

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

SAGA 2.0 S 200 water heater OSO Hotwater AS

Construction product considered as Electronic or Electric Equipment

Programme: The international EPD® system, www.environdec.com

Programme operator: EPD International AB

EPD registration number: EPD-IES-0024660

Publication date: 20.06.2025

Valid until: 19.06.2030

Geographical scope: Norway

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

MANUFACTURER INFORMATION

Manufacturer	OSO Hotwater AS
Address	Industriveien 1, 3300 Hokksund, NORWAY
Contact details	salg@osohotwater.com
Website	https://osohotwater.no/

PRODUCT IDENTIFICATION

Product name	SAGA 2.0 S 200
Additional label(s)	NA
Product number / reference	MFR prod.no: 11011642
Place(s) of production	Industriveien 1, 3300 Hokksund, NORWAY
CPC code	44817

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes 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.

EPD INFORMATION

EPD program operator	The International EPD System
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.3.4 is used. Additional requirements for construction products considered as Electronic or Electric Equipment (section 4.3.3 of PCR 1.3.4).
EPD author	OSO Hotwater AS
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
Verification date	19.06.2025
EPD verifier	Elisabet Amat, GREENIZE
EPD number	EPD-IES-0024660
ECO Platform nr.	
Publishing date	20.06.2025
EPD valid until	19.06.2030

PRODUCT INFORMATION

PRODUCT DESCRIPTION

SAGA 2.0 STANDARD 200 is a domestic electric water heater. The water heater is essentially comprised of a pressure vessel, insulation, heating element, thermostat, safety valve and outer casing. The pressure vessel is made of high grade stainless steel with long life expectancy, contributing to reduced environmental impact over the products life cycle. Insulation is made of rigid polyurethane insulation with superior insulating properties that reduces overall energy consumption. The electric heater is made of brass material and Incoloy alloy, ensuring reliable and efficient water heating. The thermostat is made of a plastic housing and copper/mild-steel parts for reliable control of water temperature. The safety valve is made of brass housing, rubber membrane and a spring of mild-steel. Outer casing is made of pre-painted mild-steel and PP material, providing both protection and a visually appealing design.

The average life expectancy of an OSO water heater is 25 years.

PRODUCT APPLICATION

The SAGA 2.0 STANDARD 200 water heater is intended for domestic use to provide heated water in a household or a small public facility. The unit is fed with consumable water to heat and store consumable hot water for washing and showering.

TECHNICAL SPECIFICATIONS

Electrical specification: 2.8kW / 1 x 230 V

Nominal volume: 190L

IP class: IP21

Capacity: 3.5 persons

V-40°C-L: 342

Heat loss: 55W

ErP class: C

PRODUCT STANDARDS

Low Voltage Directive (LVD):	2014/35/EU
Electromagnetic Compatibility (EMC):	2014/30/EU
Energy related Products (ErP):	2009/125/EC
RoHS Directive:	2011/65/EU
Pressure Equipment Directive (PED):	2014/68/EU, article 4.3.
Testing standards:	EN 12897:2016
Safety standards:	EN 60 335-1:2012;A11 EN 60 335-2-21:2003;A1;A2 NEK EN 50 106:2008
EMF standard:	EN 62 233:2008
EMC standards:	EN 55 014-1:2006;A1;A2 EN 55 014-2:2015 EN 61 000-3-2:2014 EN 61 000-3-3:2013

PHYSICAL PROPERTIES OF THE PRODUCT

Diameter & height: 595 x 1310mm

Net weight: 34kg

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at <https://osohotwater.no/>.

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-%	Biogenic material, kg C/DU
Steel	24.5	53	0	0
Brass	0.8	0	0	0
Plastics	3.9	5	0	0
Insulation	4.4	0	0	0
Adhesive	0.07	0	0	0
Electro materials	0.5	0	0	0
Paper/cardboard	2.4	30	50	1.2
Wood (packaging)	3.6	100	46	1.6
TOTAL	40.2			2.8

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	64.2	Europe
Minerals	0	-
Fossil materials	20.8	Europe
Bio-based materials	15.0	Europe

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any substances according to REACH SVHC or the Norwegian List of Priority Substances in amounts greater than 0,1 % (1000 ppm).

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.

The various materials are sourced from local or regional sources. With focus on sustainable business, OSO Hotwater selects responsible suppliers based on Green Procurement. No hazardous materials are included in the product or used during production. Welding and assembly of the water heater is done at the OSO Hotwater factory in Norway. The main source of energy for inherent processes is electricity from 100% renewable sources.

We actively engage in sustainable packaging practices by establishing return agreements for our wooden pallets. Collaborative agreements are in place with both our suppliers and customers, emphasizing our commitment to circular economy principles.

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.

Data used in the transport calculation were cross-referenced with our data of deliveries over several decades and provides a reliable scenario of

average transport to installation site in Norway. Installation of the product is a manual process and has no environmental impact.

Packaging materials are to be sorted and sent to the nearest recycling center for proper end-of-life processing.

Packing material end of life scenario:

- Polyethylene: Incineration
- Polypropylene: Incineration
- Paper: Recycling
- Paperboard and cardboard: Recycling
- Wooden pallet: Reuse

PRODUCT USE AND MAINTENANCE (B1-B7)

The use stage scenario used in this EPD is water and energy consumption based on 17 years of operation. The recorded energy and water usage during the operational phase is detailed below. The energy consumption was determined in accordance with the stipulations outlined in Directive 2009/125/EC, as further elucidated in EN 50440, which addresses the efficiency of domestic electrical storage water heaters and their testing methodologies.

