Zucchetti Centro Sistemi S.p.A.

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCTS NAME

Azzurro 3PH 5000 HYD ZP3
Azzurro 3PH 6000 HYD ZP3
Azzurro 3PH 8000 HYD ZP3
Azzurro 3PH 10000 HYD ZP3
Azzurro 3PH 12000 HYD ZP3

SITE

No.1 Shiquanling West Road, Chenjiang Street, Zhongkai High-Tech Zone, 516006, Huizhou City, Guangdong Province, P.R. China

In accordance with ISO 14025 and EN 50693

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration number	Azzurro ZCS 010
Registration Number	EPDITALY1132

Release Date	29/10/2025
Valid until	29/10/2030

GENERAL INFORMATION

EPD OWNER

Company Name	Zucchetti Centro Sistemi S.p.A. (https://www.zcscompany.com/it/)
Registered office	Via Lungarno, 305 52028 Terranuova Bracciolini (AR)
Contact for EPD information	Samanta Marzielli • e-mail: s.marzielli@zcscompany.com, • Tel: 0559197422

PROGRAM OPERATOR

EPDItaly	Via Gaetano De Castillia n° 10 - 20124 Milano, Italy

ABOUT THE EPD

Products Name	Azzurro 3PH 5000 HYD ZP3, Azzurro 3PH 6000 HYD ZP3, Azzurro 3PH 8000 HYD ZP3, Azzurro 3PH 10000 HYD ZP3, Azzurro 3PH 12000 HYD ZP3
Sites	No.1 Shiquanling West Road, Chenjiang Street, Zhongkai High-Tech Zone, 516006, Huizhou City, Guangdong Province, P.R. China
Brief description and technical information of the products	The ZCS Azzurro 3PH HYD (3PH HYD 5000 ZP3, 6000 ZP3, 8000 ZP3, 10000 ZP3, 12000 ZP3) are versatile hybrid three-phase inverters designed for residential and commercial storage systems. Featuring integrated storage capability, modular installation, and parallel connection options, they offer flexibility and ease of use. With up to 98.2% efficiency and three independent MPPTs, they support a wide DC input range (160–980V) and ensure maximum energy harvesting. These inverters are compatible with high-voltage $LiFePO_4$ battery modules (HV ZBT 5K), offering up to 30.6 kWh of scalable capacity. They include an integrated EMS, support stand-alone operation during grid outages, and provide EPS backup up to 13.2 kVA with <10 ms switching time. Equipped with natural convection cooling, IP65 protection, and quiet operation (<45 dB), the series supports Wi-Fi/4G, Ethernet, CAN, RS485, and Bluetooth interfaces. A 10-year warranty (with registration) ensures long-term reliability.
Product application area	The ZCS Azzurro 3PH HYD inverters (Azzurro 3PH 5000 HYD ZP3, Azzurro 3PH 6000 HYD ZP3, Azzurro 3PH 8000 HYD ZP3, Azzurro 3PH 10000 HYD ZP3, Azzurro 3PH 12000 HYD ZP3) are perfectly suited for domestic and commercial applications and can easily be integrated with energy storage systems.
CPC Code https://unstats.un.org/unsd/classifications/Econ	CPC 4612: "Electrical transformers, static converters and inductors"
EPD generation	EPD generated by means of a validated tool: ZCS LCA-Tool, version 1.0, 10/03/2025

VERIFICATION INFORMATION

PCR	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV. 3.1 Issue date 12.11.2024 Sub-category PCR: EPDItaly032 "Power Inverter", (Rev. 0), 22/12/2022
EPDItaly Regulation	Regulations of the EPDItaly Programme Revision 6.0. Issue date 30.10.2023
Project Report LCA	*Life Cycle Assessment Report* - LCA tool report
Independent Verification Statement	The PCR review was performed by ICMQ S.p.A. Independent verification of the declaration and data carried out in accordance with ISO 14025:2010. ☐ Internal ☑ External Third-party verification carried out by: ICMQ S.p.A., via Gaetano De Castillia n° 10 - 20124 Milan, Italy. Accredited by Accredia
Statement Comparability	Environmental claims published within the same product category, but from different programs, may not be comparable.
Statement Responsibility	The EPD Owner relieves EPDItaly from any non-compliance with environmental legislation. The holder of the statement will be responsible for the information and supporting evidence. EPDItaly declines all responsibility for the information, data and results provided by the EPD Owner for the life cycle assessment.

1. THE COMPANY

Zucchetti Centro Sistemi Spa (ZCS), founded in 1985 in the heart of Tuscany, Italy, is a leader in technological innovation, specializing in software development, robotics, automation, and renewable energy solutions. Under the visionary leadership of its founder and current CEO, Fabrizio Bernini, the company has expanded its presence in international markets, offering SMART & GREEN solutions that integrate advanced technologies. In 2000, ZCS became part of the Zucchetti Group, a prominent Italian and European leader in Information and Communication Technology (ICT). This integration has bolstered ZCS's capabilities, enabling it to develop vertically oriented, cloud-based solutions for businesses of all sizes, aiming to enhance efficiency and effectiveness in business processes.

ZCS operates through five main business units:

- **Software**: Developing cloud-based solutions to improve business process efficiency.
- **Healthcare**: Designing integrated IT systems for healthcare facilities, including analysis labs and hospital services.
- **Automation**: Creating systems for traceability and security across various industries.
- **Robotics**: Producing innovative robots for gardening and pool maintenance, such as the Ambrogio Robot, an eco-friendly, autonomous lawn mower.
- **Green Innovation**: Distributing energy-saving solutions, including smart photovoltaic inverters and storage systems, to promote energy independence in residential, commercial, and industrial settings.

