Metalogalva
engineering and protecting steel

In accordance with ISO 14025 and
EN 15804:2012+A2:2019 for:

LATTICE TOWER

METALOGALVA – IRMÃOS SILVAS S.A.

ENVIRONMENTAL PRODUCT **DECLARATION**

PROGRAMME: THE INTERNATIONAL EPD® SYSTEM,
WWW.ENVIRONDEC.COM

PROGRAMME OPERATOR: EPD INTERNATIONAL AB
EPD REGISTRATION NUMBER: S-P-04199

PUBLICATION DATE: 2021-07-28
VALID UNTIL: 2026-07-27

GENERAL INFORMATION

Programme information

Programme:
The International EPD®
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CEN STANDARD EN 15804 SERVES AS THE CORE PRODUCT CATEGORY RULES (PCR)
Product category rules (PCR): PCR 2019:14 Construction products. Version 1.1. 2020-09-14.
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☑ EPD verification
Third party verifier: Rubén Carnerero, IK Ingeniería
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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:

METALOGALVA – IRMÃOS SILVAS S.A.
Maganha - Santiago de Bougado - Apartado 206
4786-909 - Trofa - Portugal

Contact: Sara Pimenta

Description of the organisation:

Metalogalva - Irmãos Silvas, S.A., is a metalworking company, part of the VigentGroup, developing its activity in design and manufacture of metal structures, hot dip galvanizing and powder and liquid painting. The headquarters is located in Trofa city, at 19km of Oporto airport and 28 km of Leixões harbour. Founded in 1971, it is the oldest company of the VigentGroup, with interests in a wide range of economic sectors, namely in the industrial, financial, construction and food distribution areas.

With modern manufacturing facilities, it has 6 national industrial units, covering 60.500m2 of indoor space, and a total area of 221.000m2. With over 600 employees, the company has an annual turnover of over 100 million euros, resulting from the constant technological evolution and productivity increase.

Metalogalva's mission is to produce steel structures, consistently delivering the best products, maintaining the highest levels of service and promoting responsible business and environmental management, welfare, motivation and safety of employees. Achieve maximum productivity, ensuring high quality standards for customer satisfaction, based on a culture of research, development and innovation of their products.

Product-related or management system-related certifications:

- Integrated Management System: quality (ISO9001), environment (ISO 14001), health and safety at work (ISO 45001) and RDI (NP 4457)

Other certifications:

- EN 1090 EXC4 (metal structures CE Marking);
  EN40 / EN1317 (product CE marking);
  ISO 3834-2 (welding);
  CW47.1 (welding – Canadian standard);
  DAST Guideline 022 (galvanization);
  NHSS6 (UK market);

Name and location of production site(s):

METALOGALVA – IRMÃOS SILVAS S.A.
Maganha - Santiago de Bougado - Apartado 206
4786-909 - Trofa - Portugal

Product information

Product name:
LATTICE TOWER

Product identification:
LATTICE TOWER – POWERLINES

Product description:

A lattice tower is a steel structure used on transmission and distribution overhead lines. The main purpose of these structures is the transport of the energy from the production plants to the consumption areas.

These structures are mainly manufactured in L profiles, but there are also some solutions in CHS profiles or other profiles like for example U/H profiles. The connections are mostly bolted connections, but there may also be welded connections.

The design and material types of a lattice tower are linked to the transferred load from cables to the structure and the operation voltage. The line voltage can be from 15kV up to 420kV and the loads are designed taking in consideration the span, angle line, type of cable and climate conditions of the location. There are several tower configurations, but the most common are alignment, angle, reinforcement, and dead end.

Besides the electrical and mechanical aspects, the design of a lattice towers also considers, nowadays, other values, namely of environmental nature, being included in some countries, of compulsory and objective evaluation in terms of the impacts on the landscape and on the avifauna:

- Adequacy of the supports to the configuration of the terrain.
- Minimization of the risks of collision of birds with the cables through the reduction of the «collision areas».
- Dimensions and geometry of the supports at ground level appropriate to the type of operation of the same.
- Corrosion protection scheme is normally galvanized, but in some cases/countries a duplex system may be requested by aesthetic issues, aeronautical signalling, or extra protection due to highly corrosive environments.
- Product group classification UN CPC 42110.

