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GlobalEPD
A VERIFIED ENVIRONMENTAL DECLARATION

Enviromental product declaration

EN ISO 14025:2010, EN 15804:2012+A2:2020, UNE 36904-2:2018

Drawn Steel products for prestressed concrete produced using 100% renewable electricity. PC Wire, 3-Wire/7-Wire Bare Strand and 7-Wire Sheathed Strand.

By:

TYCSA PSC – Celsa Group

The declared validity is subject to registration and publication on www.aenor.com

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ECO PLATFORM
EPD
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CELSA GROUP | TYCSA PSC

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The EPD holder is responsible for the content of the Declaration. The holder is responsible for keeping the records and documents supporting the content of the Declaration.

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HOLDER OF THE DECLARATION

Tycsa PSC – Grupo Celsa
Pol. Industrial Nueva Montaña s/n. 39011Santander (Cantabria, España)

Tel: (+34) 942 200 336 / 630 885 950
Mail: icano@tycsa.com
Web: www.tycsapsc.com

LCA STUDY

Abaleo S.L.
D. José Luis Canga Cabañes
c/ Poza de la Sal, 8; 3º A
28031 Madrid, España.

Tel: (+34) 639 901 043
Mail: jlcanga@abaleo.es; info@abaleo.es
Web: www.abaleo.es

OPERATOR OF THE GLOBAL EPD PROGRAMME

AENOR Internacional S.A.U.
C/ Génova 6. 28009. Madrid, España.

Tel: (+34) 902 102 201
Mail: aenordap@aenor.com
Web: www.aenor.com

UNE 36904-2:2018. CEN standard EN 15804:2012+A2:2020 serves as the core for the RCP

Independent verification of the declaration and data, according to EN ISO 14025:2010

☐ Internal ☑ External

Verification Body: AENOR Confía

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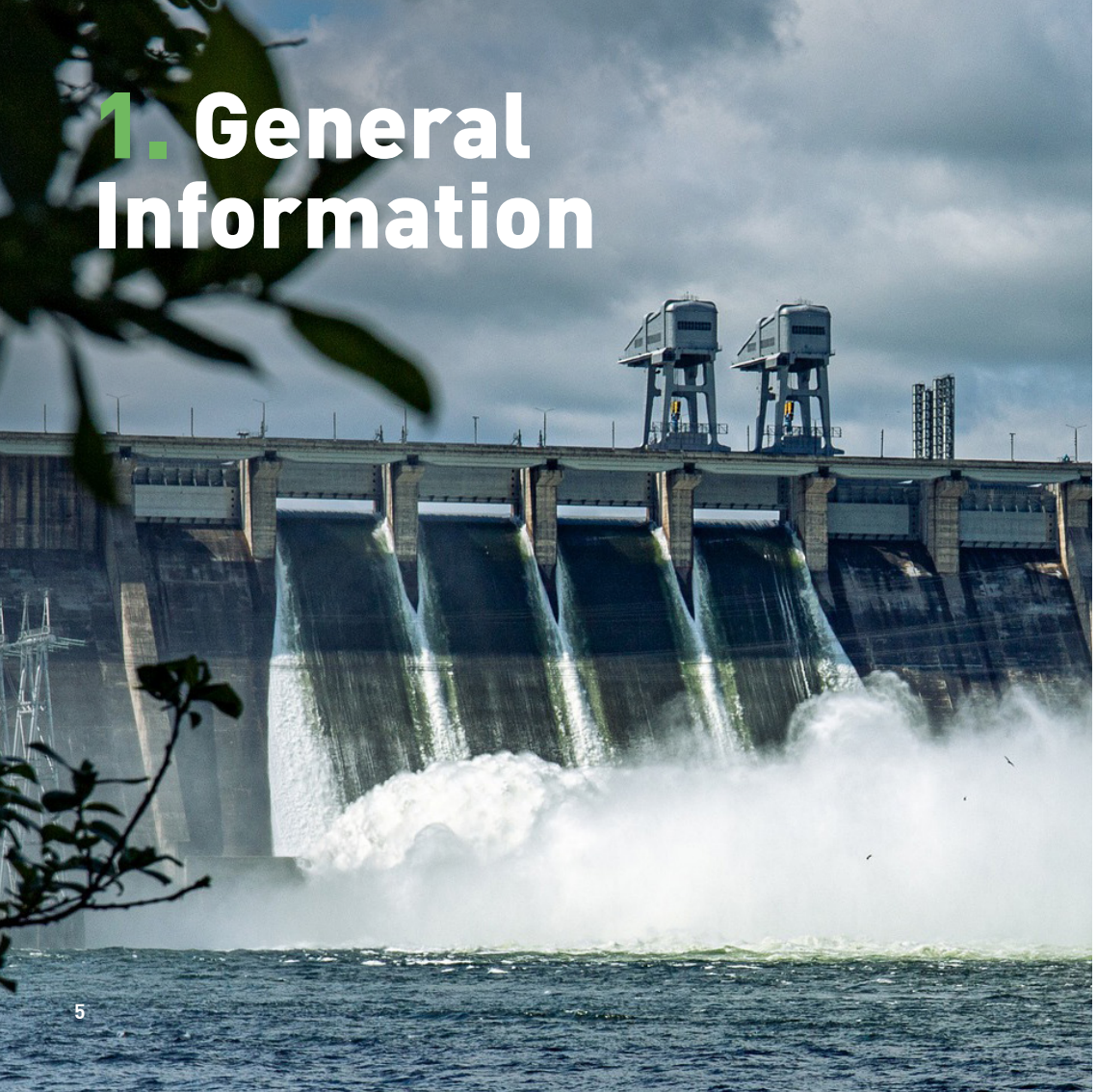
1. General Information



1.1. The organization

Tycsa PSC is the largest manufacturer of wires and high elastic limit steel strands for construction and the company in the sector with the largest presence in the international market, offering a long experience in manufacturing your products, with the contribution of a highly qualified human team and a global comercial presence.

Tycsa PSC began its journey in Barberá del Vallès (Barcelona) in the 1950s as one of the largest national producers of wires, strands and cables for different applications industrial, but with a strong export profile, with contact already at the time on a regular basis with different international markets.

Today, the extensive experience in combination with advanced production processes and rigorous control mechanisms make the quality of Tycsa PSC its best presentation.

Within Tycsa PSC's environmental policy, the protection and improvement of the Environment is set as an objetive within the manufacturing and commercialization of their products.

Both the steel and the production process used for the manufacture of the drawn products stand outfor its ecological values and for its ability torecycling compared to other products and technologies.

1.2. Scope of the Declaration

This environmental product declaration describes environmental information related to the life cycle of production from cradle to gate with modules A4, C1-C4 and D (A1-A3, A4, C and D), of five types of products of drawn steel:

- Prestressed Wire (smooth or indented), PF4.
- 7-wire bare strand, P61 y P62.
- 3-wire strand, PC4.
- 7-wire sheathed strand, P63.

The role played by the product system studied is the production of drawn steel products to be used in the construction sector as constructive elements..

1.3. Lyfe cycle and conformity

This EPD has been drawn up and verified according to the standards EN ISO 14025:2010, EN 15804:2012+A1:2013, UNE 36904-2:2018.

This EPD includes the life cycle stages listed in Table 1-1. This DAP is of the cradle to door type with modules A4, C and D.

System boundary. Information modules included			
Product stage	A1	Raw material supply	X
	A2	Transport to the manufacturer	X
	A3	Manufacturing	X
Construction	A4	Transport to Work site	X
	A5	Installation / Construction	MNE
Use stage	B1	Use	MNE
	B2	Maintenance	MNE
	B3	Repair	MNE
	B4	Replacement	MNE
	B5	Refurbishment	MNE
Use stage	B6	Operational energy use	MNE
	B7	Operational wáter use	MNE
End of life	C1	De-construction / demolition	NR
	C2	Transport	X
	C3	Waste processing	X
	C4	Disposal	X
	D	Reuse, recovery and/or recycling potentials	x

X = Module included in the LCA; NR = Not relevant module; MNE = Module not assessed

This EPD may not be comparable to others developed in other Programs or according to documents of different reference; specifically can not be comparable to EPDs not developed and verified according to the EN 15804 Standard.

Similarly, the EPDs may not be comparable if the source of the data is different (for example, databases), if all relevant information modules are not included or if they are not based on the same scenarios.

The comparison of construction products must be done on the same function, applying the same functional unit and at the level of the building or infrastructure, which means, including the behavior of the product throughout its entire life cycle, as well as the specifications of the section 6.7.2. of the EN ISO 14025 Standard.

1.4. Differences compared to previous versions of this EPD

In 2020, an EPD for Tycsa products was published. In it, to represent the production of wire rod, the results of a sectorial EPD of wire rod production in Spain were used.

In the current version, a specific EPD for GSW wire rod has been used, carried out with data from the year 2021. In addition, in 2021 part of the production in GSW and Tycsa was done with 100% renewable electricity.

2. The Product

2.1. Identification of the product

This EPD is applicable to drawn steel products manufactured by Tycsa PSC using 100% renewable electricity with Guarantee of Origin (GdO): prestressed wire PF4, bare 7-wire strands P61 and P62, 3-wire strands PC4 and 7-wire sheathed strand P63.

CPC Code: 4126.

2.2. Product Performance

Specifically, the manufacturer declares the following information on the technical specifications of the product:

Mechanical characteristics	
Young Modulus	195 GPa ± 10% (strand) 205 GPa ± 10% (wire)
Elongation	⩾ 3,5% L > 500 m
Very low relaxation	⩽ 2,5% after 1.000 h to 70% Fm

2.3. Composition of the product

The composition and properties of the wires and strands are established in the UNE 36094:1997 standard Steel wires and strands for prestressed concrete reinforcement or in the international reference standard depending on the client.

