

Environmental Product Declaration

In accordance with 14025 and EN15804 +A2

Høiax Connected 200 Water Heater



Owner of the declaration:
Høiax AS

Product name:
Høiax Connected 200 Water Heater

Functional unit:
Produce 1 litre of stored domestic hot water at a temperature at 40°C equivalent according to the reference use scenario and with a product reference lifetime of 17 years.

Product category /PCR:
NPCR Part A:2021 Construction products and services Version 2.0 and PEP Ecopassport PSR-0004-ed4.0-EN-2019 03 14

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-5319-4616-EN

Registration number:
NEPD-5319-4616-EN

Issue date: 09.11.2023

Valid to: 09.11.2028

Høiax[®]
SYSTEMS

General information

Product:

Høiax Connected 200 Water Heater

Program Operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Phone: +47 23 08 80 00
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Declaration Number:

NEPD-5319-4616-EN

This declaration is based on Product

Category Rules:

NPCR Part A:2021 Construction products and services
Version 2.0 and PEP Ecopassport PSR-0004-ed4.0-EN-
2019 03 14.

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 evidences.

Declared unit:

-

Declared unit with option:

-

Functional unit:

Produce 1 litre of stored domestic hot water at a temperature at 40°C equivalent according to the reference use scenario and with a product reference lifetime of 17 years.

Verification:

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

internal External

Elisabet Amat

Independent verifier approved by EPD Norway



Owner of the declaration:

Høiax AS
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Manufacturer:

Høiax AS
Trippeveien 5, 1618 Fredrikstad
Phone: +47 69 35 55 00
e-mail: post@hoiax.no

Place of production:

Fredrikstad, Norway

Management system:

ISO 9001:2015 and ISO 14001:2015

Organisation no:

936 030 327

Issue date:

09.11.2023

Valid to:

09.11.2028

Year of study:

2022

Comparability:

EPDs from other programmes than EPD Norway may not be comparable.

The EPD has been worked out by:

Mafalda Silva and Anne Rønning

Approved



Manager of EPD Norway

Product

Product description:

The Høiax Connected 200 is a stainless-steel water heater designed for heating domestic water using electrical energy.

The electronic thermostat is designed so the water heater can be controlled via an app. The utilizer can then set up schedules for when the water heater should be switched on. This in turn means that the utilizer can use the water heater during the time periods when the electricity is most affordable and by so doing, heating the water in a more intelligent way.

The water heater is produced only in one plant. It has a lifespan of 20-25 years.

This declaration can be used to represent the following products by using the scaling factors given in the table on page 13: Høiax Connected 300, Titanium Eco 120, Titanium Extreme Eco 120, Titanium Eco 200, Titanium Extreme Eco 200, Titanium Extreme Eco 200 cl, Titanium Express Eco 200, Titanium Expand Eco 200/25, Titanium ECO 200 Carbon Light, Titanium Eco 200 Liggende, Titanium Eco 250, Titanium Eco 300, Titanium Extreme Eco 300, Titanium Express Eco 300, Titanium Expand Eco 300/25 and Titanium Eco 300 Liggende.

Product specification:

| Materials | kg | % |
|----------------------------------|--------------|------------|
| Steel | 20.43 | 65.9 |
| Brass | 0.68 | 2.2 |
| Plastic | 4.69 | 15.5 |
| Insulation material | 4.55 | 14.3 |
| Electronic material | 0.52 | 1.7 |
| Bitumen seal | 0.01 | 0.0 |
| Graphic paper | 0.13 | 0.4 |
| Total | 31.0 | 100 |
| Expanded polystyrene | 0.23 | |
| Cardboard | 2.38 | |
| Plastic | 0.02 | |
| Wood pallet | 2.75 | |
| Total product + packaging | 36.37 | |

Technical data:

| | Høiax Connected 200 |
|--|---------------------|
| Logistics [m ³] | 0.443 |
| Effect [kW] | 2 |
| Tank-volume [L] | 190 |
| Energy efficiency class | C |
| Energy efficiency [%] | 94.90 |
| Quantity of mixed water at 40 °C [V40] | 282.1 |
| Annual electricity cons. [kWh/year] | 4361.0 |

For more information from the product data sheet and Energy label please see: www.hoiax.no

Market:

Norway

Reference service life, product:

17 years

LCA: Calculation rules

Functional unit:

Produce 1 litre of stored domestic hot water at a temperature at 40°C equivalent according to the reference use scenario and with a product reference lifetime of 17 years.

