Environmental Product Declaration

In accordance with ISO 14025 and EN 50693:2019 for:

Single-Phase Step-Voltage Regulator – 414 kVA (500.150)

from

ITB Equipamentos Elétricos Ltda.

Declaration number:	EPDITB05
Production site:	Birigui, São Paulo - Brazil
Programme:	EPD Italy®, www.epditaly.it
Programme operator:	EPD Italy
EPD registration number:	EPDITALY0698
Issue date:	2024-04-11
Valid until:	2029-04-11

General information

Programme information

Programme:	EPD Italy®
Address:	EPDItaly Via Gaetano De Castillia, 10 20124 – Milano/Italy
Website:	www.epditaly.it
E-mail:	info@epditaly.it

Scope of application:	*Single-Phase Step-Voltage Regulator – 414 kVA (code 500.150): liquid-immersed, single-phase, 60 Hz, self-air cooled, step-voltage regulators, 414 kVA rated power. Cradle to grave with 35 years of reference service life (RSL)*
Functional unit:	*A single piece of step-voltage regulator operating for 35 years*
CPC code:	*46121 – Electrical transformers*
Geography:	*World (raw materials), Brazil (production, use and end-of-life)*
LCA report	*[iTB-LCA] 300-414 kVA voltage_regulator_report_v2.0 (2024)*
Product category rules (PCR):	*Core PCR EPDItaly007: Electronic and Electrical Products and Systems, revision 3 (2023-01-13)* *Sub PCR EPDItaly018: Electronic and Electrical Products and Systems – Power Transformers, version 3.5 (2021-12-13)*
Oher references:	*Regulations of the EPDItaly Programme rev 5.2, 2022-02-16* *EN 50693 is the framework reference for the Product Category Rules (PCR)*
Core PCR review was conducted by:	*ICMQ S.p.A. – Certificazioni e controlli per le costruzioni* *Moderator: Eng. Vito D'Incognito, Take Care International*
Sub PCR review was conducted by	*ENEL S.p.A.; Life Cycle Engineering* *Moderator: Massimo De Pieri, Life Cycle Engineering*

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ internal ☒ external

Third party verification carried out by:
SGS Italia S.p.A. Via Caldera, 21, 20153, Milano, Lombardia, Italia.
Accredited by: ACCREDIA certificate number 0005VV.

Procedure for follow-up of data during EPD validity involves third party verifier:
☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs relating to the same category of products but belonging to different programmes may not be comparable. EPDs of electronic and electrical products may not be comparable if they do not comply with EN 50693. For further information about comparability, see EN 50693 and ISO 14025.

Company information

Owner of the EPD:	ITB Equipamentos Elétricos Ltda.
Address:	Rua Devanir Terence, 161 – Parque Industrial
Location of production site(s):	Birigui, State of São Paulo, Brazil
Website:	www.itb.ind.br www.itb.ind.br/en/ www.itb.ind.br/es/
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About the organization

ITB Equipamentos Elétricos Ltda. Is a reference company and one of the largest manufacturers of electrical distribution transformers in Latin America, with a diversified line of distribution transformers for different applications in urban, rural and industrial networks. ITB's product portfolio also includes lines of single-phase automatic voltage regulators and dynamic reactive power compensators. Founded in 1974, ITB's policy is to practice competitive prices, excellence in quality and efficient technical assistance. These factors, linked to professional management, permanent qualification of its employees, developed technology and constant investments in new equipment turned ITB to a company known and recognized for the excellence in our products and for the excellent professional relationship with our partners.

Sustainability

Sustainability is one of the core values of ITB, present in the company governance from the environmental compliance, passing through the environmental management and continuous improvement, developing the supply chain through the sustainable purchase policy, until the company's commitment to implement the SDGs from 2030 agenda. ITB Equipamentos Eletricos Ltda has a formal interventional guideline to meet the UN recommendations, listing 14 priority objectives in a materiality matrix, tracing actions to promote sustainable development.

