Environmental Product Declaration

In accordance with ISO 14025:2006 and
EN 15804:2012+A2:2019/AC:2021 for:

Aluminium EC Rod

EPD of multiple products, based on average results

Oman Aluminium Processing Industries SPC

Programme	**The International EPD® System, www.environdec.com**
Programme operator	EPD International AB
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Oman Aluminium Processing Industries SPC (OAPIL)
Sohar Industrial Port Company
Area, Al Liwa,
Oman
www.oapil.com

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1.0 Program Information

Program and Address	The International EPD® System EPD International AB, EPD MENA Box 210 60, SE-100 31 Stockholm, Sweden info@environdec.com
Accountabilities for PCR, LCA and independent, third-party verification	
Product Category Rules (PCR)	
PCR 2019:14 Construction products (EN 15804:A2) Version 1.3.4 dated 30.04.2024 CEN standard EN 15804 serves as the Core Product Category Rules (PCR) PCR Review Conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact	
Life Cycle Assessment (LCA)	
LCA accountability: GCAS Quality Certifications S.B.Rajan -BS (Engg.& Tech), M.Sc (GE & Climate Finance), Green Finance Specialist Alan Beski Christopher -Sustainability Consultant P.O.Box 65561, Dubai, United Arab Emirates. www.gcasquality.com	
Third-party verification	
Independent third-party verification of the declaration and data, according to ISO 14025:2006 via; ☒ EPD Verification by individual verifier	
Third party verification: Mari Kirss, Meetripuu OÜ	
Procedure for follow-up of data during EPD validity involves third party verifier ☒ Yes ☐ No	
The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programs may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison. The scenarios included are currently in use and are representative for one of the most probable alternatives.	

2.0 Introduction

This report contains the environmental performance of the manufacturing process of Aluminium EC Rod by Oman Aluminium Processing Industries SPC. This Environmental Product Declaration (EPD) has been developed using the Life Cycle Assessment (LCA) methodology. The environmental impact values calculated are expressed to 1 metric ton of Aluminium EC Rod.

The assessed life cycle includes all phases in the manufacturing process of Aluminium EC Rod in "cradle-to-gate with modules C1–C4, module D and optional modules" scope. This LCA covers transportation of Raw materials, production, distribution of final products to the customer and end of life stages.

This EPD has been conducted according to the program operator regulations, and it has been verified in accordance with The International EPD System. The EPD regulation is a system for the international use of Type III Environmental Declarations, according to ISO 14025:2006. Not only the system, but also its applications, is described in the Programmer's Product Category Rules (PCR). This report has been made following the specifications given in the European standard EN 15804:2012+A2:2019/AC:2021.

Oman Aluminium Processing Industries SPC (OAPIL) is Oman's leading Aluminium rod and overhead line conductor manufacturer. The company was established in 2008 as a joint venture between two of Oman's prestigious business groups, Oman Cables Industries (SAOG) and Takamul Investments Co (SAOC) OAPIL is fulfilling its role as an important player in the Sultanate's Aluminium and Electrical Transmission sector by contributing to Oman's industrialization and creating an incomparable and skilled international workforce within the organization.

OAPIL announced its very first commercial production in the month of July 2010 and since then has been instrumental in shaping the Power Transmission Industries not only in Oman but also in other GCC countries and in select international markets. Today OAPIL is 100% owned by Oman Cables Industry SAOG.

At OAPIL, the customer is the focal point, as the processes and decision making are aligned to anticipate and exceed the customer's needs. OAPIL is committed to continuously raising the bar in terms of product innovation and creating solutions that serve the precise requirement of the customers. OAPIL is fully geared to meet the specific requirements of the customers for Aluminium rods and overhead line conductors, while creating benchmarks in terms of quality, environment, health & safety

2.1 Certifications

OAPIL has achieved the certifications below:

- ISO 9001:2015 – Quality Management System (131837-2023-AQ-ARE-RvA)
- ISO 14001:2015 – Environmental Management System (131126-2023-AE-ARE-RvA)

- ISO 45001:2018 – Occupational Health & Safety Management System (131833-2013-AHSO-ARE-RvA)

3.0 Product Information

3.1 Analyzed Product

The assessed system in this Environmental Product Declaration (EPD) comprises cradle-to-gate with modules C1–C4, module D and optional modules of Aluminium EC Rod by Oman Aluminium Processing Industries SPC in its factory in Sohar, Oman.

