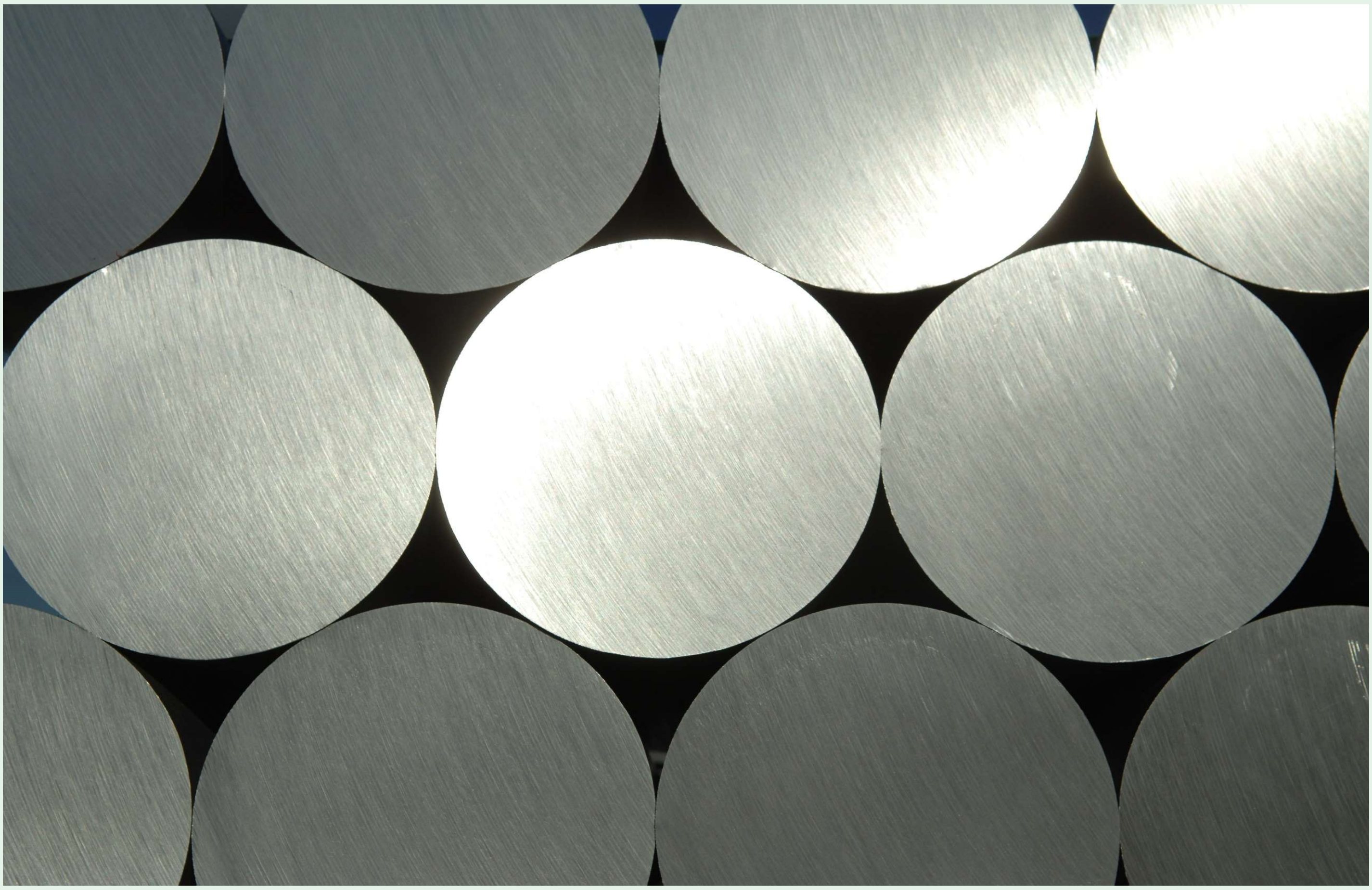
Environmental Product Declaration

In accordance with 14025 and EN15804 +A2

Hydro REDUXA 4.0, Extrusion Ingot



Owner of the declaration:
Hydro Aluminium AS
Drammensveien 264, N-0283 Oslo
www.hydro.com

Product name:
Hydro REDUXA 4.0, Extrusion Ingot)

Declared unit:
1 kg Hydro REDUXA 4.0, Extrusion Ingot

Product category /PCR:
NPCR 013, "Version 3.0 Part B for steel and aluminium construction products" and NPCR Part A: Construction Products and Services Version 2.0

