ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	**Sikla GmbH**
Program operator	The Norwegian EPD Foundation
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	NEPD-4539-3797-EN
Registration number	MR-NOR-EPD-SIK-20230246-EN
Issue date	07.06.2023
Valid to	06.06.2028

siFramo modular secondary steel system

Sikla GmbH

Registered under the scope of mutual recognition between Institut Bauen und Umwelt e.V. (IBU) and EPD Norge

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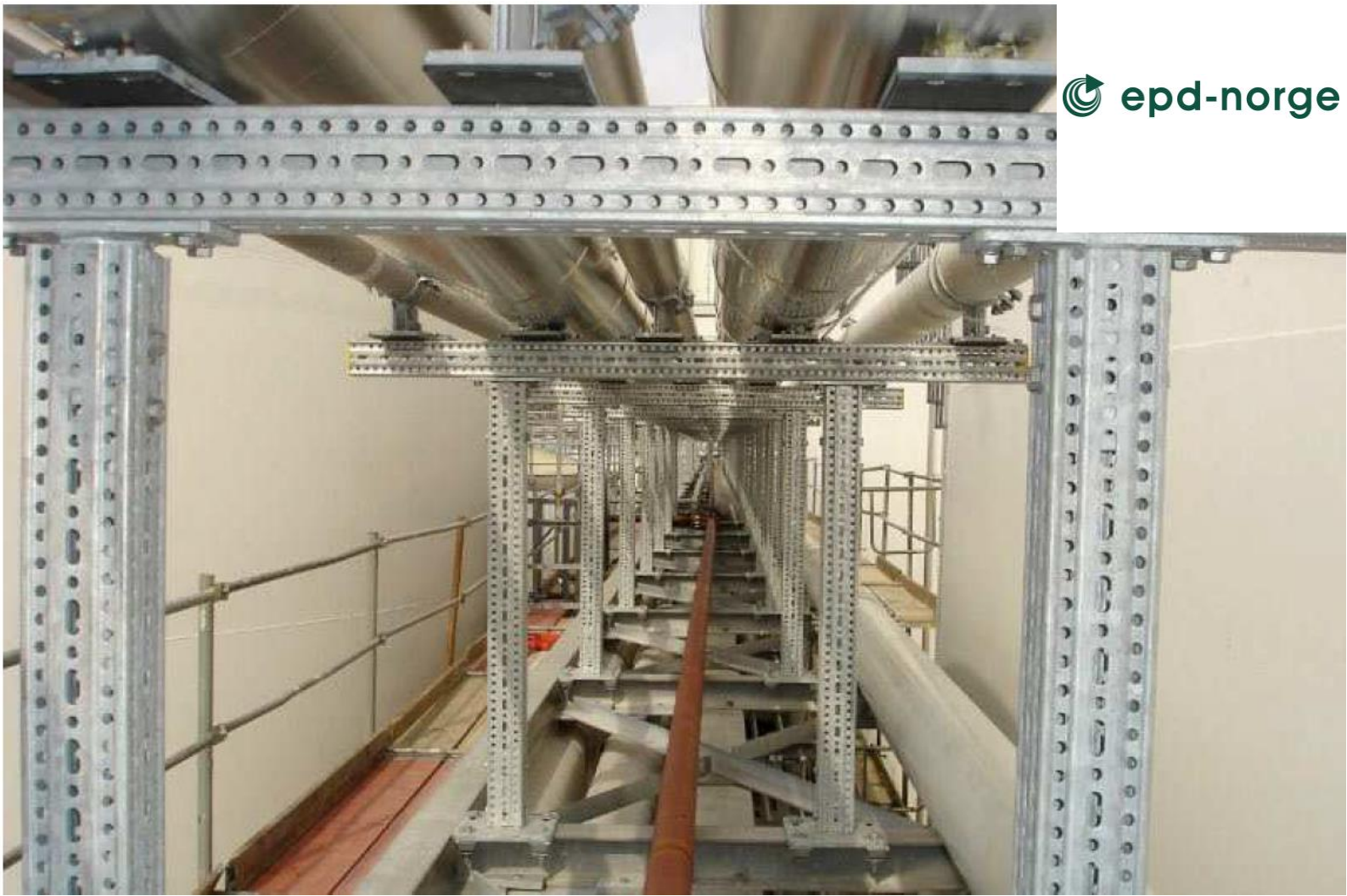

General information

Product:
siFramo modular secondary steel system

Program Operator:
The Norwegian EPD Foundation
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Declaration number:
NEPD-4538-3797-EN

This declaration is based on Product Category Rules:
NPCR Part B for Steel and Aluminum Construction Products (references to EN15804+A2)

Statements:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidence.