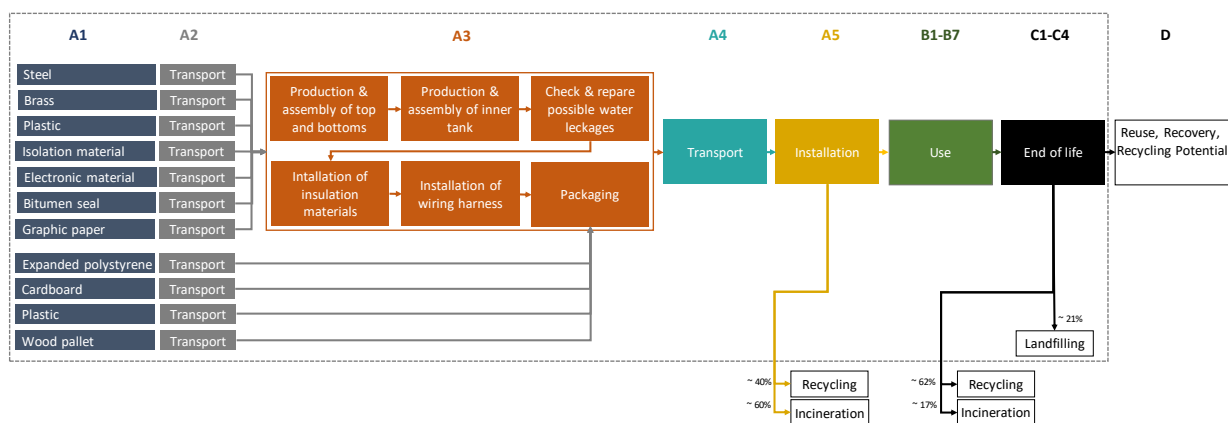
Data quality:

The manufacturing data for Høiax was collected in 2023 and represents an average for 2022. Other data are from Ecoinvent v3.9, released in 2022, but with some changes to improve representativeness. The LCA software used is SimaPro version 9.5.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Energy and water use, as well as in-house generated waste are distributed among products from the factory using physical allocation based on the total number of units produced annually. This means that all products, regardless of what they are made of, are given the same load per piece produced from these flows.

Flowchart:



The top and bottom parts are assembled as well as the tank are produced separately and then mechanically assembled. After this step, the water heater is filled with water to check and repair possible water leakages. The water is reused. Thereafter, the insulation material and wiring harnesses are installed, and a 100 % quality assessment of the product is performed. If the product presents no defect, it is packaged to be sent to the customer.

System boundary:

This EPD represents a cradle-to-grave and module D analysis. The analysis comprises all modules A, B, C and D. Modul D is also declared with material and energy substitution from net recovery.

Cut-off criteria:

All major raw materials and all the essential energy are included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

LCA: Scenarios and additional technical information

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

Transport from production place to assembly (A4)

The product is transported directly to the customer. As most of Høiax customers are located in the Oslo area, the transport of the product over an average distance of 97.4 km was considered the most representative one.

| Type | Capacity utilisation (incl. return) [%] | Type of vehicle | Distance [km] | Fuel/Energy consumption | Unit |
|-------|---|-------------------------|---------------|-------------------------|-------|
| Truck | 53 | 16-32 metric ton, EURO6 | 97.4 | 0.0431 | l/tkm |

Assembly (A5)

The installation process does not comprise energy, additional materials use or product wastage as it is a manual process. Therefore, only packaging waste is included in the life cycle stage. The scenarios used to model the packaging waste processing are based on information provided by Høiax and by considering the Norwegian practice.

| Scenario information | Unit | Value |
|--|----------------|-------|
| Water consumption | m ³ | 0 |
| Electricity use | kWh | 0 |
| Other energy carriers | MJ | 0 |
| Material loss | kg | 0 |
| Output materials to waste treatment - Packaging, cardboard, recycling | kg | 2.38 |
| Output materials to waste treatment - Packaging, wood pallet, incineration | kg | 2.75 |
| Output materials to waste treatment - Packaging, Plastic strip, incineration | kg | 0.02 |
| Output materials to waste treatment - Packaging, EPS, recycling | kg | 0.23 |

Use (B1)

There are no LCA-related environmental impacts during use.