The Green Innovation Division is at the forefront of ZCS's commitment to sustainable development. It focuses on designing and delivering advanced energy solutions, including photovoltaic inverters, intelligent energy storage systems, and electric vehicle charging stations. These innovations empower residential, commercial, and industrial sectors to reduce energy consumption, enhance energy independence, and contribute to a greener future.

The company's mission focuses on improving quality of life and supporting business development through intelligent, eco-friendly technology, combining creativity with technological innovation. ZCS is committed to sustainability, emphasizing economic, environmental, and social responsibility in its operations. With a strong emphasis on research and development, ZCS's Idealab incubates innovative ideas, transforming them into market-ready solutions. The company has received numerous awards and recognitions for its commitment to innovation and social responsibility, including the prestigious "Award of Awards for Innovation" and the knighthood title "Cavaliere del Lavoro" awarded to Fabrizio Bernini in 2017.

2. THE PRODUCT

The ZCS Azzurro 3PH HYD hybrid inverters (3PH HYD 5000 ZP3, 3PH HYD 6000 ZP3, 3PH HYD 8000 ZP3, 3PH HYD 10000 ZP3, 3PH HYD 12000 ZP3) are advanced three-phase storage inverters engineered for residential and commercial energy systems. They integrate photovoltaic energy conversion with battery storage in a compact, modular design that simplifies installation and parallel scalability. Featuring three independent MPPTs and a broad input voltage range (160–980V), these inverters deliver a maximum efficiency of up to 98.2%, ensuring optimal performance even under fluctuating solar conditions. Compatible with high-voltage lithium batteries (HV ZBT 5K), they support up to six units for a total capacity of 30.6 kWh, offering high adaptability for various storage needs.

Safety and continuity are key strengths of the HYD series. With anti-islanding protection, integrated DC disconnectors, and fast-switching EPS output (<10 ms), they guarantee seamless backup during blackouts using either solar or battery power.

The inverters also include an embedded EMS (Energy Management System) and support zero-feed-in, allowing for intelligent energy control and grid compliance. Their IP65-rated housing, natural convection cooling, and low noise emission (<45 dB) make them reliable for indoor and outdoor installation.

With built-in Wi-Fi, RS485, CAN, Bluetooth, USB, and optional 4G/Ethernet interfaces, they offer flexible monitoring and connectivity options. Backed by a 10-year warranty (subject to registration), the ZCS Azzurro 3PH HYD series is an ideal solution for sustainable and resilient solar-plus-storage applications.

The table below highlights the principal technical data for the inverters:

	DATA	**5000 ZP3**	**6000 ZP3**	**8000 ZP3**	**10000 ZP3**	**12000 ZP3**
DC input (PV)	Typical DC Power	7500W	9000W	12000W	15000W	18000W
	No. of MPPTs / Strings per MPPT	3/1	3/1	3/1	3/1	3/1
	Max Input Voltage	1100V	1100V	1100V	1100V	1100V
	Start-up Voltage	200V	200V	200V	200V	200V
	Nominal Input Voltage	600V	600V	600V	600V	600V
	MPPT Voltage Range	160-980V	160-980V	160-980V	160-980V	160-980V
	Max Input Current per MPPT	20A	20A	20A	20A	20A
	Absolute Max Current per MPPT	25A	25A	25A	25A	25A
Batteries	Compatible Battery	HV ZBT 5K	HV ZBT 5K	HV ZBT 5K	HV ZBT 5K	HV ZBT 5K
	Nominal Voltage	400V	400V	400V	400V	400V
	Voltage Range	350-435V	350-435V	350-435V	350-435V	350-435V
	Max Charge/Discharge Power	5000W	6000W	8000W	10000W	10000W
	Battery Capacity Range	5.1-30.6kWh	5.1-30.6kWh	5.1-30.6kWh	5.1-30.6kWh	5.1-30.6kWh
	DoD (programmable)	0-90%	0-90%	0-90%	0-90%	0-90%
AC output (grid)	Nominal Power	5000W	6000W	8000W	10000W	12000W
	Max Apparent Power	5500VA	6600VA	8800VA	11000VA	13200VA
	Max Current	14.5A	17.4A	23.2A	29A	31.9A
EPS Output	Max EPS Power	5500VA	6600VA	8800VA	11000VA	13200VA
	EPS Current	8A	10A	13A	16A	19A
	Switch Time	<10ms	<10ms	<10ms	<10ms	<10ms
Efficiency	Max Efficiency	98%	98%	98%	98.2%	98.2%
	European Efficiency	97.5%	97.5%	97.5%	97.7%	97.7%
	MPPT Efficiency	>99.9%	>99.9%	>99.9%	>99.9%	>99.9%
Protections	Anti-Islanding, Ground Fault, RCMU	Yes	Yes	Yes	Yes	Yes
	DC Reverse Polarity	Yes	Yes	Yes	Yes	Yes
	DC Switch	Integrated	Integrated	Integrated	Integrated	Integrated
	Overheat Protection	Yes	Yes	Yes	Yes	Yes
General	Operating Temp.	-10°C to +50°C				
	Noise Level	<45dB @1m				
	Cooling	Natural Convection				
	Ingress Protection	IP65				
	Max Altitude	4000m				
	Dimensions (WxHxD)	440x708x170mm				
	Communication	Wi-Fi, RS485, CAN, USB, Bluetooth, 4G/Ethernet (opt.)				
	Warranty	10 years (with registration)				
	Country or region of installation	Italy				
	Standby power use consumption	≤5W				

2.1. COMPOSITION

The Azzurro 3PH 5000 HYD ZP3, Azzurro 3PH 6000 HYD ZP3, Azzurro 3PH 8000 HYD ZP3, Azzurro 3PH 10000 HYD ZP3, Azzurro 3PH 12000 HYD ZP3 share the same hardware and they all approximately weight 32.5 kg. They are all composed of different materials, including steel, aluminium and other metals for rigid parts that make up the structure and for the internal parts. There are also other materials like electronic components, plastics and others.