Declared unit:
1 kg siFramo modular secondary steel system

Declared unit with option:
1 kg siFramo modular secondary steel system
Modules A1-A3, A4, C1-C4 and D

Functional unit:
NA

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ☒

Silvia Vilčeková
Independent verifier approved by EPD Norway

Owner of the declaration:
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Manufacturer:
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Place of production:
Sikla production facilities in Europe

Management system:
ISO 9001:2015

Organization no:
HRB 70289

Issue date:
07.06.2023

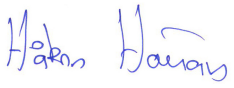
Valid to:
07.06.2028

Year of study:
2021

Comparability:
EPDs from other programs than [Name of Program operator] may not be comparable.

The EPD has been worked out by:
Trebostad, M., Johansen, B.H., Energiråd AS

Approved



Manager of EPD Norway

Product

Product description:

siFramo is a multi-functional mounting system for all load ranges, offering unlimited three-dimensional connection options. The closed siFramo profile is characterized by high torsional rigidity and the adaptation is reliably secured by a stepless form-fit connection. One type of a thread-forming screw is used for connections of all components in the assembly of siFramo. The non-cutting and precision work hardening of the nut thread creates a form-fit. Mounted screws can be loosened and reused in the already formed threads. The siFramo system is approved to EN 1090 up to EXC2 and is used on a par with conventional steel construction. It benefits from a reassuring level of safety guaranteed by tested corrosion resistance to Corrosivity Category C4-high according to EN ISO 12944-2 and statically calculated constructions according to Eurocode 3 (DIN EN 1993). The system is type-approved by the DNV classification society for use in shipbuilding and offshore applications.

Product specification:

This EPD covers the siFramo modular steel products, which are manufactured from construction steel and following hot-dip galvanized. The manufacturing process of these products includes cutting, punching, forming and welding of the steel input prior to hot dip galvanizing.

Materials	KG	%
Steel, low alloyed	0,99	99%
Steel, stainless	0,01	1%

Market:

Global

Reference service life, product:

This EPD does not declare the construction process (A5) and use stages (B1-B7). The lifetime of zinc coated steel will depend on the specific application and environmental conditions. Hence, a reference service life for the product is not declared.

Reference service life, building:

N/A

LCA: Calculation rules

Declared unit:

1 kg siFramo modular secondary steel system

Data quality:

Upstream:
Specific data was collected by using measurable consumption and emissions data from Sikla and its suppliers for 2021.

Downstream:
Scenarios were developed based on PCR and sales statistics. PCR defaults and database data were used.

Conversion to process flows and LCI:
Conversion to primary flows and environmental impacts was done using OpenLCA (version 1.11.0). Datasets from the ecoinvent v3.8 cutoff database with the EN15804 add-on developed by GreenDelta were selected according to their technological, geographical and temporal representativeness for the assessed process.

Impact assessment:
Open LCA software (version 1.11.0) was used to perform the impact assessment of this LCA. The latter refers to the LCIA characterization models, factors and methods as given in EN15804:2012+A2:2019, labelled 'EN15804_A1_2020_3' and 'EN15804_A2_additional_2020' in Open LCA.

Allocation:

The allocation is made according to the requirements of EN 15804. The energy, water and waste consumption of the company's own production is equally allocated to all products by mass allocation. Effects of primary production of recycled materials are allocated to the main product in which the material is used. The recycling process and transport of the material are allocated to this analysis.

System boundary:

The scope of the study is cradle-to-gate with options described as A1-A3, A4, C1-C4 and D modules. The A4 scenario is calculated for average transport in Europe. It also provides impact data per 1000 km of global transport. Two end-of-life scenarios (C2-C4 + D) are considered, one for recycling (Scenario A) and one for 80% reuse (Scenario B).