In the production of wire and strands (3 and 7 wires), steel wire rod is used as the main raw material. The composition declared by the manufacturer for each of the products is as follows:

Composition of drawn products in %			
	Steel	Polyethylene (HDPE)	Grease
Wire PF4	100%	-	-
3-wire strand PC4	100%	-	-
7-wire strand P61	100%	-	-
7-wire strand P62	100%	-	-
Stheathed Strand P63	89,4 - 90,1%	6,8 - 9,1%	3,8 - 0,8%

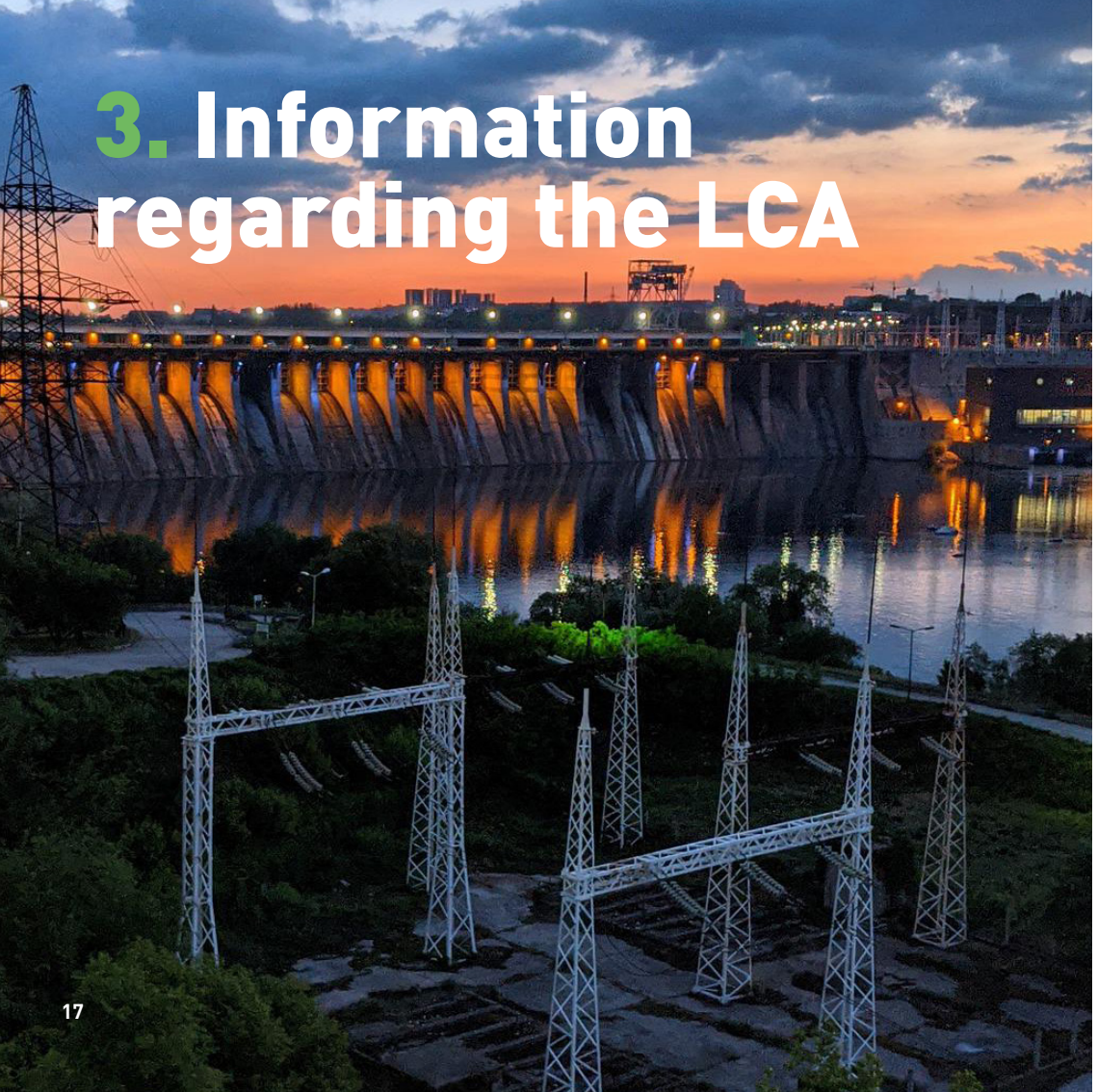
The steel wire rod used in the production of Tycsa PSC wires and strads, manufactured by Global Steel Wire S.A., has the following average composition:

Average composition of the wire rod used as raw material	
Material	Quantity
Post-consumer scrap	27,42%
Pre-consumer scrap	62,45%
Recycled Pig Iron	7,114%
pre-reduced iron	3,016%

The content of recycled raw material is 96.984%.

The manufacturer declares that some families of products manufactured by Tycsa PSC use substances listed in the "CandidateList of Substances of Very High Concern (SVHC) for authorization" in a percentage greater than 0.1% and less than 0.3% of the weight of the product.

3. Information regarding the LCA



3.1. Life cycle analysis

The life cycle analysis report for the EPD of the production of Tycsa PSC's drawn steel products, of July 2022, has been carried out by the company Abaleo S.L. with the Ecoinvent 3.8 database (November 2021) and the SimaPro 9.3.0.3 software, which is the most updated version available at the time of the LCA.

To carry out the study, data from Tycsa PSC factory located in Poligono Industrial Nueva Montaña s/n, 39011 Santander (Cantabria) was available.

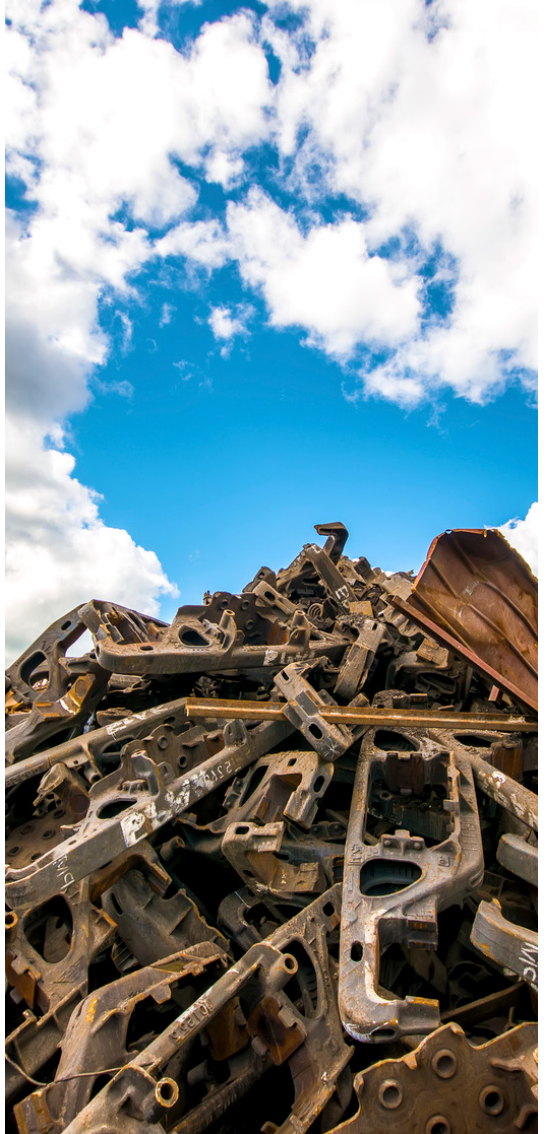
The LCA study follows the recommendations and requirements of international standards ISO 14040:2006, ISO 14044:2006 and the European Standard UNE-EN 15804:2012 + A2:2020.

3.2. Stydy Scope

The scope of this EDP is the cradle-to-gate production with modules A4, C1-C4 and D (A1-A3, A4, C and D), of the five drawn steel products (steel wire, 3-wire strand and the 7-wire bare strand and black sheathed strand) for use in the construction of structures.
The specific data on the manufacturing process of the products come from Tycsa PSC facilities at Polígono Industrial Nueva Montaña s/n factory, 39011 Santander (Spain), corresponding to year 2021.

The LCA does not include:

- The production of auxiliary materials used in the plant, which account for 0.014% of the total weight of Tycsa PSC's production in 2021.
- All equipment whose useful life is greater than 3 years.
- The construction of the factory buildings, or other capital goods. Nor have the products used in the maintenance of buildings been considered.
- Transport of product returned to the factory has not been considered.
- Staff work trips.
- Travel to or from work by staff.



3.3. Declared Unit

The declared unit for Tycsa PSC's drawn steel products is 1 ton of product, including its packaging:

- Alambre pretensado PF4.
- Trenza PC4.
- Cordón desnudo P61.
- Cordón desnudo P62.
- Cordón plastificado P63.

3.4. Allocation criteria

According to the criteria of the reference standard:

- Whenever possible it has been expanded the product system to avoid assigning the environmental impacts to the co-products of multi-unit unit processes, within the process of production.
- When it has not been possible to avoid the assignment, an assignment of the inputs and outputs of the system has been made, based on mass.

It has not been necessary to apply economic allocation criteria.

3.5. Reference Service Life (RSL)

The Reference Service Life (RSL) of drawn steel products is the RSL of the structure in which they are installed.

A medium RSL of 50 years can be accepted. The assembly and/or installation processes of drawn steel products are outside the scope of this EPD.

3.6. Cut off criteria

The LCA includes the gross weight/volume of all the materials used in the production process of the drawn steel products studied, except for auxiliary materials that account for 0.014% of the total weight of production in 2021. Consequently, the criteria of including at least 99% of the total weight of the products used for the declared functional unit.

There has been no exclusion of energy consumption.

3.7. Representativeness, quality and selection of data

To model the manufacturing process of the different drawn steel products, the production data of the Tycsa PSC factory in Santander, from the year 2021, which is a representative year of average production, have been used. Data from this factory have been obtained for material and energy consumption; air emissions, discharges and waste generation; and transport distances.

To represent the production of GSW wire rod used as raw material in the manufacture of Tycsa PSC products, the supplier's EPD has been considered: "Special steel wire rod produced in electric arc furnace using 100% renewable electricity" (S-P-06112 EPD International AB; publication date 2022-06-01; validity date: 2027-05-31).

