Environmental Product Declaration

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

DrenPro® pipes

from

ADS TIGRE CHILE LTDA

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	Regional Hub: EPD Brasil. www.environdec.com
Type of EPD:	EPD of a single product from a manufacturer/service provider
EPD registration number:	EPD-IES-0025537:003
Original version date:	2025-08-21
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Validity date:	2030-08-21

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

GENERAL INFORMATION

Programme Information	
Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): ***Construction products, 2019:14, version 2.0.1*** ***UN CPC code(s): 363 – Semi-manufactures of plastics and 36320 – Tubes, pipes and hoses, and fittings therefor, of plastics pipes.***
PCR review was conducted by: ***The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com. The last appointed Chairs of the PCR were: Rob Rouwette (chair) and Noa Meron (co-chair).***
c-PCR, if applicable:

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: *Diogo Aparecido Lopes Silva; Universidade Federal de São Carlos (UFSCar); diogo.apls@ufscar.br* Approved by: International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No [Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with

the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.
For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: ADS Tigre Chile Ltda.

Address: Panamericana Norte 20500, Lampa, Región Metropolitana, Chile

Contact: Osvaldo B. Oliveira Jr [obarbosa@tigre-ads.com]

Address and contact information of the LCA practitioner commissioned by the EPD owner:
Henrique Rogerio Antunes de Souza Junior, EnCiclo Soluções Sustentáveis
[henrique@enciclo.com.br]

Description of the organisation:
Protecting water resources and the environment is ADS Tigre's foremost commitment. The company promotes the expansion of sustainable civil construction and responsible water management by investing in innovative solutions for sanitation, rainwater collection, storage, and quality control. Its primary objective is to safeguard aquifers and underground rivers from contamination, thereby contributing to the balance of the natural water cycle.
By combining Tigre's expertise with ADS's innovation, ADS Tigre pioneers water management solutions, delivering durable, safe, and environmentally responsible products. Since 2009, the company has operated in South America, applying proven technologies used in major infrastructure projects worldwide. Its HDPE corrugated pipes are designed for applications in stormwater drainage, mining, sanitary sewer systems, and water detention and retention. Additionally, its StormTech chamber systems are highly effective in flood prevention.
In the face of climate change and the growing demand for sustainable products, ADS Tigre's innovative systems stand out by reducing the carbon footprint and avoiding the extraction of natural resources when compared to conventional technologies.
Investing in ADS Tigre's solutions means committing to a sustainable future, ensuring that each project supports environmental protection and improves quality of life. The company understands that water is the essence of life and a key element for building a sustainable future.

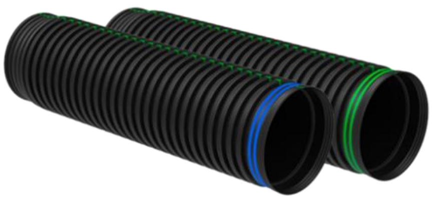
Product-related or management system-related certifications:

ICONTEC – Colombian Technical Regulations for Products and Services	Bureau Veritas – Conformity and Quality Management Certification	ASTM – International Technical Standards for Materials and Testing	AASHTO – U.S. Standards for Infrastructure Design and Materials

PRODUCT INFORMATION

Product name: DrenPro® pipes

Product identification: DrenPro® pipes are exclusive for rainwater drainage, not applicable to effluent drainage. This application avoids the need to use materials for more specific protection, such as anticorrosive, for example. The pipe is composed of HDPE (95%), which includes 60% recycled HDPE (PCR/PIR) and 40% virgin material, along with ceramic tape, pigments, antioxidants, as well as carbon black. After receiving the additives and being subjected to high pressures and temperatures, the resins are shaped into their tubular shape and cut into 6 meters bars in length. The cutting process includes a finishing step to remove any burrs, particularly to facilitate the application of ceramic tape and a sealing ring (made of rubber). These components ensure easy installation of the 'point and pouch' system and provide excellent tightness for the drainage system.



UN CPC code:
363 – Semi-manufactures of plastics.
36320 - Tubes, pipes and hoses, and fittings therefor, of plastics pipes.

