# Zucchetti Centro Sistemi S.p.A.

# ENVIRONMENTAL PRODUCT DECLARATION


**PRODUCTS NAME**

**Azzurro 3PH 15KTL-V3**
**Azzurro 3PH 17KTL-V3**
**Azzurro 3PH 20KTL-V3**
**Azzurro 3PH 22KTL-V3**
**Azzurro 3PH 24KTL-V3**

**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 |

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| Declaration number | Azzurro ZCS 011 |
| Registration Number | EPDITALY1230 |

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|---|---|
| Release Date | 16/12/2025 |
| Valid until | 16/12/2030 |

# 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<br>• e-mail: s.marzielli@zcscompany.com,<br>• Tel: 0559197422 |

## PROGRAM OPERATOR

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

## ABOUT THE EPD

| | |
|---|---|
| **Products Name** | Azzurro 3PH 15KTL-V3, Azzurro 3PH 17KTL-V3, Azzurro 3PH 20KTL-V3, Azzurro 3PH 22KTL-V3, Azzurro 3PH 24KTL-V3 |
| **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 (Azzurro 3PH 15KTL-V3, Azzurro 3PH 17KTL-V3, Azzurro 3PH 20KTL-V3, Azzurro 3PH 22KTL-V3, Azzurro 3PH 24KTL-V3) are compact, efficient three-phase inverters for residential and industrial solar systems. With 98.6% max efficiency, two MPPTS, and a wide input range (140–1000V), they ensure optimal performance.<br>They feature advanced protection, natural and fan-forced convection air cooling, IP65 rating, and Wi-Fi/Ethernet/USB connectivity. Quiet operation (<40 dB), zero-feed-in support, and a 10-year warranty make them ideal for small-scale solar setups. |
| **Product application area** | The ZCS Azzurro 3PH inverters (Azzurro 3PH 15KTL-V3, Azzurro 3PH 17KTL-V3, Azzurro 3PH 20KTL-V3, Azzurro 3PH 22KTL-V3, Azzurro 3PH 24KTL-V3) are perfectly suited for domestic and industrial applications and can easily be integrated with energy storage systems. |
| **CPC Code**<br>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

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|---|---|
| **PCR** | Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV. 3.1 Issue date 12.11.2024<br>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*<br>- LCA tool report |
| **Independent Verification Statement** | The PCR review was performed by ICMQ S.p.A.<br>Independent verification of the declaration and data carried out in accordance with ISO 14025:2010.<br>☐ Internal ☑ External<br>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 inverters (Azzurro 3PH 15KTL-V3, Azzurro 3PH 17KTL-V3, Azzurro 3PH 20KTL-V3, Azzurro 3PH 22KTL-V3, Azzurro 3PH 24KTL-V3) are compact and efficient three-phase string inverters designed for residential and industrial photovoltaic systems. With a maximum efficiency of 98.6% and two independent MPPT inputs, they ensure optimal energy harvesting even under varying environmental conditions. Their wide input voltage range (140–1000V) makes them adaptable to small-scale solar installations. These transformerless inverters support advanced safety features, including anti-islanding protection, ground fault monitoring, and integrated DC disconnectors, ensuring reliable and secure operation. The unit's lightweight design and dimensions facilitate easy installation and maintenance.

Equipped with communication options such as Wi-Fi, Ethernet, and USB, these inverters offer convenient system monitoring and diagnostics. They operate with a low noise level (<40dB) and feature natural and fan-forced convection air cooling for efficient heat management. The IP65-rated enclosure ensures

durability in outdoor environments, while the zero-feed-in functionality supports precise energy management.

Backed by a 10-year warranty, these ZCS Azzurro 3PH inverters deliver reliable performance and sustainability, making them an ideal choice for small-scale solar energy solutions. In fact, they are perfectly suited for domestic and industrial applications and can easily be integrated with energy storage systems.