When necessary, the Ecoinvent 3.8 database (November 2021) was used, which is the latest version available at the time of the LCA. For the inventory data, to model the LCA and to calculate the environmental impact categories requested by the Product Category Rule, the SimaPro 9.3.0.3 software has been used, which is the most updated version available at the time of carrying out the study.

For the choice of the most representative processes, the following criteria have been applied:

- That they are representative data of the technological development actually applied in the manufacturing processes. In case of not having information, a representative data of an average technology has been chosen.
- That they be geographical data as close as possible and, where appropriate, regionalized means.
- That the data be as up-to-date as possible.

To assess the quality of the primary data on the production of Tycsa PSC's drawn steel products, the criteria for semi-quantitative evaluation of the quality of the data are applied, proposed by the European Union in its Guide to the Environmental Footprint of Products and Organizations. The results obtained are the following:

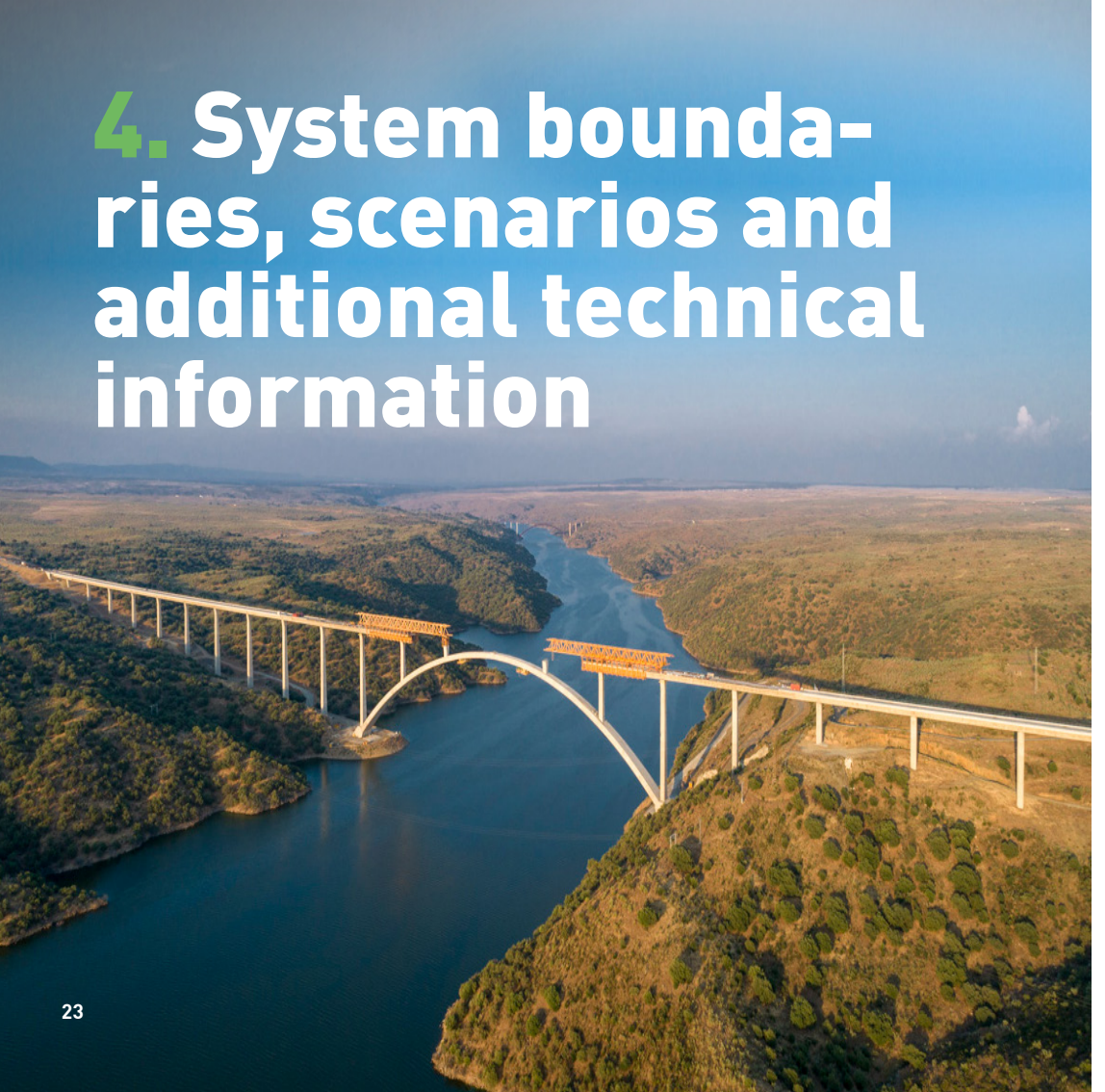
- Very good integrity. Score 1.
- Good methodological suitability and coherence. Score 2.
- Very good temporal representation. Score 1.
- Good technological representativeness. Score 2.
- Very good geographical representation. Score 1.
- Very low data uncertainty. score 1.

According to the above data, the Data Quality Rating (DQR) takes the following value: 8/6= 1.33, which indicates that the quality of the data is excellent.

To better understand the evaluation of the quality of the data carried out, it is indicated that the score of each of the criteria varies from 1 to 5 (the lower the score, the better the quality) and that the following table is applied to obtain the final score:

Overall data quality score (DQR)	Overall quality level of data
⩽ 1,6	Excellent quality
1,6 a 2,0	Very good quality
2,0 a 3,0	Good quality
3 a 4,0	Reasonable quality
> 4	Insufficient quality

4. System boundaries, scenarios and additional technical information



The product system studied in the Life Cycle Analysis of the production of Tycsa PSC drawn steel products (wire, 3-wire strand, 7-wire bare strand and 7-wire sheathed strand) is from the cradle to the gate with the A4 modules, C1-C4 and D. Assembly processes and/or product installation are excluded. The following phases of production have been studied:

Product stage:

- A1 from production of the raw material used in the manufacture of the wire, 3-wire strand, 7-wire bare strand and 7-wire sheathed strand and the energy consumption of the production process. In 2021, the Global Steel Wire Group purchased renewable electricity with GdO for a part of the production of all the Group companies, including Tycsa PSC.

- A2, from transportation of materials to the plant.

- A3, from manufacturing wire, 3-wire strand, 7-wire bare strand and 7-wire sheathed strand in Santander: production of parts including water and fuel consumption; production of auxiliary materials; packaging production; and transport and management of waste generated.

Installation stage:

- A4, transportation from the door of the Tycsa PSC factory to the construction site.

End of life stage:

- C1, deconstruction or demolition.

- C2, transportation of disassembled materials to the place of waste treatment or final disposal.

- C3, waste treatment for reuse, recovery and/or recycling.

- C4, of waste disposal, including physical pre-treatment and management at the disposal site and associated energy and water use.

Benefits and burdens beyond the system:

D, of reuse, recovery and/or recycling potential, expressed as net charges and benefits.

4.1. Processes prior to manufacturing (upstream) and product manufacturing (modules A1-A3)

The components necessary for their manufacture are received at the drawn steel products factory: the wire rod used as raw material and the auxiliary products used in each stage of the process.

The manufacturing process consists of the following production stages:

- Pickling. Hot rolled products have a thin layer of iron oxides on their surface that must be removed before cold drawing. This process is carried out in the pickling line where the steel product is immersed in successive acid baths to remove the iron oxide from the surface, as well as the calamine that forms in the hot rolling of the wire rod. Once pickled, they are washed for further processing and prepared with a coating of products that reduce friction during the following stages and improve resistance to corrosion.
- Wire drawing. In cold drawing, the wire rod is passed through some dies, producing a reduction in the section and a modification of the physical characteristics. To facilitate passage through the dies, lubricating soaps and emulsions are used. By passing the wire rod through successive dies, it is possible to reduce the section to a predetermined size, also achieving a hardening of the material and a smooth surface.
- Indentation. To improve adherence with the concrete, the wires are passed through rollers that, applied to the passage on the surface of these, produce the indentations.
- Stabilization: To releases the tensions produced in the forming processes, a thermomechanical treatment is carried out under established temperature conditions to subsequently be cooled first by means of water by controlled temperature and finally by air drying to prevent the strand from arriving wet.
- Coiling. The wires and strand are wound into coils.
- Stranding (only 3-wire and 7-wire strand). In this stage the wires are wound helically to form the different types of strands.
- Sheathing. The sheathed strands are covered with a polyethylene sheath, injecting specific materials between the steel and the sheath: (grease or wax).