Owned certifications

ISO 9001 — ISO 14001 — ISO 45001 — Programa Brasileiro GHG Protocol 2022 Inventário Verificado

Voluntary actions

UN Global Compact Network Brazil WE SUPPORT — PROGRAMA BRASILEIRO DE ETIQUETAGEM — Selo Verde — Selo de Responsabilidade Social Rotary ABTRF EMPRESA CIDADÃ 2023-24

Product information

Product name:	Single-Phase Step-Voltage Regulator – 414 kVA	
Product description:	A single-phase step-voltage regulator is an electrical device designed to maintain a stable output voltage in a single-phase electrical system. It operates by continuously monitoring the input voltage and adjusting the output voltage to a specified level, ensuring a consistent and reliable power supply. It transfers energy from one circuit to another by magnetic coupling without requiring relative motion between its parts and comprises coupled windings and a magnetic core to concentrate magnetic flux made of silicon-steel. It is a single-phase step-voltage regulator in mineral cooled oil, with nominal power of 414 kVA and final project mass (without packaging) of **1,715 kg**. The packaging consists of wood bars and steel nails, washers and screws.	
Average dimensions:	1,955 mm height x 1,385 mm length x 1,425 mm width	**Single-Phase Step-Voltage Regulator** 
Expedition weight:	1,816 kg	
Product weight:	1,715 kg	
Packaging weight:	101 kg	
Type:	Regulator, oil-immersed	
Number of phases:	1P	
Voltage class:	Medium	
Nominal primary voltage	15 kV	
Rated power:	414 kVA	
Cooled-oil type:	Mineral (naphthenic)	
Products covered:	414 kVA Single-Phase Step-Voltage Regulator	
Geographical scope:	Brazil	

LCA information

Declared unit:

A single piece of step-voltage regulator operating for 35 years.

Time representativeness:

01 January 2022 to 31 December 2022.

Data representativeness:

Raw materials and end-of-life characterization are representative of the products. This also applies to the voltage regulators' use phase since the losses are based on the product operational parameters. Inbound logistics and manufacturing phases data are based on similar products from which most of the bill-of-materials are equal with minor differences on some components, and that went through the same production processes at the same Production Unit with identical energy carriers. Therefore "*the database used is regarded as representative on the basis of a comparative study, which examined the data for a reference product of the EPD Owner*".

Database(s) and LCA software used:

SimaPro® software v.9.5.0.1 developed by PRé Consultants was used to create the product system model. The ecoinvent® database version 3.9 provided the life cycle background data for product system modelling.

System boundaries:

Cradle-to-grave with upstream, core and downstream modules.

Modules declared, geographical scope and data variation:

Module	Raw material supply	Transport	Manufacturing	Distribution	Installation	Use and Maintenance	Deinstallation and End-of-Life
	Upstream		Core	Downstream			
Supply chain processes	extraction of raw materials and the production of semi-finished products and auxiliary items; electricity; production; transport of raw materials to plant		Step-voltage regulator assembling, waste and effluent management at plant; air emissions from paint solvents	Step-voltage regulator transport into the operation site, installation and packaging waste management, operating for 35 years (RSL) in Brazil, deinstallation and step-voltage regulator EoL, including metal recycling, insulating oil treatment and final disposal of non-recyclable fractions at sanitary landfill. Transport of waste flows			
Modules declared	X	X	X	X	X	X	X
Geography	GLO	BR	BR	BR	BR	BR	BR
Variation – sites	Not relevant						

Manufacturing:

Manufacturing data is aggregated for all the factory, and therefore, it is not possible to estimate inputs and outputs directly for a specific step-voltage regulator since ITB produces other equipment at the same plant. Thus, to relate utility consumptions and waste generation per step-voltage regulator, it was necessary to apportion aggregated data. The rationale was based on the 'Standard Unit factor', provided for in the manufacturing scripts, proportioned by the electricity, or by the mass of the inputs and ancillary materials, or even the generation of waste. All flows were proportioned by the total amount of products manufactured.

Distribution:

The step-voltage regulator is transported to Ceará (northeastern Brazil) by road transportation in diesel-powered lorries. The distance was estimated according to the most probable road from Birigui plant until Ceará, 2,945 km.

Installation:

The installation phase implies in the transportation of 100 km of the step-voltage regulator and its packaging from energy company storage until the operation site. Then, the step-voltage regulator is lifted and (generally) installed through manual/pneumatic tools. This phase also includes the disposal of the packaging of the step-voltage regulator, first returning until the energy company waste management central (100 km) and then transported until the waste management company (200 km).