To assess water consumption, the following assumptions were employed: An average daily water consumption of 50 liters per person in a Norwegian household, with an average of 2.12 persons per household per day, as per Statistics Norway (2022). The quantity of mixed water at 40 °C, as specified in the energy label test of OSO Saga2 200, was then utilized to compute the water consumption of the water heater throughout its lifespan.

Factor	Unit	Value
Energy consumption per L @ 40°C	kWh	0.035
Energy efficiency	%	95
Water consumption per day (L @ 40°C)	L	106
Total water consumption 17 years	L	657730
Total energy consumption 17 years, including heat loss	kWh	75004

During normal operation no maintenance, refurbishment or repairs is considered necessary.

PRODUCT END OF LIFE (C1-C4, D)

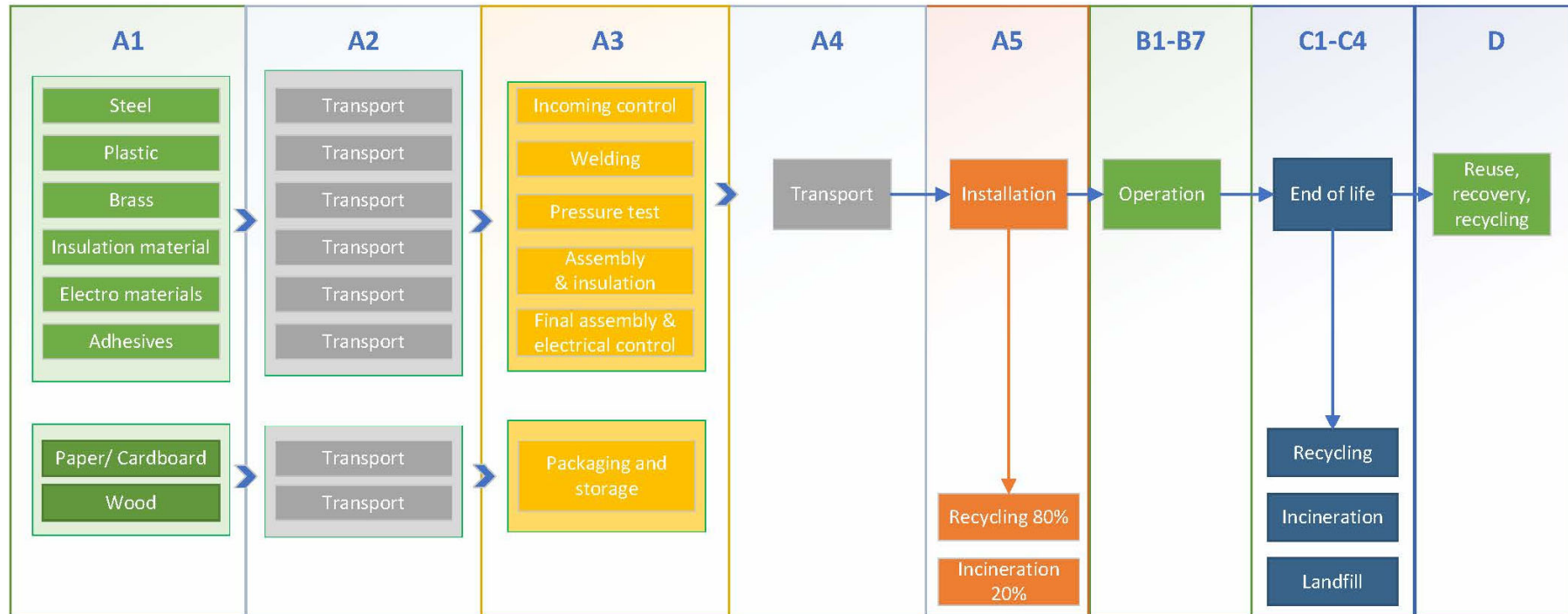
Decommissioning the product is a manual process with no need for auxiliary materials or energy (C1).

C2 is generating transport to waste processing. C3 is defined in the table with prosentage of reuse of recycling. C4 is defined in the table with prosentage of landfill.

A large proportion of the product is to be recycled, such as steels, brass and plastics.

Other types of materials are modelled as landfill as a conservative scenario.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2023
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DECLARED AND FUNCTIONAL UNIT

Declared unit	1 unit of a hot water tank with a nominal volume of 190 liters
Mass per declared unit	34 kg
Functional unit	
Reference service life	17 years

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	2.8

SYSTEM BOUNDARY

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	D	D
Geography, by two-letter ISO country code or regions. The International EPD System only.																		
GLO	GLO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
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.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 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.

An in-depth analysis of all materials and process stages ensures all environmental aspects are included in this Life Cycle Assessment.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Allocation is conducted in strict adherence to the EN 15804 guidelines. Energy and water consumption, along with material wastes, are distributed among products from the factory utilizing a physical allocation method. This allocation is based on the total number of units produced annually, ensuring an equitable distribution. Consequently, each product, irrespective of its composition, bears an equivalent load per unit produced from these resource flows.

