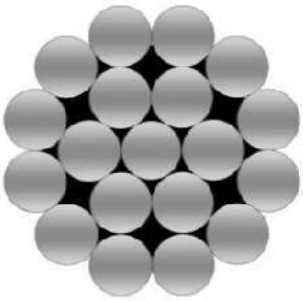
# Environmental Product Declaration

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

# All Aluminum Alloy Conductor ELM



| EPD Program | Title | Details |
|---|---|---|
| **International Climate Intelligence System**<br>71-75 Shelton Street<br>Covent Garden<br>London, WC2H 9JQ<br>United Kingdom<br>office@climateintell.com | Registration # | ICIS-202409-51 |
| | Date of Publication | 21.09.2024 |
| | Validity | 20.09.2029 |
| | Date of Revision | - |

The most recent data needs to be provided through an EPD, which may be updated when circumstances change. Thereby the claimed validity is contingent upon ongoing validation at www.climateintell.com

**Oman Aluminium Processing Industries SPC**
Sohar Industrial Estate
P O Box 324, Sohar, PC 322,
Sultanate of Oman

**www.oapil.com**

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# 1.0 PROGRAM INFORMATION

| | |
|---|---|
| **Program** | International Climate Intelligence System<br>71-75 Shelton Street<br>Covent Garden<br>London, WC2H 9JQ<br>United Kingdom<br>office@climateintell.com |
| **Product Group Classification** | UN CPC 41532 |
| **Product Category Rules (PCR)** | PCR 2020:17 Construction products (EN 15804:2021+A2:2019 /AC:2021) Version 1.2.5 dated 01.11.2022. EN standard EN 15804 serves as the Core Product Category Rules (PCR) |
| **Registration Number** | ICIS-202409-51 |
| **Date of Publication** | 21.09.2024 |
| **Validity Date** | 20.09.2029 |
| **Geographical Scope** | Global |

# 2.0 INTRODUCTION

This report contains the environmental performance of the manufacturing process of All Aluminum Alloy Conductor ELM 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 ton of All Aluminum Alloy Conductor ELM.

The assessed life cycle includes all phases in the manufacturing process of All Aluminum Alloy Conductor ELM in a “cradle to gate with options” scope. This LCA covers transportation of Raw materials, production, distribution of final product 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 Climate Intelligence 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.

# 3.0 COMPANY INFORMATION

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 raise 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

## Certifications

OAPIL has achieved the below certifications:

- 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)

# 4.0 PRODUCT INFORMATION

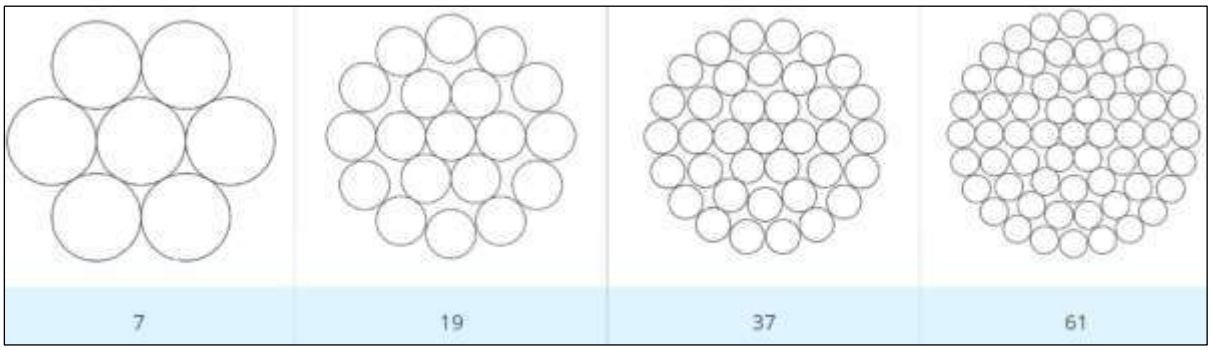
## 4.1 Analyzed Product

The assessed system in this Environmental Product Declaration (EPD) comprises the full life cycle of All Aluminum Alloy Conductor ELM. These are made out of high strength Aluminium-Magnesium-Silicon alloy. AAAC are of lighter weight, comparable strength & current carrying capacity, lower electrical losses and superior corrosion resistance, this has given AAAC a wide acceptance in the distribution and transmission lines.