Aluminium EC Rod has more than 99.5% Aluminum and good conductivity, corrosion resistance, large conductivity capacity, and high tensile strength, is often used as a transmission wire in overhead line. Manufactured in accordance with ASTM B233 and EN 1715-1 & 2.

3.2 Product Specifications

Product Specifications	Details
Product Type	Aluminium EC Rod
Size	9.5mm, 12mm & 15mm diameter
Coil Inner Diameter	550 mm
Coil Outer Diameter	1600 mm (max)
Coil Height	850 mm max
For more details https://www.oapil.com/index.php?option=_content&id=198%20&mid=278&itemid=311	

3.3 Product Application

Application	Advantages
Widely used for electrical conductor as wire and solid shaped conductor	**Conductivity:** In excess of twice that of copper by unit weight **Light Weight:** Due to its proven light weight and excellent bend qualities make our EC Aluminium favorable for further customization **Workability:** Permitting a wide range of processing from wire drawing to extrusion or rolling. Excellent bend quality. Aluminium possesses high elongation that eases the cold work process **Corrosion Resistance:** A tough, protective oxide coating quickly forms on freshly exposed Aluminium, and it does not thicken significantly from continued exposure to air **Creep:** Like all metal under sustained stress, there is a gradual deformation over a term of years. With Aluminium, design factors take it into account **Compatibility with Insulation:** Does not adhere to or combine with usual insulating materials. No tin-coating required; clean stripping.
Widely used in the production of electrical conductors for magnetic motor	
With its purity of more than 99.5% of Aluminium (higher than others), this conductor has higher conductivity with softer rod.	

4.0 LCA Information

4.1 Declared unit

The Declared unit of the LCA is 1 metric ton of Aluminium EC Rod. All direct and indirect environmental impacts, as well as the use of resources, are reported referred to this unit. This EPD presents the environmental impacts associated with the LCA of Aluminium EC Rod.

4.2 Time representativeness

Manufacturing facility specific data from Oman Aluminium Processing Industries are based on 1 year average for process data (Reference year January to December 2023). The following rules for time scope of data were applied - < 10 years for background data and < 2 years for manufacturer's data.

4.3 LCA software & database

The LCA tool/software Air.e.LCA™ version 3.17.4.0 with Ecoinvent™ 3.10 database and **"Allocation, cut-off by classification"** (or "cut-off") system model has been used for LCA modelling and impact calculations.

4.4 UN CPC Code

The code is UN CPC 41532.

4.5 System boundaries

This EPD covers all product stages from "cradle to gate with options", i.e. this LCA covers Production stage A1-A3, Transportation A4, End of life stages C1-C4 and Resource recovery stage

D according to EN 15804 + A2/AC:2021.

The procedures that are not controlled by the company, but are included in this environmental study, are:

- The extraction and production of fuels and electricity.

All related direct and indirect environmental impacts related to these elements have been calculated and were included in the LCAs in this EPD. Personnel-related processes, such as transportation of employees to and from work is excluded. Also, the production and end-of-life processes of infrastructure or capital goods used in the product system are excluded.

4.5.1 Raw material supply (A1)

Production of the product starts with mainly raw material production and transportation from different parts of the world and Liquid Aluminium locally sourced. 'Raw material supply' includes raw material extraction before production.

4.5.2 Raw material transportation (A2)

Transport is relevant for delivery of raw materials to the plant. Raw material (Liquid Aluminium) is transported from Sohar Aluminium which is very close (within one kilometer) to OAPIL. Solid Aluminium and other materials such as Master Alloys are transported from Oman and China.

4.5.3 Manufacturing (A3)

The processes that are included in the manufacturing phase are the charging in the furnace, degassing & drossing, casting, hot rolling, quenching, coiling and packaging & wrapping. Electricity, Natural Gas and Diesel are consumed in the production process. During the manufacturing process, 100% process scrap is recycled in-house. Aluminium skimming from furnaces is sent to 3rd party recycling company.

4.5.4 Delivery (A4)

To create a scenario of the A4 phase, all the products sold from January to December 2023 has been analyzed as representative of international transport. The type of truck used is >32t truck, Euro 6. The total distance covered for the delivery of Aluminium EC rods was 1,690 kilometers by road transport and 131,393 nautical miles by sea transport.

