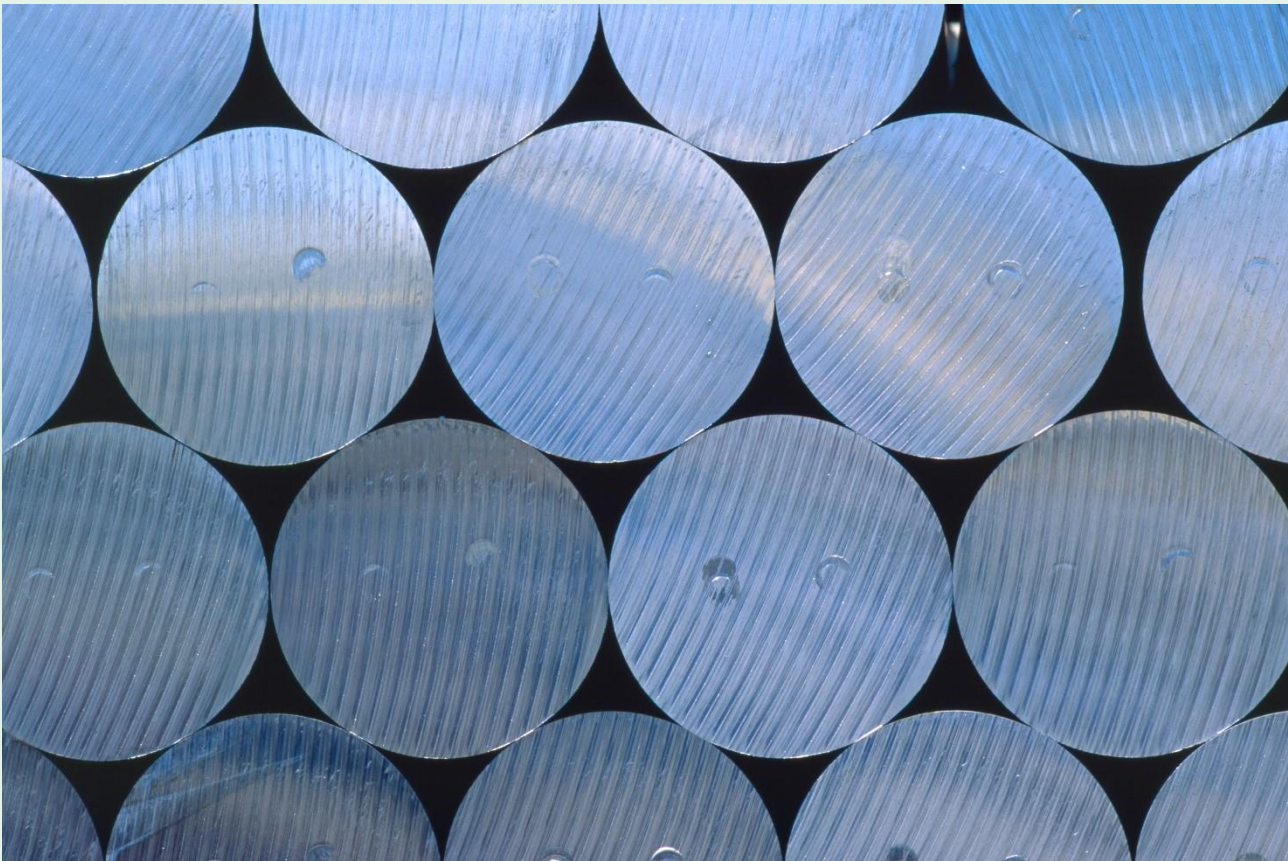


# Environmental Product Declaration

In accordance with 14025 and EN15804 +A2

Hydro Aluminium Extrusion Ingot, Wrexham Plant



The Norwegian  
EPD Foundation

**Owner of the declaration:**

Hydro Aluminium AS  
Drammensveien 264, N-0283 Oslo  
[www.hydro.com](http://www.hydro.com)

**Product name:**

Hydro Aluminium Extrusion Ingots, Wrexham Plant

**Declared unit:**

1 kg Aluminium extrusion ingot from the Wrexham aluminium recycling plant.