Maintenance (B2)/Repair (B3)

It is assumed there is no need for maintenance nor repair under a normal scenario.

Replacement (B4)/Refurbishment (B5)

It is assumed there is no need for replacement nor refurbishment under a normal scenario.

Operational energy (B6) and water consumption (B7)

The energy and water consumption during the use stage are reported below. The energy consumption was calculated by following the requirements of the Directive 2009/125/EC which are further specified in EN 50440 Efficiency of domestic electrical storage water heaters and testing methods. The water consumption was calculated based on the following assumptions: average consumption of water per day in a Norwegian household is 50 liters and an average of 2.12 persons per household per day (Statistics Norway, 2022). The quantity of mixed water at 40 °C given in the energy label test of Høiax Connected 200 was then considered to calculate the water consumption of the water heater over its lifetime.

| Scenario information | Unit | Value |
|-----------------------------|----------------|---------|
| Net fresh water consumption | m ³ | 657 730 |
| Electricity | kWh | 74 137 |
| Other energy carriers | MJ | 0 |
| Power output of equipment | kW | 0 |

End of Life (C1, C3, C4)

The deinstallation process does not comprise energy nor additional inputs as it is a manual process. Therefore, C1 life cycle stage has no associated environmental burdens. Regarding the waste processing scenario is based on information provided by Høiax AS and Norwegian practice.

| Scenario information | Unit | Value |
|---|------|-------|
| Hazardous waste disposed | kg | 0 |
| Collected as mixed construction waste | kg | 0 |
| Reuse | kg | 0 |
| Recycling, Steel | kg | 20.43 |
| Recycling, brass | kg | 0.68 |
| Recycling, Insulation material | kg | 0.13 |
| Recycling, Electric and electronic material | kg | 0.52 |
| Recycling, Paper and board waste | kg | 0.13 |
| Energy recovery, Plastic, mixture | kg | 4.69 |
| Energy recovery, bitumen seal | kg | 0.01 |
| To landfill | kg | 4.42 |

Transport to waste processing (C2)

According to information provided by Høiax AS, at the end-of-life, the product is either sent back to Høiax production site or collected by RENAS, whose mail goal is to motivate consumers and customers to deliver the product for recycling at the end of its life cycle to an approved recycling center or to the manufacturer's location for recycling. Therefore, it is assumed that the device is transported to a waste management plant over an average transport distance of 107 km.

| Type | Capacity utilisation (incl. return) [%] | Type of vehicle | Distance [km] | Fuel/Energy consumption | Unit |
|-------|---|-------------------------|---------------|-------------------------|-------|
| Truck | 53 | 16-32 metric ton, EURO6 | 107 | 0.0431 | l/tkm |

Benefits and loads beyond the system boundaries (D)

The benefits and loads beyond system boundaries are calculated from the net flows shown in the table below. The benefits beyond life cycle are calculated by substituting energy production.

The thermal energy exported due to the incineration of insulation material and bitumen seal is assumed to substitute district heating and therefore the 2022 energy mix (Statistics Norway, 2022b) is used. In addition to substituting district heating, the export of electric energy is assumed to substitute the Norwegian electricity mix, medium voltage, as used for waste generated electricity in Ecoinvent v3.9. The amount of energy and materials substituted are calculated in C3 and declared as output flows. For the substituted materials, conservative recycled shares have been used as described in the table below. In addition, the transport from end-of-waste state (after sorting and shredding) to the point of substitution (to the remelting facility assumed to be in Germany) is included.

| Scenario information | Unit | Value |
|---|------|--------|
| Substitution of electric energy, Plastic, mixture | MJ | 11.76 |
| Substitution of electric energy, Bitumen seal | MJ | 0.01 |
| Substitution of electric energy, Wood pallet | MJ | 3.03 |
| Substitution of thermal energy, Plastic, mixture | MJ | 134.53 |
| Substitution of thermal energy, Bitumen seal | MJ | 0.16 |
| Substitution of thermal energy, Wood pallet | MJ | 37.4 |
| Substitution of raw materials, Steel (45 % virgin and 55 % recycled) | kg | 8.09 |
| Substitution of raw materials, Brass (80% virgin and 20 % recycled zinc and copper) | kg | 0.37 |
| Substitution of raw materials, Insulation materials (88 % virgin and 12 % recycled) | kg | 0.21 |
| Substitution of raw materials, Other insulation materials (70 % virgin and 30 % recycled) | kg | 0.05 |
| Substitution of raw materials, Electric and electronic material (90 % virgin and 10 % recycled) | kg | 0.19 |
| Substitution of raw materials, Paper and board (50 % virgin and 50 % recycled) | kg | 1.33 |
| Substitution of fuels | kg | 0 |
| Substitution of products | kg | 0 |