IEC62474 Classname	IEC62474 ID	% by weight (all inverters)
Stainless steel	M-100	0.2
Other ferrous alloys, non-stainless steels	M-119	29.4
Alluminium and its alloys	M-120	18.2
Copper and its alloys	M-121	0.04
Other inorganic materials	M-199	0.3
PolyVinylChloride (PVC)	M-200	0.1
PolyEthylene (PE)	M-204	0.4
PolyCarbonate (PC)	M-204	2.9
PolyAmide (PA)	M-208	0.1
Other unfilled thermoplastics	M-249	0.9
Silicone	M-321	0.3
Paper	M-341	0.9
Electronic components	-	46.2

No substance in the product greater than 0,10% by weight is present on the "List of Potentially Hazardous Substances" candidates for authorization under the REACH legislation.

Printed circuit boards used in all the inverters weight approx. 1.33 kg and are modelled through the Ecoinvent 3.9 process "Printed wiring board, for surface mounting, Pb free surface {GLO}| printed wiring board production, for surface mounting, Pb free surface | Cut-off, S".

2.2. REFERENCE SERVICE LIFE (RSL)

The reference service life of the product has been assumed to be 25 years.

3. SCOPE AND TYPE OF EPD

This is a product-specific EPD, compliant with ISO 14025 and EN 50693 standards, as part of the EPDItaly program, for the ZCS Azzurro 3PH HYD ZP3 inverters family. They are power inverters for domestic applications that can be integrated with photovoltaic production and energy storage. The study is based on a "cradle to grave" LCA methodology, in accordance with ISO 14040 and 14044 standards. The geographical scope of the data is referred to Italy as the products are mainly sold and used in Italy. The reference year is set at 2024, considering the current technological level. The results were generated using SimaPro 9.6 modeling software.

Representativeness	Scope
Spatial	Italy
Year	2024

3.1. FUNCTIONAL UNIT

The functional unit identified for the LCA study is a single power inverter produced, defined as an assembly of electric and electronic devices converting the variable DC voltage generated by a photovoltaic (PV) solar panel into a commercial frequency alternating current (AC).

3.2. PRINCIPLE OF MODULARITY AND ENVIRONMENTAL RESPONSIBILITY (PPP)

In the LCA study, the principle of modularity was adopted, which allows the product life cycle to be broken down into different phases, assigning specific environmental impacts to each of them. This approach facilitates a clear attribution of environmental responsibilities at every stage of the production process, ensuring greater transparency and traceability of data.

In addition, the PPP (Polluter Pays Principle) has been complied with, according to which the entity causing an environmental impact is also the one responsible for the related mitigation or repair costs. This principle ensures that environmental costs are not passed on to the community, but are correctly attributed to those who generated them, promoting greater responsibility and incentivizing the adoption of more sustainable practices throughout the supply chain.

3.3. SYSTEM BOUNDARIES

The system boundary implemented in this LCA covered the entire product life cycle, i.e. from "cradle to grave", with the life cycle phases and geographical areas for all the main activities involved, grouped into five distinct modules: upstream, core and downstream, according to EN 50693. These modules have further been divided into sub-modules: manufacturing, distribution, installation, use and maintenance and end-of-life. In the context of life cycle analysis (LCA), the terms upstream, core, and downstream refer to different stages of a product's lifecycle:

- **Upstream:** It includes the initial stages of production, such as extracting raw materials, processing them, and transporting them to the production site. It therefore concerns everything that happens before the manufacture of the products.
- **Core:** This is the middle stage of the life cycle, which includes the production of the product itself, assembly, and manufacturing operations. It is the part of the process where the products are created or built.
- **Downstream:** Involves post-production stages, such as transportation to the customer, end-user use, and end-of-life disposal or recycling. It focuses on what happens to the products after they are built and distributed.

These three modules cover the entire life cycle of a product, from initial production to disposal. The product lifecycle and inventory analysis, which describe all the activities, simplified assumptions, and modeling scenarios used in LCA, have been covered exhaustively in the next section.

Manufacturing	Distribution	Installation	Use and maintenance	End of Life
Upstream - Core	Downstream	Downstream	Downstream	Downstream
√	√	√	√	√