Modules A1-A3 considers the life cycle stages from the extraction of raw materials to the arrival of the product at the assembly site, including all transport stages. Steel scrap from the production processes is treated in a closed loop, so that it is returned to production as an input.

Module A4 considers transport from Sikla's facilities to the end user. Average impacts from transport to customers are calculated for the European Economic Area (A4EUR). In addition, standard impacts for transport to/from ports (A4PORT) and impacts per km of sea transport (A4SEA)

are given for the global market, so that the impact of transport to non-EUR customers can be estimated using the sea distance from Hamburg to the local port.

End-of-Life: Two scenarios are considered for the end-of-life phases (C1-C4 and D), one for a recycling route (scenario A), and one for a reuse route where 80 % of the disassembled product is used for a new application (scenario B)

Module $C1_A$ and $C1_B$ accounts for the disassembly of siFramo, by operation of electric screwdriver.

Modules $C2_A$-$C4_A$ includes transport to the scrap handling facility, scrap sorting and preparation for remelting, and landfilling of a small fraction (2%) due to losses/inefficiencies in the handling process.

Module D_A includes the impacts of melting and casting of recovered steel scrap and the potential benefits of avoiding the use of virgin metals in the next product life cycle.

Modules $C2_B$-$C4_B$ includes the same processes as above, but for only 20% of the disassembled product.

Module D_B includes the impacts of transport and reassembly of 80% of the disassembled product and the potential benefits of avoided new product for the next product life cycle. Recovered steel scrap from the non-reused products and scrap from the reassembly are remelted as in scenario A. Potential maintenance of the reused product is not included.

Cut-off criteria:

All major raw materials and all the essential energy are included. The production process for raw materials and energy flows that represent very small amounts (<1%) are not included.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

Transport from production place to assembly/user (A4)

Type	Capacity utilization (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck_EUR	53 %	lorry >32 metric ton, EURO6	661	0,0228l/t*km Diesel	15,09
Truck_GLO	53 %	lorry >32 metric ton, EURO6	903	0,0228 l/t.km Diesel	20,63
Boat_GLO	70 %	container ship	X	0,0003 l/t.km HFO	N/A

The transport scenario considered for the European market is based on the distribution of sales in Europe in 2021 and corresponding transport data. Data sets from the EcoInvent database were used.

The transport distance for Europe can be considered as an average for the whole European market. For deliveries to the global market, the transport distance by truck is based on the transport distance from Sikla's plants to Hamburg and a standard transport distance of 300 km from the port of destination to the end user. Sea transport to global customers can be estimated by determining the sea distance from Hamburg to the local port.

Project specific transport data is available from Sikla on request.

Scenario A (recycling)

The following information describes the End-of-life modules in the recycling scenario.

End of Life ($C1_A$, $C3_A$, $C4_A$)

	Unit	Value
Hazardous waste disposed	Kg	-
Collected as mixed construction waste	Kg	-
Reuse	Kg	-
Recycling	Kg	0,98
Energy recovery	Kg	-
To landfill	Kg	0,02

All siFramo is disassembled and transported to sorting and preparation for recycling/remelting. 2% of the scrap is not recovered and therefore landfilled.

Transport to waste processing ($C2_A$)

Type	Capacity utilization (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	37 %	lorry 16-32 metric ton, EURO6	30,0	0,0436 l/t.km Diesel	1,309

Benefits and loads beyond the system boundaries (D_A)

	Unit	Value
Remelted steel scrap	kg	0,98
Substituted new low-alloyed steel	**kg**	**0,87**

The recovered siFramo system is assumed to be remelted to produce secondary low-alloyed steel in an electric arc furnace. Due to losses in the remelting process, this steel substitutes a smaller amount of new steel. Primary steel will have a varying degree of recycled content. For the purpose of this study, the secondary steel is assumed to replace average European steel produced by blast oxygen furnaces.

Scenario B (80% reuse)

The following information describe the End-of-life modules in the reuse scenario.

End of Life ($C1_B$, $C3_B$, $C4_B$)

	Unit	Value
Hazardous waste disposed	Kg	-
Collected as mixed construction waste	Kg	-
Reuse	Kg	0,80
Recycling	Kg	0,196
Energy recovery	Kg	-
To landfill	Kg	0,004

All siFramo is disassembled and 20% of the amount is transported to sorting and preparation for recycling/remelting. 2% of the non-reused siFramo can not be recovered and therefore landfilled.