LCA: Results

As specified in the PCR and EN 15804:2012+A2:2019, the LCA results are presented in the following tables for the environmental impact categories, resource indicators, and waste and outflow indicators. The impacts have been analyzed excluding long-term emissions.

LCA results refer to a functional unit of producing 1 litre of stored domestic hot water at a temperature at 40°C equivalent according to the reference use scenario and with a product reference lifetime of 17 years. The reference use scenario is the following: the device supplies a residence with 2.12 inhabitants at a daily consumption rate of 50 litres.

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 | X | X | X | X | X | X | X | X | X | X | X | X | X |

Core environmental impact indicators

| Indicator | Unit | A1-A3 | A4 | A5 | B1-B5 | B6 | B7 |
|----------------|------------------------|-----------|----------|----------|----------|----------|----------|
| GWP-total | kg CO ₂ eq. | 2.94E-04 | 9.96E-07 | 6.45E-06 | 0.00E+00 | 3.92E-03 | 8.49E-05 |
| GWP-fossil | kg CO ₂ eq. | 3.00E-04 | 9.95E-07 | 3.49E-07 | 0.00E+00 | 3.78E-03 | 7.54E-05 |
| GWP-biogenic | kg CO ₂ eq. | -6.41E-06 | 9.12E-10 | 6.11E-06 | 0.00E+00 | 1.17E-04 | 9.47E-06 |
| GWP-LULUC | kg CO ₂ eq. | 3.95E-07 | 4.91E-10 | 1.65E-10 | 0.00E+00 | 2.54E-05 | 7.61E-08 |
| ODP | kg CFC11 eq. | 7.29E-12 | 2.17E-14 | 1.44E-14 | 0.00E+00 | 1.11E-10 | 4.30E-12 |
| AP | mol H ⁺ eq. | 2.28E-06 | 2.18E-09 | 2.00E-09 | 0.00E+00 | 4.06E-05 | 5.34E-07 |
| EP-freshwater | kg P eq. | 1.87E-08 | 8.08E-12 | 5.62E-12 | 0.00E+00 | 2.59E-07 | 3.22E-09 |
| EP-marine | kg N eq. | 3.48E-07 | 5.36E-10 | 7.87E-10 | 0.00E+00 | 3.79E-06 | 9.31E-08 |
| EP-terrestrial | mol N eq. | 3.55E-06 | 5.58E-09 | 8.91E-09 | 0.00E+00 | 4.92E-05 | 1.07E-06 |
| POCP | kg NMVOC eq. | 1.25E-06 | 3.38E-09 | 2.71E-09 | 0.00E+00 | 1.45E-05 | 3.71E-07 |
| ADP-M&M | kg Sb eq. | 1.86E-08 | 3.25E-12 | 8.85E-13 | 0.00E+00 | 4.25E-07 | 9.06E-10 |
| ADP-fossil | MJ | 4.53E-03 | 1.41E-05 | 3.79E-06 | 0.00E+00 | 7.37E-02 | 2.28E-03 |
| WDP | m ³ | 1.00E-04 | 5.83E-08 | 4.16E-08 | 0.00E+00 | 3.27E-03 | 1.38E-03 |

| Indicator | Unit | C1 | C2 | C3 | C4 | D |
|---------------|------------------------|----------|----------|----------|----------|-----------|
| GWP-total | kg CO ₂ eq. | 0.00E+00 | 9.33E-07 | 1.68E-05 | 1.82E-05 | -2.63E-05 |
| GWP-fossil | kg CO ₂ eq. | 0.00E+00 | 9.32E-07 | 1.68E-05 | 1.82E-05 | -2.96E-05 |
| GWP-biogenic | kg CO ₂ eq. | 0.00E+00 | 8.54E-10 | 1.81E-09 | 2.93E-09 | 3.26E-06 |
| GWP-LULUC | kg CO ₂ eq. | 0.00E+00 | 4.60E-10 | 4.67E-10 | 2.29E-10 | -3.86E-08 |
| ODP | kg CFC11 eq. | 0.00E+00 | 2.03E-14 | 1.04E-13 | 3.67E-14 | -9.62E-13 |
| AP | mol H ⁺ eq. | 0.00E+00 | 2.04E-09 | 4.64E-09 | 1.57E-08 | -1.52E-07 |
| EP-freshwater | kg P eq. | 0.00E+00 | 7.57E-12 | 1.49E-11 | 6.85E-12 | -3.22E-09 |
| EP-marine | kg N eq. | 0.00E+00 | 5.01E-10 | 1.88E-09 | 8.81E-09 | -3.53E-08 |

