DIMEL®
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ENVIRONMENTAL PRODUCT DECLARATION

In accordance with the guidelines of
ISO 14025:2006 and ISO 21930:2017

ENVIRONMENTAL PRODUCT DECLARATION FIBERGLASS REINFORCED POLYESTER POLES MANUFACTURED BY DIMEL INGENIERÍA SAS AT ITS PLANT IN SIBATÉ, CUNDINAMARCA, COLOMBIA

LABELING sustainability

ISSUE DATE	VALID UNTIL
20 / 01 / 2025	20 / 01 / 2030

Administrative information

Certified International Environmental Product Declaration

Product Declared	"FIBERGLASS POLE DISTRIBUTTION 16.0M X 1350KGF - 3 SECTIONS (400 kg)"
Owner of the EPD:	DIMEL INGENIERÍA Km. 3 vía Cali, Candelaria. Candelaria, Valle del Cauca, Colombia https://dimel-ingenieria.com
LCA study:	Casostenible S.A.S Carrera 10 # 96 – 25 Oficina 408 Bogotá, Colombia www.casostenible.com
Program operator:	Labeling Sustainability 11670 W Sunset Blvd Los Angeles, CA 90049 www.labelingsustainability.com
Product Category Rule (PCR):	Part B: Product group definition | Utility poles | Part B #23-007 Sustainable Minds Parte B | Mentes Sostenibles (sustainableminds.com)
Independent LCA reviewer and EPD verifier:	This statement was independently verified in accordance with the standard ISO 14025:2006 Independent verification of the declaration, in accordance with the following standard ISO 14025:2006 Interno ☐ Externo ☒ Third party verifier External verifier certified according to the Labeling and Sustainability (www.labelingsustainability.com), CSA Group (www.csaregistries.ca),
Issue date:	January 20, 2025
Validity period:	5 years. Valid until January 20, 2030.
EPD Number:	DI010325CS3

Company Description

DIMEL INGENIERÍA S.A. is a Colombian company founded in 1989 in Valle del Cauca, is a leading organization in the manufacture of metal-mechanical and fiberglass reinforced polyester products for electrical infrastructure, telecommunications and street furniture.

Throughout more than 30 years, Dimel Ingeniería S.A. has been characterized for offering innovative products and services of high quality, allowing them to be the leaders in Colombia, positioning themselves in the Latin American market.

Objective of the Study

The objective of this document is to comply with the requirements of 21930:2017 for the development of the Environmental Product Declaration (EPD) type III and to publish the EPD for public review on the website www.labelingsutainability.com.

The main objective of this study is to assess the environmental burden of DIMEL INGENIERÍA's Dipole line through life cycle analysis where a cradle-to-grave approach is included to declare the associated impact of the modules: raw material supply (A1), transportation (A2), manufacturing (A3), Transportation to site (A4), Installation (A5) Use or application of the installed product (B1), maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), deconstruction -demolition (C1), transportation (C2), waste treatment (C3), waste disposal (C4) and Potential for reuse, recovery and recycling (D).

The LCA is developed at the request of the company DIMEL INGENIERÍA for the elaboration of one (1) Environmental Product Declaration (EPD), in order to know the impacts related to fiberglass-reinforced polyester poles to communicate in a verifiable and accurate way the contribution to global warming of its product and different categories of environmental impact, supporting the decision making of its customers, being this a reason for choice over other products of the same physical and functional characteristics.

The results of the Life Cycle Assessment (LCA) mentioned above are addressed to all DIMEL stakeholders, with Business to Business (B2B) and Business to Consumer (B2C) relationships, from suppliers, collaborators, to internal and external customers.

Product Information

Product name:

Fiberglass-reinforced polyester poles

Product description:

The stated product is poles used to support overhead power lines and related equipment for transmission, distribution and telecommunications applications.

The fiberglass-reinforced polyester poles in two (2) references: Fiberglass and Solar power.

The poles manufactured by DIMEL INGENIERÍA are characterized by:

- Resistance to impact or collision

- Ideal designs for the construction of power lines, distribution, and telecommunication in places of difficult access.

- Lightweight designs for easy transportation, storage, and economical installation.

- Safety by preventing unauthorized personnel from climbing and avoiding accidents.