**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

**Declaration number:**

NEPD-5011-4267-EN

**Registration Number:**

NEPD-5011-4267-EN

**Issue date:**

19.09.2023

**Valid to:**

19.09.2028

## General information

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### Product:

Hydro Aluminium Extrusion Ingot, Wrexham Plant

### Program Operator:

The Norwegian EPD Foundation  
Post Box 5250 Majorstuen, 0303 Oslo, Norway  
Phone: +47 23 08 80 00  
e-mail: post@epd-norge.no

### Declaration Number:

NEPD-5011-4267-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 evidences.

### Declared unit:

1 kg Aluminium extrusion ingot from the Wrexham aluminium recycling plant.

### 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



Linda Høibye, Life Cycle Assessment Consulting  
Independent verifier approved by EPD Norway

### Owner of the declaration:

Hydro Aluminium AS  
Contact person: Stig Tjøtta  
Phone: +47 908 88 767  
e-mail: stig.tjotta@hydro.com

### Manufacturer:

Hydro Aluminium AS  
Drammensveien 264, N-0283 Oslo  
Phone: +47 22538100  
e-mail: greener.aluminium@hydro.com

### Place of production:

Wrexham, United Kingdom

### Management system:

ISO 14001, ISO 9001, ISO 50001

### Organisation no:

917537534

### Issue date:

19.09.2023

### Valid to:

19.09.2028

### Year of study:

[xxxx]

### Comparability:

EPDs from other programmes than [Name of Program operator] may not be comparable.

### This EPD has been worked out by:

Valentina Pauna, Andreas Brekke, and Maciej Biedacha, all from NORSUS AS

Approved



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Manager of EPD Norway

## Product/Process

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### **Hydro Aluminium Extrusion Ingot from Hydro Aluminium Metal**

Norsk Hydro ASA is the mother company of Hydro Energy and Hydro Aluminium AS. The latter is divided into Hydro Bauxite and Alumina, Hydro Aluminium Metal, and Hydro Extrusions. Hydro Aluminium Metal is a leading supplier of cast house products from a global network of cast houses supplied in the form of extrusion ingots, sheet ingots, foundry alloys, forging ingots and wire rods with a total volume of around 3 million metric tons per year.

The production sites for products of primary aluminium are:

- Sunndalsøra, Norway: Extrusion Ingots, Foundry Alloys
- Karmøy, Norway: Extrusion Ingots, Wire Rod
- Husnes, Norway: Extrusion Ingots, Forging Ingots
- Årdal, Norway: Sheet Ingots, Foundry Alloys
- Høyanger, Norway: Sheet Ingots
- Slovalco, Slovakia: Extrusion Ingots, Foundry Alloys
- Qatalum, Qatar: Extrusion Ingots, Foundry Alloys
- Albras, Brasil: Foundry Alloys, Standard Ingots

The production sites for products of recycled aluminium are:

- Rackwitz, Germany: Extrusion Ingots, Forging Ingots (from 2023)
- Clervaux, Luxembourg: Extrusion Ingots
- Luce, France: Extrusion Ingots
- Wrexham, UK: Extrusion Ingots
- Azuqueca, Spain: Extrusion Ingots
- Commerce, TX USA: Extrusion Ingots
- Henderson, KY USA: Extrusion Ingots
- Cassopolis, MI USA: Extrusion Ingots (from 2023)

### **Extrusion Ingots, Wrexham**

Hydro Aluminium Wrexham is an aluminium recycling plant located in Wales, with an annual total production of 57 000 metric tons of Extrusion Ingots.

The production consists of three product ranges:

- Conversion volumes (metal that is converted from process scrap into new extrusion ingots but that is owned by the plant purchasing it).
- Extrusion Ingots Direct Sales (or Full price)
- Extrusion Ingots, Hydro CIRCAL 75R

This EPD covers the Extrusion Ingot Direct sales from the Hydro Wrexham recycling plant in Wales only. Hence, process scrap from conversion service agreements is excluded. The Hydro CIRCAL 75R product range is covered by a separate EPD, and the specific burden is excluded for the current EPD.