3.3.1. ALLOCATION RULES

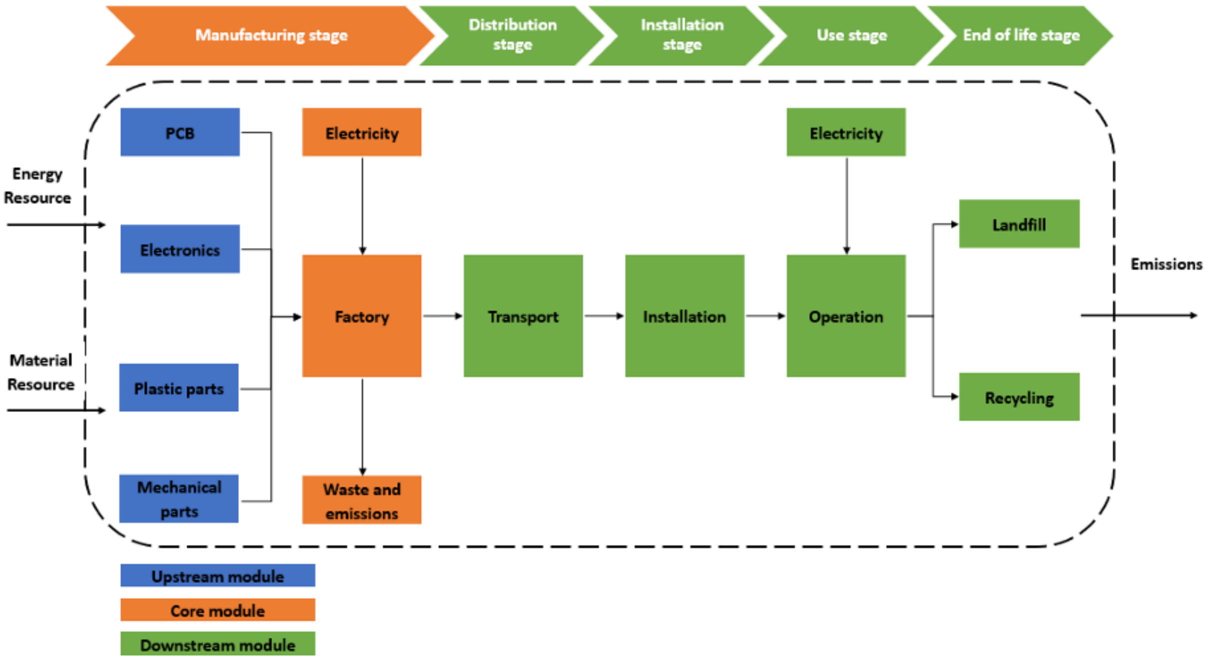
An allocation was made for the waste production based on the functional unit. This calculation was based on the 2024 annual production of inverters in GW and the amount of waste generated in 2024 from the inverters production line.

3.4. DATA QUALITY

The data used in the LCA study include both primary and secondary data. The primary data were obtained directly from Zucchetti Centro Sistemi S.p.A. and from the external manufacturing plant. This data is under the control and management of the company (e.g., bills, invoices, transport documents, weighing records). Secondary data comes from a variety of sources, including selected generic data from international databases; Proxy data: sourced from sources other than databases, used to create scenarios and fill in any information gaps. In the present study, secondary data were modeled using the Ecoinvent 3.9 database (2021), with citation of origin in the case of data from different sources.

4. LIFE CYCLE INVENTORY ANALYSIS (LCIA)

The Life Cycle Inventory (LCI) lists and quantifies all inflows and outflows at all declared life cycle stages of the products within the system boundary considered in relation to the scope of the study.



4.1. MANUFACTURING STAGE

The Life Cycle Study (LCA) includes both the "Upstream" phase, and the "Core" processes related to production. The Upstream phase includes the semi-finished products, the materials used in the production system and the manufacturing of the products by the external supplier in China (Huizhou City, Guangdong Province). It also includes the transportation of raw materials and semi-finished products to the external manufacturing plant as well as the transportation of the final products from the Chinese manufacturer to Zucchetti Centro Sistemi premises, where the products are then shipped to the customer.

The core processes concern all the internal processes to which the products and their components are subjected within Zucchetti Centro Sistemi's plant. However, given that there is no manufacturing process taking place at Zucchetti Centro Sistemi's premises, the impacts considered in the core phase are related to the energy consumption of the building where the Green Innovation Division operates. These data, extracted from the ERP and bills of the company, were entered into the SimaPro software to calculate the environmental impact of the production cycle of the products.

4.2. DISTRIBUTION STAGE

This stage includes the transportation of the products to the final customer. Based on the main country of shipment, in this case Italy, an assumed mean fixed value of 300 km has been chosen as distance to calculate the ton*km value for all the inverters. The transportation takes place only within the European Union and is assumed to be carried by truck, EURO 4, 16-32 ton.

4.3. INSTALLATION STAGE

This module calculates the environmental impacts associated with the installation of the products. In this case, the products are manually installed, so there is no impact associated, while the impact comes from the discarding of the packaging. For the impact modeling of this phase, the treatment percentage guidelines from EN 56693 and EUROSTAT were used. The distance from the recycler is assumed to be 50 km, according to the relevant PCR.

4.4. USE & MAINTENANCE STAGE

This module analyses the environmental impacts associated with the use and maintenance of the products, by excluding energy carriers used in maintenance, such as spare parts and materials specified by the manufacturer, due to the lack of reliable data on failure times and maintenance frequencies. The analysis of emissions during the use phase of the module is based on the information available from the product data sheet and the formulas reported in the relevant c-PCR.

In particular, the total energy consumption value (expressed in kWh per RSL) is calculated using this formula:

$$E_{use}\,[kWh] = \mathit{Output\ rated\ AC\ active\ power} * \mathit{average\ local\ annual\ sunshine} * (1 - \mathit{average\ energy\ efficiency}) * RSL$$

To model this phase, a process from Ecoinvent describing the production of electric energy from photovoltaic (to which the inverters are connected, in this case in the "slanted roof" configuration) has been used:

"Electricity, low voltage {IT}| electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted | Cut-off, S"

The relevant geographic area for the use phase is Italy.

The output rated AC active power refers to the maximum continuous power that the inverter can deliver to the electrical grid or the connected load under standard conditions. It is measured in kilowatts (kW) and represents the usable AC power output after conversion from DC (direct current) produced by the solar panels.

The average local sunshine has been calculated from the *photovoltaic geographical information system* (https://re.jrc.ec.europa.eu/pvg_tools/en/). In case of the Italian scenario, a value of 1500 hours of photovoltaic productivity has been considered.