Transport to waste processing ($C2_B$)

Type	Capacity utilization (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	37 %	lorry 16-32 metric ton, EURO6	30,0	0,0436 l/t.km Diesel	1,309

The module only considers the non-reused ratio of siFramo. The transport and handling of reusable products are considered in the D_B module.

Benefits and loads beyond the system boundaries (D_B)

	Unit	Value
Reusable siFramo transported to new assembly location	kg	0,80
Substituted new siFramo in reuse application	**kg**	**0,72**
Remelted non-reusable siFramo	kg	0,20
Remelted scrap from reassembly of reusable siFramo	kg	0,08
Substituted new low-alloy steel	**kg**	**0,25**

The siFramo system is modular and reusable without material losses or structural degradation. However, losses and waste will occur because of differing needs in new applications, impractical transport, or simply a lack in demand for reusable products.

To account for such imperfections, 20% of the disassembled siFramo is assumed to go straight to recycling. Reusable siFramo is transported to a new assembly site (assumed avg. 20 km) and is reassembled. A scrap rate of 10% is assumed in the reassembly, due to profiles being cut to fit the new application.

Reused siFramo in the new assembly is considered to replace the production and transport of new siFramo (modules A1-A4)

All non-reused steel (including scrap from reassembly) is considered in the same manner as in Scenario A.

LCA: Results

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Results for Scenario A

The following chapter presents the results for the recycle scenario. The A1-A4 modules are identical for the two scenarios but are presented for both scenarios for ease of navigation.

Core environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
GWP-total	kg CO2 eq.	3,22E+00	6,04E-02	8,43E-02	1,01E-05	5,70E-04	4,89E-03	2,06E-02	1,10E-04	-1,41E+00
GWP-fossil	kg CO2 eq.	3,10E+00	6,03E-02	8,41E-02	1,01E-05	5,50E-04	4,88E-03	2,18E-02	1,10E-04	-1,40E+00
GWP-biogenic	kg CO2 eq.	1,13E-01	9,63E-05	1,30E-04	2,40E-10	2,01E-05	8,69E-06	-1,26E-03	3,01E-07	-5,34E-03
GWP-LULUC	kg CO2 eq.	2,22E-03	2,28E-05	3,18E-05	7,27E-09	1,29E-06	1,96E-06	2,88E-05	9,72E-08	-2,60E-04
ODP	kg CFC11 eq.	1,94E-07	1,50E-08	2,10E-08	2,00E-12	2,75E-11	1,13E-09	2,70E-09	4,26E-11	-5,59E-08
AP	mol H^+ eq.	1,33E-02	1,90E-04	2,70E-04	3,28E-07	3,11E-06	1,39E-05	2,80E-04	9,90E-07	-5,75E-03
EP-freshwater	kg P eq.	1,58E-03	3,95E-06	5,51E-06	3,33E-10	5,51E-07	3,22E-07	1,55E-05	9,72E-09	-6,10E-04
EP-marine	kg N eq.	3,10E-03	4,31E-05	6,01E-05	8,07E-08	5,20E-07	2,82E-06	6,03E-05	3,45E-07	-1,27E-03
EP-terrestrial	mol N eq.	3,13E-02	4,70E-04	6,60E-04	8,96E-07	4,57E-06	3,07E-05	6,80E-04	3,77E-06	-1,38E-02
POCP	kg NMVOC eq.	1,16E-02	1,80E-04	2,50E-04	2,31E-07	1,24E-06	1,15E-05	1,80E-04	1,07E-06	-6,06E-03
ADP-M&M	kg Sb eq.	8,54E-05	1,39E-07	1,94E-07	1,30E-11	4,90E-09	1,66E-08	2,80E-06	2,27E-10	-2,37E-05
ADP-fossil	MJ	2,91E+01	7,43E-02	1,04E-01	7,05E-06	5,53E-03	5,65E-03	1,07E-01	2,20E-04	-1,69E+01
WDP	m^3	1,39E+00	5,01E-03	6,99E-03	3,22E-07	4,30E-04	3,60E-04	7,60E-03	1,40E-04	-1,27E-01