Average raw material used for the extrusion ingots direct sales are:

- Post-Consumer Scrap: 36%
- Primary Ingot: 30.9%
- Process Scrap: 32.5%
- Alloying Materials: 0.6%

Aluminium production starts with the mining of bauxite at specific locations around the Equator with Australia, Guinea, China, and Brazil as the four main producers. Alumina (also called aluminium oxide) is refined and after several processes alumina emerges as a fine white powder. Alumina is further smelted using the Hall-Héroult electrolytic process, an electrolysis process driven by electrical current. Finally, the aluminium goes to a cast house process, being casted into semi-finished products. During this process, various sources and amounts of cold metals (primary aluminium from other producers) and alloys such as silicon, magnesium or manganese are added, depending on the final desired functions of the aluminium product.

In an aluminium recycling plant, extrusion ingots are made from smelting a mix of end-of-life scrap (post-consumer scrap), process scrap (pre-consumer scrap), and primary aluminium and forming this is cylindrical shapes.

Extrusion ingots are transported to an extrusion plant. In the extrusions process the aluminium is shaped by heating it and forcing it with a hydraulic ram through a hole in a die. Extruded material emerges as a long piece with the same profile as the die opening. The largest quantity of extruded profiles is used by the construction sector.

Recycling requires only 5% of the energy required for production of primary metal (Hydro, 2023). Hence, the direct emissions from plants recycling aluminium are small in comparison to the production of primary aluminium. The emissions connected to a recycling unit are therefore mainly determined by the indirect emissions, in other words from the production and transportation of raw materials used.

The contribution from different factors to impacts on climate change (GWP-Total in kg CO<sub>2</sub>/kg Al) for Wrexham is shown in Fig. 1.