Technical characteristics:

The DIMEL INGENIERÍA product catalog, presents different references that vary in their nominal size, finishes and load support, has different numbers of sections that facilitate their installation. Below are the technical characteristics of the references included in this EPD.

Table 1. Technical characteristics of fiberglass reinforced polyester poles

DESCRIPCTION	POLE HEIGHT (m)	POLE HEIGHT (ft)	PRODUCT WEIGHT (Kg)	PRODUCT WEIGHT (lb)
SOLARPOWER POLE 8,0M X510KGF - 1 SECTION	8	26,2	55	121,3
FIBERGLASS POLE 8,0M X510KGF - 1 SECTION	8	26,2	55	121,3
FIBERGLASS POLE DISTRIBUTION 8,0M X510KGF - 1 SECTION	8	26,2	56	123,5
FIBERGLASS POLE DISTRIBUTION 8,0M X510KGF - 2 SECTIONS	8	26,2	60	132,3
FIBERGLASS POLE 8,0M X510KGF - 2 SECTIONS	8	26,2	60	132,3
FIBERGLASS POLE 9,0M X510KGF -1 SECTIONS	9	29,5	70	154,3
FIBERGLASS POLE DISTRIBUTION 10,0M X510KGF 2 SECTIONS	10	32,8	83	183,0
FIBERGLASS POLE DISTRIBUTION 10,0M X1050KGF - 1 SECTION	10	32,8	102	224,9
FIBERGLASS POLE 12,0M X510KGF - 1 SECTION	12	39,4	99	218,3
FIBERGLASS POLE 12,0M X750KGF - 1 SECTION	12	39,4	122	269,0
FIBERGLASS POLE 12,0M X750KGF - 1 SECTION	12	39,4	122	269,0
FIBERGLASS POLE 12,0M X750KGF - 3 SECTION	12	39,4	158	348,3
FIBERGLASS POLE 12,0M X1350KGF - 1 SECTION	12	39,4	163	359,4
FIBERGLASS POLE DISTRIBUTION 14,0M X750KGF- 3 SECTIONS	14	45,9	234	515,9
FIBERGLASS POLE 14,0M X1050KGF - 1 SECTION	14	45,9	276	608,5
FIBERGLASS POLE DISTRIBUTION 14,0M X1050KGF - 3 SECTIONS	14	45,9	288	634,9
FIBERGLASS POLE 14,0M X750KGF - 2 SECTIONS	14	45,9	302	665,8
FIBERGLASS POLE DISTRIBUTION 14,0M X1350KGF - 3 SECTIONS	14	45,9	354	780,4
FIBERGLASS POLE DISTRIBUTION 16,0M X1350KGF - 3 SECTIONS*	16	52,5	400	881,8
FIBERGLASS POLE 16,0M X1350KGF - 3 SECTIONS	16	52,5	400	881,8
FIBERGLASS POLE 18,0M X1050KGF- 3 SECTIONS	18	59,1	331	729,7

Note: The pole chosen as reference for the functional unit of this study corresponds to the FIBERGLASS POLE DISTRIBUTION reference of 52.2 feet (16 m) and 881.8 pounds (400 kg). This pole reference is taken as the representative reference considering the highest weight of the poles, thus representing the highest environmental impact of the references in the Dimel Ingeniería catalog, covering the total of the references.*

Content Information

The general composition of fiberglass poles is shown below:

Table 2. Typical composition of poles for lighting and power distribution made of fiberglass reinforced polyester (GRP)

Product	Material or Chemical Substance	Chemical Substance	Weight (%)	CAS Registry Number	Substance Function	SVHC[1]
Poles in fiberglass reinforced polyester (GRP)	FIBERGLASS	Fibrous glass (continuous filament glass fiber)	70-60%	65997-17-3	Reinforcement of thermoplastic and thermosetting resins	No listed
	RESIN	Styrene	30-20%	100-42-5	Polyester laminate with fiberglass. Exclusive use for industrial users.	Not listed
		Methyl methacrylate		80-62-6		
		Ortho-phthalic acid		88-99-3		
		Maleic acid		110-16-7		
	TOP COAT	Styrene	<5%	100-42-5	Outer coating of glass fiber reinforced parts	Not listed
		Chlorinated kerosene		85535-85-9		
		Antimony trioxide		1309-64-4		
		Cobalt octoate		136-52-7		
	CAPS	Polypropylene	<1%	9003-07-0	Seal and protection	
	OXIDOL	Methyl ethyl ketone peroxide	<1%	1338-23-4	Catalyst used in the polymerization of unsaturated polyester resins	Not listed
	PAINT	Commercial formula	<1%	-	-	-

The product does not include during its life cycle any hazardous substance included in the "Substances of Very High Concern (SVHC) Candidate List "in a percentage higher than 0.1% of the weight of the product.