| | | | | | | |
|----------------|----------------|----------|----------|----------|----------|-----------|
| EP-terrestrial | mol N eq. | 0.00E+00 | 5.22E-09 | 2.04E-08 | 8.41E-08 | -4.13E-07 |
| POCP | kg NMVOC eq. | 0.00E+00 | 3.16E-09 | 5.37E-09 | 2.07E-08 | -1.67E-07 |
| ADP-M&M | kg Sb eq. | 0.00E+00 | 3.05E-12 | 2.26E-12 | 1.87E-12 | -3.42E-09 |
| ADP-fossil | MJ | 0.00E+00 | 1.32E-05 | 4.38E-06 | 1.01E-05 | -3.52E-04 |
| WDP | m ³ | 0.00E+00 | 5.46E-08 | 1.99E-07 | 1.91E-07 | -5.52E-06 |

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 | A5 | B1-B5 | B6 | B7 |
|-----------|-------------------|----------|----------|----------|----------|----------|----------|
| PM | Disease incidence | 2.19E-11 | 1.12E-12 | 5.71E-13 | 0.00E+00 | 2.57E-10 | 7.09E-12 |
| IRP | kBq U235 eq. | 1.36E-05 | 1.36E-06 | 1.31E-06 | 0.00E+00 | 1.49E-03 | 3.96E-05 |
| ETP-fw | CTUe | 3.89E-03 | 1.52E-04 | 9.83E-05 | 0.00E+00 | 4.52E-02 | 6.94E-04 |
| HTP-c | CTUh | 1.66E-12 | 1.51E-14 | 1.32E-14 | 0.00E+00 | 9.82E-12 | 3.99E-13 |
| HTP-nc | CTUh | 2.08E-11 | 6.40E-13 | 5.53E-13 | 0.00E+00 | 4.62E-10 | 5.87E-12 |
| SQP | Dimensionless | 3.25E-03 | 2.16E-04 | 1.40E-04 | 0.00E+00 | 3.49E-02 | 5.14E-04 |

| Indicator | Unit | C1 | C2 | C3 | C4 | D |
|-----------|-------------------|----------|----------|----------|----------|-----------|
| PM | Disease incidence | 0.00E+00 | 6.91E-14 | 3.48E-14 | 5.77E-14 | -2.93E-12 |
| IRP | kBq U235 eq. | 0.00E+00 | 6.71E-09 | 1.30E-08 | 6.16E-09 | -8.62E-07 |
| ETP-fw | CTUe | 0.00E+00 | 7.01E-06 | 4.19E-05 | 4.71E-05 | -2.93E-04 |
| HTP-c | CTUh | 0.00E+00 | 4.25E-16 | 3.39E-15 | 1.14E-15 | -1.29E-13 |
| HTP-nc | CTUh | 0.00E+00 | 1.20E-14 | 3.43E-14 | 5.39E-14 | -1.33E-12 |
| SQP | Dimensionless | 0.00E+00 | 8.00E-06 | 1.53E-06 | 2.71E-06 | -5.49E-04 |

PM: Particulate matter emissions; **IRP:** Ionising 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

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 |
| ILCD type / level 2 | Acidification potential, Accumulated Exceedance (AP) | None |
| | 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 |
| <p>Disclaimer 1 – 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.</p> <p>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</p> | | |