LCA information

Functional unit / declared unit: 1 tonne of product

Reference service life: 63 years, for a metal frame with 85 µm of zinc coating (2% by mass).

Time representativeness: 2019

Database(s) and LCA software used: Databases Ecoinvent 3.6 and EF Database 2.0, and software Simapro 9.1.1.1

Description of system boundaries: The EPD type is cradle to gate with options, modules C1–C4, and module D (A1–A3, C,D and additional module A4).

Excluded life cycle stages:
Modules A5, B1-B5 are not assessed.
In B1-B5, only minimal maintenance is required.

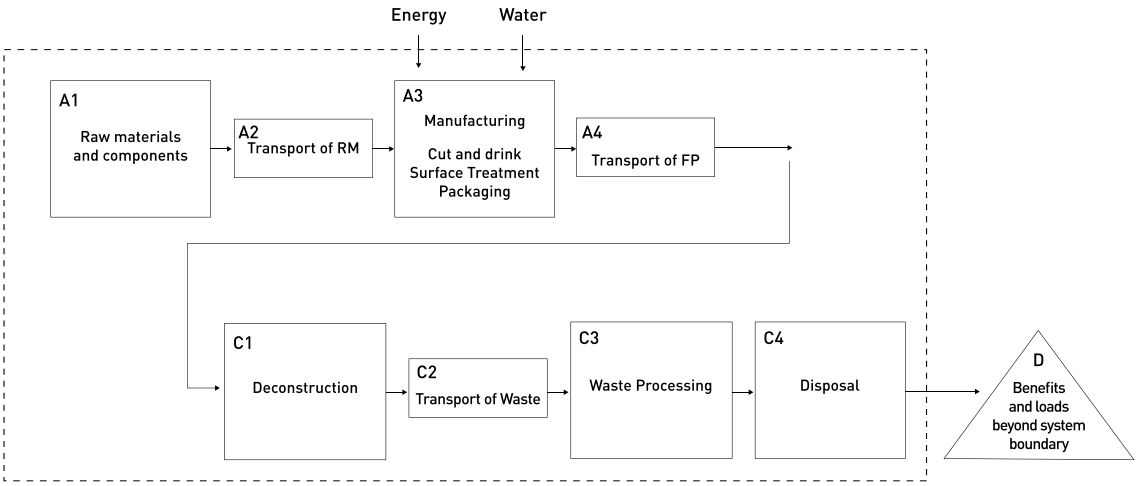
Manufacturing Process:

The manufacturing of a tower starts with the cutting and drilling of the components using programmed equipment. All components go through a pickling process to prepare their surface for the next step which is the protective coating. The protection of the components is done through the process of hot-dip galvanisation, consisting of the adherence of a thin layer of zinc.

Some components, usually of the upper structure, are painted in a contrasting colour to provide a visual indication of safety to avoid plane collisions.

The final activity consists of preparing the components and bolts for shipment, which are grouped by sets and sub-sets, allowing easier assembly.

System diagram:



Flowchart with system boundaries. Modules A1-C4 are within system boundary (dashed line). Module D is outside system boundary but is also modeled.

Cut-off 10rule:

1% cut-off rule was applied for input flows in the inventory.

Excluded processes:

Capital goods and activities that are not directly associated to the production of the assessed product, but that indirectly contribute to it, were not included in the assessment.

These include the buildings and machinery, social areas, the training center, the laboratories, and the overall maintenance of the units.

Assumptions:

1. The study was carried out considering an average pole - the total materials used to produce the different models of the lattice steel towers family were accounted for, thus representing a pole with an average composition of the poles produced in this family.

2. Welded products represent less than 0,1% of the manufactured products, therefore the welding process was not considered in this assessment.