Other codes for product classification:
HS Code: 3917.21 - Tubes, pipes, and hoses, rigid, of polymers of ethylene.
ISO 4427 - Polyethylene (PE) pipes for water supply – Specifications.

Product description: ADS Tigre DrenPro® HDPE corrugated pipes were developed with high technology and manufactured in light materials to facilitate installation and transport. They have an enlarged pouch and a conical tip that facilitates the installation, not requiring the use of soldering or electrofusion machines due to its point and pouch union system. One of the advantages of corrugated pipes DrenPro® is the use of a double sealing ring, whose purpose is to ensure greater watertightness.
DrenPro® pipes have hydraulic conditions that ensure optimization of rainwater drainage networks, as well as several installation facilities in smaller ditches. Due to the high structural resistance of HDPE corrugated pipes, its installation allows for less coating, providing greater economy in soil movement (excavation, loading, transport to dump, backfill) and in the use of the machinery involved. O-rings, in compliance with ASTM F477/EN 681, ensure better tightness and strength in the joint. The design meets or exceeds ASTM D3212/EN 1277 laboratory tests, ensuring that the pipe does not leak, and ASTM F1417 waterproof field testing requirements, playing an important role in complying with the most stringent environmental requirements in the handling of water-based fluids.

Product characteristics	
Product names	DrenPro® ADSTIGRE HDPE corrugated pipes
Products covered	DN 600 mm
Product mass	98.5 kg
Resin density	940 a 947 kg/m³
Circumferential flexural modulus (2mm/min)	552 – 758 MPa
Coefficient of linear thermal expansion	2X10-4 - 80 / ºC
Tensile yield stress (50mm/min)	21 - 24 MPa
Ring bending stiffness	2000 a 6000 N/m.m
Nominal diameter	375-1500 mm

Name and location of production site(s): Panamericana Norte 20500, Lampa, Región Metropolitana, Chile.

CONTENT DECLARATION

The mass (weight) of one unit of a product, as purchased or per declared unit: 98.5 kg

Content of the product in the form of a list of materials and substances, and their mass:

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material*, weight-% and kg C/kg
HDPE PCR/PIR	0.604	100%	0% - 0 kg C/kg
HDPE virgin	0.325	0%	0% - 0 kg C/kg
Pigments	0.058	0%	0% - 0 kg C/kg
Ceramic tape (fiberglass)	0.0012	0%	0% - 0 kg C/kg
Sealing ring (rubber)	0.0114	0%	0% - 0 kg C/kg
Plastic tape	0.0004	0%	0% - 0 kg C/kg
TOTAL	1.000	60%	0% - 0 kg C/kg
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
-	-	-	-
TOTAL	-	-	-

* DrenPro pipe composition (materials) do not contain biogenic carbon.

Substances of very high concern (SVHC):
These products contain no substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency.

LCA INFORMATION

Declared unit: 1 kg of DrenPro®

Reference service life: 75 years

Time representativeness: January 2023 – December 2023.

Geographical scope:
A1: Chile, United States of America and Brazil
A2: Global
A3: Chile
A4-D: Chile

Database(s) and LCA software used: Ecoinvent 3.10, Sima Pro 9.6.0.1.