Scenario Details	Description
Vehicle used for transport	3.5-7.5t & >32t trucks, Euro 6.
Vehicle capacity	3.5 -7.5 tons and >32 tons
Fuel type and consumption	Diesel, 0.38 liters per km
Capacity utilization	100% as assumed in Ecoinvent
Bulk transportation	Mass of the transported product.

4.5.5 Deconstruction and Demolition (C1)

95% of the Aluminium is removed (as per The Aluminium Association) during demolition with diesel consumption of machineries: 60.8 liters/hour; capacity approx. 15 m^3/h) and 40% is

dismantled with hydraulic excavator and tongs (diesel consumption of excavator: 36.1 liters/hour; capacity approx. 20 m^3/h). Calculated diesel consumption for the demolition of 1 kg Aluminium is 0.0013 liters.

4.5.6 Demolished items transportation (C2)

With a collection rate of 100%, 95% of the Aluminium is transported to a nearby scrap yard and the remaining 5% is transported to a landfill site. The transport is carried out by a >32-ton truck over 50 km carrying the demolished items from the demolition site to a nearby scrap yard and landfill sites. Aluminium is collected as mixed construction waste.

Type	Capacity utilization	Type of vehicle	Average distance
Truck	75%	Euro >32-ton truck	50 km

4.5.7 Waste processing (C3)

Aluminium must be mechanically separated from any other material surrounding them prior to recycling so that it can be made available to a downstream product system as secondary material. Hence, the environmental impacts of separation of Aluminium are considered in module C3.

4.5.8 Disposal (C4)

The environmental impacts of the remaining 5% of the produced Aluminium EC Rods that are disposed of in a landfill are considered in this module.

4.5.9 Reuse, Recycling and Recovery potential (D)

This module represents the net impacts (burdens – benefits) of burdens and benefits of the used Aluminium and packaging materials. 100% of the 95% recycled aluminium is usable in module D. It was assumed that 100% of the used wooden pallet and corrugated sheet was recycled whereas 95% of the used steel straps, polypropylene strap and pallet cover was recycled.

