**CONDUMAX – ELETRO METALÚRGICA CIAFUNDI LTDA**

# ENVIRONMENTAL PRODUCT DECLARATION

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| **PRODUCT NAME:**<br>**Multiplex Cable NI CA 0,6/1kV 3X25+25MM2 ENEL**<br>**Maxlink Cable SC AL XLPE/HDPE 15 kV 185MM2 CZ GSCC** | **PLANTS: Brazil, Olímpia – SP** |

**in accordance with ISO 14025 and EN 50693:2019**

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| Program Operator | EPDItaly |
| Publisher | EPDItaly |
| | |
| Declaration Number | *EPD 001* |
| Registration Number | EPDITALY0404 |
| | |
| Issue Date | 09/27/2022 |
| Valid to | 09/26/2027 |

# General information

## Program information

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|---|---|
| Program | |
| Address | EPDItaly Via Gaetano De Castillia, 10 20124 – Milano Italy |
| Website | https://www.epditaly.it/ |
| Contact | info@epditaly.it \| (+39) 02 701 5081 |

## EDP Owner

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| EPD owner | Condumax - Eletro Metalurgica Ciafundi LTDA |
| Website | https://www.condumax.com.br/ |
| Contact | Robson Luiz Micheletto<br>Quality & Environmental Manager<br>robson.micheletto@condumax.com.br |
| Address | Rodovia Wilquem Manoel Neves, s/n km 3,5, Olímpia – SP, Brazil, 15.405-370 |

## EDP information

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| Name of the product | Electrical wires and cables (Multiplex Cable NI CA 0.6/1kV 3X25+25MM2 ENEL and Maxlink Cable SC AL XLPE/HDPE 15 kV 185MM2 CZ GSCC) |
| CPC Code | 463 family "Insulated wire and cable; optical fibre cables" and sub-sequent clusters |
| Declared unit | To transmit energy expressed for 1A over a distance of 1 km (cable length) for 40 years (RSL) and 100% of use rate. |
| Applied standards | ISO 14040-44 – Life cycle assessment<br>ISO 14025 – Environmental labels declarations – Type III environmental declarations – Principles and procedures<br>BS EN 50693:2019. Product category rules for life cycle assessments of electronic and electrical products and systems |
| Product category rules (PCR): | Core PCR EPDItaly007 - PCR for electronic and electrical product and systems. Revision 2 – 2020/10/21; Conducted by ICMQ S.p.A. – Certificazioni e controlli per le costruzioni Moderator: Eng. Vito D'Incognito, Take Care International<br>Sub PCR EPDItaly016 - PCR for electronic and electrical product and systems – cables and wires. Revision 2 – 25/09/2020; Conducted by Enel S.p.A.; Life Cycle Engineering - Viale Regina Margherita 125 - 00198 Rome, Italy |
| Comparability | The EPD owner has the sole ownership, liability, and responsibility for the EPD.<br>EPDs relating to the same category of products but belonging to different programmers may not be comparable. EPDs of Electrical wires and cables may not be comparable if they do not comply with EN 50693. For further information about comparability, see EN 50693 and ISO 14025. |

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|---|---|
| Liability | Condumax relieves EPDItaly from any non-compliance with environmental legislation by the Organization. |
| Reference EPD system | Regulation of the EPDItaly Program – rev.5.2 (16/02/2022) |

### LCA developer

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| LCA was performed by | hazel |
| Website | https://hazel-esg.com.br/ |
| Contact | Rafael Raoni, D.Sc. and Elizanne P. S. Justo, D.Sc<br>raoni@hazelrisk.com; elizanne@hazelrisk.com |