Source: DIMEL INGENIERÍA (2024)

LCA Information

Declared unit:

"FIBERGLASS POLE DISTRIBUTTION 16.0M X 1350KGF - 3 SECTIONS (400 kg)" installed over 40 years and 80 year

Type of LCA:

Cradle to grave

Time Representativeness:

Life Cycle Analysis inventory data represents the 12-month average production from January to December 2022.

Database and software used

The database and software used to perform the life cycle analysis was Ecoinvent 3.9.1 and Simapro 9.5 in addition the built-in system model “Allocation, cut off by classification” is used. It is indicated that the Ecoinvent 3.9.1. database was used in the modeling as the generic data source.

System boundaries

Description of system boundaries:

According to the PCR for Utility Poles (Part B: Product group definition | Utility poles | Part B #23-007) of the Sustainable Minds program operator cradle-to-grave modules should be reported in this life cycle analysis according to the “system boundaries” described in section 5.2 of ISO 21930.

This study considers the scope of a cradle-to-grave Life Cycle Analysis with module D, i.e. product stages (modules A1-A3), construction stage (A4-A5), use stage (B1-B5) end-of-life stage (modules C1-C4) and benefits and burdens module beyond the system boundary (module D) as shown in Table 4.

Table 3. Modules evaluated - Product stages.

System Boundaries														
(•: Included in the LCA; MND: Module not declare)														
Product			Instlallation process		Use					End of life				Benefits from Reuse & Recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport to site	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction/Demolition	Transport	Waste processing	Disposal of waste	Reuse - Recovery
					B6-Operational energy use									
					B7-Operational water use									
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Source: Own elaboration

Product Stage

A1- Supply of raw materials: This first stage of the life cycle includes all environmental aspects from the extraction of materials, until the raw materials and inputs leave the facilities of each factory and become products to be used by DIMEL INGENIERÍA in its production process.

A2- Transportation: The second stage of the life cycle corresponds to the transportation used by manufacturers, suppliers/distributors and DIMEL INGENIERÍA for the transfer of raw materials and inputs from their location to DIMEL INGENIERÍA's production plant. According to the supplier's location there will be maritime and land transportation.

A3-Manufacturing: The third stage of the life cycle, corresponds to the manufacturing stage, and are all those activities that are carried out within the production plant of DIMEL INGENIERÍA, until the final product is obtained. This stage includes machinery and equipment emissions, water consumption and waste management. To reflect the electricity consumed in the production processes within Dimel Ingeniería production plants, we used the information of the Colombian electricity mix loaded in the Ecoinvent 3.9.1. database, specifically the dataset Electricity, medium voltage {CO}| market for electricity, high voltage | Cut-off, U .

Construction process stage

A4 - Transportation: In module A4 for the distribution scenario of fiberglass poles, the area with the highest sales of DIMEL INGENIERÍA was taken as a reference. Subsequently, the calculation of the kilometers that the product can travel to its installation was carried out, which is the maximum distance that a vehicle could travel to a construction site or customer.

A5 - Installation: For this scenario the specific PCR recommendation Part B No. 23007 is considered which poses the following scenario, manufacturers will assume that installation is by direct burial using an excavator derrick. Manufacturers will assume that 33.5 liters (8.85 gallons) of diesel fuel is consumed when installing one pole.

Stage of use

B1-B6: According to the characteristics of the use stage for steel and fiberglass poles in Colombia, it is interpreted that the stages of modules B1 to B3 and B5-B7 are considered zero. Once installed, steel and fiberglass poles do not have operational or usage activities that generate emissions or consume resources, as their function is entirely static. This means that they do not require energy, water, nor do they generate emissions during their service life in the use phase, justifying the interpretation of modules B1 to B3 and B5-B7 as zero.
For module B4, according to the specific PCR Part B No. 23007, impacts must be reported for estimated service lives (ESL) of 40 and 80 years. In this analysis, results are presented for a pole with a 40-year service life, which implies one replacement, and for 80 years, which considers two replacements.