Program holder and publisher:
The Norwegian EPD foundation

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NEPD-8187-7861-EN

Registration Number:
NEPD-8187-7861-EN

Issue date:
25.11.2024
Valid to:
25.11.2029

The Norwegian
EPD Foundation

General information

Product:
Hydro REDUXA 4.0, Extrusion Ingot

Program Operator:
The Norwegian EPD Foundation
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Declaration Number:
NEPD-8187-7861-EN

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR
NPCR 013, "Version 3.0 Part B for steel and aluminium construction products" 2021
NPCR Part A: Construction Products and Services Version 2.0:2021

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 Hydro REDUXA 4.0, Extrusion Ingot

Declared unit with option:
Includes modules: A1-A4, C1-C4, and D

Verification:
Independent verification of the declaration and data, according to ISO14025:2010
internal ☐ external X
Dr Jane Anderson, ConstructionLCA Ltd

Jane Anderson

Life Cycle Assessment Consulting
Independent verifier approved by EPD Norway

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Manufacturer:
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Place of production:
Norway: Sunndal, Karmøy and Husnes plants

Management system:
ISO 14001, ISO 9001, ISO 50001, 45001

Organisation no:
917537534

Issue date:
25.11.2024

Valid to:
25.11.2029

Year of study:
2023

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

This average EPD has been worked out by:
Mehrdad Gorbani and Maciej Biedacha, NORSUS AS

Approved

Håkon Hauan

Manager of EPD Norway

Product/Process

Hydro Aluminium Metal, a business area of Norsk Hydro ASA, is a leading supplier of aluminium casthouse products. Products are supplied in the form of extrusion ingots, sheet ingots, foundry alloys, forging ingots, wire rods and standard ingots with a total volume of over 3 million metric tons per year. The production is carried out in a network of recycling units in Europe and North America, five fully owned primary plants situated along the west coast of Norway and in partly owned smelters in Qatar, Brazil, and Canada.

This EPD covers the production of Extrusion Ingots sold as Hydro REDUXA 4.0, from the casthouses in the primary plants in Sunndal, Karmøy and Husnes; all located in Norway.

Hydro REDUXA 4.0 is a low-carbon aluminium brand by Hydro Aluminium estimated to have generated a maximum 4.0 kg CO*2*-equivalents per kg of aluminium for the aluminium fraction (excluding alloying elements) of the ingot at gate. The scope covers production of raw materials, energy and aluminium from mine to metal produced at Hydro's Norwegian smelters, following the guidelines from the International Aluminium Institute (IAI 2018). The IAI scope is therefore excluding a few elements that are covered in this EPD.

The most notable difference from the Hydro REDUXA brand scope to this EPD stems mostly from the addition of alloying elements, and also for infrastructure (see fig. 2).

The aluminium production value chain

Primary aluminium production

In a primary plant, aluminium is produced by electrolysis in which aluminium oxide (denoted alumina) is reduced to aluminium in the Hall-Herault process. The oxygen is combined with carbon from the anode also creating unavoidable CO_2.

$$2\ Al_2O_3 + C \rightarrow 4\ Al + 3\ CO_2$$

The anodes are made from calcined coke using coal tar pitch as a binder.

Casting

The liquid aluminium from the electrolytic cells is transported to the casthouse where it is solidified (cast) into the required semi-finished product, in this case Extrusion Ingots. During this process, smaller amounts of cold metals (primary aluminium from other producers and process/post-consumer scrap from various sources) and alloying elements such as silicon, magnesium or manganese are added, depending on the final desired functions of the aluminium product. As the liquid aluminium from electrolysis has a temperature well above the solidification temperature, the cold metal is added partly to bring the temperature of the melt down to the required casting temperature.

Average raw material composition for Hydro REDUXA 4.0, Extrusion Ingot is:

- Liquid metal, own production: 85-95%
- Post-Consumer Scrap: 0-2 %
- Primary Ingot: 4-10%
- Process Scrap (also denoted pre-consumer scrap): 0-2 %
- Alloying Materials: ~1 % (outside the scope of the Hydro REDUXA brand)

Extrusion ingots are then transported to the customer, which is typically an extrusion plant. In the extrusions process the aluminium is shaped by heating it and forcing it with a hydraulic ram through a die. The largest quantity of extruded profiles is used by the construction sector followed by the transportation sector.

Energy

Aluminium Primary Production require around 14kWh/kg Al of energy. Hence, GHG emissions and impacts to climate change are largely determined by the energy source used.

With predominantly renewable energy for the primary production, the total impacts to climate change are expected to be in the range 4-6 kg CO_2 equivalents per kg of aluminium, while natural gas gives a range 8-12 kg CO_2 equivalents per kg of aluminium and coal 18-22 kg CO_2 equivalents per kg of aluminium (figure 1).