### Independent verifier

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|---|---|
| Independent verifier | SGS Italia S.p.a.<br>Number of accreditation 006H |
| Independent verification | This declaration has been developed in accordance with the EPDItaly Regulations; further information and the Regulations themselves are available on the website: www.epditaly.it<br>EN 50693 is the framework reference for PCRs.<br>Independent verification of the declaration and data according to ISO 14025:2010.<br>Internal ☐ External ☒ |
| Contact | Via Caldera, 21 - 20153 Milano - Itália T + 39 02 739 31 F + 39 02 701 24 630 e<br>sgs.italy@sgs.com \| www.sgsgroup.it |

## Company information

Founded in 1964, Condumax is an electrical wire and cable supplier to the main energy concessionaires in Brazil and abroad. The company is located in São Paulo, Brazil, with 700 employees and more than 1000 indirect employees. All Condumax cables are environmentally friendly, heavy metal free and meet international RoHs directives.

## Scope and Type of EPD

### Type of EPD:

This declaration is specific for electrical wires and cables.

### Declared unit:

To transmit energy expressed for 1A over a distance of 1 km (cable length) for 40 years (RSL) and 100% of use rate.

### Reference flow:

The reference flow of the cable Multiplex NI CA 0,6/1kV 3X25+25MM2 ENEL is 381 kg, and the reference flow of the cable Maxlink SC AL XLPE/HDPE 15 kV 185MM2 CZ GSCC is 689 kg.

### Data:

Condumax has provided all information for the study execution, so it has described the all raw materials used, the acquisition method, product characteristics, production stages, waste generated and all other information for the impacts calculation.

The collection of raw material data for the acquisition of Condumax is carried out through the survey of invoice released in Condumax's own integrated internal information system. The technical specifications are collected through the product cost sector, where in the entire registration of a new product or structure change, the engineering team is responsible for updating this information and sending it to the cost sector, so that later this can be updated in the study data sheet. In the product structure, it contains all information on the total quantity of inputs consumed per meter of cable produced at Condumax.

The company has its own greenhouse gas (GHG) emission management data collection standard.

### Time representativeness:

January 2021 to December 2021.

### Database and LCA software used:

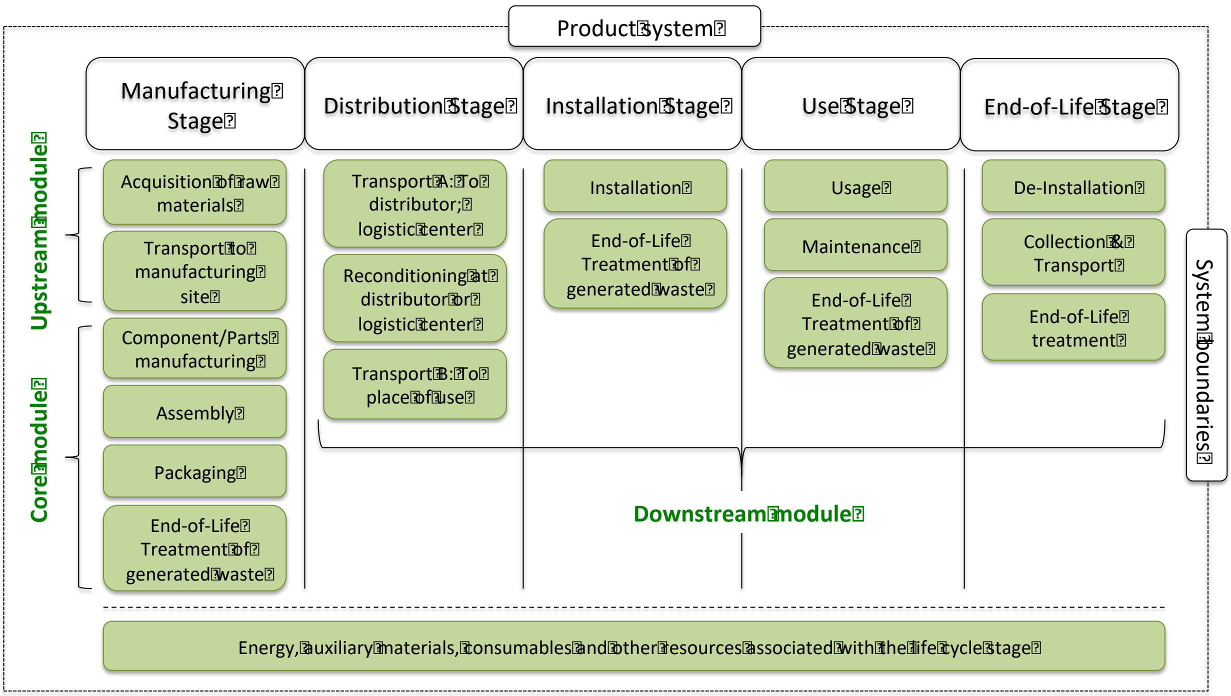
The source inventory and the emission factors of inputs and outputs used in the study are from the EN 15804 add-on for ecoinvent version 3.8 database, calculated using the OpenLCA software v. 1.11.0.