Use stage:

The total energy consumed during 35 RSL by the step-voltage regulator is **1,046,824 kWh** (losses and operational consumptions). This value was calculated according to IEC 60076-1 technical standard, expressed in kWh via the following equation (PCR0018 v.3.5):

$$E_d[kWh] = [P_{load} \times K_{load}^2 + P_{noload}] \times t_{years} \times RSL + P_{aux} \times f_{aux} \times t_{years} \times RSL$$

Table 1. Values applied to estimate the energy dissipated during step-voltage regulator RSL.

Variable	Amount
P_{load} (kW)	5.075
k_{load}	0.7
P_{noload} (kW)	0.93
t_{years} (hours)	8,760
RSL (years)	35
Electricity (kWh)*	1,046,824

**The type of energy consumed in the use phase is derived from the Brazilian mix, as represented by the dataset 'Electricity, medium voltage {BR}| market group for electricity, medium voltage | Cut-off, U'.*

End-of-Life:

EoL stage assumes that the discontinued equipment is sent for material recovering. The disassembling process is manual or done with the aid of pneumatic tools at the secondary metal recovering market. Most valuable fractions (steel, aluminium and copper) are recycled within the default recycling recovering rate established in BSI EN 50693:2019. Insulating oil is treated without energy recovering and the remaining parts, based on mass balance, are sent to sanitary landfill. Based on direct consultation and project assumptions the transport distances from energy company storage into the to disassembly facility is 100 km, from disassembly facility to recycling plant and to the oil tretament company is 200 km, meanwhile the range into a landfill is 50 km.

Table 2. End-of-life baseline scenario definition per functional unit (downstream module).

Processes		Value	Unit
Collection process	From energy company storage to recovering market	1695.20	kg
Recovery system specified by type	Reuse	0.00	kg
	Recycling	913.41	kg
	Incineration for energy recovery	0.00	kg
Disposal specified by type	Product or material for final deposition	394.59	kg
	Incineration	387.20	kg
Assumption for scenario development	Assuming that 100% of the step-voltage regulator is sent for disassembling (based on direct consultation with energy company service supplier), assuming that 80% of steel is recycled, 70% of aluminium is recycled, 60% of cooper parts are recycled (G.5 section from BSI EN 50693:2019 - Default values) and that the mineral oil is incinerated without energy recovering (conservative principle). Following mass balance principle and Brazilian environmental laws, the remaining parts of the product are sent for final disposal at sanitary landfills		

Allocation:

Allocation can be defined as the impact factors distribution between the reference product and the coproducts when they are simultaneous and dependent. At ITB value chain there is one type of situation where allocation may be required located at two points in end-of-life processes (i.e., the recycling processes) that occurs: at assembling line (core module) due to process waste generation and at EoL (downstream module) due to metal recovering from obsolete step-voltage regulators.

- **Assembling line and EoL**: regarding to the recycling of steel, silicon-steel, copper and aluminium generated during step-voltage regulator manufacturing and recovered at EoL, it was considered the cut-off approach. According to the core EPDItaly core-PCR (PCR007), for recovery and recycling processes, which take place outside the boundaries of the product system, only impacts related to the transport of the waste to the treatment platform should be considered. Therefore, all the impacts of the waste transportation by road were fully attributed to the ITB product.

Cut-off criteria:

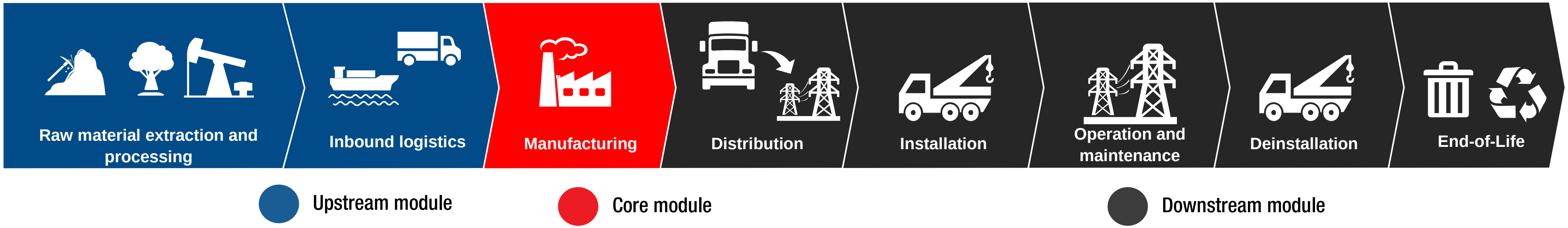
The cut-off criteria are applied to support an efficient calculation procedure. According to EN 50693 (2019) and PCR018 (2021), specifically the following flows and operations may, and have been cut-off:

- Production, use and disposal of the packaging of components and semi-finished intermediates;
- Materials making up the Single-Phase Step-Voltage Regulator itself whose total mass does not exceed 1% of the total weight of the device;
- Material and energy flows related to dismantling phase, whenever it is reasonable to assume that dismantling is performed by adopting manual tools (e.g., screwdrivers, hammers, etc.);
- Devices external to the product itself required for installation;
- Maximum 5% of the overall environmental impact of the analysed product system.

Among the omitted processes that meet the maximum criterion of 5% environmental impacts, are:

- Acquisition and manufacturing of machinery used in the manufacturing of voltage regulators, due to their extended lifespan;
- Acquisition and consumption of inputs associated with the operation and maintenance of equipment (LPG of forklift, machinery lubricants, cleaning rags, alcohol, as well as smoke and dust generation, among others);
- Some intermediate processes for the beneficiation of raw materials (conversion of steel sheet into steel tube, for example);
- Possible, but not probable, consumptions that may occur in the stage of use and maintenance, if necessary (such as oil replacement or recovery, for example).

Description of the system boundaries:



Upstream module

The voltage regulator is majorly made of steel and silicon-steel, aluminium/copper, paper/paperboard and oil (tank filled for cooling purposes). There are also minor parts of polymers, chemicals (painting, glue…), rubber and wood for packaging. The upstream module considers all upstream processes to extract such materials and process them into the final components that are inserted into ITB manufacturing line, including auxiliary consumptions at the factory such as electricity, LPG and others. This stage of the life-cycle accounts for the road and maritime transport of all materials and components from suppliers to ITB plant (inbound logistics).

Core module

The voltage regulator manufacturing is an assembling line. Metal sheets and tubes are cut, bended, calendared, moulded and welded into the final voltage regulator structure (tank, lid and radiator). Those parts are cleaned and painted. In parallel the core made of silicon-steel and assembled from several different pieces that are cut to be geometrically positioned into the magnetic core and wildings prepared with insulated conductor wires and covered with insulating paper. Core and body meet at the final assembling, with connections, cables and other minor parts and are tested for security, functioning and tightness. After packaging (wood bars and steel nails), the voltage regulator is stored and ready for shipment. The manufacturing line at ITB plant requires ancillary inputs, such as electricity and water to operate and generate wastes and other outputs. Electricity consumed at Birigui plant is 100% from renewable source (wind) meanwhile a major part of wastes is recycled following the internal policies on waste management. Wastes are majorly from metallic scraps and are recycled meanwhile there are effluent generation from washing process as well as atmospheric emissions from LPG combustion and solvent volatilization at painting process.

Downstream module

This module encompasses all steps after product expedition from ITB manufacturing plant until its End-of-life (EoL). The voltage regulator is distributed to Ceará (northeastern Brazil) by large diesel-truck through road transportation. The installation requires a lifting device that works for transport (from energy company storage into the operation point) and to elevate and install the voltage regulator. During 35 years of Reference Service Life (RSL) the voltage regulator will convert energy voltage for urban consumption and consumes medium voltage electricity from Brazilian national grid to operate and through losses in the transformation. During this period, an inspection should be made every 12 months of voltage regulator operation to check for leakages, corrosion, and others. Every 5 years, some tests should be made as for example, oil sample for quality analysis, insulating check, etc. If there are no anomalies, no maintenance is necessary. According to ITB product specialists, many voltage regulators operate until its failure and maintenance is not a controlled practice. When discontinued, a voltage regulator is generally disassembled for metal recovering due to its high aggregated value. In Brazil this may be done at secondary scrap market or by specialized recycling companies. Steel, aluminium, copper and other metallic fractions are recovered and reinserted into the market. Other fractions are more likely to be discarded to sanitary landfill. Mineral oil may be recycled or incinerated in waste management specialized companies depending on its quality when discarded (e.g., PCB content above 50 ppm).