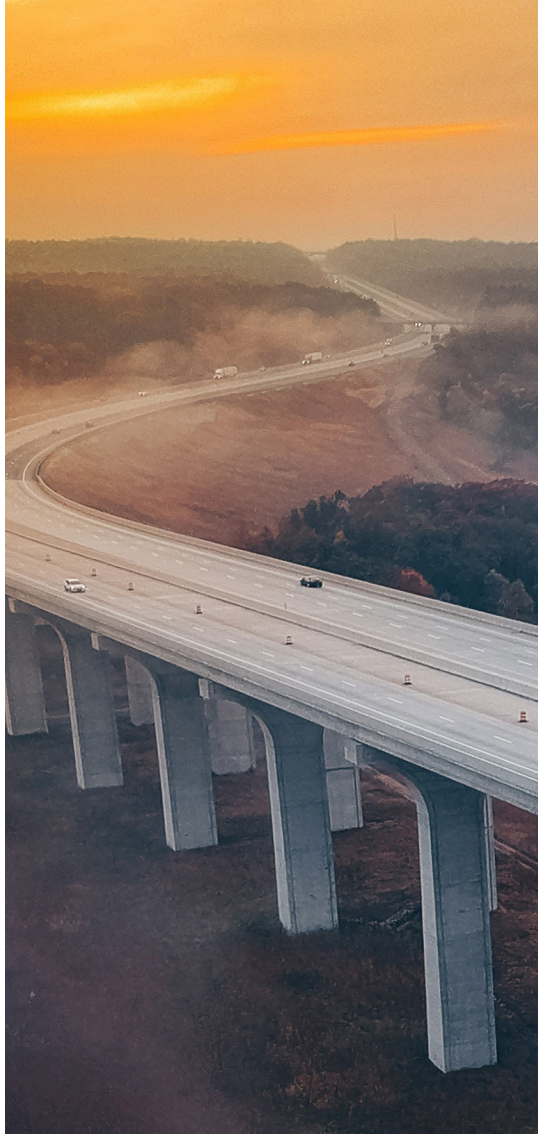
Stages and information modules for the evaluation of buildings. Building life cycle. Building Life Cycle Information.					
Building Life Cycle Information.	A1 a 3 (Production stage)	A1	X	Supply of raw materials	-
		A2	X	Transport	-
		A3	X	Production	-
	A4 - 5 (Construction stage)	A4	X	Transport	Scenario
		A5	MNE	Construction / installation process	Scenario
	B1 a 7 (Use stage)	B1	MNE	Use	Scenario
		B2	MNE	Maintenance	Scenario
		B3	MNE	Repair	Scenario
		B4	MNE	Substitution	Scenario
		B5	MNE	Rehabilitation	Scenario
		B6	MNE	Energy use in service	Scenario
		B7	MNE	Use of water in service	Scenario
	C1 a 4 (End of life stage)	C1	NR	Deconstruction, demolition	Scenario
		C2	X	Transport	Scenario
		C3	X	Waste treatment	Scenario
		C4	X	Waste disposal	Scenario
Additional Information	Benefits and burdens beyond the system	D	X	Potential for reuse, recovery and recycling	-

X Assessed module. **MNE** Module not evaluated. **NR** Not relevant.

4.2. Transport to site and construction process (A4-A5)

Module A4. The transport of drawn steel products from the Tycsa PSC production plant in Santander to the facilities where they are used has been considered, distinguishing the mode of transport used: ship and truck. Transport distances to the customer have been provided by Tycsa PSC.

Module parameters A4 – PF4	
Parameter	Quantity (per functional unit)
Liters of fuel: - Diesel in truck EURO 5 (carga útil de 29,96t) - Heavy diesel in transoceanic ship (50.000 TPM)	- 0,02255 l/tkm - 0,00269 l/tkm
Average distance: - Truck - Ship	- 1.021,03 km - 4.262,19 km
Capacity utilization (including empty return)	-
Apparent density of transported products	7.850kg/m³
Useful capacity factor	0,98 t



Module parameters A4 – PC4	
Parameter	Quantity (per functional unit)
Liters of fuel: - Diesel in truck EURO 5 (carga útil de 29,96t) - Heavy diesel in transoceanic ship (50.000 TPM)	- 0,02255 l/tkm - 0,00269 l/tkm
Average distance: - Truck - Ship	- 706,90 km - 10.588,66 km
Capacity utilization (including empty return)	-
Apparent density of transported products	7.850kg/m³
Useful capacity factor	0,98 t

Module parameters A4 – P62	
Parameter	Quantity (per functional unit)
Liters of fuel: - Diesel in truck EURO 5 (carga útil de 29,96t) - Heavy diesel in transoceanic ship (50.000 TPM)	- 0,02255 l/tkm - 0,00269 l/tkm
Average distance: - Truck - Ship	- 1.205,01 km - 5.173,26 km
Capacity utilization (including empty return)	-
Apparent density of transported products	7.850kg/m³
Useful capacity factor	0,98 t

Module parameters A4 – P61	
Parameter	Quantity (per functional unit)
Liters of fuel: - Diesel in truck EURO 5 (carga útil de 29,96t) - Heavy diesel in transoceanic ship (50.000 TPM)	- 0,02255 l/tkm - 0,00269 l/tkm
Average distance: - Truck - Ship	- 1.378,31 km - 2.216,32 km
Capacity utilization (including empty return)	-
Apparent density of transported products	7.850kg/m³
Useful capacity factor	0,98 t

Module parameters A4 – P63	
Parameter	Quantity (per functional unit)
Liters of fuel: - Diesel in truck EURO 5 (carga útil de 29,96t) - Heavy diesel in transoceanic ship (50.000 TPM)	- 0,02255 l/tkm - 0,00269 l/tkm
Average distance: - Truck - Ship	- 1.185,48 km - 4.793,80 km
Capacity utilization (including empty return)	-
Apparent density of transported products	7.850kg/m³
Useful capacity factor	0,98 t

Module A5: Not Evaluated

4.3. Use linked to the building structure

Module B1-B5: Not Evaluated

4.4. Use linked to the operation of the building

Module B6-B7: Not Evaluated

4.5. Module C - End of life stage

Module C1 – Deconstruction / demolition. It has been considered that the deconstruction module (C1) is not considered relevant for the quantitative analysis. Material and energy consumption for the deconstruction and extraction of drawn steel products are not relevant within the framework of the building or civil works of which they are part.

Module C2 – Transportation to the waste treatment/recovery site. Waste from Tycsa PSC's drawn steel elements at the end of their useful life is considered to be transported an average distance of 50km to the nearest waste management point, with EURO5 trucks of more than 32 tons.

Module C3-C4 – Waste treatment and waste disposal. To determine the percentages of recycling and sending to landfill and incineration of the products studied, the criteria of Part C of Annex 2 V2.1 (May 2020) of the Circular Footprint Formula of the Union's Environmental Footprint methodology are applied. European (RECOMMENDATION (EU) 2021/2279 OF THE COMMISSION of December 15, 2021, on the use of environmental footprint methods to measure and communicate the environmental behavior of products and organizations throughout their life cycle).

Applying the indicated values to the composition of Tycsa PSC's drawn steel products, the following end-of-life scenarios result:

Module C parameters – PF4 wire / PC4 3-wire strand / P61 7-wire strand / P62 7-wire strand	
Parameter	Value (per unit declared)
Demolition	It is considered that, during the process of deconstruction and disassembly of the products studied, material and energy consumption are included in the framework of the building or civil works of which they are a part.
Collection process, specified by type	- 1,000 kg collected separately. - 0 kg collected with mixed construction waste.
Recovery system, specified by type	- 0 kg for reuse - 850 kg of steel for recycling - 21 kg of steel for energy recovery
Elimination, specified by type	129 kg of product or material for final disposal in landfill.
Assumptions for scenario development (transport)	Transport of waste by EURO5 truck of >32 tons: average distance of 50 km from the work to the management points.

Parameters of module C – Sheathed strand P63	
Parameter	Value (per unit declared)
Demolition	It is considered that, during the process of deconstruction and disassembly of the products studied, material and energy consumption are included in the framework of the building or civil works of which they are a part.
Collection process, specified by type	- 1,000 kg collected separately. - 0 kg collected with mixed construction waste.
Recovery system, specified by type	- 0 kg for reuse - 759 9 kg of steel and 23.85 kg of PP for recycling - 18.77 kg of steel and 11.50 kg of PP for energy recovery
Elimination, specified by type	185.98 kg of product or material for final disposal in landfill.
Assumptions for scenario development (transport)	Transport of waste by EURO5 truck of >32 tons: average distance of 50 km from the work to the management points.

4.6. Module D - Benefits beyond the system

The recovery coefficient has been applied to the waste that is sent for recycling, indicated in the criteria of Part C of Annex 2 V2.1 (May 2020) of the Circular Footprint Formula of the methodology of the Environmental Footprint of the European Union (RECOMMENDATION (EU) 2021/2279 OF THE COMMISSION of December 15, 2021, on the use of environmental footprint methods to measure and communicate the environmental behavior of products and organizations throughout their life cycle):

- 100% of the steel sent for recycling.
- 90% of the PE sent to recycling.

5. Declaration of the environmental parameters of the LCA and the LCI

Below are the different environmental parameters obtained from the Life Cycle Assessment (LCA) for the production of 1 ton of each of Tycsa PSC's drawn steel products.

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

Environmental impact parameters:

Prestressed Wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
GWP-fossil	kg CO2 eq	3,49E+02	1,44E+00	2,63E+01	3,77E+02	4,18E+00
GWP-biogenic	kg CO2 eq	5,30E+00	8,40E-05	1,21E-01	5,43E+00	2,37E-04
GWP-luluc	kg CO2 eq	4,36E-01	1,16E-05	1,87E+00	2,30E+00	4,30E-05
GWP-total	kg CO2 eq	3,55E+02	1,44E+00	2,83E+01	3,85E+02	4,18E+00
ODP	kg CFC-11 eq	3,80E-05	3,41E-07	1,51E-05	5,34E-05	9,46E-07
AP	mol H+ eq	1,33E+00	4,99E-03	2,27E-01	1,56E+00	5,08E-02
EP-freshwater	kg PO4 eq	1,81E-01	6,59E-04	3,12E-02	2,13E-01	4,81E-03
EP-marine	kg N eq	4,22E-01	1,60E-03	4,77E-02	4,71E-01	1,32E-02
EP-terrestrial	mol N eq	3,82E+00	1,76E-02	2,88E-01	4,13E+00	1,47E-01
POCP	kg NMVOC eq	1,20E+00	4,79E-03	8,12E-02	1,28E+00	3,79E-02
ADP-minerals&metals 2	kg Sb eq	2,92E-03	6,25E-08	1,49E-05	2,93E-03	1,41E-07
ADP-fossil 2	MJ, v.c.n.	3,96E+03	2,03E+01	3,22E+02	4,30E+03	5,69E+01
WDP 2	m3 eq	1,32E+02	-1,94E-03	7,48E+01	2,07E+02	-5,51E-03

GWP - total (kg CO2 eq): Global warming potential ; GWP - fossil (kg CO2 eq): Global warming potential of fossil fuels; GWP - biogenic (kg CO2 eq): Potencial de calentamiento global biogénico; GWP - luluc (kg CO2 eq): Global warming potential of land use and land use change; ODP (kg CFC-11 eq): Stratospheric ozone layer depletion potential; AP (mol H+ eq): Acidification potential, accumulated surplus; EP-freshwater (kg PO4 eq): Eutrophication potential, fraction of nutrients reaching the final freshwater compartment;

Parameters that describe the environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 ton of PF4 prestressed wire.