### Calculations:

The calculation was performed in a mathematical model built in Excel. The model has specific characteristics for the application from the Condumax data.

### Description of system boundaries:

Cradle to grave: All stages until the end of life.




Source: Adapted from EN 50693:2019

### Upstream module:

**Manufacturing stage:** The upstream module of the manufacturing stage considers all upstream processes to extract and process all the raw materials used by Condumax to manufacturing its products, including electricity consumption and other. This stage also accounts the emissions for the road and maritime transportation of all materials and components from suppliers to Condumax plant.

### Core module:

**Manufacturing stage:** The core module of the manufacturing stage includes all the material transformation, assembling and packing for the cables manufacturing process; the water, gas and electricity consumptions; and the residues and effluent treatment, considering also the recycling processes of the metal end plastics scrapes generates during the manufacturing process. The processes stages to manufacturing the cables are as follow.

- Drawing – The drawing process is used to reduce the cross-section (area) of the filament and change the material's mechanical properties.
- Twist – This process aims the filaments to twist, transforming them into ropes and giving the cable certain flexibility.
- Taping – This process bandages the material using a tape. At Condumax, they can wrap study cables in aluminum or polymeric tape, to protect against electromagnetic interference.
- Extrusion - It comprises the process of the polymeric material covering the entire product surface. At Condumax, they intend the polymeric extrusion for electrical insulation.
- Measurement and packing – The measurement and packaging sector aims to ensure that products are measured, fractionated, packaged and identified in the characteristics expected by customers. They can package the products in coils, plastic spools, rolls or cardboard boxes.

### Downstream module:

**Distribution:** The cables are transported from Condumax's factory to the client warehouse, place where the cables is stored until its installation. As the cables can be transported from São Paulo to any Brazilian state, an overland distribution scenario of 1000 km is adopted.

**Installation:** For the installation, the cable is transported from the client warehouse to the installation site (250 km distance); being considered thet the installation process generates 5% of the cable total mass and the package as waste, that is transported to its final destinations (500 km distance).

**Use:** During the use stage, the cable dissipates energy due to the Joule effect. The dissipation energy calculation followed the Sub PCR EPDItaly016, considering a current of 1A during a lifetime of 40 years.

**End-of-life:** The stage considers the transport of the cable de-installed to the client warehouse (250 km distance); the cable disassembly operations, that consider the separation of the cable metal and plastic materials; the transportation of the residues from the warehouse to its disposal site (200 km) and, finally, the recycling processes of the EoL product's metal end plastic.

### Allocation:

- The cable and packaging materials mass are in accordance with the structure file provided by Condumax.
- To emission of the raw materials transport, from the supplier to Condumax, it was considered the materials consumed for the cables manufacturing. That includes the material allocated in the cables and its proportional waste generated during manufacturing process.
- The scraps allocation of aluminum was calculated according to the aluminum mass consumed in the product manufacture.
- It was considered mass allocation to obtain the electricity, water and LPG consumption of the manufactured cables, and also the allocation of the mass of miscellaneous waste disposal. This means that it was considered the proportion of cable-produced mass in front of the mass of all cables produced in the evaluated time of the study to obtain the mass of the utility and waste allocated for each cable.
- The discarded aqueous emulsion mass per cable was also calculated proportionally mass of the cable, but had considered only the fraction of the metal mass consumed to produce the cables.
- The discarded production scraps and various contaminated residues mass was calculated proportionally mass of the cable, considering the fraction of the metal and polymers mass.