## 4.2 Product Specifications

### Construction

All Aluminum-Alloy Conductors (AAAC) is a homogenous concentric-lay-stranded conductor made from round Aluminium alloy wires. AAAC conductors are available in single and multi-layer constructions.




| AAAC conductors are manufactured in accordance with the following Standards: | | | |
|---|---|---|---|
| British Sizes | BS EN 50182 | Canadian Sizes | CSA C 49 |
| IEC Sizes | IEC 1089 | German Sizes | DIN 48 201 |
| American Sizes | ASTM B 399 | | |
| For more details https://www.oapil.com/index.php?option=_content&id=197%20&mid=278&itemid=310 | | | |

## 4.3 Product Application

AAAC, or All Aluminium Alloy Conductor, is used as a bare overhead conductor for power transmission and distribution lines. Its advantages over its counterparts, AAC and ACSR, are that it has a higher mechanical resistance than AAC, and better corrosion resistance than ACSR. Additionally, AAAC has better strength to weight ratios and therefore better sag characteristics than the other two. This conductor has a minimum conductivity of 52.5%.

# 5.0 LCA INFORMATION

## 5.1 Declared Unit

The Declared Unit of the Life Cycle Assessments is One-Ton of All Aluminum Alloy Conductor ELM. Conversion factor is used to get One Kilometer of All Aluminum Alloy Conductor ELM (Conversion details are given in clause 6.1). This EPD presents the environmental impacts associated to the LCA of All Aluminum Alloy Conductor ELM.

## 5.2 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.

## 5.3 LCA Software and Database

Version 3.16.3.4 of software Air.e LCA™ with Ecoinvent™ 3.9.1 database has been used for LCA modeling and impacts calculations.

## 5.4 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.
- The production of the machinery, buildings, and vehicles.

All related direct and indirect environmental impacts related to these elements have been calculated and were included in the LCAs in this EPD.

**Upstream Processes** (**A1: Raw Material Supply**): Production of the product starts with mainly raw material production in-house. Raw material supply' includes raw material extraction before production.

**Core Processes** (**A2: Transportation**): Transport is relevant for delivery of raw materials to the plant. The wire rod is produced in OAPIL. Hence raw material transport is not applicable.

**Manufacturing (module A3)**: The processes that are included in the manufacturing phase are wire drawing and stranding. Electricity, Natural Gas and Diesel are consumed

in the production process. During the manufacturing process, 100% process scrap is consumed in-house (re-melting).

**Transport (module A4):** To create a scenario of the A4 phase, all the products sold from January to December 2023 has been analyzed as representative of the international transport. The transport means 3.5-7.5t & >32t trucks, Euro 6.

| 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. |

**Dismantling/demolition (module 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 m³/h) and 40% is dismantled with hydraulic excavator and tongs (diesel consumption of excavator: 36.1 liters/hour; capacity approx. 20 m³/h). Calculated diesel consumption for the demolition of 1 kg Aluminium is 0.0013 liters.

**Transportation of demolished items (module 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 transports are 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 3.5-7.5t | 50 km |

**Waste processing (module 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.

**Disposal (module C4)**

This module assumes that 5% of the produced AAAC ELM is disposed of in a landfill.

**Reuse, Recycling, and Recovering Potential (module D)**

Represents the recycling benefits of the used Aluminium and packaging materials.