End-of-life stage

C1-Deconstruction/Demolition: Based on the recommendations of the specific PCR Part B No. 23007, the consumption of 5.31 gallons of diesel fuel to remove one pole is assumed.

C2-Transport: For the case of final disposal or transport to treatment of the waste from fiberglass poles, the scenario proposed by PCR Part B: Product Group Definition | Utility Poles | Part B No. 23007 is taken as a reference, where it proposes a waste transport scenario of approximately 20 miles (32.2 km) for final disposal.

C3-Waste treatment: There is no waste treatment because 100% of the waste is taken to final disposal.

C4-Waste disposal: 100% of the fiberglass poles after deinstallation will be taken to landfill.

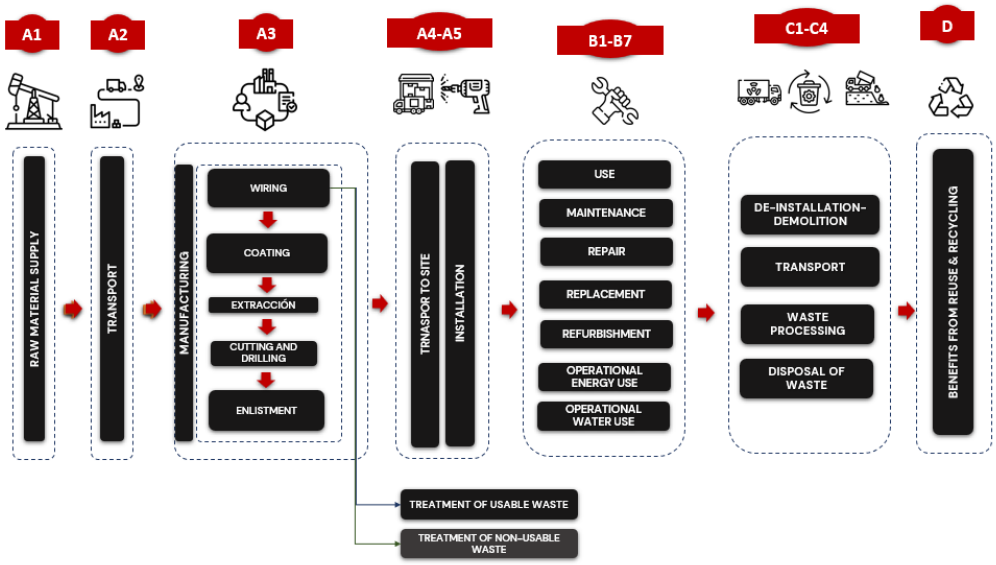
Benefits and loads beyond the limits of the system

D: Potential for reuse, recovery and recycling: Fiberglass poles have no potential for reuse, recovery and recycling since 100% of the product is disposed of in landfills.

System diagram

The flow diagram below corresponds to DIMEL INGENIERÍA's manufacturing process for fiberglass poles:

Figure 1. Fiberglass reinforced polyester poles process diagram.



Cut-off-criteria

- Life cycle analysis includes all stages of the life cycle analysis (cradle to grave)
- The study does NOT exclude any module or process that is established as mandatory in the ISO 21930 standard.
- The study includes the main raw material and energy consumption of the unit processes.
- All inputs and outputs of unit processes for which data are available and recorded for 12 months in the period January 2022 to December 2022 were included in the calculations.
- Total input and output flows excluded do not exceed 5% of energy use or mass relative to total product weight.

Allocation, estimation and assumptions

In this study, according to ISO 14044:2006, the allocation is performed according to the following steps:

1. Assignment avoidance.

2. Assignment should be based on the physical properties of the inputs and outputs of the system (e.g., mass, volume) 3.

3. If the allocation cannot be made based on the physical properties, the inputs and outputs could be allocated between co-products in proportion to the economic value of the products.

4. This methodology is in line with the requirements of ISO 21930.

This LCA study is carried out in accordance with all methodological considerations, such as, system boundaries, data quality, mass allocations and percentages less than 1% to evaluate inputs and outputs.

In the case of inputs that do not have a description of their composition as they are trade secrets and have a weight of less than <1% of the product weight, their modeling within this life cycle analysis is discarded.