Prestressed Wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq	NR	3,59E+00	7,88E-02	3,26E-01	-1,77E+02
GWP-biogenic	kg CO2 eq	NR	2,07E-04	3,42E-04	4,39E-05	-1,30E-01
GWP-luluc	kg CO2 eq	NR	2,86E-05	1,22E-06	1,11E-05	-6,38E-02
GWP-total	kg CO2 eq	NR	3,59E+00	7,92E-02	3,26E-01	-1,77E+02
ODP	kg CFC-11 eq	NR	8,39E-07	1,77E-08	6,76E-08	-7,15E-06
AP	mol H+ eq	NR	1,21E-02	5,60E-04	3,35E-03	-7,02E-01
EP-freshwater	kg PO4 eq	NR	1,58E-03	8,54E-05	5,14E-04	-7,50E-02
EP-marine	kg N eq	NR	3,82E-03	2,34E-04	1,46E-03	-1,38E-01
EP-terrestrial	mol N eq	NR	4,20E-02	2,56E-03	1,60E-02	-1,59E+00
POCP	kg NMVOC eq	NR	1,15E-02	7,72E-04	4,45E-03	-7,60E-01
ADP-minerals&metals 2	kg Sb eq	NR	1,54E-07	3,55E-09	1,57E-08	-2,35E-03
ADP-fossil 2	MJ, v.c.n.	NR	5,00E+01	1,08E+00	4,33E+00	-1,66E+03
WDP 2	m3 eq	NR	-4,78E-03	-3,83E-01	2,08E-03	-3,77E+01

EP-marine (kg N eq): Eutrophication potential, fraction of nutrients that reach the final compartment of seawater; EP-terrestrial (mol N eq): Eutrophication potential, accumulated surplus; POCP (kg NMVOC eq): Tropospheric ozone formation potential; ADP-minerals&metals (kg Sb eq): Abiotic resource depletion potential for non-fossil resources; APD-fossil (MJ, v.c.n): Abiotic resource depletion potential for fossil resources; WDP (m3 eq): Water deprivation potential (user), weighted water deprivation consumption.

Environmental impact parameters:

Prestressed Wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
PM	Disease Incidence	2,24E-05	1,07E-07	1,19E-06	2,37E-05	3,29E-07
IRP 1	kBq U235 eq	1,62E+01	8,85E-02	3,32E+00	1,96E+01	2,48E-01
ETP-fw 2	CTUe	5,09E+03	8,26E+00	6,85E+02	5,78E+03	2,32E+01
HTP-c 2	CTUh	3,10E-06	1,16E-10	7,62E-08	3,17E-06	4,49E-10
HTP-nc 2	CTUh	4,87E-06	1,35E-08	6,88E-06	1,18E-05	3,99E-08
SQP 2	Pt	3,09E+02	5,47E-02	7,26E+02	1,03E+03	1,52E-01

PM (disease incidence): Potential incidence of diseases due to emissions of particulate matter; IRP (kBq U235 eq): Exposure efficiency of human potential relative to U235; ETP-fw (CTUe): Comparative toxic unit potential for ecosystems - freshwater; HTP-c (CTUh): Comparative potential of toxic unit for ecosystems - carcinogenic effects; HTP-nc (CTUh): Comparative toxic unit potential for ecosystems - non-cancer effects; SQP (Pt): Soil quality potential index.

Additional environmental impact parameters defined in the UNE-EN 15804 Standard for the production of 1 ton of PF4 prestressed wire.

Prestressed Wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
PM	Disease Incidence	NR	3,58E-07	4,28E-08	8,98E-08	-1,26E-05
IRP 1	kBq U235 eq	NR	2,18E-01	4,67E-03	1,82E-02	-3,07E+00
ETP-fw 2	CTUe	NR	2,20E+01	7,12E+00	2,20E+00	-4,68E+03
HTP-c 2	CTUh	NR	3,08E-10	3,25E-10	2,69E-11	-1,13E-06
HTP-nc 2	CTUh	NR	4,30E-08	3,51E-09	3,26E-09	-4,02E-06
SQP 2	Pt	NR	1,35E-01	1,78E+00	5,32E+00	-2,91E+02

Warning 1. This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The ionizing radiation potential of the soil, due to radon or some construction materials, is not measured in this parameter either.

Warning 2. The results of this environmental impact indicator should be used with caution as the uncertainties of the results are high and experience with this parameter is limited.

Environmental impact parameters:

(1) 3-wire strand PC4; (2) 7-wire strand P61; (3) 7-wire strand P62

3-w Strand PC4 / 7-w Strand P61 / P62. Functional Unit: 1.000 kg								
Parameter	Unit	A1	A2	A3	A1-A3	A4(1)	A4(2)	A4(3)
GWP-fossil	kg CO2 eq	3,54E+02	1,33E+00	2,67E+01	3,82E+02	3,56E+00	9,93E+00	8,57E+00
GWP-biogenic	kg CO2 eq	5,38E+00	7,80E-05	1,26E-01	5,51E+00	2,03E-04	5,69E-04	4,88E-04
GWP-luluc	kg CO2 eq	4,42E-01	1,08E-05	1,85E+00	2,29E+00	3,62E-05	8,75E-05	8,45E-05
GWP-total	kg CO2 eq	3,60E+02	1,34E+00	2,87E+01	3,90E+02	3,56E+00	9,94E+00	8,57E+00
ODP	kg CFC-11 eq	3,85E-05	3,17E-07	1,50E-05	5,38E-05	8,08E-07	2,30E-06	1,95E-06
AP	mol H+ eq	1,35E+00	4,64E-03	2,31E-01	1,58E+00	4,13E-02	6,49E-02	9,02E-02
EP-freshwater	kg PO4 eq	1,84E-01	6,12E-04	3,41E-02	2,19E-01	3,93E-03	6,92E-03	8,73E-03
EP-marine	kg N eq	6,10E-01	1,48E-03	5,22E-02	6,63E-01	1,08E-02	1,81E-02	2,38E-02
EP-terrestrial	mol N eq	5,97E+00	1,63E-02	2,93E-01	6,28E+00	1,20E-01	2,00E-01	2,63E-01
POCP	kg NMVOC eq	1,76E+00	4,45E-03	8,23E-02	1,84E+00	3,10E-02	5,28E-02	6,84E-02
ADP-mineral-s&metals 2	kg Sb eq	2,98E-03	5,80E-08	1,49E-05	3,00E-03	1,22E-07	3,93E-07	3,04E-07
ADP-fossil 2	MJ, v.c.n.	7,15E+03	1,89E+01	3,26E+02	7,50E+03	4,86E+01	1,37E+02	1,17E+02
WDP 2	m3 eq	3,26E+02	-1,81E-03	9,22E+01	4,18E+02	-4,70E-03	-1,32E-02	-1,13E-02

GWP - total (kg CO2 eq): Global warming potential ; GWP - fossil (kg CO2 eq): Global warming potential of fossil fuels; GWP - biogenic (kg CO2 eq): Potencial de calentamiento global biogénico; GWP - luluc (kg CO2 eq): Global warming potential of land use and land use change; ODP (kg CFC-11 eq): Stratospheric ozone layer depletion potential; AP (mol H+ eq): Acidification potential, accumulated surplus; EP-freshwater (kg PO4 eq): Eutrophication potential, fraction of nutrients reaching the final freshwater compartment;

Parameters that describe the environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 ton of 3-wire strand PC4 , and 7-wire strand P61 & P62.

3-w Strand PC4 / 7-w Strand P61 / P62. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq	NR	3,59E+00	7,88E-02	3,26E-01	-1,77E+02
GWP-biogenic	kg CO2 eq	NR	2,07E-04	3,42E-04	4,39E-05	-1,30E-01
GWP-luluc	kg CO2 eq	NR	2,86E-05	1,22E-06	1,11E-05	-6,38E-02
GWP-total	kg CO2 eq	NR	3,59E+00	7,92E-02	3,26E-01	-1,77E+02
ODP	kg CFC-11 eq	NR	8,39E-07	1,77E-08	6,76E-08	-7,15E-06
AP	mol H+ eq	NR	1,21E-02	5,60E-04	3,35E-03	-7,02E-01
EP-freshwater	kg PO4 eq	NR	1,58E-03	8,54E-05	5,14E-04	-7,50E-02
EP-marine	kg N eq	NR	3,82E-03	2,34E-04	1,46E-03	-1,38E-01
EP-terrestrial	mol N eq	NR	4,20E-02	2,56E-03	1,60E-02	-1,59E+00
POCP	kg NMVOC eq	NR	1,15E-02	7,72E-04	4,45E-03	-7,60E-01
ADP-minerals&me-tals 2	kg Sb eq	NR	1,54E-07	3,55E-09	1,57E-08	-2,35E-03
ADP-fossil 2	MJ, v.c.n.	NR	5,00E+01	1,08E+00	4,33E+00	-1,66E+03
WDP 2	m3 eq	NR	-4,78E-03	-3,83E-01	2,08E-03	-3,77E+01

EP-marine (kg N eq): Eutrophication potential, fraction of nutrients that reach the final compartment of seawater; EP-terrestrial (mol N eq): Eutrophication potential, accumulated surplus; POCP (kg NMVOC eq): Tropospheric ozone formation potential; ADP-minerals&metals (kg Sb eq): Abiotic resource depletion potential for non-fossil resources; APD-fossil (MJ, v.c.n): Abiotic resource depletion potential for fossil resources; WDP (m3 eq): Water deprivation potential (user), weighted water deprivation consumption.