## Manufacturing and System Boundaries Diagram

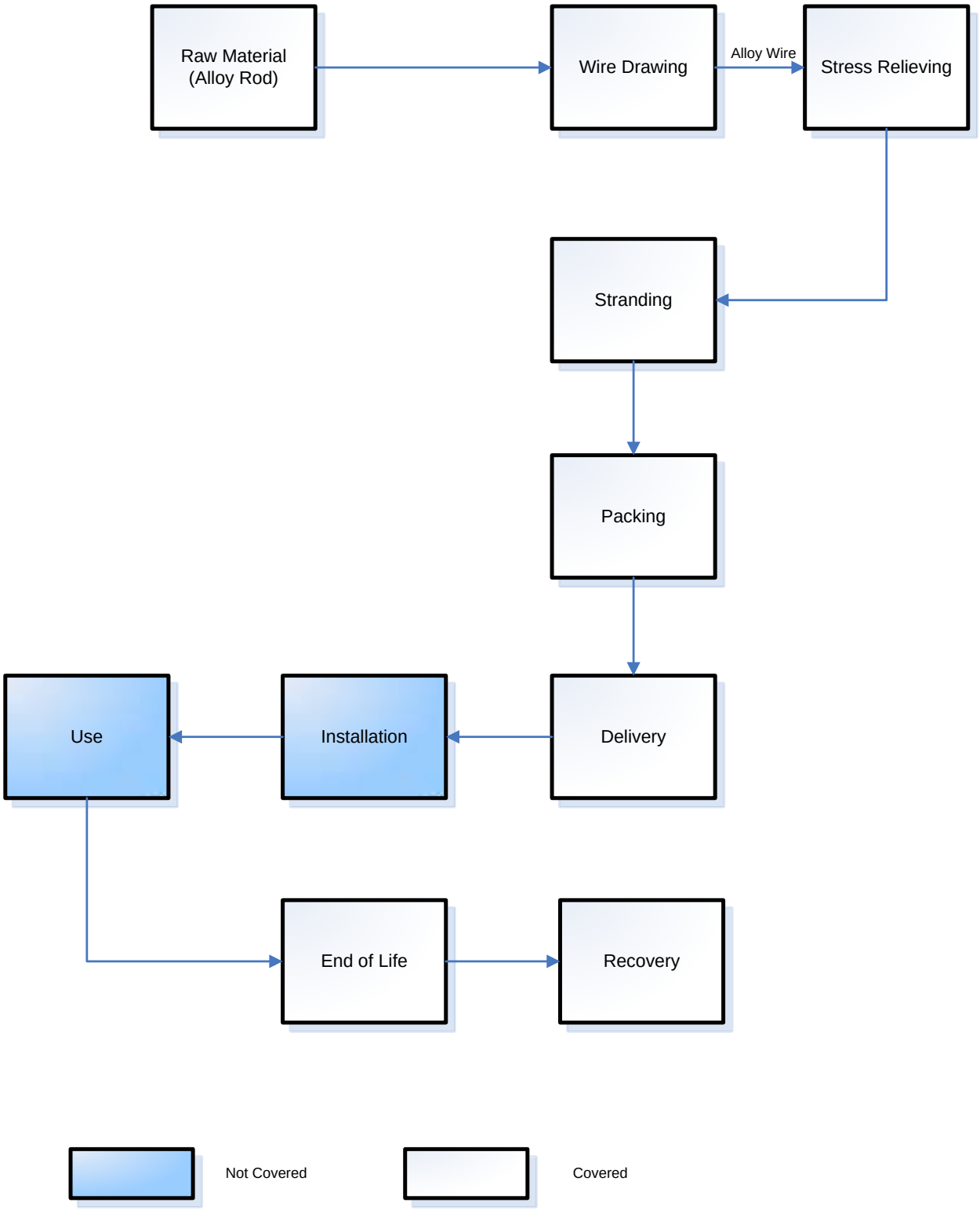
| | Production Stage | | | Construction Process Stage | | Use Stage | | | | | | | End of Life Stage | | | | Resource Recovery Stage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Raw Materials | Transport | Manufacturing | Transport | Construction Installation | Use | 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 | Oman | Nil | Oman | GLO | - | - | - | - | - | - | - | - | GLO | GLO | GLO | GLO | GLO |
| Specific data | GWP > 90% | | | | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – products | One Product | | | | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – sites | One manufacturing center | | | | - | - | - | - | - | - | - | - | - | - | - | - | - |