Content information

Product components	Material classes*	Weight, kg**	Weight-% (versus the product)
Other ferrous alloys, non-stainless steel	M-119	956.93	56.45%
Aluminium and its alloys	M-120	108.62	6.41%
Copper and its alloys	M-121	119.72	7.06%
Stainless steel	M-100	3.20	0.19%
Tin and its alloys	M-126	2.03	0.12%
Paper/paperboard	M-341	54.65	3.22%
Ceramics	M-160	15.30	0.90%
Oils and greases	M-410	387.20	22.84%
Chemicals (paints, varnish, dilutant, glues)	-	31.53	1.86%
Polymers	-	13.71	0.81%
Rubber	M326	2.31	0.14%
TOTAL	**-**	**1,695.20**	**100.00%**
Packaging materials	**Material classes***	**Weight, kg**	**Weight-% (versus the product)**
Wooden bars	M-340	101.46	100.00%
TOTAL	**-**	**101.46**	**100.00%**

**According to IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry.*

***The masses presented in the content declaration are related to the Bill-of-Materials (BOM) of the product, which, depending on the components involved, may undergo minor variations due to processing details or technical specifications (such as the thickness of a steel sheet or the density of oil, for example). For this reason, they may slightly diverge from the projected product mass.*

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 in a concentration that exceed 0.01% (w/w).

Environmental Information

Potential environmental impact – mandatory indicators according to core-PCR

Results per a single piece of step-voltage regulator operating for 35 years

Indicator*	Unit	Raw material supply / Transport	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	Deinstallation stage and End-of-Life	Total
		upstream	core	downstream				
GWP-total	kg CO_2 eq	6.89E+03	1.11E+02	4.71E+02	2.56E+02	2.38E+05	1.42E+03	2.48E+05
GWP-fossil	kg CO_2 eq	7.03E+03	1.11E+02	4.38E+02	1.06E+02	1.18E+05	1.22E+03	1.27E+05
GWP-biogenic**	kg CO_2 eq	-1.58E+02	2.58E-02	8.69E+00	1.49E+02	1.01E+05	1.98E+02	1.01E+05
GWP-luluc	kg CO_2 eq	1.78E+01	1.87E-03	2.36E+01	9.43E-01	1.98E+04	7.66E-01	1.98E+04
ODP	kg CFC11 eq	9.12E-05	4.26E-07	1.88E-05	2.03E-06	3.17E-03	2.79E-06	3.29E-03
AP	mol H+ eq	1.39E+02	4.98E-02	1.80E+00	4.31E-01	8.01E+02	6.31E-01	9.43E+02
EP-freshwater	kg P eq	5.68E-01	4.18E-05	1.73E-03	6.67E-04	2.70E+00	5.53E-03	3.28E+00
EP-marine	kg N eq	9.72E+00	9.21E-03	9.44E-01	3.18E-01	1.46E+02	4.84E-01	1.58E+02
EP-terrestrial	mol N eq	1.19E+02	9.47E-02	8.12E+00	2.00E+00	1.49E+03	2.89E+00	1.62E+03
POCP	kg NMVOC eq	4.14E+01	5.24E-02	2.48E+00	6.72E-01	4.59E+02	9.66E-01	5.04E+02
ADP-m***	kg Sb eq	1.43E+00	1.77E-06	6.45E-05	6.05E-06	1.93E-02	8.08E-06	1.45E+00
ADP-f***	MJ	9.23E+04	2.97E+02	5.64E+03	1.30E+03	1.70E+06	1.57E+03	1.80E+06
WDP***	m^3 depriv.	2.14E+03	-8.72E+01	8.08E+01	4.72E+00	4.03E+05	7.21E+00	4.05E+05
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; 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 applied characterization factors are associated with the EF 3.0 method.*

*** For the GWP-biogenic indicator, it was assumed that the carbon uptake is fully emitted at the disposal point, even though degradation may occur over a longer period within the 100-year timeframe of GWP analysis. Therefore, the paper content within the product and the wood composing the packaging had their biogenic carbon contents (captured throughout their value chains, i.e., - 1 kg CO_2 eq) manually adjusted to be 100% emitted to the installation phase (for wood packaging) and end-of-life phase (for the product), i.e., +1 kg CO_2 eq.*