4.5. END OF LIFE STAGE

This section examines products end-of-life, for which Zucchetti Centro Sistemi does not have primary data that can be used in the LCA study. End-of-life has been calculated according to the end-of-life scenarios outlined in the EN 50693 and EUROSTAT (the only exception is for electronic components, for which a specific process from Ecoinvent was directly applied), estimating a distance from the recycler of 50 km by truck, EURO 4, 16-32 ton. For the environmental impact of the different waste treatments, the EcoInvent database has been used.

5. RESULTS

In this section, the results of the study for every inverter model are presented, divided by different impact parameters and by the phases of the study that constituted the LCA.

Environmental impacts were calculated using the EN 15804 + A2, Cumulative Energy Demand (LHV), Selected LCI results additional, and EDIP 2003 methodologies, as indicated in the SimaPro Methods library. These methodologies are used to calculate environmental impact categories, resource use and waste produced, as required by the PCR "EPDItaly007-PCR for electronic and electrical products and systems (Stand-alone) – Rev 3.1".

5.1. ENVIRONMENTAL IMPACTS

3PH 5000 HYD ZP3

				Upstream - Core	*Downstream*			
Impact indicators	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Global warming Potential - Total	GWP - Total	kg CO2 eq	1.61E+03	1.29E+03	2.42E+00	5.15E+00	3.13E+02	1.92E+01
Global warming Potential - Fossil	GWP - Fossil	kg CO2 eq	1.60E+03	1.29E+03	2.20E-03	6.49E-02	3.12E+02	1.89E+01
Global warming Potential – Biogenic	GWP - Biogenic	kg CO2 eq	8.87E+00	-1.45E+00	2.42E+00	6.53E+00	1.06E+00	3.13E-01
Global warming Potential - Land use and LU change	GWP - Luluc	kg CO2 eq	3.31E+00	2.72E+00	1.18E-03	7.24E-05	5.87E-01	8.80E-04
Ozone depletion Potential	ODP	kg CFC11 eq	1.20E-04	1.00E-04	5.30E-08	3.44E-09	1.96E-05	3.54E-08
Acidification Potential	AP	mol H+ eq	1.29E+01	1.06E+01	1.00E-02	1.05E-03	2.34E+00	8.06E-03
Eutrophication Potential, freshwater	EP - freshwater	kg P eq	9.88E-01	7.96E-01	1.70E-04	3.20E-05	1.92E-01	2.67E-04
Eutrophication Potential, marine	EP - marine	kg N eq	2.07E+00	1.71E+00	3.82E-03	8.59E-04	3.59E-01	4.81E-03
Eutrophication Potential, terrestrial	EP - terrestrial	mol N eq	2.24E+01	1.86E+01	4.08E-02	4.83E-03	3.75E+00	3.49E-02
Photochemical ozone formation Potential	POCP	kg NMVOC eq	8.68E+00	7.33E+00	1.47E-02	1.46E-03	1.33E+00	9.75E-03
Resource use Potential, minerals and metals	ADP - minerals&metals	kg Sb eq	3.39E-01	3.20E-01	7.82E-06	4.38E-07	1.89E-02	2.54E-06
Resource use Potential, fossil	ADP - fossil	MJ	2.06E+04	1.66E+04	3.45E+01	2.14E+00	3.90E+03	1.36E+01
Water deprivation Potential	WDP	m3 depriv.	4.13E+02	1.88E+02	1.41E-01	-1.82E-02	2.25E+02	1.11E+00

3PH 6000 HYD ZP3

				Upstream - Core	Downstream			
Impact indicators	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Global warming Potential - Total	GWP - Total	kg CO2 eq	1.68E+03	1.29E+03	2.42E+00	5.15E+00	3.76E+02	1.92E+01
Global warming Potential - Fossil	GWP - Fossil	kg CO2 eq	1.67E+03	1.29E+03	2.20E-03	6.49E-02	3.74E+02	1.89E+01
Global warming Potential – Biogenic	GWP - Biogenic	kg CO2 eq	9.09E+00	-1.22E+00	2.42E+00	6.33E+00	1.27E+00	3.13E-01
Global warming Potential - Land use and LU change	GWP - Luluc	kg CO2 eq	3.43E+00	2.72E+00	1.18E-03	7.24E-05	7.05E-01	8.80E-04
Ozone depletion Potential	ODP	kg CFC11 eq	1.24E-04	1.00E-04	5.30E-08	3.44E-09	2.36E-05	3.54E-08
Acidification Potential	AP	mol H+ eq	1.34E+01	1.06E+01	1.00E-02	1.05E-03	2.81E+00	8.06E-03
Eutrophication Potential, freshwater	EP - freshwater	kg P eq	1.03E+00	7.96E-01	1.70E-04	3.20E-05	2.30E-01	2.67E-04
Eutrophication Potential, marine	EP - marine	kg N eq	2.15E+00	1.71E+00	3.82E-03	8.59E-04	4.30E-01	4.81E-03
Eutrophication Potential, terrestrial	EP - terrestrial	mol N eq	2.32E+01	1.86E+01	4.08E-02	4.83E-03	4.50E+00	3.49E-02
Photochemical ozone formation Potential	POCP	kg NMVOC eq	8.95E+00	7.33E+00	1.47E-02	1.46E-03	1.60E+00	9.75E-03
Resource use Potential, minerals and metals	ADP - minerals&metals	kg Sb eq	3.42E-01	3.20E-01	7.82E-06	4.38E-07	2.27E-02	2.54E-06
Resource use Potential, fossil	ADP - fossil	MJ	2.13E+04	1.66E+04	3.45E+01	2.14E+00	4.68E+03	1.36E+01
Water deprivation Potential	WDP	m3 depriv.	4.54E+02	1.83E+02	1.41E-01	-1.82E-02	2.70E+02	1.11E+00