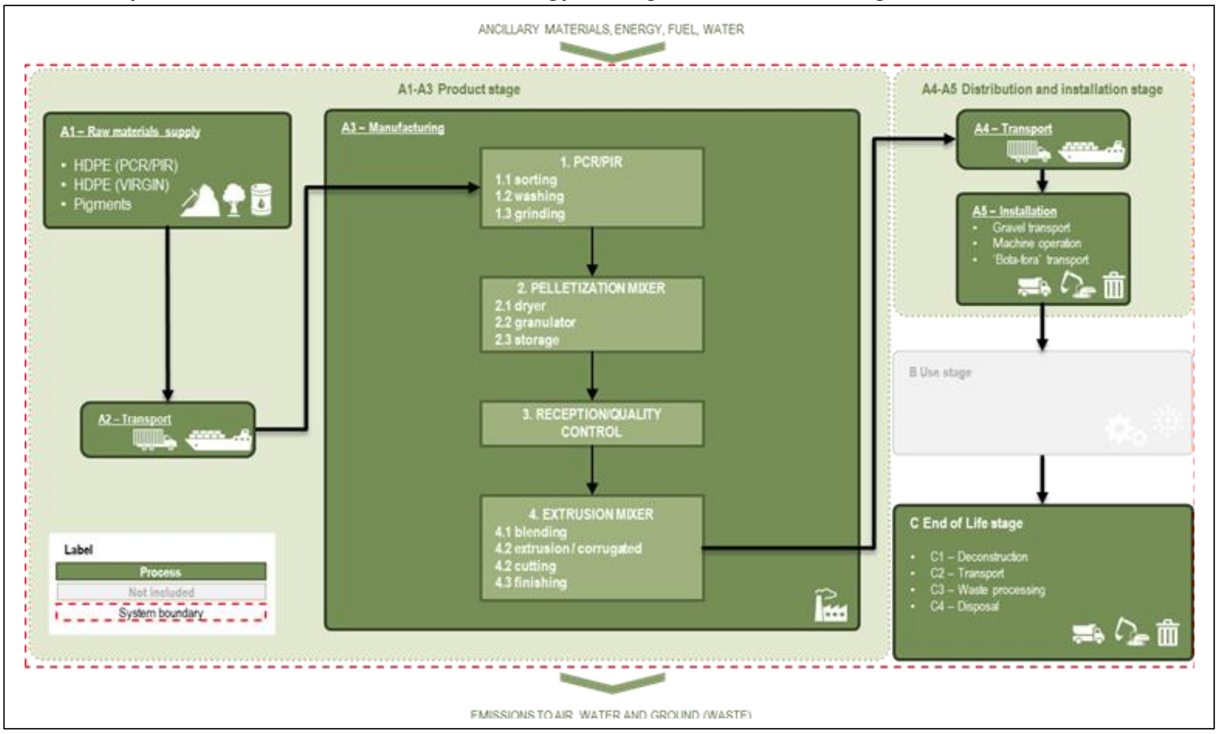
Description of system boundaries:
Cradle to gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules). The additional modules considered are A4 and A5.

For the A4 module, a transport distance of 500 km by road was assumed for delivering materials to the distribution center. The A5 module includes assumptions related to 100 km of road transportation from the distribution center to the installation site, as well as machine operating time, excavation volumes for both trench opening and backfilling, and the consumption of crushed gravel. It is not feasible to identify or characterize a specific application for the product; therefore, the B modules were not considered.

Disclaimer: For a comprehensive assessment, it is essential to consider the results of module C (and not only those of modules A1-A3).
Infrastructure and capital goods was excluded based on the cut-off criteria, as it is expected to have low environmental relevance in relation to the total product production at the facility

The communication of the EPD will be business-to-business (B2B).
The goal of the study is the evaluation of the potential environmental impacts of the DrenPro® pipe.

Process flow diagram:
Process flow diagram of the product system, divided into the life-cycle stages and modules (or other division of the product life cycle, if defined in the PCR), showing the main processes included and the system boundary of the LCA. The diagram shall make it clear when the end-of-waste state is reached for main input flows of reused/recycled materials and recovered energy, and for output flows of reused/recycled materials and recovered energy exiting the end-of-life stage.



More information:

Modules description and Cut-off criteria:

The LCI includes all relevant input and output flows associated with the product system. The only exclusion refers to secondary packaging materials used during the transportation of raw materials, which were deemed negligible. These flows represent less than 1% of the total mass and do not contribute meaningfully to the environmental profile of the product. The inventory complies with the cut-off criteria defined in EN 15804+A2 (Section 6.3.6):

- At least 99% of the total mass and energy inflows are included at the unit process level, and;
- At least 95% of the environmental impacts are captured per module.

The modelling approach ensures a high level of completeness and representativeness. All foreground processes are based on primary data provided by the manufacturer, and mass and energy consistency checks were conducted to verify system completeness. No significant flows were omitted. The implementation of the cut-off rules, including LCI data excluded based on cut-offs, are presented in the following table.