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

Potential environmental impact – mandatory indicators according to core-PCR

Results per a single piece of step-voltage regulator operating for 35 years									
Indicator	Unit	Raw material supply	Transport	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	Deinstallation stage and End-of-Life	Total
		upstream		core	downstream				
PM	disease inc.	7.30E-04	4.96E-07	4.72E-05	8.04E-06	2.24E-02	1.53E-05	2.32E-02	
IRP	kBq U-235 eq	1.31E+02	5.02E-02	4.36E-01	1.84E-01	5.26E+03	3.30E-01	5.39E+03	
ETP-fw	CTUe	7.94E+04	1.64E+02	2.17E+04	1.63E+03	3.88E+05	2.18E+03	4.93E+05	
HTP-c	CTUh	3.57E-05	1.27E-07	9.36E-08	5.79E-08	7.72E-05	1.19E-07	1.13E-04	
HTP-nc	CTUh	1.64E-03	2.27E-07	7.61E-06	8.70E-07	1.10E-03	2.72E-06	2.75E-03	
SQP	Pt	6.76E+04	1.82E+00	4.71E+02	3.95E+01	1.23E+06	7.32E+01	1.30E+06	
Acronyms	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.								

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Use of resources

Results per a single piece of step-voltage regulator operating for 35 years									
Indicator		unit	Raw material supply + Transport (upstream)	Manufacturing stage (core)	Distribution stage (downstream)	Installation stage (downstream)	Use and Maintenance stage (downstream)	Deinstallation stage and End-of-Life (downstream)	Total
Primary energy resources - Renewable	Use as energy carrier (PERE)	MJ, net calorific value	13,726.21	1.20	224.61	12.29	4,347,062.57	15.69	4,361,042.57
	Use as raw materials (PERM)	MJ, net calorific value	891.07	0.00	0.00	0.00	0.00	0.00	891.07
	Total (PERT)	MJ, net calorific value	14,617.28	1.20	224.61	12.29	4,347,062.57	15.69	4,361,933.64
Primary energy resources - Non-renewable	Use as energy carrier (PENRE)	MJ, net calorific value	73,298.92	296.58	5,806.62	1,308.65	1,698,577.70	1,575.12	1,780,863.58
	Use as raw materials (PENRM)	MJ, net calorific value	18,997.56	0.00	0.00	0.00	0.00	0.00	18,997.56
	Total (PERNT)	MJ, net calorific value	92,296.48	296.58	5,806.62	1,308.65	1,698,577.70	1,575.12	1,799,861.15
Secondary material (MS)		kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Renewable secondary fuels (RSF)		MJ, net calorific value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-renewable secondary fuels (NRSF)		MJ, net calorific value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net use of fresh water (FW)		m^3	68.33	-1.56	2.50	0.15	9,201.35	0.46	9,271.23

Waste production and output flows

Waste production

Results per a single piece of step-voltage regulator operating for 35 years									
Indicator	Unit	Raw material supply	Transport	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	Deinstallation stage and End-of-Life	Total
		upstream		core	downstream				
Hazardous waste disposed (HWD)	kg	0.00		18.72	0.00	0.00	0.00	0.00	18.72
Non-hazardous waste disposed (NHWD)	kg	0.00		0.00	0.00	101.46	0.00	781.79	883.24
Radioactive waste disposed (RWD)	kg	0.00		0.00	0.00	0.00	0.00	0.00	0.00

Output flows

Results per a single piece of step-voltage regulator operating for 35 years									
Indicator	Unit	Raw material supply	Transport	Manufacturing stage	Distribution stage	Installation stage	Use and Maintenance stage	Deinstallation stage and End-of-Life	Total
		upstream		core	downstream				
Materials for energy recovery (MER)	kg	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Material for recycling (MFR)	kg	0.00		129.49	0.00	0.00	0.00	913.41	1,042.90
Components for reuse (CRU)	kg	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Exported thermal energy (ETE)	MJ	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Exported electricity energy (EEE)	MJ	0.00		0.00	0.00	0.00	0.00	0.00	0.00

References

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