### Cut-off criteria:

The cut-off criteria are applied to support an efficient calculation procedure. Following the EPDItaly 016, it was considered the following operations in the cut-off criteria:

- The cable installation and de-installation operations were disregarded, since it was assumed that these operations are performed using manual tools (chapter 4.2.3.9);
- Maintenance operation was disregarded, since it was considered no scheduled interventions during the life of the product (chapter 4.2.3.5);
- Cut-off was used to exclude water blocking tape (0.6 %) and printer ink for making cables (chapter 4.2.3.9)

### Additional information:

- During the manufacturing stage, the waste is generated during the production process and packaging (waste from raw materials), contaminated residues and aqueous emulsion from production process and machine operation.
- The production and packaging generated waste are inert and sent to recycling, the contaminated residues are sent to incineration, and the aqueous emulsion is sent to effluent treatment process.
- In order to enable a higher results accuration (e.g.: Allocation of energy bases on the cable produced mass), it was considered in the calculations all raw materials used for all the cables manufactured in Condumax in the period of the inventory analysis, even if the raw materials are not used for the cables production analyzed in this report.
- It was considered that all material used in the finished product (installation waste, packaging and EoL product) during the end-of-life stage are sent to recycling.

- Condumax customer and Condumax plant confirm that that all material used in the finished product (installation waste, packaging and EoL product) are sent to recycling. The polyethylene, even if a percentage goes to the landfill, it is recovered and sold by collectors and reused, turning into sustainable products, a common practice in Brazil.
- In Brazil, commercial diesel has a 12 % biodiesel fraction (biodiesel minimum percentage added to commercial diesel).
- Electricity used to manufacturing the product comes from the Brazilian Electricity Matrix, which has 55% of its generated energy coming from renewable sources.
- It was considered the Condumax technical specifications of the cable structure to obtain the life cycle inventory (LCI) of the raw material emission source. e.g.: 0.1 of aluminum to 1 meter of cable.

## Detailed product description

Following ABNT ISO 14025 and EN 50693:2019, the study presents the environmental declaration of two different cables produced by Condumax to meet its necessity in front of its customers.

- ### Multiplex NI CA 0,6/1kV 3X25+25MM2 ENEL:

The cable is assembled by bare aluminum wires alloy 1350, H19 temper; and class 2 strings meeting the NBR 8182. Insulated in XLPE 90ºC – Thermosetting compound of cross-linked polyethylene.

### Application:

Used in the public secondary distribution network in low voltage energy, urban or rural, aim at higher safety, reliability and less aggressive visual effect. They are also suitable for wooded areas.

### Main raw materials:

In 2021, January to December interval, Condumax has manufactured 6.400 km of finished product. Its mass composition is as followed:

| **Product Components** | **Weight, kg (per km of cable)** | **Unit (%)** |
|---|---|---|
| Aluminum (Al) | 260 | 68.4 |
| Polyethylene (PE) | 110 | 28.9 |
| Master Catalytic | 4 | 1.1 |
| Master Batch | 6 | 1.6 |
| **Total** | **381** | **100** |
| **Packaging materials** | **Weight (kg per km of cable)** | **Unit (%)** |
| Wood | 105 | 99.8 |

| | | |
|---|---|---|
| Plastic | 0.014 | 0.01 |
| Polypropylene | 0.200 | 0.19 |
| **Total** | **106** | **100** |

## Environmental performance

Besides the total results, parameters are declared separately for stage.