4.6 Manufacturing & System boundaries diagram

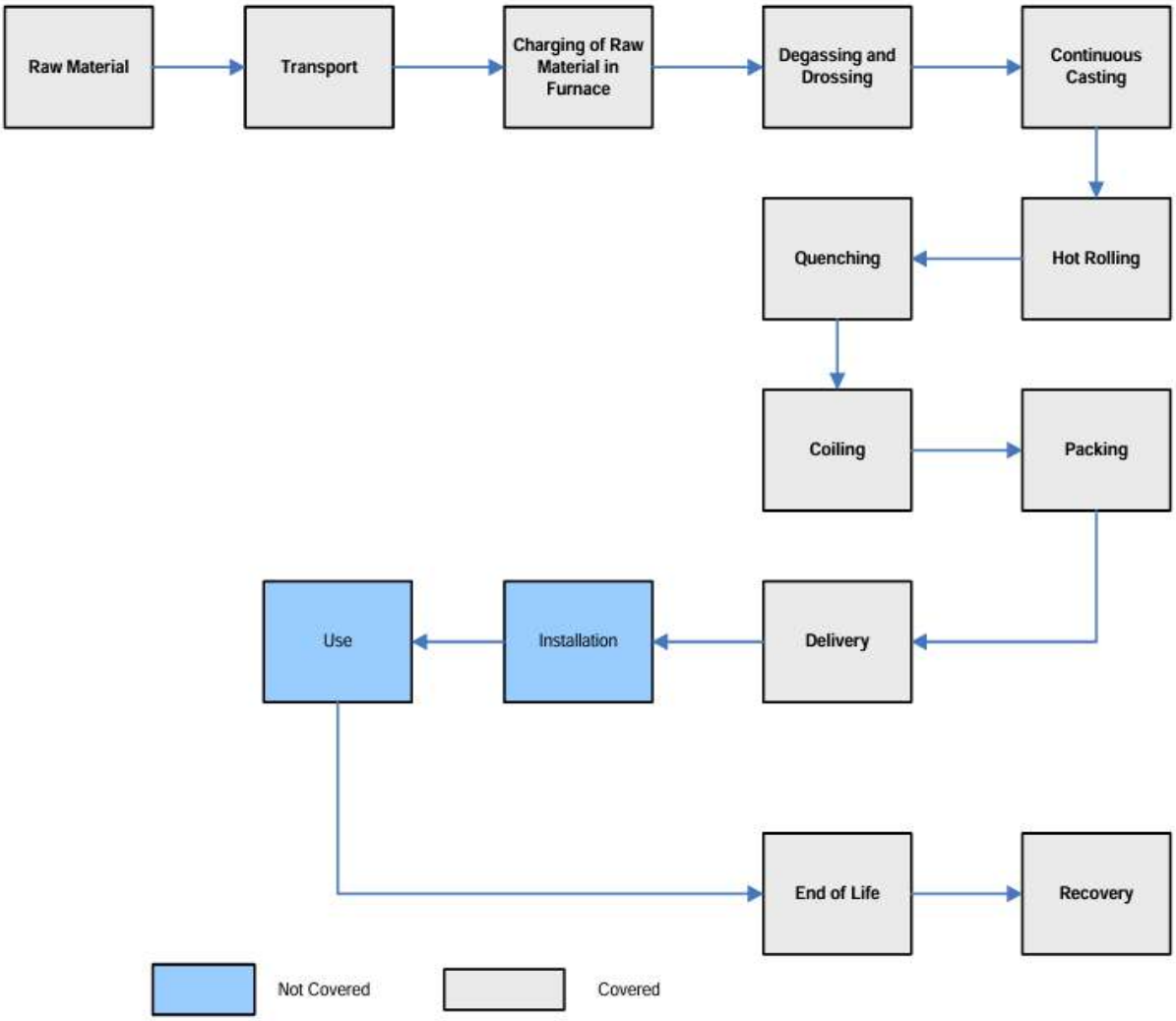
	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules Declared	X	X	X	X	ND*	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	OMAN	GLO	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Share of specific data	GWP > 90%			-		-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	0%			-		-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%			-		-	-	-	-	-	-	-	-	-	-	-	-

*X = Included, ND=Module not declared. *Module A5 is included to balance out biogenic emissions from packaging.*

Scope of this Life Cycle Assessment 'Cradle to Gate with Options'

A1 Raw Materials Production	A2 Transport raw materials	A3 Manufacture	A4 Distribution	End of use Stage (C1-C4)	Recovering and Recycling (D)
					
Raw Materials	Transport from Supplier by Road & Sea	Charging, Casting, Rolling & packing	Transport to customers by sea and road	Demolition, transport, disposal.	Reuse, recovery and recycling potential

4.7 Manufacturing flow



4.8 Content Declaration*

Product Components	Weight (kg)	Post-consumer material weight (%) of product	Biogenic material, weight (%) of product	Biogenic material, weight (kg C/DU)
Aluminium (Liquid & Solid)	remainder	0	0	0
Altab Iron 80% (Fe)	0.16	0	0	0
Aluminium-Boron alloy	1.15	0	0	0
Tibor rod	0.16	0	0	0
Total	**1000**	**0**	**0**	**0**

Packaging materials			
Packaging materials	**Weight (kg)**	**Weight vs product (%)**	**Biogenic carbon (kg C/DU)**
Wooden pallet	0.0057	0.00057	0.0104 (50%)
Corrugated sheet	0.0006	0.00006	0.0010 (45%)
Steel strap	0.0006	0.00006	0
Polypropylene strap	0.0001	0.00001	0
Pallet cover	0.0003	0.00003	0
Total	**0.0072**	**0.0007**	**0.0031**
Note - Biogenic materials account for 86.3% of the total packaging weight, they exceed the 5% threshold as stated in PCR 2019:14 (Annex 2). These biogenic emissions are added in module A3 and balanced out in module A5.			

4.9 Substances listed in the "Candidate list of SVHC"

During the life cycle of the product, no hazardous substances listed in the "Candidate List of substances of very high concern (SVHC) for authorization" has been used in a percentage higher than 0.1% of the weight of the product.

4.10 Additional information

4.10.1 Cut-off rules

More than 99% of the materials and energy consumption have been included. The Polluter Pays Principle, and the Modularity Principle have been followed.