Module		Main data	Accounted
A1) **Raw materials**	**Recycled HDPE:** HDPE is accepted at most recycling centers in the world, as it is one of the easiest plastic polymers to recycle. First, the plastic is sorted and cleaned, to remove any unwanted debris. The polyethylene recycled resin is obtained entirely from recycling companies that recover the resins post-consumption (PCR) present in shampoo bottles, detergent bottles, softener packages, and in post-industry resin (PIR) as drums, gallons, among others. A logistics network is established to gather recycled resins from different region of Chile and Brazil. The waste is received at the recycling plant and passes through several processes, including sorting, washing, grinding and classification/quality check to meet Tigre-ADS material requirements. Final post-consumer resin and PIR are accommodated into big bags and sent to Tigre-ADS manufacturing plants. **Virgin HDPE:** Virgin HDPE is a thermoplastic polymer produced from petroleum through a polymerization process. The material used by Tigre-ADS is sourced from U.S.-based manufacturers that comply with industry standards for resin purity and performance. The production of virgin HDPE involves the cracking of hydrocarbons, typically natural gas or naphtha, followed by polymerization using catalysts to obtain high-molecular-weight polyethylene chains. Once produced, the virgin resin is transported in bulk (e.g., in silos or big bags) to Tigre-ADS manufacturing facilities, where it is stored and dosed according to product specifications. **Additives/pigment**: Pigments are insoluble organic or inorganic particles added to the polymer base to give a specific color to the plastic. Pigments that are organic in nature are hard to disperse and tend to form agglomerates (clumps of pigment particles). These agglomerates can cause spots and specks in the final product. On the other hand, inorganic pigments like metal oxides and sulfides, carbon black, etc. get more easily dispersed in the resin. Amongst the inorganic pigments titanium dioxide is the most widely used pigment in the plastics industry. Major performance properties of pigments in plastics are decided by their weatherability or aging, light fastness, warping or nucleation and transparency. Different types of plastic colorants mainly include masterbatches, colored pellets, colored compounds, dry color, paste colors and liquid masterbatch. They are mixed with natural pellets and molded to produce plastic products.	HDPE (PCR/PIR); HDPE (VIRGIN); Pigments; Ceramic tape (fiberglass); Sealing ring (rubber); Plastic tape.	✓
		Packaging used for the transportation of ancillary materials	⛔
A2) **Transport**	This module primarily addresses the transportation of main raw materials for DrenPro, from suppliers in USA, Brazil and Chile to the manufacturing facility in Lampa, Chile. Maritime transport serves as the dominant mode for delivering the materials to Chilean ports. Subsequently, road transport is utilized to transfer	Inbound logistics: Transport, freight, sea, container ship {GLO}| transport, freight, sea,	✓