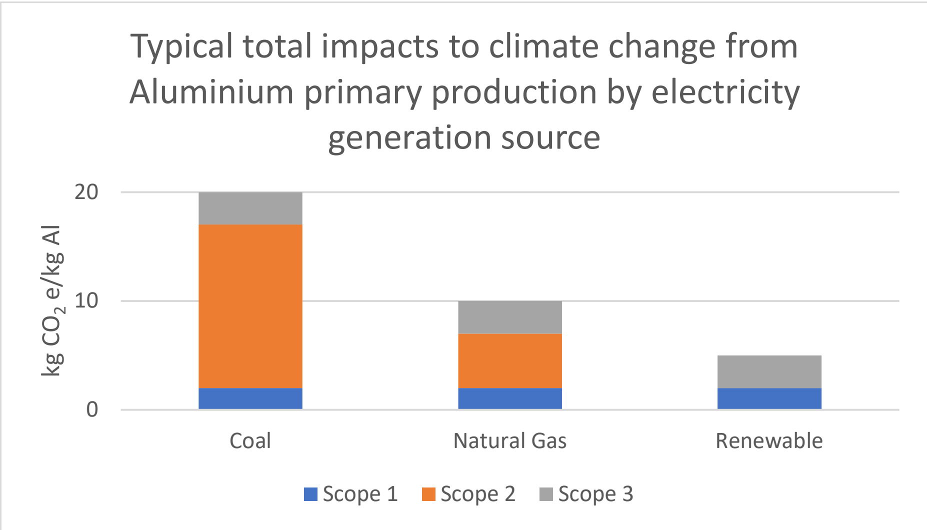

Figure 1 Typical impacts to climate change from aluminium primary production by energy source (in practice there will be variations within a certain range based on technology used, process control and the sourcing of various input).

Power used for production of Hydro REDUXA 4.0, Extrusion Ingot, is predominantly hydro power, where a large portion (~9 TWh) comes from own captive power plants.

BAUXITE AND ALUMINA

Alumina is made from Bauxite that is extracted from mines mainly in various location around the tropics. Most of the supply of Bauxite to Hydro Aluminium Metal comes from the Hydro operated mine in Brazil and is refined into Alumina in the Hydro refinery in Barcarena, Brazil.

Typically, around 4 tons of Bauxite is needed to produce 2 tons of alumina ending up with 1 ton of aluminium.

The Bauxite extraction and Alumina refineries in Hydro are located in the state of Para, Brazil, in the Amazon basin. This is a region of enormous natural values but also hampered by social challenges and inequality. Operating in such a region therefore require special attention to both impact on nature and social challenges. Hydro has several programs to address these challenges – to mention some:

- Rehabilitation of mined areas with a long-term ambition of no net loss of biodiversity
- Close monitoring biodiversity in collaboration with universities

- Elimination of new tailing dams through a pioneering process of dry back filling of tailings in already mined areas.
- Support 500 000 people by 2030 with education and skills development
- Support local farmers and small businesses.
- Building community centres offering local communities access to education, sport, medical treatment, and cultural activities.

Climate change impacts for Hydro REDUXA 4.0, Extrusion Ingot

The contribution from different factors to impacts on climate change (GWP-Total in kg CO_2/kg Al) for Hydro REDUXA 4.0, Extrusion Ingot is shown in Fig. 2.