X = Included, ND=Module not declared, NR= Module not relevant

Modules from A5 to B7 are not included (X refers to considered stage; N refers to not relevant stage and ND to not declared stage).

| 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 | In-house Supply | Wire Drawing and Stranding | Transport to customers by sea and road | Demolition, transport, disposal. | Reuse, recovery and recycling potential |

**5.5** The following diagram is a more detailed description of the process.



## 5.6 Content Declaration

| Product Components | Weight % | Post-consumer material, weight-% | Biogenic material, weight-% and kg C/kg |
|---|---|---|---|
| Aluminium | Reminder | 0 | 0 |
| Altab Iron 80% (Fe) | 0.17 | 0 | 0 |
| Slicon Lumps | 0.47 | 0 | 0 |
| TiBor Rods | 0.19 | 0 | 0 |
| Master Alloys & Others | 0.20 | 0 | 0 |
| Magnesium Ingots | 0.60 | 0 | 0 |
| **Total** | **100** | 0 | 0 |

| Packaging Materials | | | |
|---|---|---|---|
| **Packaging Materials** | **Weight Kg** | **Weight % (Versus the Product)** | **Weight biogenic carbon, kg C/kg** |
| Corrugated Sheet - 2 Ply | 1609 | 0.11 | 0 |
| Strap PP | 134 | 0.009 | 0 |
| LLDPE Sheet Black | 1867 | 0.12 | 0 |
| Wooden Drum RDWDM 140709* | 126800 | 0.80 | 0 |
| Wooden Drum RDWDM 160809* | 840 | 0.06 | 0 |
| Wooden Drum | 10920 | 0.72 | 0 |
| **Total** | 142,170 | 1.82 | 0 |
| *Biogenic carbon content is not presents since the packaging weights less than a 5% over the product's weight. | | | |

## 5.7 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.

## 5.8 More information

**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.

**Allocations**: 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.

**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.

**Calculation Rules:** Datasets from Ecoinvent 3.9.1 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 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.

All transports 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 a one of the ports in the country of origin to the factory. Operation in port has also been excluded. Road distances calculated using Google Maps. Maritime distances calculated using Marine Traffic Voyage Planner.

**By Products Assignment:** There are no by-products in this Environmental Product Declaration. Hence no allocation had to be applied.

# 6.0 ENVIRONMENTAL PERFORMACE

## 6.1 Potential Environment Impacts

In the following tables, the environmental performance of the declared units "One-Ton of All Aluminum Alloy Conductor ELM" is presented for the Oman Aluminium Processing Industries. 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 the EF-3.1, (ILCD).

**Conversion**

Conversion factor One Kilometer to Ton of All Aluminum Alloy Conductor ELM.

- 1 Km = 0.579 MT

**Environmental impacts: GHG –GWP**

Example: A1 = 0.579 x 4.68E+03 kgCo2e = 2709.72 kgCo2e, Therefore, 1 kilometer = 2709.72 kgCo2e (2.71E+03)

Example: A3 = 0.579 x 2.36E+02 kgCo2e = 136.64 kgCo2e, Therefore, 1 kilometer = 136.64 kgCo2e (1.37E+02)

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## All Aluminum Alloy Conductor ELM

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.