4.10.2 Allocation

The allocation of common inputs and outputs is based on the general allocation rule what represents the proportion of production of every specific product in overall production expressed in metric tons. Generic process data for production of input materials were used.

4.10.3 Electricity

A specific dataset with the Life Cycle Inventory (LCI) corresponding to the electricity mix in Sohar, Sultanate of Oman, has been used for this LCA from Ecoinvent v3.10 (cut-off). The electricity mix comprises of oil (3%), Natural Gas – combined cycle power plant (21%), Natural Gas – conventional power plant (72%) and others (4%). The climate impact of the used electricity mix is 6.95E-01 Kg CO_2e/kWh.

4.10.4 Calculation rules

Datasets from Ecoinvent 3.10 (cut-off) with emission factors for raw materials and generic chemicals have been characterized to adjust them to the characteristics of manufacturing of suppliers or counties where suppliers are located. Specific datasets with the emissions factors corresponding to the fuel combustion of the production plant and machinery have been developed for these LCAs. Indirect emissions due to diesel production and transportation are also included in the environmental impact. Minor components are not directly related to the product, with less than 1% impact, such as office supplies, has been excluded from the assessment.

The LCA report for aluminium products from Sohar Aluminium evaluates environmental impacts, focusing primarily on global warming potential. It follows ISO 14040/14044: 2006 standards, using a cradle-to-grave scope and primary data from 2023. The assessment employs the EF 3.0 impact assessment method and references the Ecoinvent v3.9.1 database for secondary data. The study analyzes various environmental indicators, including climate change (CO2 eq.), resource consumption, particulate matter emissions, ozone depletion, eutrophication, acidification, and human toxicity.

The identified errors in Ecoinvent version 3.10, specifically related to coke production emissions and Brazilian electricity market production volumes, do not affect our LCA results. Since our LCA does not utilize either of these datasets, the corrections made in version 3.10.1 have no impact on our analysis or conclusions.

All transport of components have been included in the LCA considering real distances travelled by materials used for production. It is estimated in a global scale according to Ecoinvent™ criteria. As exact port locations are not known in detail, transport distances have been calculated from one of the ports in the country of origin to the factory. Operations at the port has also been excluded. Road distances calculated using Google Maps. Maritime distances calculated using Marine Traffic Voyage Planner.

4.10.5 Byproducts assignment

There are no by-products in this Environmental Product Declaration. Hence no allocation had to be applied.

4.10.6 End-of-Life scenarios

Process	Unit (ton)
Collection process specified by type	
Aluminium collected separately	Not applicable
Aluminium collected as mixed construction waste	1
Recovery system specified by type	
Aluminium for reuse and recycling	0.95 (95%)
Aluminium for energy recovery	Not applicable
Disposal specified by type	
Aluminium sent to landfill	0.05 (5%)
Transportation assumptions	
Transport to scrap yard and landfill sites	50 km transport by >32-ton truck

4.10.7 Details regarding EPD Multiple Product based on average results

This Environmental Product Declaration (EPD) represents multiple Aluminium rod products of different diameters manufactured by OAPIL at a single production site, using a consistent Aluminium alloy and standardized manufacturing process. In accordance with Section 2.2.2.1 of PCR 2019:14 v1.3.4, this EPD presents production volume-weighted average results for all included variants. The average content is reflected in the content declaration, and this EPD does not claim compliance with ISO 21930

*The material composition declared in this EPD reflects the average content of Aluminium rod products with varying diameters, manufactured at OAPIL's single production site. The average has been calculated based on production volume across all included product variants. All products are produced using the same Aluminium alloy and identical process conditions. No recycled content is used in the production process unless otherwise specified.

5.0 Environmental Performance

5.1 Potential environmental impacts

In the following tables, the environmental performance of the declared units "1 metric ton of Aluminium EC rod" is presented for the Oman Aluminium Processing Industries SPC. During the assessment it was not evident to distinguish the differences in the consumption of electricity, water and raw material during the manufacturing. Hence, the calculation is based on total production vs total consumption against manufacturing of the product. Environmental impacts are calculated using EF-3.1, (ILCD).

Disclaimer - The results presented for modules A1-A3 represent only the initial product stage impacts and do not account for the environmental effects associated with the end-of-life stage (Module C). Any interpretation or use of these results without considering Module C may lead to incomplete or misleading conclusions regarding the product's overall environmental performance. For a comprehensive assessment, all life cycle stages should be evaluated together.