	the raw materials from the ports to the production site. Both transportation stages are evaluated in terms of fuel consumption, transport distances, and the associated emissions.	container ship | EN15804, U Transport, freight, lorry, unspecified {GLO}| market group for transport, freight, lorry, unspecified | EN15804, U	
A3) Manufacturing	After processing at the recycler unit, PCR/PIR are transported by truck to the factory in Lampa. Arriving at the Tigre-ADS facility in the form of flakes, the material is sent to preparation processes before pelletizing and extrusion, including a blender for regulating granulometry and dryer to correct the granulate humidity. Air is heated and distributed throughout the drum by a fan or a blower. When the drying process is completed, the material goes to the granulator/pelletizer, which is essentially rotary grinders that are used to grind scrap parts and melt delivery systems (sprues and runners) into feedstock-sized granules for reprocessing. This allows the molder to reduce waste and produce components more cost-effectively. Once the plastic is fed into the granulator, a series of cutting knives within the rotor are powered by an electric motor to break the plastic into smaller pieces. After leaving the granulator, the material is stored. The following step is a pre-extrusion blender. Going to the extrusion process, the resin is gravity fed from a top-mounted hopper into the barrel of the extruder. Additives, such as colorants and UV inhibitors, in either liquid or pellet form are often used and can be introduced into the resin below arriving at the hopper. As the material enters the feed throat near the rear of the barrel, and run into the screw, forcing the plastic resin forward into the barrel, which is heated to the desired melt temperature. This step allows the plastic resin to melt gradually as it is pushed through the barrel and lowers the risk of overheating, which would cause degradation in the polymer. The resin leaves the screw and travels through a reinforced screen to remove any contaminants. After this part, the resin enters the die, giving the final product its profile or shape. The molten plastic flows from a cylindrical profile into the product's profile shape and is then cooled. Product quality is dependent upon the level of melt homogeneity achieved by the extruder screw. The extruders consume energy through the drive motor, barrel heaters, cooling fans, cooling water pumps, gear pumps, etc. Typically, the drive motor is the largest energy consuming device in an extruder while barrel/die heaters are responsible for the second largest energy demand. After being cooled, the product is sent to the final steps, such as cutting in the desired shape, finishing, dispatching to installation site. At Tigre-ADS any polyethylene scrap from the DrenPro® production line is reinserted into the processing through an additional grinder that will feed the blender altogether with the flakes from PCR/PIR supplier.	Inputs: Electricity; Water; Lubricating; LPG (forklift). Outputs: Packaging waste; Big bags waste (PP).	✓
		Infrastructure	✓
A4) Transport	The distribution phase in a product's life cycle involves the transportation of finished products from manufacturing facilities to customers, either domestically or internationally. For domestic distribution, road transport is typically used, while international distribution often involves a combination of road and maritime transport.	Outbound logistics	✓
A5) Installation	This step includes the transport of pipes into the site and their installation. The logistics are done with road transportation by diesel-lorries. After arriving at the construction site, the pipes are unloaded by (generally) diesel machinery. Installation involves excavating a trench with depths and widths defined according to the need for tensile strength and the diameter of the pipe. The open trench should receive a layer of approximately 15 cm thick with coarse aggregates (gravel, for example) that serves as a bed to lay the pipes. Generally, the same machine that dug the trench is used to move and lay the pipes, but in the case of the DrenPro®, depending on its diameter (and mass), laying can be done manually. After laying, the pipes need to be connected in order to ensure watertightness. For DrenPro® pipes, as they have an enlarged bag and conical tip, it is not necessary to use	Product transport and installation	✓

	welding or electrofusion machines due to their tip and bag union system, the connection is simply done by pressure between the pipes with the assistance of a lubricating paste. With the pipes in place, the last stage of the installation is filling the trench, which is usually carried out with the material removed during the excavation and disposing of the surplus material (named 'bota-fora'), with the aid of dump trucks to inert landfills.		
C1-C2) Deinstallation	Although it is difficult to estimate precisely due to the long reference service life (RSL) of approximately 75 years, drainage pipes are expected to deteriorate over time and eventually require replacement. Currently, little to no official information is available regarding their actual end-of-life treatment. However, based on expert input from ADSTIGRE, it is expected that the material will be fully recovered at the end of the pipes' life cycle. Accordingly, the baseline scenario in the LCA model assumes 100% recycling of the obsolete pipes. Additionally, a 100% landfill scenario was also modeled as an alternative to assess the potential impacts of a less favorable end-of-life treatment. The uninstallation phase involves excavation to remove the old pipes and install new ones. Given the mono-material composition of the product and the retained material value, obsolete pipes are assumed to be recycled through processes similar to those used in manufacturing. These include cleaning, washing, and grinding to regenerate recycled HDPE resin. Once removed, the pipes are transported from the installation site to a recycling facility, where they are reintegrated into existing recycling streams, such as post-consumer resin (PCR) or post-industrial resin (PIR). Upon arrival, the pipes are sorted and undergo a cleaning process that primarily consumes water and energy. The HDPE is then shredded, melted, and further refined to restore the polymer for reuse.	Product deinstallation and transport	✓
		Transport	✓
C3-C4) End-of-Life		Product for recycling	✓
D) Benefits and loads beyond the system boundary	This phase considers the avoided environmental impacts due to the substitution of virgin materials with recycled ones in future production processes. By recycling HDPE, the need for extracting and processing new raw materials is reduced. Additionally, the reuse of components or materials can extend their lifecycle, further reducing environmental burdens. The overall environmental benefits of Module D depend on the efficiency and effectiveness of the recycling processes and the demand for recycled materials in new production cycles.	Avoided impact of virgin raw material due to the reintegration of secondary raw material into the technological sphere.	✓

Allocation:

In the foreground system, the cut-off allocation approach was applied to manage multifunctionality related to recycling processes. Under this approach, only the transportation of waste to the recovery or recycling facility is considered. This applies to both recyclable waste generated during manufacturing and scrap materials entering the system. That is, raw materials sourced from recycled content are accounted for solely by their transport-related impacts, excluding the environmental burdens of their original production.