Resource use

| Indicator | Unit | A1-A3 | A4 | A5 | B1-B5 | B6 | B7 |
|-----------|----------------|----------|----------|-----------|----------|----------|----------|
| RPEE | MJ | 1.25E-03 | 2.23E-07 | 8.54E-05 | 0.00E+00 | 4.54E-01 | 1.44E-03 |
| RPEM | MJ | 1.25E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TPE | MJ | 1.38E-03 | 2.23E-07 | 8.54E-05 | 0.00E+00 | 4.54E-01 | 1.44E-03 |
| NRPE | MJ | 4.54E-03 | 1.41E-05 | 4.84E-06 | 0.00E+00 | 7.38E-02 | 2.28E-03 |
| NRPM | MJ | 1.23E-05 | 0.00E+00 | -1.05E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TRPE | MJ | 4.55E-03 | 1.41E-05 | 3.79E-06 | 0.00E+00 | 7.38E-02 | 2.28E-03 |
| SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| W | m ³ | 6.17E-06 | 2.04E-09 | 2.92E-09 | 0.00E+00 | 3.21E-03 | 1.00E-03 |

| Indicator | Unit | C1 | C2 | C3 | C4 | D |
|-----------|----------------|----------|----------|-----------|----------|-----------|
| RPEE | MJ | 0.00E+00 | 2.08E-07 | 4.14E-07 | 2.57E-07 | -2.49E-04 |
| RPEM | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| TPE | MJ | 0.00E+00 | 2.08E-07 | 4.14E-07 | 2.57E-07 | -2.49E-04 |
| NRPE | MJ | 0.00E+00 | 1.32E-05 | 3.11E-04 | 1.01E-05 | -3.52E-04 |
| NRPM | MJ | 0.00E+00 | 0.00E+00 | -3.07E-04 | 0.00E+00 | 0.00E+00 |
| TRPE | MJ | 0.00E+00 | 1.32E-05 | 4.38E-06 | 1.01E-05 | -3.52E-04 |
| SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| W | m ³ | 0.00E+00 | 1.91E-09 | 8.29E-09 | 2.70E-08 | -5.07E-07 |

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** Non renewable primary energy resources used as energy carrier; **NRPM** Non renewable primary energy resources used as materials; **TRPE** Total use of non renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non renewable secondary fuels; **W** Use of net fresh water

End of life – Waste

| Indicator | Unit | A1-A3 | A4 | A5 | B1-B5 | B6 | B7 |
|-----------|------|----------|----------|----------|----------|----------|----------|
| HW | kg | 1.82E-08 | 8.99E-11 | 1.68E-11 | 0.00E+00 | 1.45E-07 | 5.36E-09 |
| NHW | kg | 6.41E-04 | 8.30E-07 | 2.35E-07 | 0.00E+00 | 1.42E-02 | 7.19E-05 |
| RW | kg | 9.60E-09 | 4.65E-12 | 5.44E-12 | 0.00E+00 | 6.81E-07 | 2.18E-08 |

| Indicator | Unit | C1 | C2 | C3 | C4 | D |
|-----------|------|----------|----------|----------|----------|-----------|
| HW | kg | 0.00E+00 | 8.42E-11 | 1.92E-11 | 8.32E-11 | -4.73E-09 |
| NHW | kg | 0.00E+00 | 7.77E-07 | 3.41E-07 | 7.62E-06 | -2.25E-05 |
| RW | kg | 0.00E+00 | 4.35E-12 | 1.02E-11 | 4.14E-12 | -5.25E-10 |

HW Hazardous waste disposed; **NHW** Non hazardous waste disposed; **RW** Radioactive waste disposed

End of life – output flow

| Indicator | Unit | A1-A3 | A4 | A5 | B1-B5 | B6 | B7 |
|-----------|------|----------|----------|----------|----------|----------|----------|
| CR | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MR | kg | 4.72E-06 | 0.00E+00 | 4.28E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER | kg | 2.07E-06 | 0.00E+00 | 4.22E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE | MJ | 2.21E-05 | 0.00E+00 | 6.18E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ETE | MJ | 1.78E-05 | 0.00E+00 | 7.74E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

| Indicator | Unit | C1 | C2 | C3 | C4 | D |
|-----------|------|----------|----------|----------|----------|-----------|
| CR | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MR | kg | 0.00E+00 | 0.00E+00 | 3.34E-05 | 0.00E+00 | 3.72E-05 |
| MER | kg | 0.00E+00 | 0.00E+00 | 7.15E-06 | 0.00E+00 | 1.13E-05 |
| EEE | MJ | 0.00E+00 | 0.00E+00 | 1.79E-05 | 0.00E+00 | -2.29E-05 |
| ETE | MJ | 0.00E+00 | 0.00E+00 | 2.04E-04 | 0.00E+00 | -2.62E-04 |