5.1.1 Core environmental impact indicators

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding thresholds values, safety margins or risks.

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Climate change (GWP) – fossil	kg CO2e	8.72E+03	3.09E-01	2.10E+02	8.93E+03	1.01E+02	0.00E+00	6.95E-01	4.99E-03	2.42E+02	1.24E+00	-7.61E+03
Climate change (GWP) – biogenic	kg CO2e	0.00E+00	0.00E+00	-1.14E-02	-1.14E-02	0.00E+00	1.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Climate change (GWP) – LULUC	kg CO2e	3.35E+01	1.38E-04	1.95E-02	3.35E+01	5.33E-02	0.00E+00	1.12E-04	2.11E-06	1.67E-01	1.58E-03	-7.75E-02
Climate change (GWP) – total	kg CO2e	8.82E+03	3.09E-01	2.10E+02	9.03E+03	1.01E+02	0.00E+00	6.96E-01	4.99E-03	2.44E+02	1.25E+00	-7.61E+03
Ozone depletion	kg CFC11e	3.01E-04	4.04E-09	2.23E-06	3.03E-04	9.94E-07	0.00E+00	4.28E-08	7.09E-08	1.35E-06	2.00E-08	-1.50E-04
Acidification	mol H+e	3.21E+01	2.88E-03	4.30E-01	3.25E+01	2.99E+00	0.00E+00	3.47E-03	1.21E-02	7.68E-01	7.24E-03	-3.10E+01
Eutrophication, aquatic freshwater	kg PO4e	5.57E+00	5.81E-05	1.57E-02	5.59E+00	9.44E-03	0.00E+00	8.78E-05	1.10E-03	1.01E-01	6.11E-04	-1.80E+00
Eutrophication, aquatic freshwater	Kg P eq	1.81E+00	1.89E-05	5.11E-03	1.82E+00	3.07E-03	0.00E+00	2.86E-05	3.58E-04	3.28E-02	1.99E-04	-5.87E-01
Eutrophication, aquatic marine	kg Ne	2.65E-01	7.26E-04	1.53E-01	4.18E-01	7.46E-01	0.00E+00	4.48E-04	3.20E-03	1.72E-01	3.99E-03	-4.50E+00
Eutrophication, terrestrial	mol Ne	9.53E+01	8.00E-03	1.48E+00	9.67E+01	8.29E+00	0.00E+00	4.57E-03	3.43E-02	1.88E+00	2.76E-02	-4.82E+01
Photochemical ozone formation	Kg NMVOCe	3.15E+01	2.58E-03	7.43E-01	3.23E+01	2.22E+00	0.00E+00	6.02E-03	1.87E-05	6.15E-01	8.44E-03	-2.51E+01
Abiotic depletion, minerals & metals	kg Sbe	9.42E-03	7.49E-07	1.10E-04	9.53E-03	1.07E-04	0.00E+00	3.84E-07	1.44E-05	3.34E-03	3.28E-06	-8.89E+00
Abiotic depletion of fossil resources	MJ	1.45E+05	4.18E+00	4.46E+03	1.49E+05	1.06E+03	0.00E+00	4.13E+01	7.30E-02	1.42E+03	2.07E+01	-1.10E+05
Water use	m3e depr.	6.10E+02	2.20E-02	2.05E+01	6.31E+02	3.28E+00	0.00E+00	3.84E-02	4.23E-04	2.52E+01	8.22E+00	3.39E+02

EN 15804:2012+A2:2019/AC: 2021 disclaimers for Abiotic depletion and Water use indicators and all optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator. "Reading example: 1.57E-03 = 1.57*10-3 = 0.00157"