## Core Environmental Impact Indicators

| Impact Category | Unit | A1 | A2 | A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Climate change (GWP) – fossil | kg CO2e | 4.68E+03 | 0.00E+00 | 2.36E+02 | 2.68E+01 | ND | ND | 1.32E+01 | 2.92E+00 | 3.91E+00 | 1.43E+01 | -1.99E+03 |
| Climate change (GWP) – biogenic | kg CO2e | 6.76E+00 | 0.00E+00 | 2.53E-02 | 0.00E+00 | ND | ND | 1.15E-03 | 0.00E+00 | 5.41E-02 | 1.09E-01 | -6.01E+00 |
| Climate change (GWP) – LULUC | kg CO2e | 2.15E+00 | 0.00E+00 | 1.14E-02 | 0.00E+00 | ND | ND | 5.73E-04 | 0.00E+00 | 6.47E-02 | 9.39E-02 | -1.82E+00 |
| Climate change (GWP) – total | kg CO2e | 4.69E+03 | 0.00E+00 | 2.36E+02 | 2.68E+01 | ND | ND | 1.32E+01 | 2.92E+00 | 4.03E+00 | 1.45E+01 | -2.00E+03 |
| Ozone depletion | kg CFC11e | 1.38E-04 | 0.00E+00 | 9.24E-06 | 0.00E+00 | ND | ND | 3.67E-07 | 0.00E+00 | 1.80E-06 | 1.66E-06 | -1.62E-04 |
| Acidification | mol H+e | 1.93E+01 | 0.00E+00 | 4.69E-01 | 9.42E-03 | ND | ND | 1.67E-02 | 1.02E-03 | 3.67E-02 | 1.03E-01 | -1.06E+01 |
| Eutrophication, aquatic freshwater | kg PO4e | 1.11E+00 | 0.00E+00 | 9.03E-03 | 0.00E+00 | ND | ND | 4.73E-04 | 0.00E+00 | 2.70E-03 | 2.23E-02 | -1.09E+00 |
| Eutrophication, aquatic freshwater | Kg P eq | 3.61E-01 | 0.00E+00 | 2.94E-03 | 0.00E+00 | ND | ND | 1.54E-04 | 0.00E+00 | 8.79E-04 | 7.26E-03 | -3.56E-01 |
| Eutrophication, aquatic marine | kg Ne | 2.40E+00 | 0.00E+00 | 1.61E-01 | 4.69E-03 | ND | ND | 4.59E-03 | 5.12E-04 | 5.31E-03 | 1.90E-02 | -2.09E+00 |
| Eutrophication, terrestrial | mol Ne | 2.60E+01 | 0.00E+00 | 1.74E+00 | 5.28E-02 | ND | ND | 4.90E-02 | 5.73E-03 | 7.62E-02 | 1.70E-01 | -2.27E+01 |
| Photochemical ozone formation | kg NMVOCe | 1.53E+01 | 0.00E+00 | 7.56E-01 | 1.39E-02 | ND | ND | 3.10E-02 | 1.51E-03 | 1.71E-02 | 4.64E-02 | -7.40E+00 |
| Abiotic depletion, minerals & metals | kg Sbe | 2.71E-02 | 0.00E+00 | 1.50E-04 | 0.00E+00 | ND | ND | 7.32E-06 | 0.00E+00 | 7.45E-05 | 1.78E-03 | -1.03E-02 |
| Abiotic depletion of fossil resources | MJ | 5.43E+04 | 0.00E+00 | 4.22E+03 | 0.00E+00 | ND | ND | 2.30E+02 | 0.00E+00 | 1.03E+02 | 1.80E+02 | -3.09E+04 |
| Water use | m3e depr. | 6.79E+02 | 0.00E+00 | 1.56E+01 | 0.00E+00 | ND | ND | 9.49E-01 | 0.00E+00 | 5.16E+00 | 1.60E+01 | -5.38E+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 experienced with the indicator. "Reading example: 1.57E-03 = 1.57*10-3 = 0.00157"