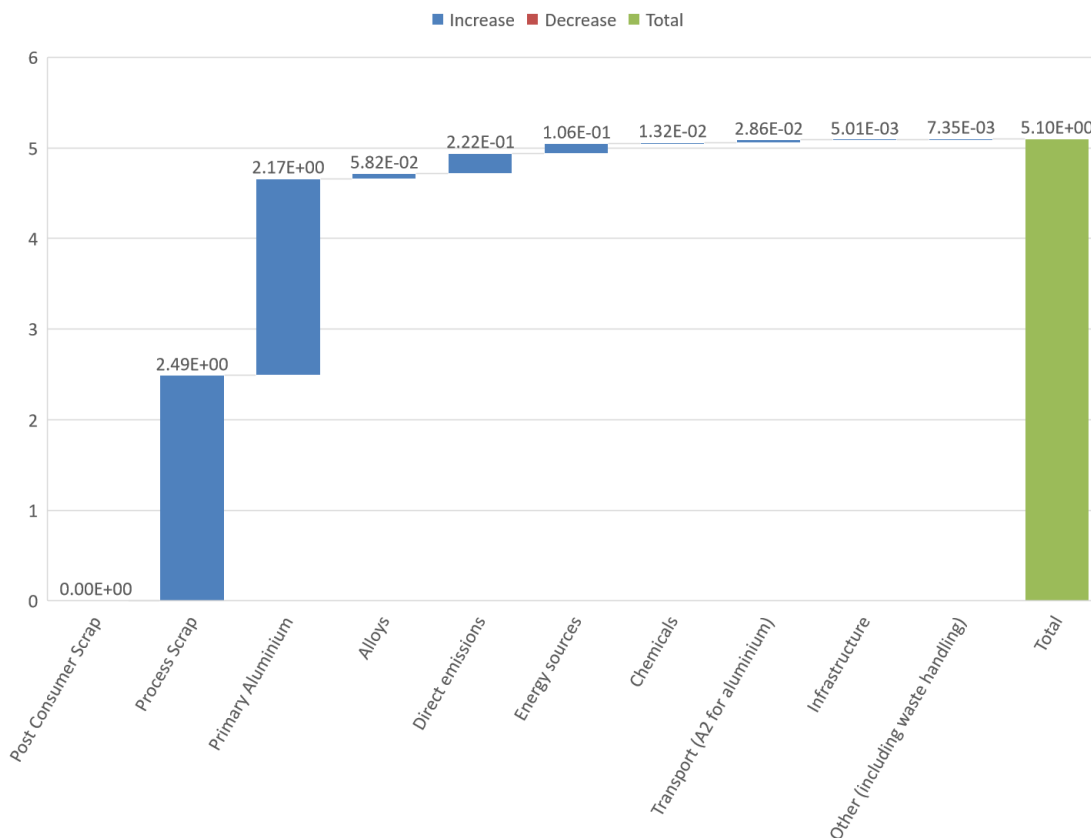


Fig. 1 A waterflow diagram showing the contributions to climate change (GWP-Total in kg CO<sub>2</sub>/kg Al) for Wrexham for modules A1-A3.

The reason why post-consumer scrap has no contribution is that this is considered a waste product with zero impact. Only transport impacts are included for this material flow, and this is included in the bar called 'Transport (A2 for aluminium)'.

### Product specification:

Cast aluminium products contain alloying materials and these are designated different numbers depending on what materials they contain which also give specific product characteristics. Most of the Extrusion Ingots produced belong to the 6000 alloy family from all major alloy groups with compositions 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 Comparing scrap chemistry with standard alloy group. Scrap chemistry averages from 9 months production in 2017. The only limitation being a minimum level of selected elements

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 variou 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 <sup>3</sup> ) * 10 <sup>3</sup>
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	MPa * 10 <sup>3</sup>
Chemical composition	Varying alloy by alloy, most case Al > 98	% by mass

### Market:

Great Britain is the main market for extrusion ingots from Wrexham. 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 aluminium extrusion ingot manufactured at the Wrexham aluminium recycling 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 3.8 (Wernet et al. 2016 and Ecoinvent 2022) as implemented in the software SimaPro, version 9.3 (Pré 2022). 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. Infrastructure of the plant, incoming energy, water and waste production in-house is allocated equally among all products (conversion volumes, full price/direct sales, and CIRCAL 75R) 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 post-consumer scrap used for the aluminium at the Wrexham aluminium recycling plant. Fig. 2 shows the incoming materials to the recycling plant and the return of materials from customers.

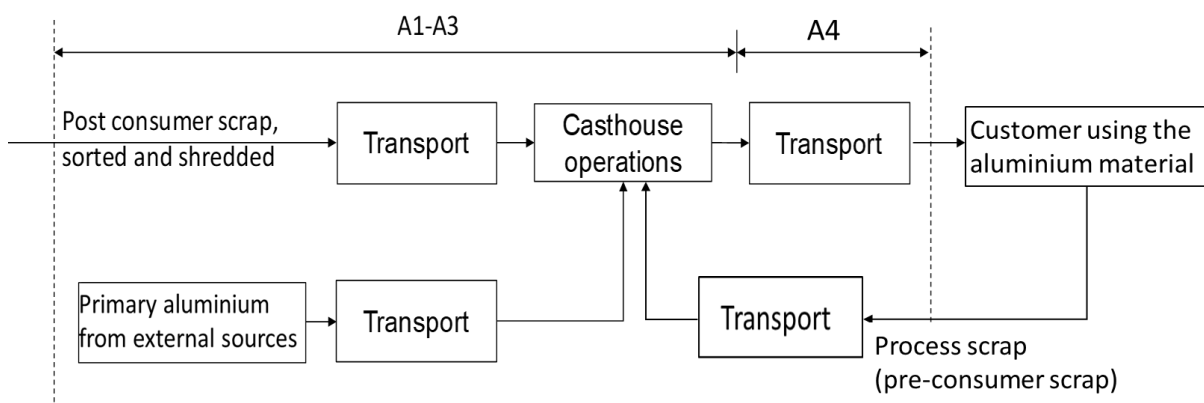
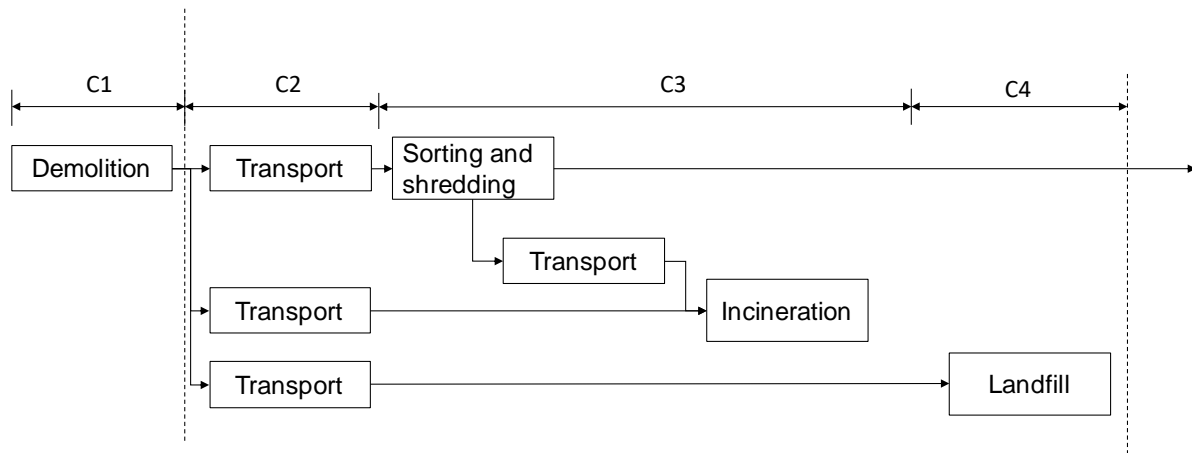