3PH 8000 HYD ZP3

				Upstream - Core	Downstream			
Impact indicators	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Global warming Potential - Total	GWP - Total	kg CO2 eq	1.80E+03	1.29E+03	2.42E+00	5.15E+00	5.01E+02	1.92E+01
Global warming Potential - Fossil	GWP - Fossil	kg CO2 eq	1.79E+03	1.29E+03	2.20E-03	6.49E-02	4.99E+02	1.89E+01
Global warming Potential – Biogenic	GWP - Biogenic	kg CO2 eq	9.51E+00	-7.65E-01	2.42E+00	5.85E+00	1.70E+00	3.13E-01
Global warming Potential - Land use and LU change	GWP - Luluc	kg CO2 eq	3.66E+00	2.72E+00	1.18E-03	7.24E-05	9.40E-01	8.80E-04
Ozone depletion Potential	ODP	kg CFC11 eq	1.32E-04	1.00E-04	5.30E-08	3.44E-09	3.14E-05	3.54E-08
Acidification Potential	AP	mol H+ eq	1.43E+01	1.06E+01	1.00E-02	1.05E-03	3.75E+00	8.06E-03
Eutrophication Potential, freshwater	EP - freshwater	kg P eq	1.10E+00	7.97E-01	1.70E-04	3.20E-05	3.07E-01	2.67E-04
Eutrophication Potential, marine	EP - marine	kg N eq	2.29E+00	1.71E+00	3.82E-03	8.59E-04	5.74E-01	4.81E-03
Eutrophication Potential, terrestrial	EP - terrestrial	mol N eq	2.47E+01	1.86E+01	4.08E-02	4.83E-03	6.01E+00	3.49E-02
Photochemical ozone formation Potential	POCP	kg NMVOC eq	9.48E+00	7.33E+00	1.47E-02	1.46E-03	2.13E+00	9.75E-03
Resource use Potential, minerals and metals	ADP - minerals&metals	kg Sb eq	3.50E-01	3.20E-01	7.82E-06	4.38E-07	3.02E-02	2.54E-06
Resource use Potential, fossil	ADP - fossil	MJ	2.29E+04	1.66E+04	3.45E+01	2.14E+00	6.24E+03	1.36E+01
Water deprivation Potential	WDP	m3 depriv.	5.34E+02	1.74E+02	1.41E-01	-1.82E-02	3.60E+02	1.11E+00

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				Upstream - Core	*Downstream*			
Impact indicators	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Global warming Potential - Total	GWP - Total	kg CO2 eq	1.93E+03	1.29E+03	2.42E+00	5.15E+00	6.26E+02	1.92E+01
Global warming Potential - Fossil	GWP - Fossil	kg CO2 eq	1.92E+03	1.29E+03	2.20E-03	6.49E-02	6.23E+02	1.89E+01
Global warming Potential – Biogenic	GWP - Biogenic	kg CO2 eq	9.94E+00	-3.10E-01	2.42E+00	5.39E+00	2.12E+00	3.13E-01
Global warming Potential - Land use and LU change	GWP - Luluc	kg CO2 eq	3.90E+00	2.72E+00	1.18E-03	7.24E-05	1.17E+00	8.80E-04
Ozone depletion Potential	ODP	kg CFC11 eq	1.39E-04	1.00E-04	5.30E-08	3.44E-09	3.93E-05	3.54E-08
Acidification Potential	AP	mol H+ eq	1.53E+01	1.06E+01	1.00E-02	1.05E-03	4.69E+00	8.06E-03
Eutrophication Potential, freshwater	EP - freshwater	kg P eq	1.18E+00	7.98E-01	1.70E-04	3.20E-05	3.84E-01	2.67E-04
Eutrophication Potential, marine	EP - marine	kg N eq	2.44E+00	1.72E+00	3.82E-03	8.59E-04	7.17E-01	4.81E-03
Eutrophication Potential, terrestrial	EP - terrestrial	mol N eq	2.62E+01	1.86E+01	4.08E-02	4.83E-03	7.51E+00	3.49E-02
Photochemical ozone formation Potential	POCP	kg NMVOC eq	1.00E+01	7.33E+00	1.47E-02	1.46E-03	2.67E+00	9.75E-03
Resource use Potential, minerals and metals	ADP - minerals&metals	kg Sb eq	3.57E-01	3.20E-01	7.82E-06	4.38E-07	3.78E-02	2.54E-06
Resource use Potential, fossil	ADP - fossil	MJ	2.45E+04	1.66E+04	3.45E+01	2.14E+00	7.80E+03	1.36E+01
Water deprivation Potential	WDP	m3 depriv.	6.15E+02	1.64E+02	1.41E-01	-1.82E-02	4.51E+02	1.11E+00