Some of the assumptions made were as follows:

- Scenarios are proposed for modules A4 and A5 corresponding to the scenarios of transportation and installation of the product on site. For these scenarios, the scenarios described in PCR Part B No. 23007 were taken as a reference.
- Modules C1 and C2: it is assumed that the fiberglass poles are disassembled based on the information in PCR Part B No. 23007, the treatment and final disposal are carried out within Colombia.
- Modules C3, C4 and D: It is established that fiberglass poles are taken 100% to final disposal.

Environmental Indicators

In accordance with the PCR, this EPD is consistent with the life cycle impact assessment indicators and inventory metrics listed in the tables below.

As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) impact categories were used as they provide a North American context for the mandatory category indicators to be included in the EPD. In addition, ISO 21930 requires a set of inventory metrics to be reported with the LCIA indicators and are listed below:

ID	Mandatory LCIA results	Abbreviations	Units
1	Climate change: global warming potential (GWP100)	GWP100	kg CO2-e
2	Ozone depletion: ozone depletion potential (ODP)	ODP	kg CFC-11-e
3	Acidification: acidification potential (AP)	AP	kg SO2-e
4	Eutrophication: eutrophication potential	EP	kg N-e
5	Smog formation potential	SFP	kg O3-e
6	Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADPfossil	MJ
Indicators describing use of primary resources			
7	Cumulative Energy Demand - renewable energy resources	RPRE	MJ
8	Renewable primary resources with energy content used as material (i.e., PERM)	PRM	MJ
9	Cumulative Energy Demand - non-renewable energy resources	NRPRE	MJ
10	Non-renewable primary resources with energy content used as material (i.e., PENRM)	NRPRM	kg
Indicators describing use of secondary resources			
11	Use of secondary material	SM	MJ
12	Use of renewable secondary fuels	RSF	MJ
13	Non-Renewable secondary fuels	NRFS	MJ
14	Recovered energy	RE	MJ
ADPfossil, consumption of freshwater, and emissions and removals of CO2			

15	Abiotic depletion potential for non-fossil mineral resources	ADP Fossil	MJ
16	Use of net fresh water	FW	M3
17	Removals and emissions associated with biogenic carbon content of the biobased product		KgCO2e
18	Removals and emissions associated with biogenic carbon content of the biobased packaging		KgCO2e
19	Emissions from land use change		KgCO2e
20	Emissions from combustion of waste from renewable sources used in production process		KgCO2e
21	Emissions from combustion of waste from nonrenewable sources used in production process		KgCO2e
Indicators describing waste			
22	Hazardous waste disposed	HWD	Kg
23	Non-hazardous waste disposed	NHWD	Kg
24	High-level radioactive waste disposed	HLRW	Kg
25	Intermediate and low-level radioactive waste disposed	ILLRW	Kg

Fiberglass pole Distribution Pole 16.0M X 1350KGF - 3 SECTIONS (400 kg)

Based on the description of the specific PCR Part B: Product Group Definition | Utility Poles | Part B No. 23007, a report of impacts with estimated service lives of 40 years and 80 years is required. In accordance with the requirements of this Part B, the results are presented considering two estimated service lives (ESL): 40 years and 80 years. For this analysis, data corresponding to a pole with a reference service life of 40 years is reported, which implies replacement at the end of this period. Additionally, for a service life of 80 years, two replacements are considered. These replacements are reflected in the impacts of module B4, where the sum of the impacts from modules A1 to A5, as well as from modules C1-C4 and D, is calculated. The impacts associated with the use stage are accounted for over the full periods of each ESL, following the established guidelines.

Impact Results with Reference Service Life of 40 Years

Impact indicators

Category	Description	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
GWP-100	Global Warming Potential, including biogenic CO_2	Kg CO_2 eq	1,35E+03	9,53E+01	1,66E+01	1,46E+03	3,34E+01	4,31E+01	1,61E+03	7,34E+01	1,94E+00	0,00E+00	1,07E+00	0,00E+00
ODP	Ozone Depletion Potential (ODP)	Kg CFC-11 eq	6,60E-05	1,45E-06	4,38E-06	7,19E-05	5,27E-07	6,73E-07	7,35E-05	4,27E-07	3,06E-08	0,00E+00	1,70E-08	0,00E+00
EP	Eutrophication potential	Kg N eq	8,93E-01	5,43E-02	7,13E-02	1,02E+00	1,04E-02	6,29E-03	1,04E+00	4,10E-03	6,05E-04	0,00E+00	6,49E-04	0,00E+00
AP	Acidification potential	Kg SO_2 eq	7,22E+00	1,22E+00	7,61E-02	8,52E+00	1,22E-01	3,76E-02	8,72E+00	2,68E-02	7,12E-03	0,00E+00	9,25E-03	0,00E+00
POCP	Potential for creation of photochemical oxidants (smog)	Kg O_3 eq	1,05E+02	2,39E+01	8,51E-01	1,30E+02	3,44E+00	5,30E-01	1,34E+02	3,86E-01	2,00E-01	0,00E+00	2,88E-01	0,00E+00