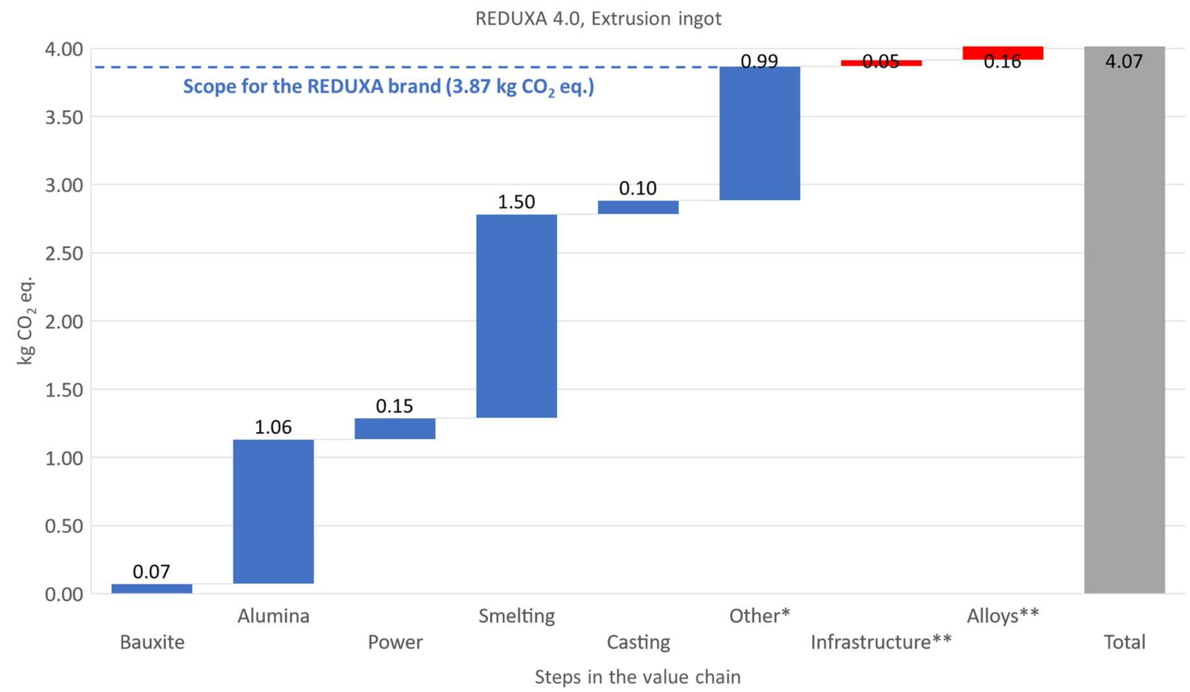

Figure 2: A waterflow diagram showing the contributions to climate change (GWP-Total in kg CO_2/kg Al) for Hydro REDUXA4.0, Extrusion Ingot for modules A1-A3.

** The category "Other" contain impacts connected to production of anodes, primary ingot from other suppliers, transport of input between facilities, waste handling from primary production and casting, and a few other elements. These are all sources of climate change impacts external to Hydro's own operations.*

*** Infrastructure and alloying elements are included within the system assessed for the product covered by this EPD but are not included in the Hydro REDUXA brand scope.*

Product specification:

Extrusion Ingots contain alloying materials to achieve specific end user properties. The various alloys are designated a 4 digit code following the international alloy designation system (see [REGISTERED INTERNATIONAL DESIGNATION (aluminum.org)]). Most of the Extrusion Ingots made by Hydro Aluminium Metal belongs to the 6000-alloy family that contain Mg and Si as main alloying elements, but also alloys belonging to the 1000, 3000 and 5000 alloy groups are produced. All these contain low levels of alloying elements (<2.5%) and are covered by this EPD. Compositions of some common 6000 alloys are shown in table 1. All products are produced according to EN 486 :2009.

https://www.hydro.com/en/aluminium/products/casthouse-products/extrusion-ingots/

Table 1 Chemistry of selected alloys within the 6000-alloy family.

Alloy	Mg	Mn	Fe	Si	Cu	Zn	Cr	Ti	Other	Al
6005A	0.4-0.7	≤0.50	≤0.35	0.5-0.9	≤0.30	≤0.20	≤0.30	≤0.10	≤0.05	Rest
6060	0.35-0.6	≤0.10	0.10-0.30	0.3-0.6	≤0.10	≤0.15	≤0.05	≤0.10	≤0.05	Rest
6061	0.8-1.2	≤0.15	≤0.7	0.4-0.8	0.15-0.40	≤0.25	0.04-0.35	≤0.15	≤0.05	Rest
6063	0.45-0.9	≤0.10	≤0.35	0.2-0.40	≤0.10	≤0.10	≤0.10	≤0.10	≤0.05	Rest
6082	0.6-1.2	0.4-1.0	≤0.50	0.7-1.3	≤0.10	≤0.20	≤0.25	≤0.10	≤0.05	Rest
6106	0.4-0.8	0.05-0.2	≤0.35	0.3-0.6	≤0.25	≤0.15	≤0.20	≤0.10	≤0.05	Rest

This EPD covers all the alloys described in the table, where the differences in environmental impacts between the various alloys are negligible (<1%) in the final products because of small variations in the amounts of alloying elements between the different groups.

Technical data:

Typical technical properties for the alloys covered by this EPD are shown in table 2.

Table 2 Technical properties for the extrusion ingot aluminium alloys covered in this EPD.