Fig. 2 Flow sheet for modules A1 – A4 for 1 kg of aluminium extrusion ingot from aluminium recycling plant.

At the far left of the figure, where post-consumer scrap and primary aluminium is entering the process (from module A1), there are several different suppliers of both post-consumer scrap and primary aluminium. The names of these are not disclosed here for reasons of confidentiality. At the far right, there is an arrow with process scrap going back to cathouse

operations. This flow is modelled as ‘closed loop’ recycling, in other words it contains the embodied impacts of the initial material.



*Fig. 3 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, C1-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 Aluminium Extrusion Ingot from Wrexham 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 Wrexham production site to the average customer location in Europe, based on lorry. The average distance is approximately 200 km. Values for capacity utilisation and fuel consumption is gathered from Hydro (2022) and ecoinvent (2016, updated 2022) as shown in Table 3.

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	50	Lorry, >32 metric tons, Euro V	200	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 96%) and recycled (approximately 97% of the collected aluminium), giving a total of 93% 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	0.96
Reuse	Kg	0
Recycling	Kg	0.933
Energy recovery	Kg	0.027*
To landfill	Kg	0.04**

\* 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	50	Lorry, >32 metric tons, Euro V	269	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	640
Aluminium extrusion ingot recycled and substituting primary aluminium	g	573

The initial content of secondary material is not included in the calculations for module D, therefore only 640 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 573 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	MNR	X	X	X	X	

## Core environmental impact indicators

Indicator	Unit	A1-A3	A4	C1*	C2	C3	C4	D
GWP-total	kg CO2 eq.	5.10E+00	1.74E-02	0	2.51E-02	2.50E-01	6.14E-04	-4.88E+00
GWP-fossil	kg CO2 eq.	4.91E+00	1.74E-02	0	2.50E-02	2.46E-01	5.24E-04	-4.77E+00
GWP-biogenic	kg CO2 eq.	4.62E-02	1.85E-05	0	2.66E-05	3.30E-03	9.04E-05	-1.89E-02
GWP-LULUC	kg CO2 eq.	1.46E-01	6.53E-06	0	9.40E-06	1.15E-04	1.69E-07	-8.69E-02
ODP	kg CFC11 eq.	5.19E-07	4.34E-09	0	6.25E-09	9.71E-09	1.49E-10	-3.57E-07
AP	mol H <sup>+</sup> eq.	3.24E-02	5.54E-05	0	7.98E-05	8.10E-04	4.24E-06	-3.25E-02
EP-freshwater	kg P eq.	1.93E-04	1.24E-07	0	1.79E-07	9.05E-06	6.00E-09	-3.57E-07
EP-marine	kg N eq.	3.78E-03	1.22E-05	0	1.76E-05	8.98E-05	1.58E-06	-3.25E-02
EP-terrestrial	mol N eq.	4.26E-02	1.36E-04	0	1.95E-04	1.12E-03	1.78E-05	-1.76E-03
POCP	kg NMVOC eq.	1.55E-02	5.34E-05	0	7.69E-05	3.21E-04	5.04E-06	-4.68E-03
ADP-M&M	kg Sb eq.	1.17E-05	4.16E-08	0	5.99E-08	7.46E-06	2.81E-09	-4.61E-02
ADP-fossil	MJ	6.54E+01	2.83E-01	0	4.08E-01	1.45E+00	1.23E-02	-1.54E-02
WDP	m <sup>3</sup>	3.58E-01	9.74E-04	0	1.40E-03	1.47E-02	6.63E-05	1.27E-05