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

| Data | | Value | | | | |
|---|---|---|---|---|---|---|
| | | 15KTL-V3 | 17KTL-V3 | 20KTL-V3 | 22KTL-V3 | 24KTL-V3 |
| *DC* | Typical DC Power | 18000W | 20400W | 24000W | 26400W | 28800W |
| | Max Power per MPPT | 10000W (400V-850V) | 12000W (460V-850V) | 12000W (460V-850V) | 15000W (580V-850V) | 15000W (580V-850V) |
| | Independent MPPTs/Strings per MPPT | 2/2 | | | | |
| | Max DC Input Voltage | 1100V | | | | |
| | Activation Voltage | 160V | | | | |
| | Nominal DC Input Voltage | 650V | | | | |
| | MPPT Voltage Range | 140V-1000V | | | | |
| | Full-Load DC Voltage Range | 300V-850V | 340V-850V | 400V-850V | 440V-850V | 480V-850V |
| | Max Current per MPPT | 26A/26A | | | | |
| | Max Absolute Current per MPPT | 36A/36A | | | | |
| *AC* | Nominal AC Power | 15000W | 17000W | 20000W | 22000W | 24000W |
| | Max AC Power | 16500VA | 18700VA | 22000VA | 24200VA | 26400VA |
| | Max Phase Current | 23.9A | 27.1A | 31.9A | 35.1A | 38.3 |
| | Connection Type/Nominal Grid Voltage | 3PH/N/PE 220V/230V/240V (PH-N); 380V/400V/415V (PH-PH) or 3PH/PE 380V/400V/415V (PH-PH) | | | | |
| | Grid Voltage Range | 184V~276V (PH-N); 320V~480V (PH-PH) (according to local network standards) | | | | |
| | Nominal Grid Frequency | 50Hz/60Hz | | | | |
| | Grid Frequency Range | 45Hz~55Hz / 54Hz~66Hz (according to local network standards) | | | | |
| | Total Harmonic Distortion (THD) | <3% | | | | |
| | Power Factor | 1 (adjustable ±0.8) | | | | |
| | Active Power Adjustment Range | 0~100% | | | | |
| | Zero Feed-In Functionality | Adjustable from zero to nominal power | | | | |
| *Eff.* | Max Efficiency | 98.6% | | | | |
| | Weighted Efficiency (EURO) | 98.2% | | | | |
| | MPPT Efficiency | >99.9% | | | | |
| | Standby power use consumption | <1W | | | | |
| | Dimensions | 430mm*520mm*189mm | | | | |
| | Installation country or region | Italy | | | | |

## 2.1. COMPOSITION

The ZCS Azzurro 3PH 15KTL and 17KTL models approximately weight 22 kg, while 20KTL, 22KTL and 24KTL models approximately weight 22.5 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 15-17KTL-V3 | % by weight 20-22-24KTL-V3 |
|---|---|---|---|
| Stainless steel | M-100 | 8.05 | 7.88 |
| Other ferrous alloys, non-stainless steels | M-119 | 13.52 | 13.24 |
| Alluminium and its alloys | M-120 | 27.05 | 26.49 |
| Copper and its alloys | M-121 | 0.11 | 0.10 |
| Other inorganic materials | M-199 | 0.41 | 0.40 |
| PolyVinylChloride (PVC) | M-200 | 0.04 | 0.04 |
| PolyEthylene (PE) | M-204 | 0.02 | 0.02 |
| PolyCarbonate (PC) | M-204 | 2.24 | 2.19 |
| PolyAmide (PA) | M-208 | 1.38 | 1.35 |
| Other unfilled thermoplastics | M-249 | 0.68 | 0.67 |
| Silicone | M-321 | 2.34 | 2.45 |
| Paper | M-341 | 1.95 | 1.91 |
| Electronic components | - | 42.23 | 43.28 |

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. 740 g 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 inverters family. They are power inverters for domestic and industrial 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 2022, considering the current technological level. The results were generated using SimaPro 9.6 modeling software.