The allocations in the Ecoinvent 3.10 datasets used in this study follow the Ecoinvent system model 'Allocation, cut-off, EN15804'.

AVERAGES AND VARIABILITY

The International EPD System additional data requirements:

Data specificity and GWP-GHG variability for GWP-GHG for A1-A3.

Supply-chain specific data for GWP-GHG	<10%
Variation in GWP-GHG between products	0 %
Variation in GWP-GHG between sites	0 %

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. Usage of results from A1-A3 without considering the results of module C is not encouraged.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	1,04E+02	2,36E+00	1,32E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,80E+03	1,98E+02	0,00E+00	1,21E+00	1,37E+01	3,68E+00	-1,09E+01
GWP – fossil	kg CO ₂ e	1,16E+02	2,36E+00	5,56E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,80E+03	1,97E+02	0,00E+00	1,20E+00	1,37E+01	3,68E+00	-2,02E+00
GWP – biogenic	kg CO ₂ e	-1,24E+01	0,00E+00	1,27E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,22E-04	-6,80E-03	3,55E-02	-8,80E+00
GWP – LULUC	kg CO ₂ e	4,63E-01	8,32E-04	1,44E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,40E+00	4,01E-01	0,00E+00	4,26E-04	2,02E-03	4,99E-04	-6,76E-02
Ozone depletion pot.	kg CFC ₁₁ e	8,00E-04	4,69E-08	2,45E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,84E-05	2,83E-06	0,00E+00	2,40E-08	8,39E-08	2,85E-08	-7,80E-08
Acidification potential	mol H ⁺ e	9,52E-01	7,37E-03	6,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,49E+01	1,05E+00	0,00E+00	3,77E-03	1,49E-02	3,52E-03	-1,98E-01
EP-freshwater ²⁾	kg Pe	7,66E-02	1,56E-04	4,33E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,89E+00	1,20E-01	0,00E+00	7,99E-05	2,61E-03	8,29E-04	-1,62E-02
EP-marine	kg Ne	1,15E-01	2,48E-03	2,20E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,16E+00	2,02E-01	0,00E+00	1,27E-03	3,83E-03	4,06E-03	-1,54E-02
EP-terrestrial	mol Ne	1,29E+00	2,70E-02	1,91E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,63E+01	1,95E+00	0,00E+00	1,38E-02	3,78E-02	9,35E-03	-1,66E-01
POCP (“smog”) ³⁾	kg NMVOCe	4,51E-01	1,15E-02	6,89E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,00E+00	6,45E-01	0,00E+00	5,91E-03	1,37E-02	3,78E-03	-5,59E-02
ADP-minerals & metals ⁴⁾	kg Sbe	1,05E-02	7,70E-06	9,16E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,85E-01	1,12E-03	0,00E+00	3,94E-06	5,61E-05	8,24E-06	-2,05E-03
ADP-fossil resources	MJ	1,71E+03	3,31E+01	2,20E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,17E+04	3,52E+03	0,00E+00	1,69E+01	4,48E+01	1,45E+01	-4,83E+01
Water use ⁵⁾	m ³ e depr.	7,09E+01	1,62E-01	4,29E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,41E+04	9,74E+01	0,00E+00	8,31E-02	7,49E-01	2,00E-01	8,45E-01

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.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	4,06E-06	1,85E-07	9,83E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,36E-04	1,19E-05	0,00E+00	9,47E-08	1,76E-07	4,16E-08	-1,56E-06
Ionizing radiation ⁶⁾	kBq U235e	8,20E+00	4,22E-02	2,26E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,85E+02	7,21E+01	0,00E+00	2,16E-02	2,50E-01	6,89E-02	7,48E-01
Ecotoxicity (freshwater)	CTUe	2,52E+03	4,34E+00	7,64E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,76E+04	6,73E+02	0,00E+00	2,22E+00	1,22E+02	5,38E+01	-2,85E+02
Human toxicity, cancer	CTUh	1,30E-06	4,02E-10	7,16E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,36E-06	2,45E-07	0,00E+00	2,05E-10	9,68E-09	3,31E-09	1,18E-09
Human tox. non-cancer	CTUh	6,94E-06	2,08E-08	2,86E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,32E-04	1,12E-05	0,00E+00	1,06E-08	6,10E-08	3,11E-08	-1,67E-06
SQP ⁷⁾	-	1,29E+03	1,97E+01	1,10E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,16E+04	8,24E+02	0,00E+00	1,01E+01	1,94E+01	4,49E+00	-5,67E+02

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	2,35E+02	5,72E-01	-3,91E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,11E+05	6,29E+02	0,00E+00	2,93E-01	3,41E+00	7,85E-01	-2,29E+00
Renew. PER as material	MJ	1,21E+02	0,00E+00	-1,10E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,80E+00	-2,60E+00	7,72E+01
Total use of renew. PER	MJ	3,56E+02	5,72E-01	-1,49E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,11E+05	6,29E+02	0,00E+00	2,93E-01	-4,39E+00	-1,81E+00	7,49E+01
Non-re. PER as energy	MJ	1,29E+03	3,31E+01	-2,95E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,17E+04	3,52E+03	0,00E+00	1,69E+01	-1,30E+02	-5,73E+01	-4,86E+01
Non-re. PER as material	MJ	2,52E+02	0,00E+00	-8,70E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,77E+02	-6,41E+01	6,09E+01
Total use of non-re. PER	MJ	1,55E+03	3,31E+01	-1,16E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,17E+04	3,52E+03	0,00E+00	1,69E+01	-3,07E+02	-1,21E+02	1,23E+01
Secondary materials	kg	4,82E+00	1,52E-02	2,17E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,22E+01	1,34E+01	0,00E+00	7,75E-03	2,40E-02	4,47E-03	2,18E+00
Renew. secondary fuels	MJ	2,95E+00	1,91E-04	1,31E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,71E-01	8,88E-03	0,00E+00	9,79E-05	5,77E-04	7,61E-05	-2,68E-01
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	4,42E+00	4,45E-03	9,69E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,20E+03	6,60E+02	0,00E+00	2,28E-03	1,90E-02	2,17E-03	3,69E-02

8) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,33E+01	4,75E-02	1,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,26E+02	2,16E+01	0,00E+00	2,43E-02	1,44E+00	4,88E-01	2,48E+01
Non-hazardous waste	kg	3,56E+02	1,00E+00	4,92E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,61E+03	6,49E+03	0,00E+00	5,12E-01	7,81E+00	7,45E+00	-4,22E+01
Radioactive waste	kg	5,68E-03	1,06E-05	5,79E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,50E-01	1,85E-02	0,00E+00	5,40E-06	6,65E-05	1,85E-05	1,88E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,29E+00	0,00E+00	2,47E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E+01	0,00E+00	0,00E+00
Materials for energy rec	kg	2,41E-06	0,00E+00	3,63E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	3,74E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E+02	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ¹⁰⁾	kg CO ₂ e	1,16E+02	2,36E+00	5,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,80E+03	1,98E+02	0,00E+00	1,21E+00	1,37E+01	3,68E+00	-2,09E+00

10) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.3.2 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Certified electricity from 100% renewable sources
Electricity CO ₂ e / kWh	0.0061
District heating data source and quality	LPG gas heating system
District heating CO ₂ e / MJ	0.0944

Transport from production place to assembly (A4)

Scenario parameter	Value
Vehicle type	Truck, 16-32 metric ton, EURO5
Specific transport CO ₂ e emissions, kg CO ₂ e / tkm	0.19
Average transport distance, km	300
Capacity utilization (including empty return) %	50
Bulk density of transported products	34 kg, 0.36 m ³
Volume capacity utilization factor	1

Assembly (A5)

The hot water tank is installed manually, so no additional materials, nor resources are required. The following waste materials from packaging are considered in the EPD:

Scenario parameter	Value
Plastic packaging waste, kg - incineration	0.08
Paper packaging waste, kg - recycling	0.03
Cardboard packaging waste, kg - recycling	2.44
Wood packaging waste, kg - recycling	3.63

Operational energy consumption (B6)

Scenario parameter	Value
Electricity consumption over 17 years of operation, kWh	75 004
Electricity data source and quality	Market group for electricity, low voltage, Norway, ecoinvent 3.10.1

Operational water use (B7)

Scenario parameter	Value
Water use over 17 years of operation, L	657730
Water data source and quality	Market group for tap water, ecoinvent 3.10.1

End of life (C1, C3, C4)

Scenario parameter	Value
Hazardous waste disposed, kg	1.93
Re-use, kg	0
Recycling, kg	21.38
To landfill, kg	10.70

Transport to waste processing (C2)

Scenario parameter	Value
Vehicle type	Truck, 16-32 metric ton, EURO5
Specific transport CO ₂ e emissions, kg CO ₂ e / tkm	0.19
Average transport distance, km	110
Capacity utilization (including empty return) %	50
Weight and volume of transported products	34 kg, 0,36 m ³
Volume capacity utilization factor	1

Benefits and loads beyond the system boundaries (D)

Scenario parameter	Value
Substitution of electricity, in Norway, MJ	16.90
Substitution of thermal energy, district heating, in Norway, MJ	95.28
Substitution of primary steel with net scrap, kg	6.61
Substitution of primary brass and copper with net scrap, kg	0.49

BIBLIOGRAPHY

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

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

Ecoinvent database v3.10 (2024) and One Click LCA database.

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

Int'l EPD System PCR 2019:14 Construction products, version 1.3.4

EPD-IES-0013302:001 (S-P-13302) - SAGA S 200 water heater

EPD-IES-0017267 – Cold rolled ferritic stainless steel

EPD-VOE-20220199-IBA1-EN - Colofer® - Organic-coated steel strip

EPD International (2021). General Programme Instructions of the international EPD® system. Version 4.0. www.environdec.com.

SAGA 2.0 S 200 LCA background report

ABOUT THE MANUFACTURER

OSO Hotwater is one of the largest manufacturers of World class electric and indirect stainless steel hot water cylinders. Manufactured in Norway since 1932, OSO cylinders have won countless awards for quality and sustainable production.

The manufacturing site in Hokksund, Norway, uses 100 % renewable energy (hydro) for the electricity.