## Environmental impact descriptive parameters

| Impact category | Unit | Manufacturing | | Distribution | Installation | Use | End-of-life | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upstream module | Core module | Downstream module | | | | |
| Climate change – total | kg $CO_2$ eq. | 3,443 | 15.6 | 56.5 | 21.4 | 139 | 551 | 4,226 |
| Climate change – fossil | kg $CO_2$ eq. | 3,406 | 15.1 | 51.2 | 19.4 | 76.9 | 542 | 4,110 |
| Climate change – biogenic | kg $CO_2$ eq. | -65.2 | 0.42 | 1.35 | 0.51 | 56.4 | 6.58 | 0 |
| Climate change – land use and land use change | kg $CO_2$ eq. | 103 | 0.07 | 3.96 | 1.50 | 5.66 | 1.77 | 116 |
| Acidification | mol $H^+$ eq. | 21.0 | 0.07 | 0.25 | 0.10 | 0.19 | 1.57 | 23.2 |
| Eutrophication aquatic freshwater | kg P eq. | 0.75 | 0.01 | 0.01 | 0.002 | 0.002 | 0.12 | 0.88 |
| Eutrophication aquatic marine | kg N eq. | 3.04 | 0.04 | 0.11 | 0.04 | 0.06 | 0.35 | 3.64 |
| Eutrophication terrestrial | mol N eq. | 30.9 | 0.17 | 1.01 | 0.38 | 0.65 | 3.47 | 36.6 |
| Photochemical ozone formation | kg NMVOC eq. | 9.19 | 0.05 | 0.31 | 0.12 | 0.15 | 0.94 | 10.8 |
| Ozone depletion | kg CFC-11 eq. | 0.0003 | 0.000001 | 0.00001 | 0.000002 | 0.00001 | 0.00002 | 0.0004 |
| Depletion of abiotic resources – minerals and metals | kg Sb eq. | 0.009 | 0.001 | 0.0002 | 0.0001 | 0.00001 | 0.02 | 0.03 |
| Depletion of abiotic resources – fossil fuels | MJ | 15,745 | 61.3 | 89.0 | 33.6 | 7.49 | 1,951 | 17,887 |
| Water use | $m^3$ eq. | 4,784 | -19.8 | 8.41 | 3.18 | 250 | 612 | 5,638 |

## Parameters describing resource use

| Renewable resource | Unit | Manufacturing | | Distribution | Installation | Use | End-of-life | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upstream | Core | Downstream module | | | | |

| | | module | module | | | | | |
|---|---|---|---|---|---|---|---|---|
| Use of renewable primary energy excluding renewable primary energy resources used as raw material | MJ | 13,977 | 10.3 | 8.95 | 3.38 | 735 | 274 | 15,008 |
| Use of renewable primary energy resources used as raw material | MJ | 4,305 | 5.30 | 46.7 | 17.7 | 92.9 | 103.7 | 4,571 |
| Total use of renewable primary energy resources | MJ | 18,282 | 15.6 | 55.6 | 21.0 | 827 | 378 | 19,579 |

| **Non-renewable resource** | **Unit** | **Manufacturing** | | **Distribution** | **Installation** | **Use** | **End-of-life** | **Total** |
|---|---|---|---|---|---|---|---|---|
| | | **Upstream module** | **Core module** | **Downstream module** | | | | |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material | MJ | 16,869 | 74.9 | 102 | 38.5 | 593 | 2.288 | 19,965 |
| Use of non-renewable primary energy resources used as raw material | MJ | 33,491 | 130 | 696 | 263 | 1,309 | 1,950 | 37,839 |
| Total use of non-renewable primary energy resources | MJ | 50,378 | 205 | 827 | 313 | 1,904 | 4,249 | 57,875 |