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

Reading example: $9.0E-03 = 9.0 \cdot 10^{-3} = 0.009$

Information describing the biogenic carbon content at the factory gate

| Biogenic carbon content | Unit | Value |
|---|------|----------|
| Biogenic carbon content in product | kg C | 5.19E-09 |
| Biogenic carbon content in the accompanying packaging | kg C | 1.45E-07 |

Note: 1 kg biogenic carbon is equivalent to 44/12 (approx. 3.67) kg CO₂

The biogenic carbon content in the Høiax water heaters is linked to the graphic paper comprised in the product. Regarding the biogenic carbon in the accompanying packaging, it is linked to the cardboard box and wood pallet.

Additional requirements

Greenhouse 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) used for modelling the production process is from ecoinvent v3.9, which was released in 2022. The manufacturing takes place in Norway.

| National electricity grid | Data source | GWP-total [kg CO ₂ eq/kWh] |
|---|----------------|--|
| Electricity, low voltage {NO} market for Cut-off, U | Ecoinvent V3.9 | 0.0348 |

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

In order 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 also referred to as GWP-GHG in context to Swedish public procurement legislation.

| Indicator | Unit | A1-A3 | A4 | A5 | B1-B5 | B6 | B7 |
|-----------|------------------------|----------|----------|----------|----------|----------|----------|
| GWP-IOBC | kg CO ₂ eq. | 2.94E-04 | 9.96E-07 | 5.90E-06 | 0.00E+00 | 3.92E-03 | 8.49E-05 |

| Indicator | Unit | C1 | C2 | C3 | C4 | D |
|-----------|------------------------|----------|----------|----------|----------|-----------|
| GWP-IOBC | kg CO ₂ eq. | 0.00E+00 | 9.33E-07 | 1.68E-05 | 1.82E-05 | -2.63E-05 |

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 than 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 (Avfallsforskriften, Annex III), see table.

Indoor environment

The product has no emission to indoor environment.

Core indicators applied for additional Høiax products






The core indicators in this EPD can be scaled to represent other Høiax water heaters by using the scaling factors provided in the table below. This is done by multiplying the given scaling factor by the result given to Høiax Connected 200 for the different environmental core indicators (A1-A3 modules). The use of scaling factors takes into account the fact that the material composition of the other considered Høiax water heaters is the same as for the Høiax Connected 200, only presenting small variations in the weight of the steel, insulation materials and paperboard packaging for some of them. For the Høiax water heaters given in the table below a full EPD data can be provided by request.

Reading example for Høiax Connected 300, GWP-total: $1.70 \times 2.94E-04 = 4.99E-04$ kg CO₂ eq. per functional unit