The plant is also certified according to the following standards:

- ISO 9001:2015 – Quality management systems
- ISO 14001:2015 – Environmental management systems
- ISO 45001:2018 – Occupational health and safety management systems

Manufacturer	OSO Hotwater AS
EPD author	OSO Hotwater AS
EPD verifier	Elisabet Amat, GREENIZE
EPD program operator	The International EPD System
Background data	This EPD is based on Ecoinvent 3.10 (Allocation, cut-off, EN15804) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Construction products

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 EN 15804, 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 background report (project report) for this EPD

Why does verification transparency matter? [Read more online.](#)

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Elisabet Amat, GREENIZE
EPD verification started on	01.04.2025
EPD verification completed on	19.06.2025
Supply-chain specific data %	10%
Approver of the EPD verifier	The International EPD System
Software verification date	05 January 2024

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 EN 15804:2012+A2:2019.

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.

Signature

Elisabet Amat, GREENIZE

VERIFICATION AND REGISTRATION (INTERNATIONAL EPD SYSTEM)

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)

PCR	PCR 2019:14 Construction products, version 1.3.4
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 .
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
Third party verifier	Elisabet Amat, GREENIZE
	Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up during EPD validity involves third party verifier	☐ yes ☒ no



THE INTERNATIONAL EPD® SYSTEM

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail:

info@environdec.com

ANNEX 1 : ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO ₂ e	1,73E+02	2,34E+00	5,79E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,81E+03	1,97E+02	0,00E+00	1,20E+00	1,37E+01	3,67E+00	-4,25E-01
Ozone depletion Pot.	kg CFC-11e	4,58E-06	3,73E-08	1,98E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,65E-05	2,40E-06	0,00E+00	1,91E-08	7,30E-08	2,48E-08	-7,18E-08
Acidification	kg SO ₂ e	1,18E+00	5,61E-03	5,02E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E+01	8,79E-01	0,00E+00	2,87E-03	1,20E-02	2,81E-03	-1,63E-01
Eutrophication	kg PO ₄ ³ e	5,82E-01	1,42E-03	1,33E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,86E+00	1,49E-01	0,00E+00	7,29E-04	2,39E-03	7,99E-04	-6,23E-02
POCP ("smog")	kg C ₂ H ₄ e	7,52E-02	5,34E-04	5,31E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,04E+00	6,70E-02	0,00E+00	2,73E-04	8,20E-04	2,26E-04	-1,16E-02
ADP-elements	kg Sbe	1,19E-02	7,53E-06	9,01E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,84E-01	1,06E-03	0,00E+00	3,85E-06	4,42E-05	4,06E-06	-2,04E-03
ADP-fossil	MJ	2,53E+03	3,31E+01	2,20E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,17E+04	3,52E+03	0,00E+00	1,69E+01	4,49E+01	1,45E+01	-2,11E+01

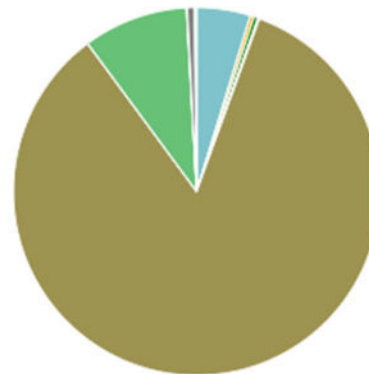
ANNEX 2 : ADDITIONAL IMPACT CATEGORIES - ISO 21930

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RW-high level ¹³⁾	kg	5,37E-04	2,62E-06	1,33E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,90E-02	4,21E-03	0,00E+00	1,34E-06	1,45E-05	3,92E-06	6,01E-05
RW-int. and low	kg	1,59E-03	7,94E-06	4,46E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E-01	1,43E-02	0,00E+00	4,06E-06	5,20E-05	1,46E-05	1,35E-04
Recovered energy	MJ	5,04E+00	1,38E-02	4,20E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,09E+02	1,28E+01	0,00E+00	7,06E-03	9,98E-02	3,19E-02	-2,09E-01