Primary resource use indicators

Category	Description	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
RPR_E	Renewable primary resources used as energy carriers (fuel)	MJ	8,82E+02	1,91E+00	1,10E+02	9,94E+02	6,70E-01	8,99E-01	9,96E+02	5,60E-01	3,89E-02	0,00E+00	6,18E-02	0,00E+00
RPR_M	Renewable primary resources with energetic content used as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
$NRPR_E$	Non-renewable primary resources used as energy carriers (fuel)	MJ	2,36E+04	1,31E+03	2,66E+02	2,52E+04	4,83E+02	6,15E+02	2,67E+04	3,90E+02	2,80E+01	0,00E+00	1,48E+01	0,00E+00
$NRPR_M$	Non-renewable primary resources with energy content used as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Secondary resource use indicators

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
SM	Secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Recovered energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ADPfossil, freshwater consumption, CO2 emissions and removals

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
ADP fossil	Potential for abiotic depletion of fossil resources	MJ	2,51E+03	1,86E+02	3,01E+01	2,73E+03	6,81E+01	8,83E+01	2,94E+03	5,60E+01	3,96E+00	0,00E+00	2,04E+00	0,00E+00
FW	Net fresh water consumption	m3	1,20E+01	5,75E-02	1,96E+00	1,40E+01	2,51E-02	7,00E-02	1,42E+01	5,13E-02	1,46E-03	0,00E+00	7,27E-04	0,00E+00
GHG LUC	GHG emissions from land use change	kg CO_2 eq	6,29E-01	3,31E-03	4,19E-01	1,05E+00	1,30E-03	2,79E-03	1,06E+00	1,71E-03	7,53E-05	0,00E+00	5,42E-05	0,00E+00
BCPR	Biogenic carbon removals associated with the biogenic carbon content of biobased **products**.	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCPE	Biogenic carbon emissions associated with the biogenic carbon content of biobased **products**	kg CO_2 eq	9,77E-01	4,98E-03	4,95E-01	1,48E+00	1,92E-03	4,25E-03	1,49E+00	2,64E-03	1,12E-04	0,00E+00	1,14E-04	0,00E+00
BCKC	Biogenic carbon removals associated with biogenic carbon content **in** biobased **containers**	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
BCKE	Biogenic carbon emissions associated with biogenic carbon content **in** biobased **packaging**	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCWR	Biogenic carbon emissions from **combustion of waste from renewable resources** used in production processes	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCWN	Carbon emissions from **combustion of wastes from non-renewable resources** used in production processes	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Waste indicators

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
HWD	Hazardous waste disposed	kg	3,69E-02	7,32E-03	1,98E-03	4,62E-02	3,06E-03	4,11E-03	5,63E-02	2,65E-03	1,78E-04	0,00E+00	8,94E-05	0,00E+00
NHWD	Disposal of non-hazardous waste	kg	8,96E+01	2,24E-01	1,08E+01	1,01E+02	1,16E-01	3,13E-02	5,00E+02	2,07E-02	6,74E-03	0,00E+00	4,00E+02	0,00E+00

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
RWD-HL	Disposal of high-level radioactive wastes	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RWD-LL	Disposal of low and intermediate level radioactive wastes	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Impact Results with Reference Service Life of 80 Years