The cut-off approach assumes that all environmental burdens and benefits are assigned to the system using the recycled material, while the system generating the waste is not credited for its recyclability. This interpretation aligns with the polluter pays principle and with EN 15804+A2:2019, which states: "Waste processing shall be assigned to the product system that generates the waste until the end-of-waste state is reached." The end-of-waste state is considered achieved once the material has been processed to a point where it can be reintroduced into the market with a positive or neutral value.

As such, cut-off allocation was applied specifically to Modules A1 and A3, where recyclable waste occurs (particularly during raw material sourcing and manufacturing operations. For recovery and recycling processes occurring outside the product system boundaries (Modules C3, C4, and D), only the impacts associated with transporting the material to the treatment facility are considered.

For the background datasets (unit process) from ecoinvent® database it was assumed the default allocation based on the economic value for the multi-output processes. More information on the allocation procedures by ecoinvent® database can be found on Weidema et al. (2013).

Finally, regarding allocations (apportionment) at the plant level, auxiliary inputs consumed, and waste generated in the manufacturing plants were allocated using a 'top-down' approach. This means that the total consumption and waste generation for the entire baseline year of the LCA project were quantified and then proportionally distributed based on the total mass of products manufactured during this period.

Data Quality Assessment (DQA):
The data quality assessment considered three key dimensions, technological, geographical, and temporal representativeness, for all datasets used in the system model. Each dataset was scored on a scale from 1 (very good) to 5 (very poor), in accordance with EN 15804 and the PCR. Based on the individual scores across the life cycle inventory, the average values were 2.29 for technological representativeness, 2.03 for geographical representativeness, and 1.59 for temporal representativeness. These results reflect an overall good to very good data quality, especially for the most impactful modules (A1–A3), which rely on documented and specific datasets, ensuring robust and reliable results for the LCA and EPD.

Emission factor for the electricity production:

ELECTRICITY MODELLING	
Selection of the power mix.	CL GRID.
LCI dataset for the generation of electricity used in module A3. (Documentation of reference year for the dataset)	Electricity, medium voltage {CL}| market for electricity, medium voltage | EN15804, U (2015-2023) https://ecoquery.ecoinvent.org/3.10/cutoff/dataset/20650/documentation
Energy source behind electricity used in the manufacturing process in A3 and its climate impact as kg CO_2 eq./kWh (using the GWP-GHG indicator)	Hard coal: 36% Hydro: 32% Natural gas: 20% Wind: 8% Oil: 1% Other: 3%
	GWP-GHG: 0.1521 kg CO_2 eq./kWh

Name and contact information of LCA practitioner:

EnCiclo SOLUÇÕES SUSTENTÁVEIS	**EnCiclo Soluções Sustentáveis Ltda. Florianópolis, Brazil**	Tel:	Florianópolis: +55 48 99144-9245 São Paulo: +55 11 95694-7217
		Mail:	henrique@enciclo.com.br
		Web:	www.enciclo.com.br

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

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	CL/US/BR	GLO	CL	CL	CL	ND	ND	ND	ND	ND	ND	ND	CL	CL	CL	CL	CL
Specific data used	>39%*			-	-	-	-	-	-	-	-	-	-	-	-	-	
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	

X = module included in EPD

ND = module not declared (does not indicate zero impact result).

CL = Chile | US = United States of America | BR = Brasil | GLO = Global.

* The estimation of GHG-GWP contributions from specific data was conducted based on the contribution tree analysis in SimaPro, mapping the contributions from processes/datasets that were either adapted to reflect the model's reality.