3. It was assumed that international transportation companies' try to capitalize their assets and return fully loaded. For Portugal, it was considered that trucks return empty, meaning that the distance allocated to the transportation doubles.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use 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	EU27, UKR, TUR, IND	EU27	EU27	EU27									EU27	EU27	EU27	EU27	EU27
Specific data used	> 90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	-					-	-	-	-	-	-	-	-	-	-	-	-

Content information:

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Hot rolled steel	980	100	0
Zinc	20	100	0
TOTAL	**1000**	**100**	**0**
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Wood	2,5	0,25	
Cardboard	0,4	0,04	
Plastic	0,2	0,02	
TOTAL	**3,1**	**0,31**	

For the manufacturing of this product there are no substances listed in the "Candidate List of substances of Very High Concern for authorisation".

Packaging

The product is delivered on the site.
Small parts and components are packed in plastic containers / bags. Other components are grouped with wire and / or straps and can be placed on wooden pallets.

End-of-Life

For the end-of-life of the lattice tower it is assumed that the tower is dismantled, and the totality of the components are collected. Five per cent of the materials are mixed with the dismantling waste and ninety-five per cent is separated and sent to recycling (EPLCA, 2020).

Benefits and loads beyond the system boundary were calculated using a net scrap formulation proposed by World Steel Association in life cycle inventory methodology report (2017), where the net scrap is determined as a difference between the amount of steel recycled at end-of-life and the scrap input from previous product life cycle (assumed as 85%).

ENVIRONMENTAL INFORMATION

Potential environmental impact – mandatory indicators according to EN 15804

Results per functional or declared unit.

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq.	3,0E+03	2,4E+02	1,2E+02	3,4E+03	2,0E+02	0,0E+00	4,7E+00	2,7E+01	1,7E-01	0,0E+00
GWP-biogenic	kg CO2 eq.	-2,8E+01	1,1E-01	-2,2E+01	-5,0E+01	9,6E-02	0,0E+00	2,6E-03	-1,6E+00	1,4E-03	0,0E+00
GWP - luluc	kg CO2 eq.	6,1E+00	8,8E-02	1,5E+00	7,7E+00	7,6E-02	0,0E+00	1,4E-03	3,0E-02	1,7E-05	0,0E+00
GWP - TOTAL	kg CO2 eq.	3,0E+03	2,4E+02	9,8E+01	3,3E+03	2,0E+02	0,0E+00	4,7E+00	2,6E+01	1,7E-01	0,0E+00
ODP	kg CFC 11 eq.	1,4E-04	5,3E-05	1,3E-05	2,1E-04	4,6E-05	0,0E+00	1,1E-06	3,3E-06	2,8E-08	0,0E+00
AP	mol H+ eq.	1,3E+01	1,4E+00	8,6E-01	1,6E+01	1,3E+00	0,0E+00	3,3E-02	3,0E-01	1,5E-03	0,0E+00
EP-freshwater	kg PO43- eq.	6,0E+00	2,1E-01	1,5E-01	6,3E+00	1,8E-01	0,0E+00	5,8E-03	8,8E-02	2,6E-04	0,0E+00
EP-freshwater	kg P eq	1,5E+00	1,7E-02	3,2E-02	1,6E+00	1,4E-02	0,0E+00	3,8E-04	1,9E-02	1,8E-05	0,0E+00
EP - marine	kg N eq.	2,9E+00	4,0E-01	1,2E-01	3,4E+00	3,5E-01	0,0E+00	1,3E-02	6,8E-02	5,9E-04	0,0E+00
EP - terrestrial	mol N eq.	2,9E+01	4,4E+00	1,3E+00	3,5E+01	3,8E+00	0,0E+00	1,4E-01	7,7E-01	6,4E-03	0,0E+00
POCP	kg NMVOC eq.	1,5E+01	1,3E+00	3,8E-01	1,6E+01	1,1E+00	0,0E+00	3,9E-02	2,1E-01	1,9E-03	0,0E+00
ADP-minerals&metals*	kg Sb eq.	2,0E+00	6,1E-03	6,4E-04	2,0E+00	5,2E-03	0,0E+00	7,9E-05	1,3E-03	2,2E-07	0,0E+00
ADP-fossil*	MJ	2,9E+04	3,5E+03	2,4E+03	3,5E+04	3,0E+03	0,0E+00	7,3E+01	3,3E+02	2,0E+00	0,0E+00
WDP	m3	1,0E+03	9,5E+00	4,1E+02	1,4E+03	8,2E+00	0,0E+00	2,6E-01	3,5E+00	3,5E-03	0,0E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption										

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory and voluntary indicators

Results per functional or declared unit.