GWP-total: *Global Warming Potential;* ***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; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestrial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water consumption*

Additional environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
PM	Disease incidence	1,95E-07	5,27E-09	7,36E-09	3,04E-13	9,15E-12	3,09E-10	3,48E-09	1,94E-11	-8,89E-08
IRP	kBq U235 eq.	2,59E-01	4,97E-03	6,93E-03	5,82E-07	3,20E-04	3,80E-04	3,31E-03	1,31E-05	4,97E-02
ETP-fw	CTUe	9,92E-01	4,15E-02	5,79E-02	1,39E-06	7,81E-05	2,48E-03	2,25E-02	2,03E-05	-1,00E-01
HTP-c	CTUh	1,54E-08	1,78E-11	2,49E-11	5,46E-15	2,24E-13	1,58E-12	3,48E-11	4,02E-14	3,10E-09
HTP-nc	CTUh	2,39E-07	1,13E-09	1,58E-09	6,32E-14	3,61E-11	9,19E-11	5,68E-09	1,44E-12	-1,79E-08
SQP	Pt	9,48E+00	1,48E+00	2,07E+00	3,56E-06	4,60E-04	6,28E-02	6,81E-02	5,01E-03	-3,12E+00

***PM:** Particulate matter emissions; **IRP:** Ionizing radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality*

Resource use

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
RPEE	MJ	3,13E+00	9,70E-03	1,35E-02	5,90E-07	2,09E-03	8,00E-04	2,22E-02	1,70E-05	-7,77E-01
RPEM	MJ	7,17E-01	2,78E-03	3,87E-03	2,77E-07	3,10E-04	2,60E-04	3,04E-02	8,05E-06	-2,42E-01
TPE	MJ	3,85E+00	1,25E-02	1,74E-02	8,67E-07	2,40E-03	1,06E-03	5,26E-02	2,51E-05	-1,02E+00
NRPE	MJ	3,30E+01	9,26E-02	1,29E-01	7,82E-06	1,10E-02	7,21E-03	1,53E-01	2,50E-04	-1,59E+01
NRPM	MJ	1,28E+01	8,95E-01	1,25E+00	1,20E-04	2,81E-03	6,73E-02	1,84E-01	2,71E-03	-2,35E+00
TRPE	MJ	4,59E+01	9,88E-01	1,38E+00	1,30E-04	1,39E-02	7,45E-02	3,37E-01	2,96E-03	-1,82E+01
SM	kg	4,39E-01	8,70E-04	1,21E-03	8,88E-08	1,50E-04	7,59E-05	3,92E-03	1,59E-06	7,96E-01
RSF	MJ	7,79E-02	2,40E-04	3,40E-04	7,92E-09	8,37E-05	2,26E-05	6,80E-04	2,79E-07	1,84E-02
NRSF	MJ	8,04E-02	7,40E-04	1,03E-03	1,49E-08	5,61E-05	9,18E-05	5,10E-04	4,03E-07	6,00E-04
W	m^3	3,44E-02	1,20E-04	1,70E-04	7,81E-09	1,01E-05	8,57E-06	1,80E-04	3,17E-06	-3,21E-03

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Nonrenewable primary energy resources used as energy carrier; NRPM Nonrenewable primary energy resources used as materials; TRPE Total use

of nonrenewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of nonrenewable secondary fuels; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
HW	KG	8,36E+00	1,99E-02	2,78E-02	1,72E-06	2,73E-03	1,66E-03	1,06E-01	4,86E-05	-3,05E+00
NHW	KG	5,98E-01	9,15E-02	1,28E-01	2,24E-07	3,45E-05	3,84E-03	7,10E-03	2,00E-02	8,53E-03
RW	KG	2,52E-03	1,84E-05	2,56E-05	1,45E-09	3,43E-06	1,49E-06	2,96E-05	3,72E-08	6,40E-04

HW Hazardous waste disposed; NHW Nonhazardous waste disposed; RW Radioactive waste disposed

End of life – output flow

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
CR	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
MR	kg	4,52E-01	6,80E-04	9,50E-04	7,96E-08	1,40E-04	6,30E-05	9,81E-01	1,01E-06	-2,15E-01
MER	kg	8,95E-03	2,10E-04	3,00E-04	5,17E-08	7,78E-07	1,74E-05	2,30E-04	5,59E-07	-1,59E-03
EEE	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
ETE	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

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 = 9,0*10-3 = 0,009

Results for Scenario B

The following chapter presents the results for the re-use scenario. The A1-A4 modules are identical for the two scenarios but are presented for both scenarios for ease of navigation.