**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	3.95E-07	2.02E-09	0	2.90E-09	1.40E-08	8.67E-11	-3.75E-07
IRP	kBq U235 eq.	3.50E-01	1.23E-03	0	1.77E-03	3.42E-03	8.33E-05	-6.35E-01
ETP-fw	CTUe	1.00E+02	2.21E-01	0	3.18E-01	5.88E+00	2.48E+01	-7.95E+01
HTP-c	CTUh	1.46E-08	6.03E-12	0	8.68E-12	1.56E-10	1.15E-12	-1.17E-08
HTP-nc	CTUh	1.89E-07	2.33E-10	0	3.35E-10	6.75E-09	2.11E-11	-1.42E-07
SQP	Dimensionless	8.15E+00	3.24E-01	0	4.66E-01	1.43E+00	2.57E-02	-5.46E+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
	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
ILCD type / level 2	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><b>Disclaimer 1</b> – 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><b>Disclaimer 2</b> – 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	C1*	C1	C2	C3	C4	D
RPEE	MJ	3.58E+01	3.61E-03	0	n/a	5.20E-03	1.99E-01	2.29E-03	-2.13E+01
RPEM	MJ	0.00E+00	0.00E+00	0	n/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	3.58E+01	3.61E-03	0	n/a	5.20E-03	1.99E-01	2.29E-03	-2.13E+01
NRPE	MJ	6.54E+01	2.83E-01	0	n/a	4.08E-01	1.45E+00	1.23E-02	-5.95E+01
NRPM	MJ	0.00E+00	0.00E+00	0	n/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	6.54E+01	2.83E-01	0	n/a	4.08E-01	1.45E+00	1.23E-02	-5.95E+01
SM	kg	4.02E-01	0.00E+00	0	n/a	0.00E+00	0.00E+00	0.00E+00	-5.73E-01
RSF	MJ	0.00E+00	0.00E+00	0	n/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0	n/a	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W	m <sup>3</sup>	2.65E-01	3.37E-05	0	n/a	4.85E-05	8.09E-04	1.78E-05	-1.16E-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	3.64E-03	6.85E-07	0	9.87E-07	6.17E-03	1.51E-08	-1.53E-03
NHW	kg	2.52E+00	2.81E-02	0	4.05E-02	1.25E+00	8.22E-02	-2.34E+00
RW	kg	3.40E-04	1.92E-06	0	2.76E-06	4.25E-06	8.49E-08	-2.45E-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	6.89E-02	0.00E+00	0	0.00E+00	9.33E-01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0	0.00E+00	2.56E-02	0.00E+00	0.00E+00
EEE	MJ	1.66E-04	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	2.98E-04	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:  $9.0 \text{ E-}03 = 9.0 \cdot 10^{-3} = 0.009$

### Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	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

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).

National electricity grid	Unit	Value
UK electricity for Wrexham	kg CO <sub>2</sub> -eq/kWh	0.31

### 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 CO <sub>2</sub> eq	5.09E+00	1.74E-02	0	2.51E-02	2.47E-01	5.26E-04	-4.88E+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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