| **Water and secondary raw** | **Unit** | **Manufacturing** | | **Distribution** | **Installation** | **Use** | **End-of-life** | **Total** |
|---|---|---|---|---|---|---|---|---|
| | | **Upstream module** | **Core module** | **Downstream module** | | | | |
| Net use of fresh water | $m^3$ | 116 | -0.13 | 0.22 | 0.08 | 5.82 | 14.3 | 136 |
| Use of secondary materials | kg | 46.7 | 18.1 | 0.95 | 0.36 | 16.0 | 406 | 489 |
| Use of renewable secondary fuels | MJ | 8.28 | 0.10 | 0.11 | 0.04 | 0.01 | 2.61 | 11.2 |
| Use of non-renewable secondary fuels | MJ | 13.5 | 0.26 | 0.19 | 0.07 | 0.02 | 5.90 | 20.0 |

## Waste production descriptive parameters

| **Impact category** | **Unit** | **Manufacturing** | | **Distribution** | **Installation** | **Use** | **End-of-life** | **Total** |
|---|---|---|---|---|---|---|---|---|
| | | **Upstream module** | **Core module** | **Downstream module** | | | | |
| Hazardous waste disposed | kg | 3,282 | 38.7 | 22.0 | 8.31 | 2.34 | 821 | 4,174 |
| Non-hazardous waste disposed | kg | 263 | 2.65 | 76.8 | 29.1 | 0.88 | 175 | 547 |
| Radioactive waste disposed | kg | 0.65 | 0.01 | 0.01 | 0.01 | 0.36 | 0.21 | 1.25 |
| Materials for energy recovery | kg | 4.67 | 0.05 | 0.26 | 0.10 | 0.02 | 0.40 | 5.50 |
| Materials for recycling | kg | 20.2 | 0.27 | 0.52 | 0.20 | 11.5 | 5.78 | 38.6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Components for reuse | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

For different impact categories, the manufacturing stage is the most significant, being the aluminum acquisition the most relevant contributor for the emissions, followed by the polyethylene. The recycling process of aluminum scrap and the LPG consumption are also significant in the manufacturing stage. The end-of-life stage is the second most relevant for different impact categories, except for the global warming potential (biogenic and land use) and the renewable resources use impacts categories. For these impacts categories, the use stage presented a higher emission than the end-of-life stage. The high emission in the use stage is due to the elevated maximum electrical resistance value (Ω/km) of the Multiplex Cable NI CA 0.6/1kV 3X25+25MM2 ENEL. In some impact categories (e.g., use of non-renewable resources and waste production), the distribution of the cable from factory to warehouse was also more significant than the use stage. Finally, the installation stage was the less relevant for all impacts categories due to its boundaries that consider only the transport of the cable from warehouse to installation site and the transport of the generated waste to the final collection site.

- **Maxlink SC AL XLPE/HDPE 15 kV 185MM2 CZ GSCC:**

The cable is assembled by bare aluminum wires alloy 1350, temper H19, stringing class 2, compact round, meeting the NBR NM 280 standard. The maximum conductor temperatures is 90 °C in continuous service, 130 °C in overload, and 250 °C in short circuit.


**Application:**

Used in regions where minor space and less visual pollution is required, such as tree-lined streets or squares.

**Main raw materials:**

In 2021, January to December interval, Condumax has manufactured 0.480 km of finished products. The cable composition is as followed:

| Product Components | Weight, kg (per km of cable) | Unit (%) |
|---|---|---|
| Aluminum (Al) | 469 | 68.0 |
| Polyethylene (PE) | 173 | 25.1 |
| Master Catalytic | 6 | 0.8 |
| Cross-linked Polyethylene (XLPE) | 37 | 5.4 |
| Water Blocking Tape | 4 | 0.6 |
| **Total** | **689** | **100** |
| **Packaging materials** | **Weight (kg per km of cable)** | **Unit (%)** |
| Wood | 135 | 99.9 |

| | | |
|---|---|---|
| Plastic | 0.007 | 0.01 |
| Polypropylene | 0.005 | 0.004 |
| **Total** | **135** | **100** |

## Environmental performance

Besides the total results, parameters are declared also separately for stage.

