5,69E-05	5,75E-05	2,67E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,64E-05	9,16E-05	3,68E-04	7,29E-05	-1,11E-03
Non-ren. secondary fuels	MJ	3,38E+01	0,00E+00	0,00E+00	3,38E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	4,99E-01	2,79E-03	3,73E-02	5,39E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,25E-03	4,24E-03	3,00E-02	1,45E-02	-1,54E-01

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	3,68E-01	2,34E-02	7,92E-02	4,71E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,76E-02	4,34E-02	1,36E-01	0,00E+00	-3,04E+00
Non-hazardous waste	kg	1,10E+01	4,04E-01	2,33E+00	1,37E+01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,94E-01	7,12E-01	6,59E+01	9,20E+01	-2,10E+01
Radioactive waste	kg	8,26E-04	1,47E-04	3,23E-04	1,30E-03	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,45E-04	2,19E-04	4,32E-04	0,00E+00	-1,97E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	9,12E-01	0,00E+00	0,00E+00	9,12E-01	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	3,72E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	4,90E-03	0,00E+00	0,00E+00	4,90E-03	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	2,77E+00	0,00E+00	2,32E+00	5,09E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	5,08E+00	1,39E+00	2,93E+00	9,40E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,51E+00	2,15E+00	3,86E+00	4,74E-01	-1,09E+01
Ozone depletion Pot.	kg CFC-$_{11}$e	3,77E-07	2,63E-07	3,35E-07	9,74E-07	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,59E-07	3,97E-07	6,33E-07	1,55E-07	-5,77E-07
Acidification	kg SO_2e	2,42E-02	4,83E-03	6,18E-03	3,52E-02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,13E-02	7,16E-03	2,60E-02	3,44E-03	-4,26E-02
Eutrophication	kg PO_4^3e	8,39E-03	1,04E-03	2,52E-03	1,20E-02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,63E-03	1,63E-03	8,01E-03	7,42E-04	-2,12E-02
POCP (“smog”)	kg C_2H_4e	1,40E-03	1,86E-04	4,35E-04	2,02E-03	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,48E-04	2,80E-04	7,45E-04	1,44E-04	-5,78E-03
ADP-elements	kg Sbe	3,43E-05	3,44E-06	7,48E-06	4,52E-05	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	7,64E-07	4,94E-06	2,54E-05	1,10E-06	-1,88E-04
ADP-fossil	MJ	6,11E+01	2,13E+01	6,25E+01	1,45E+02	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,06E+01	3,27E+01	6,38E+01	1,33E+01	-1,18E+02

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter?
Read more online

This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

VERIFICATION
STATEMENT

THIRD-PARTY
VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Neena Chandramathy, as an authorized verifier acting for EPD HUB Limited

13.10.2023

EPD Hub
VERIFIED ISO 14025

Tenel
Sustainable Elements

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH
EN15804+A2 & ISO14025 /
ISO21930

EPD Hub

One Click LCA