Impact indicators

Category	Description	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
GWP-100	Global Warming Potential, including biogenic CO_2	Kg CO_2 eq	1,35E+03	9,53E+01	1,66E+01	1,46E+03	3,34E+01	4,31E+01	3,22E+03	7,34E+01	1,94E+00	0,00E+00	1,07E+00	0,00E+00
ODP	Ozone Depletion Potential (ODP)	Kg CFC-11 eq	6,60E-05	1,45E-06	4,38E-06	7,19E-05	5,27E-07	6,73E-07	1,47E-04	4,27E-07	3,06E-08	0,00E+00	1,70E-08	0,00E+00
EP	Eutrophication potential	Kg N eq	8,93E-01	5,43E-02	7,13E-02	1,02E+00	1,04E-02	6,29E-03	2,08E+00	4,10E-03	6,05E-04	0,00E+00	6,49E-04	0,00E+00
AP	Acidification potential	Kg SO_2 eq	7,22E+00	1,22E+00	7,61E-02	8,52E+00	1,22E-01	3,76E-02	1,74E+01	2,68E-02	7,12E-03	0,00E+00	9,25E-03	0,00E+00
POCP	Potential for creation of photochemical oxidants (smog)	Kg O_3 eq	1,05E+02	2,39E+01	8,51E-01	1,30E+02	3,44E+00	5,30E-01	2,69E+02	3,86E-01	2,00E-01	0,00E+00	2,88E-01	0,00E+00

Primary resource use indicators

Category	Description	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
RPR_E	Renewable primary resources used as energy carriers (fuel)	MJ	8,82E+02	1,91E+00	1,10E+02	9,94E+02	6,70E-01	8,99E-01	1,99E+03	5,60E-01	3,89E-02	0,00E+00	6,18E-02	0,00E+00
RPR_M	Renewable primary resources with energetic content used as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
$NRPR_E$	Non-renewable primary resources used as energy carriers (fuel)	MJ	2,36E+04	1,31E+03	2,66E+02	2,52E+04	4,83E+02	6,15E+02	5,35E+04	3,90E+02	2,80E+01	0,00E+00	1,48E+01	0,00E+00
$NRPR_M$	Non-renewable primary resources with energy content used as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Secondary resource use indicators

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
SM	Secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Recovered energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ADPfossil, freshwater consumption, CO2 emissions and removals

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
ADP_{fossil}	Potential for abiotic depletion of fossil resources	MJ	2,51E+03	1,86E+02	3,01E+01	2,73E+03	6,81E+01	8,83E+01	5,89E+03	5,60E+01	3,96E+00	0,00E+00	2,04E+00	0,00E+00

Category	Description	Unity	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
FW	Net fresh water consumption	m3	1,20E+01	5,75E-02	1,96E+00	1,40E+01	2,51E-02	7,00E-02	2,84E+01	5,13E-02	1,46E-03	0,00E+00	7,27E-04	0,00E+00
GHG_{LUC}	Emmissions from land use change	kg CO_2 eq	6,29E-01	3,31E-03	4,19E-01	1,05E+00	1,30E-03	2,79E-03	2,11E+00	1,71E-03	7,53E-05	0,00E+00	5,42E-05	0,00E+00
BCPR	Biogenic carbon removals associated with the biogenic carbon content of biobased **products**.	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCPE	Biogenic carbon emissions associated with the biogenic carbon content of biobased **products**	kg CO_2 eq	9,77E-01	4,98E-03	4,95E-01	1,48E+00	1,92E-03	4,25E-03	2,97E+00	2,64E-03	1,12E-04	0,00E+00	1,14E-04	0,00E+00
BCKC	Biogenic carbon removals associated with biogenic carbon content **in** biobased **containers**	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCKE	Biogenic carbon emissions associated with biogenic carbon content **in** biobased **packaging**	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCWR	Biogenic carbon emissions from **combustion of waste from renewable resources** used in production processes	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCWN	Carbon emissions from **combustion of wastes from non-renewable resources** used in production processes	kg CO_2 eq	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Waste indicators

Category	Description	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
HWD	Hazardous waste disposed	kg	3,69E-02	7,32E-03	1,98E-03	4,62E-02	3,06E-03	4,11E-03	1,13E-01	2,65E-03	1,78E-04	0,00E+00	8,94E-05	0,00E+00
NHWD	Disposal of non-hazardous waste	kg	8,96E+01	2,24E-01	1,08E+01	1,01E+02	1,16E-01	3,13E-02	1,00E+03	2,07E-02	6,74E-03	0,00E+00	4,00E+02	0,00E+00

Category	Description	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B6	C1	C2	C3	C4	D
RWD-HL	Disposal of high-level radioactive wastes	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RWD-LL	Disposal of low and intermediate level radioactive wastes	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Interpretation

As can be seen in the results tables, it is evident that module A1 (Extraction of raw materials) is the module that contributes the most to each of the environmental impact categories.