Environmental impact parameters:

(1) 3-wire strand PC4; (2) 7-wire strand P61; (3) 7-wire strand P62

3-w Strand PC4 / 7-w Strand P61 / P62. Functional Unit: 1.000 kg								
Parameter	Unit	A1	A2	A3	A1-A3	A4(1)	A4(2)	A4(3)
PM	Disease Incidence	2,28E-05	9,97E-08	1,20E-06	2,41E-05	2,86E-07	9,16E-07	7,09E-07
IRP 1	kBq U235 eq	1,65E+01	8,22E-02	3,38E+00	1,99E+01	2,12E-01	5,98E-01	5,11E-01
ETP-fw 2	CTUe	5,16E+03	7,67E+00	7,79E+02	5,95E+03	1,99E+01	5,89E+01	4,86E+01
HTP-c 2	CTUh	3,14E-06	1,08E-10	7,75E-08	3,22E-06	3,78E-10	9,30E-10	8,86E-10
HTP-nc 2	CTUh	4,94E-06	1,25E-08	6,99E-06	1,19E-05	3,46E-08	1,10E-07	8,57E-08
SQP 2	Pt	3,13E+02	5,08E-02	7,26E+02	1,04E+03	1,30E-01	3,69E-01	3,14E-01

PM (disease incidence): Potential incidence of diseases due to emissions of particulate matter; IRP (kBq U235 eq): Exposure efficiency of human potential relative to U235; ETP-fw (CTUe): Comparative toxic unit potential for ecosystems - freshwater; HTP-c (CTUh): Comparative potential of toxic unit for ecosystems - carcinogenic effects; HTP-nc (CTUh): Comparative toxic unit potential for ecosystems - non-cancer effects; SQP (Pt): Soil quality potential index.

Additional environmental impact parameters defined in the UNE-EN 15804 Standard for the production of 1 ton of 3-wire strand PC4 , and 7-wire strand P61 & P62.

3-w Strand PC4 / 7-w Strand P61 / P62. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
PM	Disease Incidence	NR	3,58E-07	4,28E-08	8,98E-08	-1,26E-05
IRP 1	kBq U235 eq	NR	2,18E-01	4,67E-03	1,82E-02	-3,07E+00
ETP-fw 2	CTUe	NR	2,20E+01	7,12E+00	2,20E+00	-4,68E+03
HTP-c 2	CTUh	NR	3,08E-10	3,25E-10	2,69E-11	-1,13E-06
HTP-nc 2	CTUh	NR	4,30E-08	3,51E-09	3,26E-09	-4,02E-06
SQP 2	Pt	NR	1,35E-01	1,78E+00	5,32E+00	-2,91E+02

Warning 1. This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The ionizing radiation potential of the soil, due to radon or some construction materials, is not measured in this parameter either.

Warning 2. The results of this environmental impact indicator should be used with caution as the uncertainties of the results are high and experience with this parameter is limited.

Environmental impact parameters:

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
GWP-fossil	kg CO2 eq	3,35E+02	1,89E+01	2,25E+02	5,79E+02	5,81E+00
GWP-biogenic	kg CO2 eq	5,07E+00	1,11E-03	4,74E-01	5,55E+00	3,31E-04
GWP-luluc	kg CO2 eq	4,17E-01	1,53E-04	1,83E+00	2,25E+00	5,61E-05
GWP-total	kg CO2 eq	3,41E+02	1,89E+01	2,27E+02	5,87E+02	5,81E+00
ODP	kg CFC-11 eq	3,64E-05	4,49E-06	5,31E-05	9,39E-05	1,33E-06
AP	mol H+ eq	1,27E+00	6,57E-02	1,03E+00	2,36E+00	5,67E-02
EP-freshwater	kg PO4 eq	1,74E-01	8,67E-03	1,02E-01	2,85E-01	5,56E-03
EP-marine	kg N eq	4,03E-01	2,10E-02	1,82E-01	6,06E-01	1,51E-02
EP-terrestrial	mol N eq	3,65E+00	2,31E-01	1,69E+00	5,58E+00	1,67E-01
POCP	kg NMVOC eq	1,15E+00	6,30E-02	1,66E+00	2,87E+00	4,34E-02
ADP-minerals&metals 2	kg Sb eq	2,79E-03	8,22E-07	9,76E-05	2,89E-03	2,10E-07
ADP-fossil 2	MJ, v.c.n.	3,78E+03	2,67E+02	7,46E+03	1,15E+04	7,96E+01
WDP 2	m3 eq	1,27E+02	-2,56E-02	2,14E+02	3,40E+02	-7,68E-03

GWP - total (kg CO2 eq): Global warming potential ; GWP - fossil (kg CO2 eq): Global warming potential of fossil fuels; GWP - biogenic (kg CO2 eq): Potencial de calentamiento global biogénico; GWP - luluc (kg CO2 eq): Global warming potential of land use and land use change; ODP (kg CFC-11 eq): Stratospheric ozone layer depletion potential; AP (mol H+ eq): Acidification potential, accumulated surplus; EP-freshwater (kg PO4 eq): Eutrophication potential, fraction of nutrients reaching the final freshwater compartment;

Parameters that describe the environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 ton of sheathed strand P63.

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
GWP-fossil	kg CO2 eq	NR	3,59E+00	2,73E+01	1,03E+01	-1,99E+02
GWP-biogenic	kg CO2 eq	NR	2,07E-04	8,18E-04	5,11E-04	-1,77E-01
GWP-luluc	kg CO2 eq	NR	2,86E-05	8,66E-05	2,76E-05	-6,47E-02
GWP-total	kg CO2 eq	NR	3,59E+00	2,73E+01	1,03E+01	-1,99E+02
ODP	kg CFC-11 eq	NR	8,39E-07	6,97E-08	1,26E-07	-7,02E-06
AP	mol H+ eq	NR	1,21E-02	6,22E-03	6,17E-03	-7,61E-01
EP-freshwater	kg PO4 eq	NR	1,58E-03	1,47E-03	1,96E-03	-7,68E-02
EP-marine	kg N eq	NR	3,82E-03	3,03E-03	4,48E-03	-1,47E-01
EP-terrestrial	mol N eq	NR	4,20E-02	3,12E-02	2,96E-02	-1,68E+00
POCP	kg NMVOC eq	NR	1,15E-02	7,58E-03	1,04E-02	-8,13E-01
ADP-minerals&metals 2	kg Sb eq	NR	1,54E-07	1,91E-07	3,09E-08	-2,10E-03
ADP-fossil 2	MJ, v.c.n.	NR	5,00E+01	4,17E+00	7,90E+00	-2,90E+03
WDP 2	m3 eq	NR	-4,78E-03	-2,17E-01	5,82E-03	-6,62E+01

EP-marine (kg N eq): Eutrophication potential, fraction of nutrients that reach the final compartment of seawater; EP-terrestrial (mol N eq): Eutrophication potential, accumulated surplus; POCP (kg NMVOC eq): Tropospheric ozone formation potential; ADP-minerals&metals (kg Sb eq): Abiotic resource depletion potential for non-fossil resources; APD-fossil (MJ, v.c.n): Abiotic resource depletion potential for fossil resources; WDP (m3 eq): Water deprivation potential (user), weighted water deprivation consumption.

Environmental impact parameters:

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
PM	Disease Incidence	2,15E-05	1,41E-06	8,55E-06	3,14E-05	4,91E-07
IRP 1	kBq U235 eq	1,55E+01	1,16E+00	1,66E+01	3,33E+01	3,47E-01
ETP-fw 2	CTUe	4,87E+03	1,09E+02	2,70E+03	7,67E+03	3,32E+01
HTP-c 2	CTUh	2,96E-06	1,53E-09	1,55E-07	3,12E-06	5,90E-10
HTP-nc 2	CTUh	4,65E-06	1,77E-07	8,10E-06	1,29E-05	5,93E-08
SQP 2	Pt	2,95E+02	7,20E-01	2,06E+03	2,35E+03	2,13E-01

PM (disease incidence): Potential incidence of diseases due to emissions of particulate matter; IRP (kBq U235 eq): Exposure efficiency of human potential relative to U235; ETP-fw (CTUe): Comparative toxic unit potential for ecosystems - freshwater; HTP-c (CTUh): Comparative potential of toxic unit for ecosystems - carcinogenic effects; HTP-nc (CTUh): Comparative toxic unit potential for ecosystems - non-cancer effects; SQP (Pt): Soil quality potential index.

Additional environmental impact parameters defined in the UNE-EN 15804 Standard for the production of 1 ton of sheathed strand P63.

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
PM	Disease Incidence	NR	3,58E-07	5,93E-08	1,65E-07	-1,26E-05
IRP 1	kBq U235 eq	NR	2,18E-01	1,13E-02	4,43E-02	-3,59E+00
ETP-fw 2	CTUe	NR	2,20E+01	6,45E+01	8,06E+00	-4,26E+03
HTP-c 2	CTUh	NR	3,08E-10	1,68E-09	6,45E-11	-1,01E-06
HTP-nc 2	CTUh	NR	4,30E-08	7,61E-08	6,90E-09	-3,70E-06
SQP 2	Pt	NR	1,35E-01	1,97E+00	1,72E+01	-2,70E+02

Warning 1. This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The ionizing radiation potential of the soil, due to radon or some construction materials, is not measured in this parameter either.

Warning 2. The results of this environmental impact indicator should be used with caution as the uncertainties of the results are high and experience with this parameter is limited.