## Additional Environmental Impact Indicators

| Impact Category | Unit | A1 | A2 | A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Particulate matter | Incidence | 3.60E-04 | 0.00E+00 | 1.67E-06 | 4.99E-08 | ND | ND | 8.58E-08 | 5.26E-09 | 3.64E-07 | 7.83E-07 | -1.50E-04 |
| Ionizing radiation, human health | kBq U235e | 6.49E+01 | 0.00E+00 | 5.40E-01 | 0.00E+00 | ND | ND | 1.35E-02 | 0.00E+00 | 2.13E+00 | 1.75E+00 | -5.72E+01 |
| Eco-toxicity (freshwater) | CTUe | 1.97E+04 | 0.00E+00 | 3.04E+02 | 7.98E-02 | ND | ND | 7.54E+00 | 8.33E-03 | 4.21E+01 | 3.93E+02 | -7.40E+03 |
| Human toxicity, cancer effects | CTUh | 2.00E-05 | 0.00E+00 | 2.49E-08 | 9.21E-10 | ND | ND | 1.38E-09 | 1.00E-10 | 5.53E-09 | 2.34E-08 | -6.42E-06 |
| Human toxicity, non-cancer effects | CTUh | 3.00E-05 | 0.00E+00 | 4.36E-07 | 1.77E-08 | ND | ND | 2.24E-08 | 1.96E-09 | 7.03E-08 | 8.50E-07 | -3.00E-05 |
| Land use related impacts/soil quality | Dimensionless | 3.82E+05 | 0.00E+00 | 8.38E+01 | 0.00E+00 | ND | ND | 3.98E+00 | 0.00E+00 | 1.04E+02 | 1.38E+02 | -3.73E+05 |

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.

## Environmental impacts – GWP-GHG

| Impact Category | Unit | A1 | A2 | A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-GHG | kg CO2e | 4.68E+03 | 0.00E+00 | 2.36E+02 | 2.68E+01 | ND | ND | 1.32E+01 | 2.92E+00 | 3.98E+00 | 1.44E+01 | -1.99E+03 |

This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013) This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

## Use of Natural Resources

| Impact Category | Unit | A1 | A2 | A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Renewable PER used as energy | MJ | 5.21E+04 | 0.00E+00 | 5.65E+00 | 0.00E+00 | ND | ND | 2.71E-01 | 0.00E+00 | 1.93E+01 | 2.39E+01 | -5.09E+04 |
| Renewable PER used as materials | MJ | 3.48E+00 | 0.00E+00 | 5.19E-02 | 0.00E+00 | ND | ND | 2.87E-03 | 0.00E+00 | 9.20E-03 | 4.60E-02 | -2.98E+00 |
| Total use of renewable PER | MJ | 5.21E+04 | 0.00E+00 | 5.70E+00 | 0.00E+00 | ND | ND | 2.74E-01 | 0.00E+00 | 1.93E+01 | 2.39E+01 | -5.09E+04 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-renew. PER used as energy | MJ | 5.43E+04 | 0.00E+00 | 4.22E+03 | 0.00E+00 | ND | ND | 2.30E+02 | 0.00E+00 | 1.03E+02 | 1.80E+02 | -3.09E+04 |
| Non-renew. PER used as materials | MJ | 2.88E-03 | 0.00E+00 | 2.67E-05 | 0.00E+00 | ND | ND | 1.44E-06 | 0.00E+00 | 7.70E-06 | 5.27E-05 | -3.97E-03 |
| Total use of non-renewable PER | MJ | 5.43E+04 | 0.00E+00 | 4.22E+03 | 0.00E+00 | ND | ND | 2.30E+02 | 0.00E+00 | 1.03E+02 | 1.80E+02 | -3.09E+04 |
| Use of secondary materials | Kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of renewable secondary fuels | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of non-renew. secondary fuels | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 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 | 0.00E+00 | 0.00E+00 | ND | ND | 2.71E-01 | 0.00E+00 | 1.93E+01 | 2.39E+01 | -5.09E+04 |

## End of Life - Waste

| Impact Category | Unit | A1 | A2 | A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous waste | Kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.35E+04 | 0.00E+00 |
| Non-hazardous waste | Kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 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 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

## End of Life - Outflows

| Impact Category | Unit | A1 | A2 | A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Components for reuse | Kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -1.73E+06 |
| Materials for recycling | Kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for energy recovery | Kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | 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 | ND | ND | 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 | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

## Biogenic Carbon Content

| Details | Unit | A1-A3 |
|---|---|---|
| Biogenic carbon content in product | Kg C | 0 |
| Biogenic carbon content in accompanying packaging | Kg C | 0 |

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 the exceeding of thresholds, safety margins or risks".*

## 6.2 Interpretation of LCA Study Results

In general terms, as it is shown in the table of core environmental impact indicators, A1-A3 modules have the higher impact, representing above 80% of the whole impact. A4 module has a less impact. C2 and C4 module has little impact too, representing at most 0.16% and 0.01% respectively of the whole impact. Refer the below table 1 for more detailed explanations.