Results of the environmental performance indicators

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks

Mandatory impact category indicators according to EN 15804

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1**	C2**	C3**	C4**	D
GWP-fossil	kg CO_2 eq.	2.11E+00	5.77E-02	6.41E-01	1.87E-01	1.24E-01	2.31E-02	0.00E+00	-8.23E-01
GWP-biogenic	kg CO_2 eq.	1.68E-02	4.81E-04	8.64E-04	5.05E-05	1.97E-04	3.66E-05	0.00E+00	2.53E-02
GWP-luluc	kg CO_2 eq.	9.31E-04	2.23E-04	8.73E-04	5.05E-05	4.81E-04	8.94E-05	0.00E+00	-1.51E-04
GWP-total	kg CO_2 eq.	2.13E+00	5.84E-02	6.42E-01	1.87E-01	1.25E-01	2.32E-02	0.00E+00	-7.98E-01
ODP	kg CFC 11 eq.	4.40E-08	9.62E-10	9.05E-09	3.08E-09	2.07E-09	3.85E-10	0.00E+00	-3.05E-08
AP	mol H^+ eq.	1.11E-02	2.43E-04	3.89E-03	1.50E-03	5.24E-04	9.74E-05	0.00E+00	-2.06E-03
EP-freshwater	kg P eq.	9.22E-05	1.57E-07	6.54E-06	1.96E-07	3.38E-07	6.28E-08	0.00E+00	-1.17E-05
EP-marine	kg N eq.	2.54E-03	1.05E-04	1.51E-03	7.01E-04	2.25E-04	4.19E-05	0.00E+00	-3.98E-04
EP-terrestrial	mol N eq.	2.77E-02	1.13E-03	1.65E-02	7.68E-03	2.43E-03	4.51E-04	0.00E+00	-4.38E-03
POCP	kg NMVOC eq.	1.09E-02	3.57E-04	5.21E-03	2.32E-03	7.68E-04	1.43E-04	0.00E+00	-4.02E-03
ADP-minerals&metals*	kg Sb eq.	7.25E-07	3.85E-09	4.88E-08	7.93E-09	8.30E-09	1.54E-09	0.00E+00	-7.16E-08
ADP-fossil*	MJ	4.36E+01	0.00E+00	8.53E+00	2.46E+00	1.65E+00	3.07E-01	0.00E+00	-2.57E+01
WDP*	m^3	2.56E-01	5.56E-04	2.83E-01	3.13E-03	3.25E-03	6.04E-04	0.00E+00	-2.23E-01
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								

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

*** The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3)" For services, "A1-A3" shall be replaced by "A1-A5*

Additional mandatory and voluntary impact category indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2.13E+00	5.79E-02	6.42E-01	1.87E-01	1.25E-01	2.32E-02	0.00E+00	0.00E+00
PM	disease inc.	9.71E-08	4.43E-09	8.01E-08	4.13E-08	1.07E-08	1.99E-09	0.00E+00	-1.66E-08
IRP*	kBq U-235 eq	1.98E-02	5.74E-05	7.22E-03	2.40E-04	1.24E-04	2.30E-05	0.00E+00	-1.03E-02
ETP-fw**	CTUe	7.96E+00	2.71E-01	1.42E+00	1.29E-01	5.84E-01	1.09E-01	0.00E+00	-4.78E+00
HTP-c**	CTUh	7.16E-10	1.07E-11	3.93E-10	3.42E-11	2.31E-11	4.30E-12	0.00E+00	-3.20E-10
HTP-nc**	CTUh	7.92E-09	4.95E-10	3.19E-09	3.03E-10	1.07E-09	1.99E-10	0.00E+00	-1.67E-09
SQP**	Pt	1.31E+00	7.65E-03	1.31E+00	6.57E-03	1.65E-02	3.06E-03	0.00E+00	-4.49E-01
Acronyms	GWP-GHG = supplementary indicator for climate impact, with characterization factors (CFs) based on IPCC (2021); PM = Potential incidence of disease due to PM emissions; IRP = Potential Human exposure efficiency relative to U235; ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c = Potential Comparative Toxic Unit for humans; HTP-nc = Potential Comparative Toxic Unit for humans; SQP = Potential soil quality index								