## Environmental impact descriptive parameters

| **Impact category** | **Unit** | **Manufacturing** | | **Distribution** | **Installation** | **Use** | **End-of-life** | **Total** |
|---|---|---|---|---|---|---|---|---|
| | | **Upstream module** | **Core module** | **Downstream module** | | | | |
| Climate change – total | kg $CO_2$ eq. | 6,287 | 34.1 | 94.4 | 33.4 | 19.0 | 977 | 7,445 |
| Climate change – fossil | kg $CO_2$ eq. | 6,125 | 32.5 | 85.5 | 30.3 | 10.5 | 963 | 7,247 |
| Climate change – biogenic | kg $CO_2$ eq. | -23.3 | 1.38 | 2.25 | 0.80 | 7.70 | 11.2 | 0 |
| Climate change – land use and land use change | kg $CO_2$ eq. | 185 | 0.15 | 6.61 | 2.34 | 0.77 | 3.15 | 198 |
| Acidification | mol $H^+$ eq. | 37.8 | 0.16 | 0.42 | 0.15 | 0.03 | 2.78 | 41.4 |
| Eutrophication aquatic freshwater | kg P eq. | 1.34 | 0.01 | 0.01 | 0.003 | 0.0003 | 0.21 | 1.58 |
| Eutrophication aquatic marine | kg N eq. | 5.46 | 0.07 | 0.19 | 0.07 | 0.01 | 0.62 | 6.41 |
| Eutrophication terrestrial | mol N eq. | 55.4 | 0.37 | 1.69 | 0.60 | 0.09 | 6.17 | 64.3 |
| Photochemical ozone formation | kg NMVOC eq. | 16.5 | 0.10 | 0.52 | 0.18 | 0.02 | 1.67 | 19.0 |
| Ozone depletion | kg CFC-11 eq. | 0.0005 | 0.000002 | 0.00001 | 0.000003 | 0.000002 | 0.00004 | 0.001 |
| Depletion of abiotic resources – minerals and metals | kg Sb eq. | 0.02 | 0.002 | 0.0003 | 0.0001 | 0.000002 | 0.04 | 0.05 |
| Depletion of abiotic resources – fossil fuels | MJ | 28,325 | 170 | 149 | 52.6 | 1.02 | 3,439 | 32,137 |
| Water use | $m^3$ eq. | 8,585 | -34.4 | 14.0 | 4.97 | 34.2 | 1,094 | 9,698 |

## Parameters describing resource use

| Renewable resource | Unit | Manufacturing | | Distribution | Installation | Use | End-of-life | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upstream module | Core module | Downstream module | | | | |
| Use of renewable primary energy excluding renewable primary energy resources used as raw material | MJ | 25,157 | 24.8 | 14.9 | 5.29 | 100 | 486 | 25,788 |
| Use of renewable primary energy resources used as raw material | MJ | 5,675 | 10.1 | 78.0 | 27.6 | 12.7 | 186 | 5,989 |
| Total use of renewable primary energy resources | MJ | 30,832 | 34.9 | 92.9 | 32.9 | 113 | 671 | 31,777 |

| Non-renewable resource | Unit | Manufacturing | | Distribution | Installation | Use | End-of-life | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upstream module | Core module | Downstream module | | | | |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material | MJ | 30,345 | 197 | 170 | 60.1 | 81.1 | 4,041 | 34,894 |
| Use of non-renewable primary energy resources used as raw material | MJ | 60,279 | 253 | 1,162 | 411 | 179 | 3,473 | 65,758 |
| Total use of non-renewable primary energy resources | MJ | 90,656 | 452 | 1,381 | 488 | 260 | 7,532 | 100,770 |

| Water and secondary raw | Unit | Manufacturing | | Distribution | Installation | Use | End-of-life | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upstream module | Core module | Downstream module | | | | |
| Net use of fresh water | $m^3$ | 208 | -0.25 | 0.37 | 0.13 | 0.80 | 25.6 | 234 |
| Use of secondary materials | kg | 83.6 | 45.9 | 1.59 | 0.56 | 2.18 | 718 | 852 |
| Use of renewable secondary fuels | MJ | 14.9 | 0.20 | 0.19 | 0.07 | 0.001 | 4.67 | 20.0 |
| Use of non-renewable secondary fuels | MJ | 24.2 | 0.55 | 0.32 | 0.11 | 0.003 | 10.5 | 35.7 |