Name	Typical Values 6xxx alloys	Unit
Density	2.66 – 2.71	$(kg/m^3) * 10^3$
Melting point (Typical)	575-655	°C
Electrical conductivity (Typical) at 20°C/at 68°F	Equal Volume: 22-36	MS/m (0.58*%IACS)
Thermal conductivity (Typical) at 25°C/at 77°F	130-220	W/(m*k)
Average Coefficient of thermal expansion (Typical) 20° to 100°C/68° to 212°F	19.4-24.1	Per °C
Modulus of elasticity (Typical)	69-72	GPa
Chemical composition	Varying alloy by alloy, most case Al > 98	% by mass

Market:

The Hydro REDUXA 4.0, Extrusion Ingot covered in this EPD has all of Europe as its main market. The main portion goes to building and construction, but it is also employed in other sectors (general engineering, solar panels, the automotive industry, transport, and consumer goods).

LCA: Calculation rules

Declared unit:

1 kg of Hydro REDUXA 4.0, aluminium extrusion ingot manufactured by Hydro aluminium.

The Hydro REDUXA 4.0, Extrusion ingot product is cast in more than one location. This product is therefore made as a weighted average between the Husnes, Karmøy, and Sundndal plants operated by Hydro. These locations source aluminium ingots and alloying elements from different locations worldwide, where specific data is used for each plant.

Data quality:

The data quality for the foreground system is very good with specific data for the year 2021 for all inputs and outputs from the recycling plant. The data quality is good for all the main material input which is primary aluminium and pre- and post-consumer scrap from specific suppliers. Data for the background system are mainly from ecoinvent 3.10 (Wernet et al. 2016 and Ecoinvent 2024) as implemented in the software SimaPro, version 9.6.0.1 (Pré 2024). Some data for background systems have also been collected and implemented in the model as part of the project.

Allocation:

The allocation is made in accordance with the provisions of EN 15804+A2. Infrastructure of the plant, incoming energy, water and waste production in-house is allocated equally among all products through mass allocation. Allocation between aluminium hydroxide and aluminium oxide in the production of alumina for primary metal added in the process are done through economic allocation. The potential environmental impacts from production of primary aluminium are not transferred to post-consumer recycled aluminium. Only the recycling process and transportation of the material is allocated to the potential post-consumer scrap used for the aluminium at the casthouses producing Hydro REDUXA 4.0. Fig. 3 shows the incoming materials to Hydro plants and main production processes relevant for modules A1-A4.