Use of resources:

Prestressed Wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
PERE	MJ, v.c.n.	3,89E+03	3,12E-02	2,27E+02	4,12E+03	8,43E-02
PERM	MJ, v.c.n.	0	0	0	0	0
PERT	MJ, v.c.n.	3,89E+03	3,12E-02	2,27E+02	4,12E+03	8,43E-02
PENRE	MJ, v.c.n.	4,75E+03	2,04E+01	4,83E+02	5,25E+03	5,70E+01
PENRM	MJ, v.c.n.	0	0	0	0	0
PENRT	MJ, v.c.n.	4,75E+03	2,04E+01	4,83E+02	5,25E+03	5,70E+01
SM	kg	9,11E+02	0	0	9,11E+02	0
RSF	MJ, v.c.n.	0	0	0	0	0
NRSF	MJ, v.c.n.	0	0	0	0	0
FW	m3	4,88E+00	1,03E-03	1,41E+00	6,29E+00	2,79E-03

PERE (MJ, v.c.n.): Use of renewable primary energy excluding renewable primary energy resources used as raw material; PERM (MJ, v.c.n.): Use of renewable primary energy used as raw material; PERT (MJ, v.c.n.): Total use of renewable primary energy; PENRE (MJ, v.c.n.): Non-renewable primary energy use, excluding non-renewable primary energy resources used as raw material; PENRM (MJ, v.c.n.): Use of non-renewable primary energy used as raw material; PENRT (MJ, v.c.n.): Total use of non-renewable primary energy; SM (kg): Use of secondary materials; RSF (MJ, v.c.n.): Use of renewable secondary fuels; NRSF (MJ, v.c.n.): Use of non-renewable secondary fuels; FW (m3): Net use of fresh water resources.

Parameters that describe the use of resources for the production of 1 ton of prestressed wire PF4.

Prestressed Wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
PERE	MJ, v.c.n.	NR	7,68E-02	2,01E-03	1,82E-02	-1,69E+02
PERM	MJ, v.c.n.	NR	0	0	0	0
PERT	MJ, v.c.n.	NR	7,68E-02	2,01E-03	1,82E-02	-1,69E+02
PENRE	MJ, v.c.n.	NR	5,01E+01	1,08E+00	4,34E+00	-1,76E+03
PENRM	MJ, v.c.n.	NR	0	0	0	0
PENRT	MJ, v.c.n.	NR	5,01E+01	1,08E+00	4,34E+00	-1,76E+03
SM	kg	NR	0	0	0	0
RSF	MJ, v.c.n.	NR	0	0	0	0
NRSF	MJ, v.c.n.	NR	0	0	0	0
FW	m3	NR	2,53E-03	5,54E-05	2,38E-04	-5,65E-01

Use of resources:

(1) 3-wire strand PC4; (2) 7-wire strand P61; (3) 7-wire strand P62

3-w Strand PC4 / 7-w Strand P61 / P62. Functional Unit: 1.000 kg								
Parameter	Unit	A1	A2	A3	A1-A3	A4(1)	A4(2)	A4(3)
PERE	MJ, v.c.n.	4,28E+03	2,90E-02	2,27E+02	4,50E+03	7,22E-02	2,08E-01	1,75E-01
PERM	MJ, v.c.n.	0	0	0	0	0	0	0
PERT	MJ, v.c.n.	4,28E+03	2,90E-02	2,27E+02	4,50E+03	7,22E-02	2,08E-01	1,75E-01
PENRE	MJ, v.c.n.	4,82E+03	1,89E+01	4,89E+02	5,33E+03	4,87E+01	1,38E+02	1,17E+02
PENRM	MJ, v.c.n.	0	0	0	0	0	0	0
PENRT	MJ, v.c.n.	4,82E+03	1,89E+01	4,89E+02	5,33E+03	4,87E+01	1,38E+02	1,17E+02
SM	kg	9,49E+02	0	0	9,49E+02	0	0	0
RSF	MJ, v.c.n.	0	0	0	0	0	0	0
NRSF	MJ, v.c.n.	0	0	0	0	0	0	0
FW	m3	4,95E+00	9,54E-04	1,73E+00	6,68E+00	2,39E-03	6,86E-03	5,78E-03

PERE (MJ, v.c.n.): Use of renewable primary energy excluding renewable primary energy resources used as raw material; PERM (MJ, v.c.n.): Use of renewable primary energy used as raw material; PERT (MJ, v.c.n.): Total use of renewable primary energy; PENRE (MJ, v.c.n.): Non-renewable primary energy use, excluding non-renewable primary energy resources used as raw material; PENRM (MJ, v.c.n.): Use of non-renewable primary energy used as raw material; PENRT (MJ, v.c.n.): Total use of non-renewable primary energy; SM (kg): Use of secondary materials; RSF (MJ, v.c.n.): Use of renewable secondary fuels; NRSF (MJ, v.c.n.): Use of non-renewable secondary fuels; FW (m3): Net use of fresh water resources.

Parameters that describe the use of resources for the production of 1 ton of 3-wire strand PC4 , and 7-wire strand P61 & P62.

3-w Strand PC4 / 7-w Strand P61 / P62. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
PERE	MJ, v.c.n.	NR	7,68E-02	2,01E-03	1,82E-02	-1,69E+02
PERM	MJ, v.c.n.	NR	0	0	0	0
PERT	MJ, v.c.n.	NR	7,68E-02	2,01E-03	1,82E-02	-1,69E+02
PENRE	MJ, v.c.n.	NR	5,01E+01	1,08E+00	4,34E+00	-1,76E+03
PENRM	MJ, v.c.n.	NR	0	0	0	0
PENRT	MJ, v.c.n.	NR	5,01E+01	1,08E+00	4,34E+00	-1,76E+03
SM	kg	NR	0	0	0	0
RSF	MJ, v.c.n.	NR	0	0	0	0
NRSF	MJ, v.c.n.	NR	0	0	0	0
FW	m3	NR	2,53E-03	5,54E-05	2,38E-04	-5,65E-01

Use of resources:

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
PERE	MJ, v.c.n.	6,66E+03	4,11E-01	5,67E+02	7,23E+03	1,19E-01
PERM	MJ, v.c.n.	0	0	0	0	0
PERT	MJ, v.c.n.	6,66E+03	4,11E-01	5,67E+02	7,23E+03	1,19E-01
PENRE	MJ, v.c.n.	4,54E+03	2,68E+02	7,98E+03	1,28E+04	7,97E+01
PENRM	MJ, v.c.n.	0	0	0	0	0
PENRT	MJ, v.c.n.	4,54E+03	2,68E+02	7,98E+03	1,28E+04	7,97E+01
SM	kg	8,49E+02	0	0	8,49E+02	0
RSF	MJ, v.c.n.	0	0	0	0	0
NRSF	MJ, v.c.n.	0	0	0	0	0
FW	m3	4,66E+00	1,35E-02	2,28E+00	6,96E+00	3,94E-03

PERE (MJ, v.c.n.): Use of renewable primary energy excluding renewable primary energy resources used as raw material; PERM (MJ, v.c.n.): Use of renewable primary energy used as raw material; PERT (MJ, v.c.n.): Total use of renewable primary energy; PENRE (MJ, v.c.n.): Non-renewable primary energy use, excluding non-renewable primary energy resources used as raw material; PENRM (MJ, v.c.n.): Use of non-renewable primary energy used as raw material; PENRT (MJ, v.c.n.): Total use of non-renewable primary energy; SM (kg): Use of secondary materials; RSF (MJ, v.c.n.): Use of renewable secondary fuels; NRSF (MJ, v.c.n.): Use of non-renewable secondary fuels; FW (m3): Net use of fresh water resources.

Parameters that describe the use of resources for the production of 1 ton of sheathed strand P63.

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
PERE	MJ, v.c.n.	NR	7,68E-02	1,80E-01	4,57E-01	-1,70E+02
PERM	MJ, v.c.n.	NR	0	0	0	0
PERT	MJ, v.c.n.	NR	7,68E-02	1,80E-01	4,57E-01	-1,70E+02
PENRE	MJ, v.c.n.	NR	5,01E+01	4,35E+00	8,28E+00	-3,07E+03
PENRM	MJ, v.c.n.	NR	0	0	0	0
PENRT	MJ, v.c.n.	NR	5,01E+01	4,35E+00	8,28E+00	-3,07E+03
SM	kg	NR	0	0	0	0
RSF	MJ, v.c.n.	NR	0	0	0	0
NRSF	MJ, v.c.n.	NR	0	0	0	0
FW	m3	NR	2,53E-03	4,43E-02	5,35E-04	-5,81E-01

Waste categories:

Parameters that describe the waste categories for the production of 1 ton of prestressed wire PF4.

Prestressed wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
HWD	kg	5,10E-03	5,35E-05	1,04E-03	6,19E-03	1,19E-04
NHWD	kg	7,03E+01	1,07E-03	1,25E+01	8,28E+01	3,09E-03
RWD	kg	1,89E-02	1,46E-04	2,94E-03	2,20E-02	4,09E-04

Parameters that describe the categories of waste for the production of 1 ton of 3-wire strand PC4 , and 7-wire strand P61 & P62.

3-w strand PC4 / 7-w strand P61 / P62. Functional Unit: 1.000 kg								
Parameter	Unit	A1	A2	A3	A1-A3	A4 (1)	A4 (2)	A4 (3)
HWD	kg	5,17E-03	4,97E-05	9,77E-04	6,19E-03	1,03E-04	3,35E-04	2,57E-04
NHWD	kg	7,13E+01	9,92E-04	1,27E+01	8,40E+01	2,63E-03	7,30E-03	6,33E-03
RWD	kg	1,91E-02	1,35E-04	2,98E-03	2,23E-02	3,49E-04	9,84E-04	8,41E-04

Parameters that describe the categories of waste for the production of 1 ton of sheathed strand P63.

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
HWD	kg	4,88E-03	7,04E-04	6,53E-03	1,21E-02	1,78E-04
NHWD	kg	6,72E+01	1,41E-02	1,72E+01	8,44E+01	4,28E-03
RWD	kg	1,81E-02	1,92E-03	2,11E-02	4,10E-02	5,71E-04

HWD (kg): Hazardous waste disposed ; NHWD (kg): Non hazardous waste disposed; RWD (kg): Radioactive waste disposed.