## Waste production descriptive parameters

| Impact category | Unit | Manufacturing | | Distribution | Installation | Use | End-of-life | Total |
|---|---|---|---|---|---|---|---|---|
| | | Upstream module | Core module | Downstream module | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Hazardous waste disposed | kg | 5,903 | 79.5 | 36.7 | 13.0 | 0.32 | 1,464 | 7.496 |
| Non-hazardous waste disposed | kg | 469 | 5.76 | 128 | 45.4 | 0.12 | 310 | 958 |
| Radioactive waste disposed | kg | 1.16 | 0.02 | 0.02 | 0.01 | 0.05 | 0.38 | 1.64 |
| Materials for energy recovery | kg | 8.33 | 0.09 | 0.44 | 0.16 | 0.003 | 0.71 | 9.73 |
| Materials for recycling | kg | 36.6 | 0.54 | 0.87 | 0.31 | 1.58 | 10.3 | 49.9 |
| Components for reuse | kg | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy | MJ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The manufacturing stage is the most significant stage to several impact categories, being the aluminum acquisition the most relevant contributor, followed by the polyethylene. The recycling process of aluminum scrap and the LPG consumption are also significant in the manufacturing stage. Furthermore, the end-of-life stage is the second most relevant to the total emission of several impact categories, followed by the distribution of the cable from factory to warehouse, that is more significant than the installation and use stages. In installation stage it was considered the transport of the cable from warehouse to installation site and the transport of the generated waste to the final collection site, while the use stage presents a small emissions due to the small value of the maximum electrical resistance value (Ω/km) of the Maxlink SC AL XLPE/HDPE 15 Cable kV 185MM2 CZ GSCC cable.

## Additional information

The ISO 9001, ISO 14001 and ISO 14020 standards certify Condumax manufacturing unit. Some of Condumax cables and wires also are, annually, carbon footprint certified according to ISO 14067. While the International Standard Industrial Classification of All (ISIC) classifies the factory as Division 27, Group 273 and Class 2732. The ABNT also granted the license for using the ABNT Environmental Mark – ABNT Ecolabel, meeting the requirements of the document PE-425.
From the data provided by Condumax, it was possible to build a model to calculate the EPD impacts categories of the life cycle assessment for each selected cable, being also possible to analyze the results in order to allow actions to compensate and improve the impact categories in order to improve the environmental performance of the products and meet the demand of Condumax customers.-Negative values about water associated to the core module at manufacturing stage occurs due to the water left over from industrial processes going through a treatment and then being returned to water bodies (river, lakes, etc).

## Reference

Life Cycle Assessment (LCA) Report – Condumax (Multiplex Cable NI CA 0,6/1kV 3X25+25MM2 ENEL and Maxlink Cable SC AL XLPE/HDPE 15 kV 185MM2 CZ GSCC) – revision. 1 (August 30, 2022).

ISO 14040:2006/AMD 1:2020 Environmental Management – Life Cycle Assessment – Principles and Framework – Amendment 1.

ISO 14044:2006.AMD 2:2020 Environmental Management – Life Cycle Assessment – Requirements and Guidelines – Amendment 2.

ISO 14044:2006/AMD 1:2017 Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 1

Data collection issue – issue management of greenhouse effect gases (GHG). Internal procedure, Condumax – Eletro Metalúrgica Ciafundi LTDA. Issue date: 13/06/2022, rev. 1. Document in Portuguese.

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