Core environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
GWP-total	kg CO2 eq.	3,22E+00	6,04E-02	8,43E-02	1,01E-05	5,70E-04	9,80E-04	4,12E-03	1,59E-05	-2,75E+00
GWP-fossil	kg CO2 eq.	3,10E+00	6,03E-02	8,41E-02	1,01E-05	5,50E-04	9,80E-04	4,36E-03	1,58E-05	-2,67E+00
GWP-biogenic	kg CO2 eq.	1,13E-01	9,63E-05	1,30E-04	2,40E-10	2,01E-05	1,74E-06	-2,50E-04	4,52E-08	-8,29E-02
GWP-LULUC	kg CO2 eq.	2,22E-03	2,28E-05	3,18E-05	7,27E-09	1,29E-06	3,91E-07	5,76E-06	1,46E-08	-1,68E-03
ODP	kg CFC11 eq.	1,94E-07	1,50E-08	2,10E-08	2,00E-12	2,75E-11	2,26E-10	5,40E-10	6,39E-12	-1,65E-07
AP	mol H^+ eq.	1,33E-02	1,90E-04	2,70E-04	3,28E-07	3,11E-06	2,77E-06	5,55E-05	1,48E-07	-1,13E-02
EP-freshwater	kg P eq.	1,58E-03	3,95E-06	5,51E-06	3,33E-10	5,51E-07	6,45E-08	3,11E-06	1,46E-09	-1,31E-03
EP-marine	kg N eq.	3,10E-03	4,31E-05	6,01E-05	8,07E-08	5,20E-07	5,65E-07	1,21E-05	5,17E-08	-2,61E-03
EP-terrestrial	mol N eq.	3,13E-02	4,70E-04	6,60E-04	8,96E-07	4,57E-06	6,14E-06	1,40E-04	5,65E-07	-2,67E-02
POCP	kg NMVOC eq.	1,16E-02	1,80E-04	2,50E-04	2,31E-07	1,24E-06	2,29E-06	3,66E-05	1,61E-07	-1,02E-02
ADP-M&M	kg Sb eq.	8,54E-05	1,39E-07	1,94E-07	1,30E-11	4,90E-09	3,33E-09	5,61E-07	3,40E-11	-6,80E-05
ADP-fossil	MJ	2,91E+01	7,43E-02	1,04E-01	7,05E-06	5,53E-03	1,13E-03	2,14E-02	3,30E-05	-2,57E+01
WDP	m^3	1,39E+00	5,01E-03	6,99E-03	3,22E-07	4,30E-04	7,20E-05	1,52E-03	2,03E-05	-1,04E+00

GWP-total: *Global Warming Potential;* ***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; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestrial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water consumption*

Additional environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
PM	Disease incidence	1,95E-07	5,27E-09	7,36E-09	3,04E-13	9,15E-12	6,18E-11	6,96E-10	2,91E-12	-1,69E-07
IRP	kBq U235 eq.	2,59E-01	4,97E-03	6,93E-03	5,82E-07	3,20E-04	7,63E-05	6,60E-04	1,96E-06	-1,76E-01
ETP-fw	CTUe	9,92E-01	4,15E-02	5,79E-02	1,39E-06	7,81E-05	5,00E-04	4,49E-03	3,05E-06	-7,69E-01
HTP-c	CTUh	1,54E-08	1,78E-11	2,49E-11	5,46E-15	2,24E-13	3,15E-13	6,95E-12	6,04E-15	-1,02E-08
HTP-nc	CTUh	2,39E-07	1,13E-09	1,58E-09	6,32E-14	3,61E-11	1,84E-11	1,14E-09	2,16E-13	-1,77E-07
SQP	Pt	9,48E+00	1,48E+00	2,07E+00	3,56E-06	4,60E-04	1,26E-02	1,36E-02	7,50E-04	-8,73E+00