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				Upstream - Core	Downstream			
Impact indicators	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Global warming Potential - Total	GWP - Total	kg CO2 eq	2.06E+03	1.29E+03	2.42E+00	5.15E+00	7.52E+02	1.92E+01
Global warming Potential - Fossil	GWP - Fossil	kg CO2 eq	2.04E+03	1.29E+03	2.20E-03	6.49E-02	7.48E+02	1.89E+01
Global warming Potential – Biogenic	GWP - Biogenic	kg CO2 eq	1.05E+01	1.45E-01	2.42E+00	5.08E+00	2.55E+00	3.13E-01
Global warming Potential - Land use and LU change	GWP - Luluc	kg CO2 eq	4.13E+00	2.72E+00	1.18E-03	7.24E-05	1.41E+00	8.80E-04
Ozone depletion Potential	ODP	kg CFC11 eq	1.47E-04	1.00E-04	5.30E-08	3.44E-09	4.72E-05	3.54E-08
Acidification Potential	AP	mol H+ eq	1.62E+01	1.06E+01	1.00E-02	1.05E-03	5.62E+00	8.06E-03
Eutrophication Potential, freshwater	EP - freshwater	kg P eq	1.26E+00	7.99E-01	1.70E-04	3.20E-05	4.61E-01	2.67E-04
Eutrophication Potential, marine	EP - marine	kg N eq	2.59E+00	1.72E+00	3.82E-03	8.59E-04	8.61E-01	4.81E-03
Eutrophication Potential, terrestrial	EP - terrestrial	mol N eq	2.77E+01	1.87E+01	4.08E-02	4.83E-03	9.01E+00	3.49E-02
Photochemical ozone formation Potential	POCP	kg NMVOC eq	1.06E+01	7.34E+00	1.47E-02	1.46E-03	3.20E+00	9.75E-03
Resource use Potential, minerals and metals	ADP - minerals&metals	kg Sb eq	3.65E-01	3.20E-01	7.82E-06	4.38E-07	4.54E-02	2.54E-06
Resource use Potential, fossil	ADP - fossil	MJ	2.60E+04	1.66E+04	3.45E+01	2.14E+00	9.36E+03	1.36E+01
Water deprivation Potential	WDP	m3 depriv.	6.96E+02	1.55E+02	1.41E-01	-1.82E-02	5.41E+02	1.11E+00

5.2. USE OF RESOURCES

3PH 5000 HYD ZP3

				Upstream - Core	*Downstream*			
Parameter	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Renewable primary energy as energy carrier	PERE	MJ	1.70E+04	1.85E+03	5.37E-01	3.85E-02	1.51E+04	6.63E-01
Renewable primary energy resource as material utilization	PERM	MJ	1.55E+02	1.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	PERT	MJ	1.71E+04	2.00E+03	5.37E-01	3.85E-02	1.51E+04	6.63E-01
Non-renewable primary energy as energy carrier	PENRE	MJ	2.05E+04	1.65E+04	3.45E+01	2.14E+00	3.90E+03	1.36E+01
Non-renewable primary energy as material utilization	PENRM	MJ	4.78E+01	4.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	PENRT	MJ	2.05E+04	1.66E+04	3.45E+01	2.14E+00	3.90E+03	1.36E+01
Use of secondary material	SM	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	FW	m3	1.76E+01	9.14E+00	4.92E-03	-1.48E-04	8.41E+00	4.07E-02

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				Upstream - Core	*Downstream*			
Parameter	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Renewable primary energy as energy carrier	PERE	MJ	2.00E+04	1.85E+03	5.37E-01	3.85E-02	1.81E+04	6.63E-01
Renewable primary energy resource as material utilization	PERM	MJ	1.55E+02	1.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	PERT	MJ	2.01E+04	2.00E+03	5.37E-01	3.85E-02	1.81E+04	6.63E-01
Non-renewable primary energy as energy carrier	PENRE	MJ	2.13E+04	1.65E+04	3.45E+01	2.14E+00	4.68E+03	1.36E+01
Non-renewable primary energy as material utilization	PENRM	MJ	4.78E+01	4.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	PENRT	MJ	2.13E+04	1.66E+04	3.45E+01	2.14E+00	4.68E+03	1.36E+01
Use of secondary material	SM	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	FW	m3	1.91E+01	9.04E+00	4.92E-03	-1.48E-04	1.01E+01	4.07E-02

3PH 8000 HYD ZP3

				Upstream - Core	Downstream			
Parameter	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Renewable primary energy as energy carrier	PERE	MJ	2.60E+04	1.85E+03	5.37E-01	3.85E-02	2.42E+04	6.63E-01
Renewable primary energy resource as material utilization	PERM	MJ	1.55E+02	1.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	PERT	MJ	2.62E+04	2.00E+03	5.37E-01	3.85E-02	2.42E+04	6.63E-01
Non-renewable primary energy as energy carrier	PENRE	MJ	2.28E+04	1.65E+04	3.45E+01	2.14E+00	6.24E+03	1.36E+01
Non-renewable primary energy as material utilization	PENRM	MJ	4.78E+01	4.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	PENRT	MJ	2.29E+04	1.66E+04	3.45E+01	2.14E+00	6.24E+03	1.36E+01
Use of secondary material	SM	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	FW	m3	2.23E+01	8.82E+00	4.92E-03	-1.48E-04	1.34E+01	4.07E-02

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				Upstream - Core	Downstream			
Parameter	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Renewable primary energy as energy carrier	PERE	MJ	3.21E+04	1.85E+03	5.37E-01	3.85E-02	3.02E+04	6.63E-01
Renewable primary energy resource as material utilization	PERM	MJ	1.55E+02	1.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	PERT	MJ	3.22E+04	2.00E+03	5.37E-01	3.85E-02	3.02E+04	6.63E-01
Non-renewable primary energy as energy carrier	PENRE	MJ	2.44E+04	1.65E+04	3.45E+01	2.14E+00	7.80E+03	1.36E+01
Non-renewable primary energy as material utilization	PENRM	MJ	4.78E+01	4.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	PENRT	MJ	2.44E+04	1.66E+04	3.45E+01	2.14E+00	7.80E+03	1.36E+01
Use of secondary material	SM	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	FW	m3	2.54E+01	8.60E+00	4.92E-03	-1.48E-04	1.68E+01	4.07E-02