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	C1	C2	C3	C4	D
Particulate matter	disease inc.	2,40E-04	1,60E-05	6,40E-06	2,70E-04	1,40E-05	0,00E+00	5,50E-07	3,90E-06	3,70E-08	0,00E+00
Ionising radiation	kBq U-235 eq	9,00E+01	1,80E+01	7,90E+00	1,20E+02	1,50E+01	0,00E+00	3,50E-01	1,90E+00	8,30E-03	0,00E+00
Ecotoxicity, freshwater	CTUe	1,00E+05	2,80E+03	2,50E+03	1,10E+05	2,40E+03	0,00E+00	6,20E+01	1,50E+03	2,50E+00	0,00E+00
Human toxicity, cancer	CTUh	1,50E-05	8,40E-08	1,30E-07	1,50E-05	7,20E-08	0,00E+00	2,40E-09	3,60E-08	5,20E-11	0,00E+00
Human toxicity, non-cancer	CTUh	1,10E-04	3,00E-06	6,20E-06	1,20E-04	2,60E-06	0,00E+00	7,70E-08	1,70E-06	3,90E-09	0,00E+00

Use of resources

Results per functional or declared unit.

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	6,4E+02	1,5E+01	5,4E+02	1,2E+03	1,3E+01	0,0E+00	2,0E-01	3,0E+01	1,7E-02	0,0E+00
PERM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PERT	MJ	6,4E+02	1,5E+01	5,4E+02	1,2E+03	1,3E+01	0,0E+00	2,0E-01	3,0E+01	1,7E-02	0,0E+00
PENRE	MJ	1,3E+01	8,6E-02	1,2E+03	1,2E+03	7,4E-02	0,0E+00	1,0E-03	8,2E-03	8,0E-06	0,0E+00
PENRM	MJ.	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PENRT	MJ	1,3E+01	8,6E-02	1,2E+03	1,2E+03	7,4E-02	0,0E+00	1,0E-03	8,2E-03	8,0E-06	0,0E+00
SM	kg	1,2E+03	0,0E+00	0,0E+00	1,2E+03	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
RSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
NRSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
FW	m3	2,7E+01	3,6E-01	5,0E+01	7,7E+01	3,1E-01	0,0E+00	8,8E-03	1,3E-01	1,3E-04	0,0E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water										

Waste production and output flows

Waste production (Results per functional or declared unit)

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	4,89E-01	8,86E-03	1,20E-01	6,19E-01	7,59E-03	1,79E-04	9,84E-04	4,80E-06	0,00E+00	4,89E-01
Non-hazardous waste disposed	kg	5,30E+02	1,59E+02	1,28E+01	7,01E+02	1,36E+02	6,16E+00	1,03E+01	5,00E+01	0,00E+00	5,30E+02
Radioactive waste disposed	kg	4,80E-02	2,40E-02	2,70E-03	7,50E-02	2,10E-02	4,80E-04	1,60E-03	1,20E-05	0,00E+00	4,80E-02

Waste production and output flows

Waste production (Results per functional or declared unit)

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	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
Material for recycling	kg	0,00E+00	0,00E+00	4.39E+2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	950	0,00E+00	0,00E+00
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
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
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

Information on biogenic carbon content

Results per functional or declared unit.

BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	6,22

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2.

References

- EPLCA, European Platform on Life Cycle Assessment, 2020. Annex C to the PEF/OEF Methods (Updated May 2020) in https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- General Programme Instructions of the International EPD® System. Version 3.01
- PCR 2019:14 Construction products. Version 1.1. 2020-09-14.
- World Steel Association, 2017. Life Cycle assessment methodology report - Life cycle inventory study for steel products.
- World Steel Association, 2018. Life Cycle assessment methodology report - Life cycle inventory study for steel products.

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