***PM:** Particulate matter emissions; **IRP:** Ionizing radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality*

Resource use

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
RPEE	MJ	3,13E+00	9,70E-03	1,35E-02	5,90E-07	2,09E-03	1,60E-04	4,44E-03	2,55E-06	-2,48E+00
RPEM	MJ	7,17E-01	2,78E-03	3,87E-03	2,77E-07	3,10E-04	5,22E-05	6,08E-03	1,21E-06	-5,84E-01
TPE	MJ	3,85E+00	1,25E-02	1,74E-02	8,67E-07	2,40E-03	2,10E-04	1,05E-02	3,76E-06	-3,06E+00
NRPE	MJ	3,30E+01	9,26E-02	1,29E-01	7,82E-06	1,10E-02	1,44E-03	3,06E-02	3,75E-05	-2,83E+01
NRPM	MJ	1,28E+01	8,95E-01	1,25E+00	1,20E-04	2,81E-03	1,35E-02	3,68E-02	4,10E-04	-1,05E+01
TRPE	MJ	4,59E+01	9,88E-01	1,38E+00	1,30E-04	1,39E-02	1,49E-02	6,74E-02	4,40E-04	-3,88E+01
SM	kg	4,39E-01	8,70E-04	1,21E-03	8,88E-08	1,50E-04	1,52E-05	7,80E-04	2,38E-07	-1,72E-01
RSF	MJ	7,79E-02	2,40E-04	3,40E-04	7,92E-09	8,37E-05	4,52E-06	1,40E-04	4,19E-08	-5,10E-02
NRSF	MJ	8,04E-02	7,40E-04	1,03E-03	1,49E-08	5,61E-05	1,84E-05	1,00E-04	6,04E-08	-5,82E-02
W	m^3	3,44E-02	1,20E-04	1,70E-04	7,81E-09	1,01E-05	1,71E-06	3,59E-05	4,76E-07	-2,58E-02

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Nonrenewable primary energy resources used as energy carrier; NRPM Nonrenewable primary energy resources used as materials; TRPE Total use of nonrenewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of nonrenewable secondary fuels; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
HW	KG	8,36E+00	1,99E-02	2,78E-02	1,72E-06	2,73E-03	3,30E-04	2,11E-02	7,29E-06	-6,89E+00
NHW	KG	5,98E-01	9,15E-02	1,28E-01	2,24E-07	3,45E-05	7,70E-04	1,42E-03	3,00E-03	-4,91E-01
RW	KG	2,52E-03	1,84E-05	2,56E-05	1,45E-09	3,43E-06	2,97E-07	5,93E-06	5,59E-09	-1,65E-03

HW Hazardous waste disposed; NHW Nonhazardous waste disposed; RW Radioactive waste disposed

End of life – output flow

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$ /km	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,00E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	4,52E-01	6,80E-04	9,50E-04	7,96E-08	1,40E-04	1,26E-05	1,96E-01	1,52E-07	-3,86E-01
MER	kg	8,95E-03	2,10E-04	3,00E-04	5,17E-08	7,78E-07	3,47E-06	4,62E-05	8,39E-08	-7,02E-03
EEE	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
ETE	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

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 = $9,0*10^{-3}$ = 0,009

Information common for both scenarios

Classification of disclaimers to the declaration of core and additional environmental impact indicators

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
ILCD type / level 2	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals 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.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	g C	2

Additional requirements

Greenhous gas emission from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3). This is supplemented by local production form solar PV.

Electricity system	Unit	Value
Germany national electricity grid	kg CO2 -eq/kWh	0,5286
Roof-mounted solar PV	kg CO2 -eq/kWh	0,0717
Sikla electricity use	kg CO2 -eq/kWh	0,4429

Additional environmental impact indicators required in NPCR Part A for construction products

To increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is referred to as GWP-GHG in context to Swedish public procurement legislation.

Indicator	Unit	A1-A3	
GWP-IOBC	kg CO2 eq.	3,22E+00	

GWP-IOBC *Global warming potential calculated according to the principle of instantaneous oxidation.*

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ✓ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- ☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- ☐ The product contains dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Indoor environment

The product meets the requirements for low emissions.

Carbon footprint

Carbon footprint has not been prepared out for the product.

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