** Disclaimer 1: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

*** Disclaimer 2: 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.*

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Resource use indicators

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3.01E+00	1.88E-03	2.06E-01	6.15E-03	4.05E-03	7.53E-04	0.00E+00	-2.17E-01
PERM	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
PERT	MJ	3.01E+00	1.88E-03	2.06E-01	6.15E-03	4.05E-03	7.53E-04	0.00E+00	-2.17E-01
PENRE	MJ	4.36E+01	1.60E-03	8.53E+00	2.46E+00	1.66E+00	3.08E-01	0.00E+00	-2.57E+01
PENRM	MJ	4.13E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	8.49E+01	1.60E-03	8.53E+00	2.46E+00	1.66E+00	3.08E-01	0.00E+00	-2.57E+01
SM	kg	3.93E-04	0.00E+00	3.86E-04	3.90E-06	1.30E-06	2.41E-07	0.00E+00	3.83E-01
RSF	MJ	1.62E-04	0.00E+00	5.23E-06	7.57E-07	1.19E-07	2.21E-08	0.00E+00	-1.30E-05
NRSF	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
FW	m^3	9.44E-03	2.94E-05	6.70E-03	7.57E-05	7.71E-05	1.43E-05	0.00E+00	-5.30E-03
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 indicators

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.49E-01	2.19E-04	1.37E-02	2.86E-04	6.12E-04	1.14E-04	0.00E+00	-2.41E-02
Non-hazardous waste disposed	kg	1.02E+01	7.78E-04	2.90E-01	9.89E-03	1.34E-02	2.50E-03	0.00E+00	-4.13E+00
Radioactive waste disposed	kg	1.14E-05	0.00E+00	4.62E-06	1.45E-07	6.71E-08	1.25E-08	0.00E+00	-6.67E-06

Output flow indicators

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	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
Materials for recycling	kg	8.77E-02	0.00E+00	3.40E-06	6.26E-08	4.88E-08	9.06E-09	0.00E+00	8.36E-05
Materials for energy recovery	kg	1.10E-06	0.00E+00	4.98E-08	3.07E-09	2.36E-09	4.39E-10	0.00E+00	-9.99E-07
Exported energy, electricity	MJ	3.80E-03	0.00E+00	1.76E-03	6.21E-05	2.11E-05	3.91E-06	0.00E+00	0.00E+00
Exported energy, thermal	MJ	2.08E-03	0.00E+00	1.72E-04	1.97E-05	2.41E-05	4.47E-06	0.00E+00	0.00E+00

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
GHS	Globally harmonized system of classification and labelling of chemicals
GRI	Global Reporting Initiative
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO_2 eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO_2 eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO_2 eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO_2 eq.)
GWP-total	Total Global Warming Potential (kg CO_2 eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO_2 eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H^+ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m^3)
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m^3)
Waste Indicators	
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)

EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
A4	Transport to site
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number
MJ	Megajoule
kg	Kilogram
m^3	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO_2 eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO_2 eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared

REFERENCES

BSI (2019) EN 15804+A2:2019 – Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. British Standard
EPD International (2025a) General Programme Instructions for the International EPD System. Version 5.0.1. www.environdec.com.
EPD International (2025b) PCR 2019:14 – Construction Products – Version 2.0.1 (VALID UNTIL: 2030-04-07).
European Commission - Joint Research Centre (JRC). (n.d.). Developer EF: Environmental Footprint (EF) Life Cycle Data Network (LCDN). Retrieved from https://eplca.jrc.ec.europa.eu/LCDN/developerEF.html.
IPCC (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp. doi:10.1017/9781009157896.
ISO (2006a) 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
ISO (2006b) 14040: Environmental Management – Life Cycle Assessment – Principles and Framework.
ISO (2006c) 14044: Environmental Management – Life Cycle Assessment – Requirements and guidelines.
International EPD System (2021) General Programme Instructions for the International EPD® System. Version 4.0
PRé Sustainability. SimaPro 9.6.0.1 Software for Life Cycle Assessment. PRé Sustainability, Amersfoort, The Netherlands. Available at: https://simapro.com/.

VERSION HISTORY

Original Version of the EPD, 2025-08-21
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