13) RW = Radioactive waste

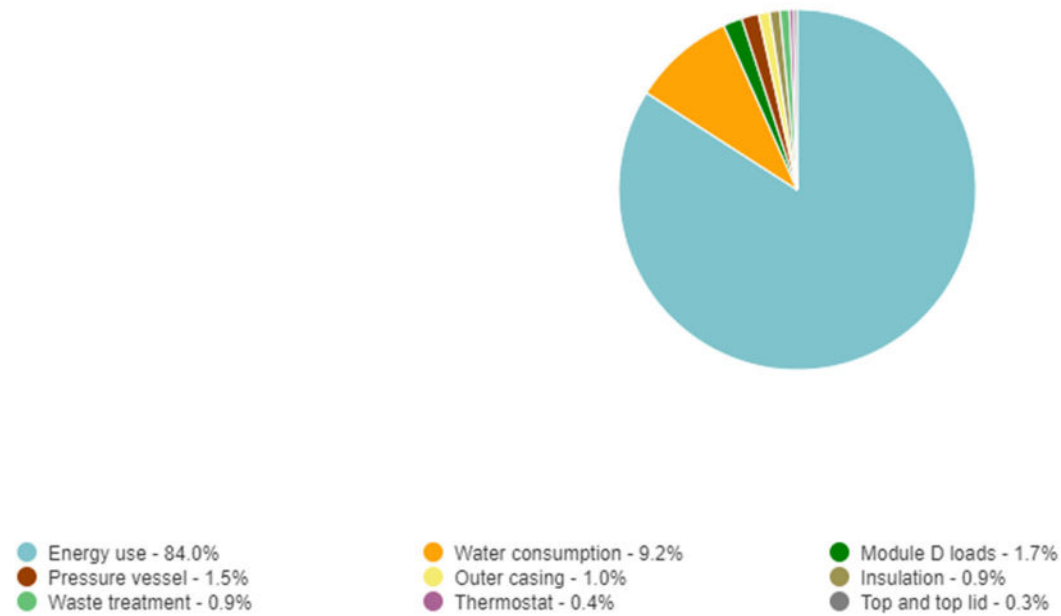
ANNEX 3 : LIFE-CYCLE ASSESSMENT RESULT VISUALIZATION

Global Warming Potential fossil kg CO₂e - Life-cycle stages



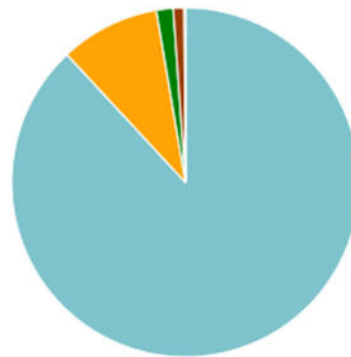
- A1 Raw material extraction and processing - 0.4%
- A2 Transport to the manufacturer - 0.1%
- A3 Manufacturing - 0.4%
- A4 Transport to the building site - 0.1%
- A5 Installation into the building - 0.0%
- B6 Operational energy use - 84.3%
- B7 Operational water use - 9.3%
- C2 Waste transport - 0.1%
- C3 Waste processing - 0.6%
- C4 Waste disposal - 0.2%

Global Warming Potential fossil kg CO2e - Classifications



Global Warming Potential fossil kg CO₂e - Resource types

This is a drilldown chart. Click on the chart to view details



● Other resource types - 88.1%
 ● Water supply, sewerage, waste man...
 ● Stainless steel - 1.5%
 ● Hot-dip galvanized/zinc coated steel ...
 ● Transport of goods, Road - 0.1%

ANNEX 4 : ENVIRONMENTAL IMPACT DATA - EU SCENARIO*

*Same product, but different transport to building site (A4) and energy mix during operation (B6)

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. Note: additional environmental impact data may be presented in annexes.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	1,04E+02	9,24E+00	1,32E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+04	1,98E+02	0,00E+00	1,21E+00	1,37E+01	3,68E+00	-1,09E+01
GWP – fossil	kg CO ₂ e	1,16E+02	9,24E+00	5,56E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,46E+04	1,97E+02	0,00E+00	1,20E+00	1,37E+01	3,68E+00	-2,02E+00
GWP – biogenic	kg CO ₂ e	-1,24E+01	1,39E-04	1,27E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,51E+01	0,00E+00	0,00E+00	9,22E-04	-6,80E-03	3,55E-02	-8,80E+00
GWP – LULUC	kg CO ₂ e	4,63E-01	3,39E-03	1,44E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,54E+01	4,01E-01	0,00E+00	4,26E-04	2,02E-03	4,99E-04	-6,76E-02
Ozone depletion pot.	kg CFC ₁₁ e	8,00E-04	1,78E-07	2,45E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,53E-04	2,83E-06	0,00E+00	2,40E-08	8,39E-08	2,85E-08	-7,80E-08
Acidification potential	mol H ⁺ e	9,52E-01	5,46E-02	6,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,44E+02	1,05E+00	0,00E+00	3,77E-03	1,49E-02	3,52E-03	-1,98E-01
EP-freshwater ²⁾	kg Pe	7,66E-02	5,76E-04	4,33E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,29E+01	1,20E-01	0,00E+00	7,99E-05	2,61E-03	8,29E-04	-1,62E-02
EP-marine	kg Ne	1,15E-01	1,60E-02	2,20E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,26E+01	2,02E-01	0,00E+00	1,27E-03	3,83E-03	4,06E-03	-1,54E-02
EP-terrestrial	mol Ne	1,29E+00	1,75E-01	1,91E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,03E+02	1,95E+00	0,00E+00	1,38E-02	3,78E-02	9,35E-03	-1,66E-01
POCP (“smog”) ³⁾	kg NMVOCe	4,51E-01	6,23E-02	6,89E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,68E+01	6,45E-01	0,00E+00	5,91E-03	1,37E-02	3,78E-03	-5,59E-02
ADP-minerals & metals ⁴⁾	kg Sbe	1,05E-02	2,79E-05	9,16E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,31E-01	1,12E-03	0,00E+00	3,94E-06	5,61E-05	8,24E-06	-2,05E-03
ADP-fossil resources	MJ	1,71E+03	1,28E+02	2,20E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,71E+05	3,52E+03	0,00E+00	1,69E+01	4,48E+01	1,45E+01	-4,83E+01
Water use ⁵⁾	m ³ e depr.	7,09E+01	6,01E-01	4,29E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,56E+04	9,74E+01	0,00E+00	8,31E-02	7,49E-01	2,00E-01	8,45E-01