In the global warming potential (GWP) category, module A1, which includes the extraction of silica and chemicals to produce raw materials for fiberglass poles (fiberglass and polyester resin), has a significant participation, ranging between 86% and 96% in the impact categories of fiberglass poles. This module shows relevance due to the processes of obtaining raw materials and inputs involved in the manufacture of fiberglass poles.

The second most relevant module is the raw material transportation module (A2) and the deconstruction module (C1), which are the modules with the highest contribution to the emission categories after module A1. These modules include fuel burning activities in the transportation of materials and the deconstruction or dismantling of the pole.

Additional Environmental Information

Conversion factors for Dimel References

The following tables present conversion factors designed for life cycle analysis, with the goal of calculating the environmental impacts associated with the different fiberglass pole references manufactured by Dimel Ingeniería. These references vary in height and weight according to the pole diameter, requiring the generation of specific conversion factors for each. These factors enable precise adjustments to the analysis results, considering the particularities of each reference and ensuring an adequate environmental assessment for all products.

Fiberglass pole

DESCRIPCTION	POLE HEIGHT (m)	POLE HEIGHT (ft)	PRODUCT WEIGHT (Kg)	PRODUCT WEIGHT (lb)	CONVERSION FACTOR
FIBERGLASS POLE DISTRIBUTTION8,0M X510KGF - 1 SECTION	8	26,2	55	121,3	0,138
FIBERGLASS POLE DISTRIBUTION 8,0M X510KGF - 1 SECTION	8	26,2	56	123,5	0,140
FIBERGLASS POLE DISTRIBUTION 8,0M X510KGF - 2 SECTIONS	8	26,2	60	132,3	0,150
FIBERGLASS POLE DISTRIBUTTION8,0M X510KGF - 2 SECTIONS	8	26,2	60	132,3	0,150
FIBERGLASS POLE DISTRIBUTTION9,0M X510KGF -1 SECTIONS	9	29,5	70	154,3	0,175
FIBERGLASS POLE DISTRIBUTION 10,0M X510KGF 2 SECTIONS	10	32,8	83	183,0	0,208
FIBERGLASS POLE DISTRIBUTION 10,0M X1050KGF - 1 SECTION	10	32,8	102	224,9	0,255
FIBERGLASS POLE DISTRIBUTTION12,0M X510KGF - 1 SECTION	12	39,4	99	218,3	0,248
FIBERGLASS POLE DISTRIBUTTION12,0M X750KGF - 1 SECTION	12	39,4	122	269,0	0,305
FIBERGLASS POLE DISTRIBUTTION12,0M X750KGF - 1 SECTION	12	39,4	122	269,0	0,305
FIBERGLASS POLE DISTRIBUTTION 12,0M X750KGF - 3 SECTION	12	39,4	158	348,3	0,395
FIBERGLASS POLE DISTRIBUTTION12,0M X1350KGF - 1 SECTION	12	39,4	163	359,4	0,408
FIBERGLASS POLE DISTRIBUTION 14,0M X750KGF- 3 SECTIONS	14	45,9	234	515,9	0,585
FIBERGLASS POLE DISTRIBUTTION14,0M X1050KGF - 1 SECTION	14	45,9	276	608,5	0,690
FIBERGLASS POLE DISTRIBUTION 14,0M X1050KGF - 3 SECTIONS	14	45,9	288	634,9	0,720
FIBERGLASS POLE DISTRIBUTTION14,0M X750KGF - 2 SECTIONS	14	45,9	302	665,8	0,755
FIBERGLASS POLE DISTRIBUTION 14,0M X1350KGF - 3 SECTIONS	14	45,9	354	780,4	0,885
FIBERGLASS POLE DISTRIBUTION 16,0M X1350KGF - 3 SECTIONS	16	52,5	400	881,8	1
FIBERGLASS POLE DISTRIBUTTION16,0M X1350KGF - 3 SECTIONS	16	52,5	400	881,8	1
FIBERGLASS POLE DISTRIBUTTION18,0M X1050KGF- 3 SECTIONS	18	59,1	331	729,7	0,828

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