Concluding, the study provides fair understanding of environmental impacts during the various life cycle stages of All Aluminum Alloy Conductor ELM 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 product to site (C2), waste processing (C3), waste disposal (C4) as well as the end of life stage recycling (D) considerations.

**Table 1 - Interpretation of most significant contributors to life cycle parameters (All Aluminum Alloy Conductor ELM)**

| 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 5.85E+04 (58495.71) MJ. In A1 – A3, the Raw material process (92.78%) and production process (7.21%) has the highest impacts. A total credit of -3.09E+04 (30914.10) 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 4.92E+03 (4917.40) kg CO2 eq. In A1 – A3, the raw material (95.20%) followed by production (4.80%) has the highest impacts. A total credit of -1.99E+03 (1991.58) kg CO2 eq is taken in the 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 4.92E+03 (4915.24) kg CO2 eq. In A1 – A3, the raw material (95.20%) followed by production (4.80%) has the highest impacts. A total credit of -1.99E+03 (1989.75) kg CO2 eq is taken in the module D. |

# 7.0 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 about 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 evidences.

EPDs within the same product category but registered in different EPD programmes 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.

# 8.0 ADDITIONAL INFORMATION

## 8.1 Action against Erosion, Environmental Restoration, and Landscaping of the 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.

## 8.2 Information related to Sector EPD

This is not a sector EPD.

## 8.3 Differences versus previous versions

This is the first version of the EPD.

# 9.0 VERIFICATION

| | |
|---|---|
| Diffusion Institution | International Climate Intelligence System<br>71-75 Shelton Street<br>Covent Garden<br>London, WC2H 9JQ<br>United Kingdom |
| Registration Number | ICIS-202409-51 |
| Date of Publication | 21.09.2024 |
| Valid until | 20.09.2029 |
| Geographical Scope | Global |
| Product category rules (PCR): PCR 2020:17 Construction products (EN 15804:2012+A2:2019/AC:2021) Version 1.2.5 dated 01.11.2022. EN standard EN 15804 serves as the Core Product Category Rules (PCR) | |
| PCR review was conducted by: International Climate Intelligence System. | |
| Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 14040:<br>☐ EPD Process Certification (internal) ☒ EPD Verification (external) | |
| Third party verifier: Mr.Luis Manuel, San Adrián, Spain<br>Accredited by: International Climate Intelligence System | |

# 10.0 CONTACT INFORMATION

| | |
|---|---|
| EPD Owner | Oman Aluminium Processing Industries SPC (OAPIL)<br>Sohar Industrial Estate,<br>P O Box 324, Sohar, PC 322,<br>Sultanate of Oman<br>Tel : +968 26827330<br>sanjeev.gupta@oapil.com<br>www.oapil.com |
| LCA Author | Alan Beski Christopher -Sustainability Consultant<br>GCAS Quality Certifications<br>P.O.Box 65561, Dubai, UAE<br>www.gcasquality.com<br>info.dubai@gcasquality.com |
| Verifier Details | Name: Mr.Luis Manuel<br>Location: San Adrián, Spain<br>Accredited by: International Climate Intelligence System |

# 11.0 REFERENCES


LCA Report: Life Cycle Inventory of All Aluminum Alloy Conductor ELM by Oman Aluminium Processing Industries SPC (OAPIL)

Software: Air.e LCA Version 3.16.3.4 www.solidforest.com

Main database: Ecoinvent 3.9.1 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 of the International Climate Intelligence System

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