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.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	4,06E-06	6,78E-07	9,83E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,15E-04	1,19E-05	0,00E+00	9,47E-08	1,76E-07	4,16E-08	-1,56E-06
Ionizing radiation ⁶⁾	kBq	8,20E+00	1,53E-01	2,26E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,58E+04	7,21E+01	0,00E+00	2,16E-02	2,50E-01	6,89E-02	7,48E-01
Ecotoxicity	CTUe	2,52E+03	1,61E+01	7,64E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,70E+04	6,73E+02	0,00E+00	2,22E+00	1,22E+02	5,38E+01	-2,85E+02
Human toxicity,	CTUh	1,30E-06	1,61E-09	7,16E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,30E-06	2,45E-07	0,00E+00	2,05E-10	9,68E-09	3,31E-09	1,18E-09
Human tox. non-	CTUh	6,94E-06	7,57E-08	2,86E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,30E-04	1,12E-05	0,00E+00	1,06E-08	6,10E-08	3,11E-08	-1,67E-06
SQP ⁷⁾	-	1,29E+03	7,00E+01	1,10E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,27E+05	8,24E+02	0,00E+00	1,01E+01	1,94E+01	4,49E+00	-5,67E+02

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	2,35E+02	2,09E+00	-3,91E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,57E+05	6,29E+02	0,00E+00	2,93E-01	3,41E+00	7,85E-01	-2,29E+00
Renew. PER as material	MJ	1,21E+02	0,00E+00	-1,10E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,80E+00	-2,60E+00	7,72E+01
Total use of renew. PER	MJ	3,56E+02	2,09E+00	-1,49E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,57E+05	6,29E+02	0,00E+00	2,93E-01	-4,39E+00	-1,81E+00	7,49E+01
Non-re. PER as energy	MJ	1,29E+03	1,28E+02	-2,95E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,71E+05	3,52E+03	0,00E+00	1,69E+01	-1,30E+02	-5,73E+01	-4,86E+01
Non-re. PER as material	MJ	2,52E+02	0,00E+00	-8,70E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,77E+02	-6,41E+01	6,09E+01
Total use of non-re. PER	MJ	1,55E+03	1,28E+02	-1,16E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,71E+05	3,52E+03	0,00E+00	1,69E+01	-3,07E+02	-1,21E+02	1,23E+01
Secondary materials	kg	4,82E+00	5,84E-02	2,17E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,45E+01	1,34E+01	0,00E+00	7,75E-03	2,40E-02	4,47E-03	2,18E+00
Renew. secondary fuels	MJ	2,95E+00	6,83E-04	1,31E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,54E-01	8,88E-03	0,00E+00	9,79E-05	5,77E-04	7,61E-05	-2,68E-01
Non-ren. secondary	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	4,42E+00	1,64E-02	9,69E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,94E+02	6,60E+02	0,00E+00	2,28E-03	1,90E-02	2,17E-03	3,69E-02

8) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,33E+01	1,81E-01	1,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,45E+03	2,16E+01	0,00E+00	2,43E-02	1,44E+00	4,88E-01	2,48E+01
Non-hazardous waste	kg	3,56E+02	3,71E+00	4,92E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E+05	6,49E+03	0,00E+00	5,12E-01	7,81E+00	7,45E+00	-4,22E+01
Radioactive waste	kg	5,68E-03	3,80E-05	5,78E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,05E+00	1,85E-02	0,00E+00	5,36E-06	6,63E-05	1,84E-05	1,83E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,29E+00	0,00E+00	2,47E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E+01	0,00E+00	0,00E+00
Materials for energy rec	kg	2,41E-06	0,00E+00	3,63E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	3,74E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E+02	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ¹⁰⁾	kg CO ₂ e	1,16E+02	9,24E+00	5,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,46E+04	1,98E+02	0,00E+00	1,21E+00	1,37E+01	3,68E+00	-2,09E+00

10) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.3.2 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.

ANNEX 5 : ENVIRONMENTAL IMPACT DATA – CANADA SCENARIO*

*Same product, but different transport to building site (A4) and energy mix during operation (B6)

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. Note: additional environmental impact data may be presented in annexes.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	1,04E+02	2,98E+01	1,32E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,24E+04	1,98E+02	0,00E+00	1,21E+00	1,37E+01	3,68E+00	-1,09E+01
GWP – fossil	kg CO ₂ e	1,16E+02	2,98E+01	5,56E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,17E+04	1,97E+02	0,00E+00	1,20E+00	1,37E+01	3,68E+00	-2,02E+00
GWP – biogenic	kg CO ₂ e	-1,24E+01	4,18E-03	1,27E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,64E+01	0,00E+00	0,00E+00	9,22E-04	-6,80E-03	3,55E-02	-8,80E+00
GWP – LULUC	kg CO ₂ e	4,63E-01	1,44E-02	1,44E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,23E+02	4,01E-01	0,00E+00	4,26E-04	2,02E-03	4,99E-04	-6,76E-02
Ozone depletion pot.	kg CFC ₁₁ e	8,00E-04	4,34E-07	2,45E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,41E-04	2,83E-06	0,00E+00	2,40E-08	8,39E-08	2,85E-08	-7,80E-08
Acidification potential	mol H ⁺ e	9,52E-01	8,65E-01	6,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,27E+01	1,05E+00	0,00E+00	3,77E-03	1,49E-02	3,52E-03	-1,98E-01
EP-freshwater ²⁾	kg Pe	7,66E-02	8,83E-04	4,33E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,02E+01	1,20E-01	0,00E+00	7,99E-05	2,61E-03	8,29E-04	-1,62E-02
EP-marine	kg Ne	1,15E-01	2,18E-01	2,20E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,69E+01	2,02E-01	0,00E+00	1,27E-03	3,83E-03	4,06E-03	-1,54E-02
EP-terrestrial	mol Ne	1,29E+00	2,43E+00	1,91E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,40E+02	1,95E+00	0,00E+00	1,38E-02	3,78E-02	9,35E-03	-1,66E-01
POCP (“smog”) ³⁾	kg NMVOCe	4,51E-01	6,56E-01	6,89E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,33E+01	6,45E-01	0,00E+00	5,91E-03	1,37E-02	3,78E-03	-5,59E-02
ADP-minerals & metals ⁴⁾	kg Sbe	1,05E-02	2,82E-05	9,16E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,00E-01	1,12E-03	0,00E+00	3,94E-06	5,61E-05	8,24E-06	-2,05E-03
ADP-fossil resources	MJ	1,71E+03	3,66E+02	2,20E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,72E+05	3,52E+03	0,00E+00	1,69E+01	4,48E+01	1,45E+01	-4,83E+01
Water use ⁵⁾	m ³ e depr.	7,09E+01	9,71E-01	4,29E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,88E+04	9,74E+01	0,00E+00	8,31E-02	7,49E-01	2,00E-01	8,45E-01