| | GWP-total | GWP-fossil | GWP-biogenic | GWP-LULUC | ODP | AP | EP-freshwater | EP-marine | EP-terrestrial | POCP | ADP-M&M | ADP-fossil | WDP |
|-------------------------------|-----------|------------|--------------|-----------|----------|----------|---------------|-----------|----------------|----------|----------|------------|----------|
| Høiax Connected 200 | 2.94E-04 | 3.00E-04 | -6.41E-06 | 3.95E-07 | 7.29E-12 | 2.28E-06 | 1.87E-08 | 3.48E-07 | 3.55E-06 | 1.25E-06 | 1.86E-08 | 4.53E-03 | 1.00E-04 |
| Titanium Eco 120 | 0.70 | 0.71 | 1.17 | 0.75 | 0.77 | 0.80 | 0.78 | 0.75 | 0.75 | 0.74 | 0.90 | 0.75 | 0.82 |
| Titanium Extreme Eco 120 | 0.74 | 0.75 | 1.11 | 552.76 | 0.80 | 0.82 | 0.81 | 0.79 | 0.79 | 0.78 | 0.92 | 0.78 | 0.84 |
| Titanium Eco 200 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Titanium Extreme Eco 200 | 1.06 | 1.06 | 0.92 | 1.04 | 1.03 | 1.04 | 1.04 | 1.05 | 1.05 | 1.05 | 1.02 | 1.05 | 1.03 |
| Titanium Extreme Eco 200 cl | 1.08 | 1.07 | 0.90 | 1.05 | 1.04 | 1.05 | 1.05 | 1.06 | 1.06 | 1.06 | 1.02 | 1.06 | 1.04 |
| Titanium Express Eco 200 | 1.07 | 1.06 | 0.91 | 1.05 | 1.04 | 1.04 | 1.05 | 1.05 | 1.05 | 1.06 | 1.02 | 1.05 | 1.03 |
| Titanium Expand Eco 200/25 | 1.44 | 1.42 | 0.40 | 1.32 | 1.25 | 1.29 | 1.32 | 1.33 | 1.35 | 1.36 | 1.14 | 1.35 | 1.22 |
| Titanium ECO 200 Carbon Light | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Titanium Eco 200 Liggende | 1.12 | 1.11 | 0.84 | 1.08 | 1.06 | 1.08 | 1.08 | 1.09 | 1.09 | 1.09 | 1.04 | 1.09 | 1.06 |
| Titanium Eco 250 | 1.20 | 1.19 | 0.74 | 1.14 | 1.14 | 1.13 | 1.15 | 1.16 | 1.16 | 1.16 | 1.06 | 1.16 | 1.13 |
| Titanium Eco 300 | 1.66 | 1.63 | 0.57 | 1.41 | 1.51 | 1.36 | 1.35 | 1.45 | 1.46 | 1.55 | 1.15 | 1.57 | 1.30 |
| Titanium Extreme Eco 300 | 1.66 | 1.64 | 0.56 | 1.42 | 1.51 | 1.36 | 1.35 | 1.46 | 1.47 | 1.56 | 1.15 | 1.57 | 1.31 |
| Titanium Express Eco 300 | 1.74 | 1.71 | 0.47 | 1.46 | 1.56 | 1.40 | 1.40 | 1.51 | 1.52 | 1.62 | 1.17 | 1.63 | 1.34 |
| Titanium Expand Eco 300/25 | 2.04 | 2.00 | 0.13 | 1.66 | 1.74 | 1.58 | 1.58 | 1.72 | 1.75 | 1.87 | 1.26 | 1.88 | 1.47 |
| Titanium Eco 300 Liggende | 1.55 | 1.53 | 0.43 | 1.41 | 1.40 | 1.37 | 1.41 | 1.44 | 1.45 | 1.46 | 1.17 | 1.46 | 1.36 |
| Høiax Connected 300 | 1.70 | 1.67 | 0.52 | 1.44 | 1.53 | 1.38 | 1.37 | 1.48 | 1.49 | 1.59 | 1.16 | 1.60 | 1.32 |

Bibliography

| | |
|-----------------------------|--|
| CEN, 2016 | EN 50440:2016 Efficiency of domestic electrical storage water heaters and testing methods. Brussels, Belgium, European Committee for Electrotechnical Standardization. |
| CEN, 2019 | EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products. Brussels, Belgium, European Committee for Standardization |
| Directive 2009/125 | Directive (EU) 2009/125 of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. http://data.europa.eu/eli/dir/2009/125/oj . |
| Ecoinvent V3.9. 2022 | Ecoinvent version 3.9. Swiss, Centre for Life Cycle Inventories, Dübendorf, Switzerland. |
| ISO 9001:2015 | Quality management systems — Requirements. |
| ISO 14001:2015 | Environmental management systems — Requirements with guidance for use. |
| ISO 14025:2006 | Environmental labels and declarations - Type III environmental declarations - Principles and procedures. |
| ISO 14044:2006 | Environmental management - Life cycle assessment - Requirements and guidelines. |
| NPCR PART A: 2021 | Construction products and services. Part A version 2.0, March 2021. EPD-Norge. |
| PEP Ecopassport PSR | Specific rules for individual, standalone devices for production of stored domestic water only, online version 2019 03 14. PSR-0004-ed4.0-EN-2019 03 14. |
| Statistics Norway. 2022a | Familier og husholdninger. Personer per privathusholdning i 2022. https://www.ssb.no/befolkning/barn-familier-og-husholdninger/statistikk/familier-og-husholdninger . |
| Statistics Norway. 2022b | Table 09469: Net production of district heating, by type of heat central (GWh) 1999 – 2022, 2022. https://www.ssb.no/en/statbank/table/09469/ . |
| Silva, M., Rønning, A. 2023 | OR.19.23. LCA report for EPD verification - Høiax water heaters. |

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