5.1.2 Additional environmental impact indicators

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate Matter	Incidence	3.09E-04	2.00E-08	2.81E-06	3.12E-04	3.12E-06	0.00E+00	2.96E-08	3.82E-10	1.00E-05	1.26E-07	-3.16E-04
Ionizing Radiation, human health	kBq U235e	4.44E+01	3.47E-03	5.94E-01	4.49E+01	4.85E-01	0.00E+00	5.79E-03	6.72E-05	2.32E+00	4.69E-02	5.72E+00
Eco-toxicity (freshwater)	CTUe	1.57E+04	9.51E-01	3.04E+04	4.62E+04	2.09E+02	0.00E+00	2.52E+00	1.71E-02	1.18E+03	8.81E+03	9.20E+03
Human toxicity, cancer effects	CTUh	2.00E-06	1.54E-09	5.71E-07	2.57E-06	4.31E-07	0.00E+00	2.31E-06	2.62E-11	1.26E-06	6.47E-09	-1.25E-05
Human toxicity, non-cancer effects	CTUh	1.42E-05	2.53E-09	2.00E-05	3.42E-05	3.22E-07	0.00E+00	3.27E-09	4.94E-11	3.25E-06	1.99E-07	-1.05E-05
Land use related impacts/soil quality	Dimensionless	3.45E+04	3.69E+00	1.19E+02	3.46E+04	1.43E+02	0.00E+00	2.57E+00	7.79E-02	8.43E+02	3.29E+01	-2.87E+04

EN 15804:2012+A2:2019/AC: 2021 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

5.1.3 Environmental impacts – GWP-GHG

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	Kg CO2e	8.82E+03	3.09E-01	2.10E+02	9.03E+03	1.01E+02	1.14E-02	6.96E-01	4.99E-03	2.44E+02	1.25E+00	-7.61E+03

This indicator includes all greenhouse gases, excluding biogenic carbon dioxide uptake and emissions, as well as biogenic carbon stored in the product, as defined by IPCC AR6 (2021). The indicator aligns closely with the Global Warming Potential (GWP) outlined in EN 15804:2012+A2:2019, incorporating updated characterization factors and environmental impact indicators.

5.1.4 Use of Natural resources

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	7.30E+03	5.28E-02	8.99E+00	7.31E+03	8.60E+00	0.00E+00	7.55E-02	1.00E-03	8.87E+01	6.40E-01	-4.62E-03
Renewable PER used as materials	MJ	7.66E-01	0.00E+00	4.54E-01	1.22E+00	0.00E+00	-1.22E+00	0.00E+00	0.00E-00	0.00E+00	0.00E+00	-2.69E+00
Total use of renewable PER	MJ	7.30E+03	5.28E-02	9.44E+00	7.31E+03	8.60E+00	-1.22E+00	7.55E-02	1.00E-03	8.87E+01	6.40E-01	-2.69E+00

Non-renew. PER used as energy	MJ	2.38E+03	4.18E+00	4.46E+03	6.84E+03	1.06E+03	0.00E+00	4.13E+01	7.30E-02	1.42E+03	2.07E+01	-9.33E+03
Non-renew. PER used as materials	MJ	6.28E-04	0.00E+00	5.77E-05	6.86E-04	0.00E+00	-6.86E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.51E-03
Total use of non-renewable PER	MJ	2.38E+03	4.18E+00	4.46E+03	6.84E+03	1.06E+03	-6.86E-04	4.13E+01	7.30E-02	1.42E+03	2.07E+01	-9.33E+03
Use of secondary materials	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.57E+02
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	0.00E+00	0.00E+00	1.11E+00	1.11E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note- Option A as detailed in Annex 3 of IES's PCR for construction products was chosen to calculate the primary energy indicators.

5.1.5 End of life – Waste

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	Kg	0.00E+00	0.00E+00	1.63E+02	1.63E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+01	0.00E+00
Non-hazardous waste	Kg	0.00E+00	0.00E+00	3.40E+00	3.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5.1.6 End of life – Outflows

Impact Category	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for reuse	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.57E+02
Materials for recycling	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E+02	0.00E+00	9.57E+02
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Exported energy - electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy - thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5.1.7 Biogenic carbon content

Details	Unit	A1-A3
Biogenic carbon content in product	Kg C	0.00E+00
Biogenic carbon content in accompanying packaging	Kg C	3.10E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2. "Reading example: 1.57E-03 = 1.57*10-3 = 0.00157"

Disclaimer: "According to the EN 15804:2012+A2:2019 standard, the LCIA results are relative expressions translating impacts into environmental themes such as climate change, ozone depletion, etc. (midpoint impact categories). Thus, the LCIA results do not predict impacts on category endpoints such as impact on the extinction of species or human health. In addition, the results do not provide information about exceeding thresholds, safety margins or risks".