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.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	4,06E-06	9,02E-07	9,83E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,59E-04	1,19E-05	0,00E+00	9,47E-08	1,76E-07	4,16E-08	-1,56E-06
Ionizing radiation ⁶⁾	kBq	8,20E+00	1,58E-01	2,26E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,62E+04	7,21E+01	0,00E+00	2,16E-02	2,50E-01	6,89E-02	7,48E-01
Ecotoxicity	CTUe	2,52E+03	2,66E+01	7,64E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,50E+04	6,73E+02	0,00E+00	2,22E+00	1,22E+02	5,38E+01	-2,85E+02
Human toxicity,	CTUh	1,30E-06	6,12E-09	7,16E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,80E-06	2,45E-07	0,00E+00	2,05E-10	9,68E-09	3,31E-09	1,18E-09
Human tox. non-	CTUh	6,94E-06	9,08E-08	2,86E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,54E-04	1,12E-05	0,00E+00	1,06E-08	6,10E-08	3,11E-08	-1,67E-06
SQP ⁷⁾	-	1,29E+03	3,31E+01	1,10E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,30E+04	8,24E+02	0,00E+00	1,01E+01	1,94E+01	4,49E+00	-5,67E+02

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	2,35E+02	2,64E+00	-3,91E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E+05	6,29E+02	0,00E+00	2,93E-01	3,41E+00	7,85E-01	-2,29E+00
Renew. PER as material	MJ	1,21E+02	0,00E+00	-1,10E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,80E+00	-2,60E+00	7,72E+01
Total use of renew. PER	MJ	3,56E+02	2,64E+00	-1,49E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E+05	6,29E+02	0,00E+00	2,93E-01	-4,39E+00	-1,81E+00	7,49E+01
Non-re. PER as energy	MJ	1,29E+03	3,66E+02	-2,95E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,72E+05	3,52E+03	0,00E+00	1,69E+01	-1,30E+02	-5,73E+01	-4,86E+01
Non-re. PER as material	MJ	2,52E+02	0,00E+00	-8,70E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,77E+02	-6,41E+01	6,09E+01
Total use of non-re. PER	MJ	1,55E+03	3,66E+02	-1,16E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,72E+05	3,52E+03	0,00E+00	1,69E+01	-3,07E+02	-1,21E+02	1,23E+01
Secondary materials	kg	4,82E+00	1,60E-01	2,17E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,29E+01	1,34E+01	0,00E+00	7,75E-03	2,40E-02	4,47E-03	2,18E+00
Renew. secondary fuels	MJ	2,95E+00	4,04E-04	1,31E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,17E-01	8,88E-03	0,00E+00	9,79E-05	5,77E-04	7,61E-05	-2,68E-01
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	4,42E+00	2,40E-02	9,69E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E+03	6,60E+02	0,00E+00	2,28E-03	1,90E-02	2,17E-03	3,69E-02

8) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,33E+01	4,48E-01	1,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,19E+02	2,16E+01	0,00E+00	2,43E-02	1,44E+00	4,88E-01	2,48E+01
Non-hazardous waste	kg	3,56E+02	6,14E+00	4,92E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,79E+04	6,49E+03	0,00E+00	5,12E-01	7,81E+00	7,45E+00	-4,22E+01
Radioactive waste	kg	5,68E-03	3,84E-05	5,78E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,28E+00	1,85E-02	0,00E+00	5,36E-06	6,63E-05	1,84E-05	1,83E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,29E+00	0,00E+00	2,47E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E+01	0,00E+00	0,00E+00
Materials for energy rec	kg	2,41E-06	0,00E+00	3,63E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	3,74E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E+02	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG ¹⁰⁾	kg CO ₂ e	1,16E+02	2,98E+01	5,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,23E+04	1,98E+02	0,00E+00	1,21E+00	1,37E+01	3,68E+00	-2,09E+00

10) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013). In addition, the characterisation factors for the flows - CH₄ fossil, CH₄ biogenic and Dinitrogen monoxide - were updated in line with the guidance of IES PCR 1.3.2 Annex 1. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterization factor for biogenic CO₂ is set to zero.