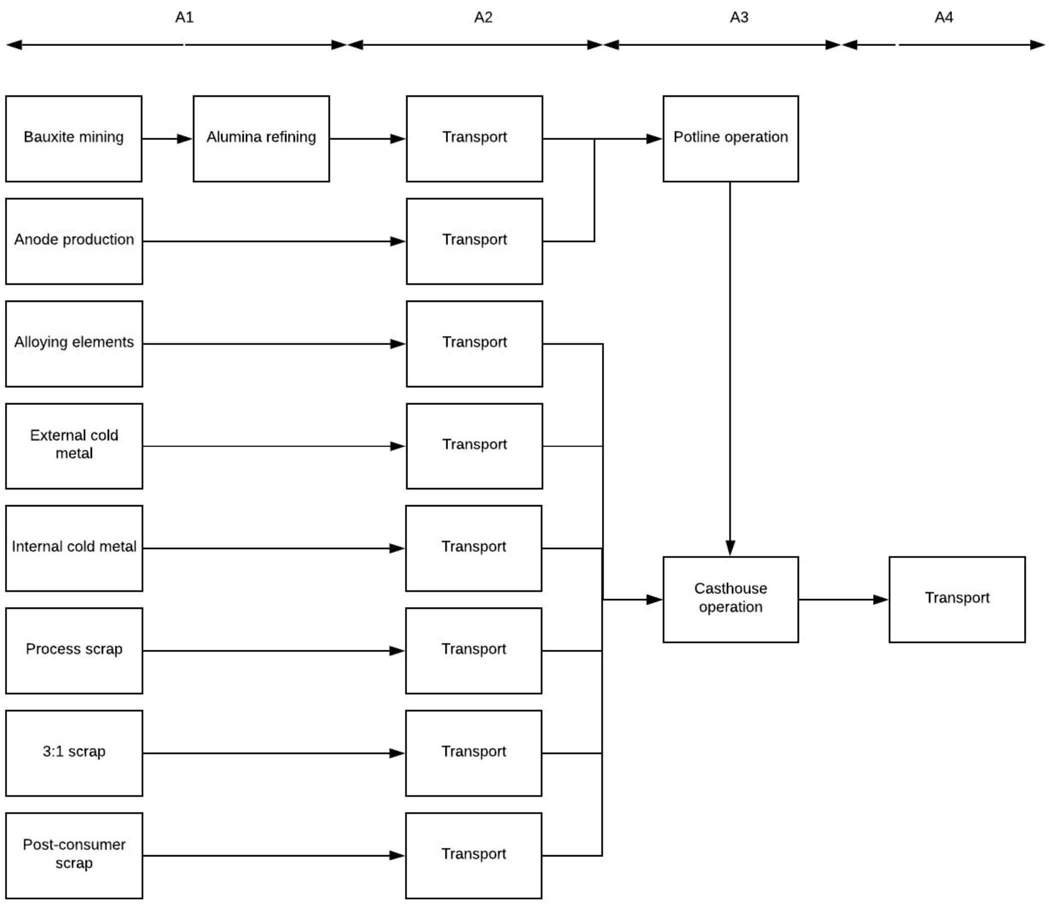

Figure 3: Flow sheet for modules A1 – A4 for 1 kg of aluminium extrusion ingot from Hydro plants.

At the far left of the figure, where post-consumer scrap and external cold metal is entering the process (from module A1), there are several different suppliers of both post-consumer scrap and cold metal. The names of these are not disclosed here for reasons of confidentiality.

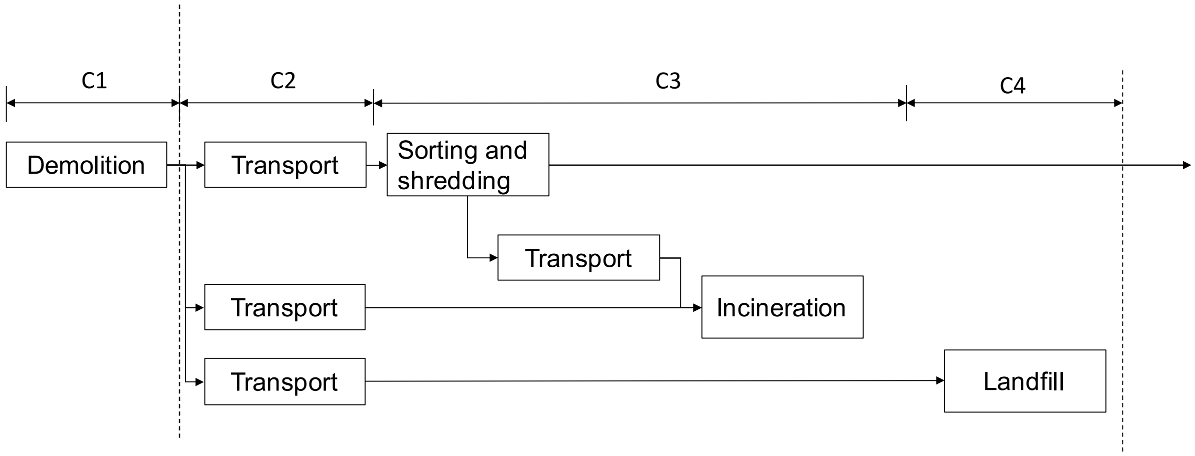

Figure 4: Flow sheet for modules C1 – C4 for 1 of aluminium extrusion ingot after end of useful life. C1 is included but assumed negligible because the material and energy used to dismantle or demolish extruded aluminium is typically insignificant.

System boundary:

Cradle to gate with options. The following stages have been declared: A1-A4, C2-C4, and D. Further specified in the flow sheets shown in figure 2 and figure 3. Sub module A5 and all modules under B are not declared in this EPD as the extrusion ingot are used for many different applications where these sub modules will vary to the extent that making an average scenario is nonsensical.

Module D covers the potential benefits from recycling of 893 grams of Aluminium Extrusion Ingot after end of useful life. Module D covers all necessary processes from C3 until the aluminium is back on the market and can be compared to the environmental performance of an average market aluminium extrusion ingot. The module is further specified in the section LCA: Scenarios and additional technical information.

Cut-off criteria:

All major raw materials and all the essential energy is included. Detailed production process for raw materials and both renewable and non-renewable energy flows that are included with very small amounts (<1%) are not included.

When applying the cut-off criteria for this EPD, mass and energy flows have been gathered for the entire production system and all processes in the foreground system including A1 to A4. Cut-off has only been applied to module C1 where it is assumed that renewable and non-renewable energy and material use is less than 1% of total use of materials, that none of these are hazardous and does not contribute to significant environmental impacts. The total exclusion of mass and energy flows is well below 5% per module and for the system in total.

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)

The transport from the production sites for Hydro REDUXA 4.0 EI to the average customer location in Europe, based on lorry and container ship. The average distance from the port is assumed to be 400 km.