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				Upstream - Core	Downstream			
Parameter	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Renewable primary energy as energy carrier	PERE	MJ	3.81E+04	1.85E+03	5.37E-01	3.85E-02	3.63E+04	6.63E-01
Renewable primary energy resource as material utilization	PERM	MJ	1.55E+02	1.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	PERT	MJ	3.83E+04	2.00E+03	5.37E-01	3.85E-02	3.63E+04	6.63E-01
Non-renewable primary energy as energy carrier	PENRE	MJ	2.59E+04	1.65E+04	3.45E+01	2.14E+00	9.36E+03	1.36E+01
Non-renewable primary energy as material utilization	PENRM	MJ	4.78E+01	4.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	PENRT	MJ	2.60E+04	1.66E+04	3.45E+01	2.14E+00	9.36E+03	1.36E+01
Use of secondary material	SM	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	FW	m3	2.86E+01	8.39E+00	4.92E-03	-1.48E-04	2.02E+01	4.07E-02

5.3. WASTE AND OUTPUT FLOWS

3PH 5000 HYD ZP3

				Upstream - Core	Downstream			
Parameter/indicator	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Hazardous waste disposed	HWD	Kg	5.26E+00	1.00E+00	8.55E-04	2.12E-02	2.90E+00	1.65E+00
Non-hazardous waste disposed	NHWD	Kg	1.86E+02	1.34E+02	1.69E+00	1.20E+00	4.68E+01	9.85E+00
Radioactive waste disposed	RWD	Kg	3.99E-02	3.29E-02	1.12E-05	6.89E-07	7.04E-03	1.27E-05
Components for re-use	CRU	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	Kg	1.83E+01	0.00E+00	0.00E+00	6.19E+00	0.00E+00	1.21E+01
Materials for energy recovery	MER	Kg	3.06E+00	0.00E+00	0.00E+00	2.25E+00	0.00E+00	8.11E-01
Exported thermal energy	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity energy	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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				Upstream - Core	Downstream			
Parameter/indicator	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Hazardous waste disposed	HWD	Kg	5.87E+00	1.04E+00	8.55E-04	2.12E-02	3.48E+00	1.65E+00
Non-hazardous waste disposed	NHWD	Kg	1.96E+02	1.34E+02	1.69E+00	1.20E+00	5.61E+01	9.85E+00
Radioactive waste disposed	RWD	Kg	4.14E-02	3.29E-02	1.12E-05	6.89E-07	8.45E-03	1.27E-05
Components for re-use	CRU	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	Kg	1.83E+01	0.00E+00	0.00E+00	6.19E+00	0.00E+00	1.21E+01
Materials for energy recovery	MER	Kg	3.06E+00	0.00E+00	0.00E+00	2.25E+00	0.00E+00	8.11E-01
Exported thermal energy	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity energy	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

3PH 8000 HYD ZP3

				Upstream - Core	Downstream			
Parameter/indicator	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Hazardous waste disposed	HWD	Kg	7.09E+00	1.10E+00	8.55E-04	2.12E-02	4.64E+00	1.65E+00
Non-hazardous waste disposed	NHWD	Kg	2.15E+02	1.34E+02	1.69E+00	1.20E+00	7.48E+01	9.85E+00
Radioactive waste disposed	RWD	Kg	4.42E-02	3.29E-02	1.12E-05	6.89E-07	1.13E-02	1.27E-05
Components for re-use	CRU	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	Kg	1.83E+01	0.00E+00	0.00E+00	6.19E+00	0.00E+00	1.21E+01
Materials for energy recovery	MER	Kg	3.06E+00	0.00E+00	0.00E+00	2.25E+00	0.00E+00	8.11E-01
Exported thermal energy	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity energy	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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				Upstream - Core	Downstream			
Parameter/indicator	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Hazardous waste disposed	HWD	Kg	8.32E+00	1.16E+00	8.55E-04	2.12E-02	5.80E+00	1.65E+00
Non-hazardous waste disposed	NHWD	Kg	2.34E+02	1.35E+02	1.69E+00	1.20E+00	9.35E+01	9.85E+00
Radioactive waste disposed	RWD	Kg	4.70E-02	3.29E-02	1.12E-05	6.89E-07	1.41E-02	1.27E-05
Components for re-use	CRU	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	Kg	1.83E+01	0.00E+00	0.00E+00	6.19E+00	0.00E+00	1.21E+01
Materials for energy recovery	MER	Kg	3.06E+00	0.00E+00	0.00E+00	2.25E+00	0.00E+00	8.11E-01
Exported thermal energy	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity energy	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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				Upstream - Core	Downstream			
Parameter/indicator	**Nomenclatures**	**Unit**	**Total**	**Manufacturing**	**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
Hazardous waste disposed	HWD	Kg	9.54E+00	1.23E+00	8.55E-04	2.12E-02	6.96E+00	1.65E+00
Non-hazardous waste disposed	NHWD	Kg	2.52E+02	1.35E+02	1.69E+00	1.20E+00	1.12E+02	9.85E+00
Radioactive waste disposed	RWD	Kg	4.98E-02	3.29E-02	1.12E-05	6.89E-07	1.69E-02	1.27E-05
Components for re-use	CRU	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	Kg	1.83E+01	0.00E+00	0.00E+00	6.19E+00	0.00E+00	1.21E+01
Materials for energy recovery	MER	Kg	3.06E+00	0.00E+00	0.00E+00	2.25E+00	0.00E+00	8.11E-01
Exported thermal energy	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity energy	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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