Prestressed wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
HWD	kg	NR	1,32E-04	2,81E-06	1,09E-05	-1,38E-02
NHWD	kg	NR	2,63E-03	1,16E+01	1,29E+02	-7,00E+01
RWD	kg	NR	3,58E-04	7,68E-06	2,99E-05	-3,01E-03

(1) 3-wire strand PC4; (2) 7-wire strand P61; (3) 7-wire strand P62

3-w strand PC4 / 7-w strand P61 / P62. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
HWD	kg	NR	1,32E-04	2,81E-06	1,09E-05	-1,38E-02
NHWD	kg	NR	2,63E-03	1,16E+01	1,29E+02	-7,00E+01
RWD	kg	NR	3,58E-04	7,68E-06	2,99E-05	-3,01E-03

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
HWD	kg	NR	1,32E-04	5,97E-05	2,03E-05	-1,24E-02
NHWD	kg	NR	2,63E-03	1,10E+01	1,86E+02	-6,29E+01
RWD	kg	NR	3,58E-04	1,46E-05	6,09E-05	-3,46E-03

Outflows:

Parameters that describe the output flows for the production of 1 ton of prestressed wire PF4.

Prestressed wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
CRU	kg	0	0	0	0	0
MFR	kg	0	0	1,68E+01	1,68E+01	0
MER	kg	0	0	0	0	0
EE	MJ	0	0	0	0	0

Parameters that describe the output flows for the production of 1 ton of 3-wire strand PC4 , and 7-wire strand P61 & P62.

3-w strand PC4 / 7-w strand P61 / P62. Functional Unit: 1.000 kg								
Parameter	Unit	A1	A2	A3	A1-A3	A4 (1)		A4 (2)
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	3,08E+01	3,08E+01	0	0	0
MER	kg	0	0	0	0	0	0	0
EE	MJ	0	0	0	0	0	0	0

CRU (kg): Components for re-use; MFR (kg): Materials for recycling; MER (kg): Materials for energy recovery; EE (MJ): Exported electric energy.

Prestressed wire PF4. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
CRU	kg	NR	0	0	0	0
MFR	kg	NR	0	8,50E+02	0	0
MER	kg	NR	0	2,10E+01	0	0
EE	MJ	NR	0	0	0	0

(1) 3-wire strand PC4; (2) 7-wire strand P61; (3) 7-wire strand P62

3-w strand PC4 / 7-w strand P61 / P62. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
CRU	kg	NR	0	0	0	0
MFR	kg	NR	0	8,50E+02	0	0
MER	kg	NR	0	2,10E+01	0	0
EE	MJ	NR	0	0	0	0

Outflows:

Parameters that describe the output flows for the production of 1 ton of sheathed strand P63.

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	A1	A2	A3	A1-A3	A4
CRU	kg	0	0	0	0	0
MFR	kg	0	0	7,82E+01	7,82E+01	0
MER	kg	0	0	0	0	0
EE	MJ	0	0	0	0	0

CRU (kg): Components for re-use; MFR (kg): Materials for recycling; MER (kg): Materials for energy recovery; EE (MJ): Exported electric energy.

Sheathed Strand P63. Functional Unit: 1.000 kg						
Parameter	Unit	C1	C2	C3	C4	D
CRU	kg	NR	0	0	0	0
MFR	kg	NR	0	7,84E+02	0	0
MER	kg	NR	0	3,03E+01	0	0
EE	MJ	NR	0	0	0	0

Information on biogenic carbon content:

The manufacturer declares that the drawn steel products do not contain materials with biogenic carbon.

Following the indications of the reference standard, the declaration of the biogenic carbon content of the packaging is omitted because the mass of the materials that contain biogenic carbon in the packaging is less than 5% of the total mass of the product.

6. Additional environmental information

6.1. Indoor air emissions

The use in the construction of drawn steel products, prestressed wire, bare strand, and sheathed strand, does not produce emissions into the indoor air during its useful life.

6.2. Release to soil and water

The use in the construction of drawn steel products, prestressed wire, bare strand and sheathed strand, does not generate emissions to the ground or water, during its useful life.

6.3. Results of the EF 3.0 Methodology

As additional information, the results of applying the EF 3.0 Method (adapted) V1.00 / EF 3.0 normalization and weighting set methodology to the product stage (A1-A3) of Tycsa PSC's drawn steel products have been calculated.

All results refer to the declared unit, which is without 1,000 kg (1 ton) of product. The values for the environmental impact categories considered in the applied methodology are shown.

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

Potential environmental impacts resulting from the application of the EF 3.0 Method for the production of 1 ton of PF4 prestressed wire using a 100% renewable electrical mix.

Impact Categories	Unit	A1	A2	A3	Total
Climate change	kg CO2 eq	3,55E+02	1,44E+00	2,83E+01	3,85E+02
Ozone depletion	kg CFC11 eq	3,80E-05	3,41E-07	1,51E-05	5,34E-05
Ionising radiation	kBq U-235 eq	1,62E+01	8,85E-02	3,32E+00	1,96E+01
Photochemical ozone formation	kg NMVOC eq	1,20E+00	4,79E-03	8,12E-02	1,28E+00
Particulate matter	disease inc.	2,24E-05	1,07E-07	1,19E-06	2,37E-05
Human toxicity, non-cancer	CTUh	4,87E-06	1,35E-08	6,88E-06	1,18E-05
Human toxicity, cancer	CTUh	3,10E-06	1,16E-10	7,62E-08	3,17E-06
Acidification	mol H+ eq	1,33E+00	4,99E-03	2,27E-01	1,56E+00
Eutrophication, freshwater	kg P eq	7,84E-03	7,35E-07	2,40E-03	1,02E-02
Eutrophication, marine	kg N eq	4,22E-01	1,60E-03	4,77E-02	4,71E-01
Eutrophication, terrestrial	mol N eq	3,82E+00	1,76E-02	2,88E-01	4,13E+00
Ecotoxicity, freshwater	CTUe	5,09E+03	8,26E+00	6,85E+02	5,78E+03
Land use	Pt	3,09E+02	5,47E-02	7,26E+02	1,03E+03
Water use	m3 depriv.	1,28E+02	-3,41E-03	7,53E+01	2,04E+02
Resource use, fossils	MJ	4,75E+03	2,04E+01	4,81E+02	5,25E+03
Resource use, minerals and metals	kg Sb eq	2,92E-03	6,24E-08	1,38E-05	2,93E-03

Potential environmental impacts resulting from the application of the EF 3.0 Method for the production of 1 ton of PC4 3-wire strand / P61 7-wire strand / P62 7-wire strand using a 100% renewable electrical mix.

Impact Categories	Unit	A1	A2	A3	Total
Climate change	kg CO2 eq	3,60E+02	1,34E+00	2,87E+01	3,90E+02
Ozone depletion	kg CFC11 eq	3,85E-05	3,17E-07	1,50E-05	5,38E-05
Ionising radiation	kBq U-235 eq	1,65E+01	8,22E-02	3,38E+00	1,99E+01
Photochemical ozone formation	kg NMVOC eq	1,21E+00	4,45E-03	8,23E-02	1,30E+00
Particulate matter	disease inc.	2,28E-05	9,97E-08	1,20E-06	2,41E-05
Human toxicity, non-cancer	CTUh	4,94E-06	1,25E-08	6,99E-06	1,19E-05
Human toxicity, cancer	CTUh	3,14E-06	1,08E-10	7,75E-08	3,22E-06
Acidification	mol H+ eq	1,35E+00	4,64E-03	2,31E-01	1,58E+00
Eutrophication, freshwater	kg P eq	7,95E-03	6,83E-07	2,63E-03	1,06E-02
Eutrophication, marine	kg N eq	4,27E-01	1,48E-03	5,22E-02	4,81E-01
Eutrophication, terrestrial	mol N eq	3,88E+00	1,63E-02	2,93E-01	4,18E+00
Ecotoxicity, freshwater	CTUe	5,16E+03	7,67E+00	7,79E+02	5,95E+03
Land use	Pt	3,13E+02	5,08E-02	7,26E+02	1,04E+03
Water use	m3 depriv.	1,30E+02	-3,16E-03	9,18E+01	2,22E+02
Resource use, fossils	MJ	4,82E+03	1,89E+01	4,87E+02	5,32E+03
Resource use, minerals and metals	kg Sb eq	2,96E-03	5,79E-08	1,38E-05	2,97E-03

Potential environmental impacts resulting from the application of the EF 3.0 Method for the production of 1 ton of P63 sheathed strand using a 100% renewable electrical mix.

Impact Categories	Unit	A1	A2	A3	Total
Climate change	kg CO2 eq	3,41E+02	1,89E+01	2,27E+02	5,87E+02
Ozone depletion	kg CFC11 eq	3,64E-05	4,49E-06	5,31E-05	9,39E-05
Ionising radiation	kBq U-235 eq	1,55E+01	1,16E+00	1,66E+01	3,33E+01
Photochemical ozone formation	kg NMVOC eq	1,15E+00	6,30E-02	1,66E+00	2,87E+00
Particulate matter	disease inc.	2,15E-05	1,41E-06	8,55E-06	3,14E-05
Human toxicity, non-cancer	CTUh	4,65E-06	1,77E-07	8,10E-06	1,29E-05
Human toxicity, cancer	CTUh	2,96E-06	1,53E-09	1,55E-07	3,12E-06
Acidification	mol H+ eq	1,27E+00	6,57E-02	1,03E+00	2,36E+00
Eutrophication, freshwater	kg P eq	7,50E-03	9,68E-06	6,36E-03	1,39E-02
Eutrophication, marine	kg N eq	4,03E-01	2,10E-02	1,82E-01	6,06E-01
Eutrophication, terrestrial	mol N eq	3,65E+00	2,31E-01	1,69E+00	5,58E+00
Ecotoxicity, freshwater	CTUe	4,87E+03	1,09E+02	2,70E+03	7,67E+03
Land use	Pt	2,95E+02	7,20E-01	2,06E+03	2,35E+03
Water use	m3 depriv.	1,23E+02	-4,48E-02	2,18E+02	3,41E+02
Resource use, fossils	MJ	4,54E+03	2,68E+02	7,98E+03	1,28E+04
Resource use, minerals and metals	kg Sb eq	2,79E-03	8,21E-07	9,40E-05	2,88E-03

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