Table 3 Specification of the important parameters for the A4 module.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption value (l/tkm)
Truck	53	Lorry, >32 metric tons, Euro V	400	1.63E-02

End of Life (C1, C3, C4)

After end of useful life, most of the aluminium used for construction purposes is collected (approximately 94%) and recycled (approximately 97% of the collected aluminium), giving a total of 91.3 % recycled aluminium. The aluminium is transported to a material processing site where different materials are sorted and sent to recycling. Hydro has a DNV certified process in the recycling plants and therefore closed loop recycling is assumed for pre-consumer scrap, and open loop recycling to the same facility for the post-consumer scrap. Table 4 shows the material flows at the end of life for the product.

Table 4: The material flows of the fate of the product after end of useful life.

	Unit	Value
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	0.94
Reuse	kg	0
Recycling	kg	0.913
Energy recovery	kg	0.027*
To landfill	kg	0.06**

* 27 grams of the original 1 kilogram of aluminium is going to incineration. No loads or benefits are attributed to this flow.

** There will be a small portion of extruded aluminium ending as aggregate at the construction site. This is included under "To landfill" where no loads or benefits are included.

Transport to waste processing (C2)

Transport back to waste processing after end-of-useful life is modelled based on real distances to Hydro facilities and data from ecoinvent (Hydro 2022 and Ecoinvent 2016/2022) as shown in

Table 5.

Table 5 Important parameters for the specification of module C2 for the product.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption value (l/tkm)
Truck	53	Lorry, 16-32 metric tons, Euro VI	50	2.42E-02

Aluminium from the shredder to waste handling site is assumed to be transported in an older medium-sized lorry with smaller capacity utilization than in the production system.

Benefits and loads beyond the system boundaries (D)

Aluminium collected and recycled is assumed to replace a virgin aluminium product representing the European average primary aluminium used for extrusion ingot. The flow of material being sent to recycling and the actual amount of primary aluminium being substituted is shown in Table 6.

Table 6 The flow of material that replaces primary material in other life cycles.

	Unit	Value
Aluminium extrusion ingot to material recycling	g	893
Aluminium extrusion ingot recycled and substituting primary aluminium	g	536

The initial content of secondary material is not included in the calculations for module D, therefore only 893 grams of material is used in the calculations as sent to recycling. As described under "End of life" in Table 4, there is a loss in the handling of scrap metal after the end-of-waste state which means that 536 grams of primary aluminium is substituted. The entire loss is being calculated as primary material. This is a conservative assumption.

LCA: Results

All results are calculated with the use of SimaPro v.9.4 (2022) and impact methods according to ISO 15804+A2:2019.

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	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	X	X	X	X	X

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	C1*	C2	C3	C4	D
GWP-total	kg CO2 eq.	4.07E+00	6.08E-02	0	9.51E-03	2.44E-01	1.13E-03	-5.19E+00
GWP-fossil	kg CO2 eq.	4.02E+00	6.08E-02	0	9.50E-03	2.42E-01	1.08E-03	-5.08E+00
GWP-biogenic	kg CO2 eq.	2.30E-02	3.18E-05	0	6.58E-06	2.75E-03	4.21E-05	-1.25E-02
GWP-LULUC	kg CO2 eq.	2.37E-02	2.00E-05	0	3.15E-06	1.05E-04	2.38E-07	-9.22E-02
ODP	kg CFC11 eq.	8.30E-08	1.60E-09	0	1.89E-10	2.13E-09	2.92E-11	-5.95E-08
AP	mol H^+ eq.	2.02E-02	4.28E-04	0	1.98E-05	7.80E-04	5.53E-06	-3.06E-02
EP-freshwater	kg P eq.	5.65E-05	4.66E-07	0	7.41E-08	6.58E-06	1.06E-08	-1.82E-04
EP-marine	kg N eq.	3.59E-03	9.14E-05	0	4.63E-06	9.20E-05	2.39E-06	-4.28E-03
EP-terrestrial	mol N eq.	4.03E-02	1.02E-03	0	5.13E-05	1.12E-03	2.38E-05	-4.68E-02
POCP	kg NMVOC eq.	1.41E-02	4.34E-04	0	3.29E-05	3.79E-04	8.54E-06	-1.83E-02
ADP-M&M	kg Sb eq.	8.04E-06	1.24E-07	0	3.09E-08	6.04E-06	3.08E-09	8.15E-05
ADP-fossil	MJ	9.94E+00	7.21E-02	0	1.11E-02	5.10E-01	3.19E-03	-3.12E+01
WDP	m^3	6.27E-01	3.68E-03	0	5.55E-04	1.63E-02	-2.02E-04	-6.80E-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*

* C1 is assumed negligible, and the value is therefore set equal to zero. To show the uncertainty for this assumption, no decimals are used.

Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	C1*	C2	C3	C4	D
PM	Disease incidence	3.18E-07	4.55E-09	0	6.96E-10	1.41E-08	1.18E-10	-3.92E-07
IRP	kBq U235 eq.	4.52E-02	4.12E-04	0	6.17E-05	2.32E-03	4.41E-05	-2.07E-01
ETP-fw	CTUe	1.08E+01	1.41E-01	0	2.92E-02	7.88E-01	3.95E+00	-5.53E+00
HTP-c	CTUh	2.34E-08	3.14E-10	0	6.74E-11	1.29E-09	6.23E-12	-1.38E-08
HTP-nc	CTUh	1.92E-08	4.67E-10	0	8.39E-11	5.27E-09	4.67E-11	2.07E-08
SQP	Dimensionless	1.54E+01	6.71E-01	0	8.07E-02	1.45E+00	3.63E-02	-2.16E+00

***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*
* C1 is assumed negligible, and the value is therefore set equal to zero. To show the uncertainty for this assumption, no decimals are used.

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
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.		
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		

Resource use

Indicator	Unit	A1-A3	A4	C1*	C2	C3	C4	D
RPEE	MJ	6.00E+01	1.40E-02	0	2.30E-03	2.28E-01	2.15E-03	-2.22E+01
RPEM	MJ	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	6.00E+01	1.40E-02	0	2.30E-03	2.28E-01	2.15E-03	-2.22E+01
NRPE	MJ	9.94E+00	7.21E-02	0	1.11E-02	5.10E-01	3.19E-03	-3.12E+01
NRPM	MJ	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	9.94E+00	7.21E-02	0	1.11E-02	5.10E-01	3.19E-03	-3.12E+01
SM	kg	1.85E-02	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W	m^3	4.91E-01	1.19E-04	0	1.85E-05	8.15E-04	-2.57E-04	-1.15E-01

***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*

* C1 is assumed negligible, and the value is therefore set equal to zero. To show the uncertainty for this assumption, no decimals are used.

End of life - Waste

Indicator	Unit	A1-A3	A4	C1*	C2	C3	C4	D
HW	kg	1.74E+00	8.46E-04	0	1.33E-04	1.98E-02	2.55E-04	-1.23E+00
NHW	kg	4.28E+00	6.94E-02	0	9.38E-03	1.62E+00	5.40E-01	-1.65E+00
RW	kg	2.67E-05	2.76E-07	0	4.31E-08	2.33E-06	2.67E-08	-1.55E-04

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

* C1 is assumed negligible, and the value is therefore set equal to zero. To show the uncertainty for this assumption, no decimals are used.

End of life – output flow

Indicator	Unit	A1-A3	A4	C1*	C2	C3	C4	D
CR	kg	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0	0.00E+00	9.15E-01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0	0.00E+00	2.54E-02	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	0	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.*

* C1 is assumed negligible, and the value is therefore set equal to zero. To show the uncertainty for this assumption, no decimals are used.

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

Information describing the biogenic carbon content at the factory gate

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

Additional Norwegian requirements

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

For emissions related to electricity usage, a location-based approach has been used. For the main electricity consuming processes, primary aluminium production (Norway), the scope of location-based grid-mix factors has been defined as "Norway" but with a portion coming from electricity generated directly for the site.

Geographical location	National electricity mix [kg CO2 -eq/kWh]	Residual electricity mix [kg CO2 -eq/kWh]	Electricity used in foreground system [kWh/kg product]	Difference in GWP-total for A1-A3 [kg CO2-eq]
Norway	0.016	0.60	10.4	-6.07

The fact that the value for the national electricity mix is lower than the residual electricity mix for Norway shows that using different data sources for these electricity mixes can make non-sensical results. The result for GWP-total would *increase* with 6.07 kg CO2-eq if values for the contribution to climate change for residual electricity mix is used instead of the values for the national electricity mix.

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	C1*	C2	C3	C4	D
GWP-IOBC	kg CO2 eq	4.06E+00	6.08E-02	0	9.50E-03	2.42E-01	1.08E-03	-5.19E+00

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

* C1 is assumed negligible, and the value is therefore set equal to zero. To show the uncertainty for this assumption, no decimals are used.

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.

- X 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 (Avfallsforskriften, Annex III), see table.

Indoor environment

Not relevant

Carbon footprint

An individual carbon footprint has not been worked out for the product but impacts connected to climate change is reported in this EPD.

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