5.2 Interpretation of LCA study results

In general terms, as is shown in the table of core environmental impact indicators, A1-A3 modules have the higher impact, representing above 80% of the whole impact. The A4 module has less impact. C2 and C4 modules have little impact too, representing at most 0.16% and 0.01% respectively of the whole impact. Refer below table for more detailed explanations.

Concluding, the study provides fair understanding of environmental impacts during the various life cycle stages of Aluminium EC Rod production. It also identifies the hot spots in the value chain where improvement activities can be prioritized and accordingly actions can be planned. The scope covers the ecological information to be divided into raw material production (A1), transportation (A2), manufacturing (A3), delivery (A4), product dismantling (C1), transport of dismantled products to site (C2), waste processing (C3), waste disposal (C4) as well as the end-of-life stage recycling (D)considerations.

Impact Indicator	Description	Most significant contributor
Depletion of abiotic resources – fossil fuels	Indicator of the depletion of natural fossil fuel resources.	The total cradle to gate impact is 1.49E+05 MJ. A1–A2 (95.39%) and A3 (2.94%) has the highest impacts. A total credit of -1.10E+05 MJ is taken in module D
Climate Change (Global Warming Potential- GWP-GHG)	Indicator of potential global warming due to emissions of greenhouse gases to the air. Divided into 3 subcategories based on the emission source: (1) fossil resources, (2) bio-based resources, and (3) land use change.	The total cradle to gate impact is 9.03E+03 kg CO2 eq. A1 – A2 (94.06%) followed by A3 (2.23%) has the highest impacts. A total credit of -7.61E+03 kg CO2eq is obtained in module D.
Climate change (fossil)	Indicator of the Climate change is largely driven by the release of greenhouse gases like CO 2.	The total cradle to gate impact is 8.93E+03 kg CO2 eq. A1 – A2 (94.02%) and A3 (2.26%) has the highest impacts. A total credit of -7.61E+03 kg CO2eq is obtained in module D.

6.0 Mandatory statements

Explanatory material can be obtained from EPD owner and/or LCA author. The verifier and The Program Operator do not make any claim or present any responsibility for the legality of the product. The EPD owner has the sole ownership, liability, and responsibility for the EPD. The LCA Author shall not be liable with respect to manufacturer information, life cycle assessment data and evidence.

EPDs within the same product category but registered in different EPD programs may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; have equivalent content declarations; and be valid at the time of comparison.

7.0 Additional information

7.1 Action against erosion, environmental restoration, and landscaping of work

Application of measures to prevent erosion, restore the environment, and landscape the job includes restoring all elements immediately connected to it. The restoration of other related items indirectly is also suggested, including auxiliary facilities and landfill lands.

We recycle as many waste materials as possible. We follow a Just-in-Time manufacturing strategy to increase efficiency, reduce wastage and eliminate the need for excess storage.

7.2 Information related to sector EPD

This is not a sector EPD.

7.3 Differences vs previous versions

This is the first version of the EPD.

8.0 Contact Information

EPD Owner	Oman Aluminium Processing Industries SPC (OAPIL) Sohar Industrial Estate, PO Box 324, Sohar, PC 322, Sultanate of Oman Tel: +968 2682 7330 jehan.alagappan@omancables.com www.oapil.com
LCA Author	Alan Beski Christopher – Sustainability Manager GCAS Quality Certifications PO Box 65561, Dubai, UAE Info.dubai@gcasquality.com www.gcasquality.com
Verifier Details	Mari Kirss Meetripuu OÜ

9.0 References

- LCA Report: Life Cycle Inventory of Aluminium EC Rod by Oman Aluminium Processing Industries SPC (OAPIL)
- Software: Air.e.LCA Version 3.17.4.0 www.solidforest.com
- Main database: Ecoinvent 3.10(cut-off) www.ecoinvent.org
- Geographical scope of the EPD: Global
- ISO 14040:2006 “Environmental management -- life cycle assessment -- principles and framework”;
- ISO 14044:2006 “Environmental management -- life cycle assessment -- requirements and guidelines”;
- ISO 14025:2006 “Environmental labels and declarations -- type III environmental declarations -- principles and procedures”.
- EN 15804+A2:2019/AC:2021 European Committee for Standardization: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- General Programme Instructions (v4.0) of The International EPD System.