| Representativeness | Scope |
|---|---|
| Spatial | Italy |
| Year | 2022 |

## 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

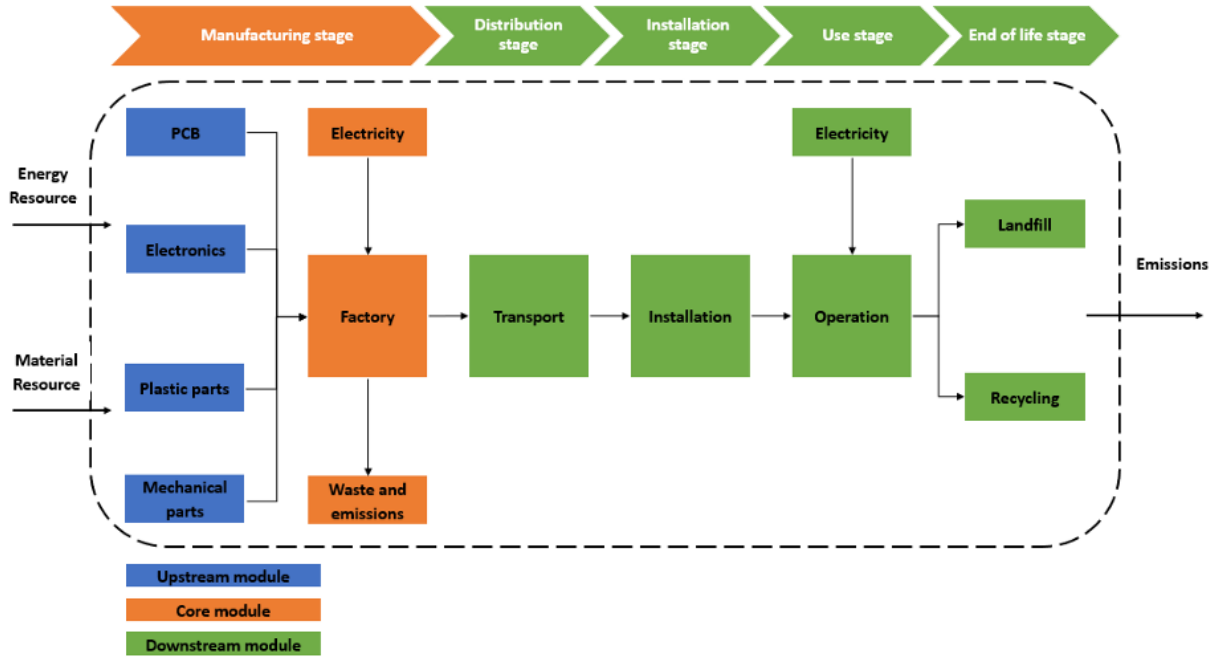
An allocation was made for the waste production based on the functional unit. This calculation was based on the 2022 annual production of inverters in GW and the amount of waste generated in 2022 from the inverters production line.

## 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:

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

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 15KTL-V3**

| | | | | *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 | 1.70E+03 | 8.44E+02 | 1.45E+00 | 2.90E+00 | 8.46E+02 | 1.29E+01 |
| *Global warming Potential - Fossil* | GWP - Fossil | kg CO2 eq | 1.68E+03 | 8.38E+02 | 1.31E-03 | 1.92E+00 | 8.41E+02 | 1.27E+01 |
| *Global warming Potential – Biogenic* | GWP - Biogenic | kg CO2 eq | 6.52E+00 | 1.01E+00 | 1.44E+00 | 9.80E-01 | 2.87E+00 | 2.17E-01 |
| *Global warming Potential - Land use and LU change* | GWP - Luluc | kg CO2 eq | 6.56E+00 | 4.97E+00 | 7.06E-04 | 2.82E-05 | 1.59E+00 | 5.79E-04 |
| *Ozone depletion Potential* | ODP | kg CFC11 eq | 8.03E-05 | 2.72E-05 | 3.16E-08 | 1.53E-09 | 5.30E-05 | 2.34E-08 |
| *Acidification Potential* | AP | mol H+ eq | 1.32E+01 | 6.90E+00 | 5.98E-03 | 5.24E-04 | 6.33E+00 | 5.42E-03 |
| *Eutrophication Potential, freshwater* | EP - freshwater | kg P eq | 9.77E-01 | 4.59E-01 | 1.02E-04 | 9.81E-06 | 5.18E-01 | 1.73E-04 |
| *Eutrophication Potential, marine* | EP - marine | kg N eq | 2.04E+00 | 1.07E+00 | 2.28E-03 | 4.09E-04 | 9.68E-01 | 3.52E-03 |
| *Eutrophication Potential, terrestrial* | EP - terrestrial | mol N eq | 2.16E+01 | 1.15E+01 | 2.43E-02 | 2.50E-03 | 1.01E+01 | 2.35E-02 |
| *Photochemical ozone formation Potential* | POCP | kg NMVOC eq | 8.37E+00 | 4.76E+00 | 8.75E-03 | 7.12E-04 | 3.60E+00 | 6.57E-03 |
| *Resource use Potential, minerals and metals* | ADP - minerals&metals | kg Sb eq | 2.13E-01 | 1.62E-01 | 4.67E-06 | 1.75E-07 | 5.10E-02 | 1.72E-06 |
| *Resource use Potential, fossil* | ADP - fossil | MJ | 2.13E+04 | 1.07E+04 | 2.06E+01 | 8.49E-01 | 1.05E+04 | 9.16E+00 |
| *Water deprivation Potential* | WDP | m3 depriv. | 7.73E+02 | 1.65E+02 | 8.40E-02 | 2.79E-03 | 6.08E+02 | 7.25E-01 |

## 3PH 17KTL-V3

| | | | | *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 | 1.81E+03 | 8.44E+02 | 1.45E+00 | 2.90E+00 | 9.58E+02 | 1.29E+01 |
| *Global warming Potential - Fossil* | GWP - Fossil | kg CO2 eq | 1.80E+03 | 8.38E+02 | 1.31E-03 | 1.92E+00 | 9.53E+02 | 1.27E+01 |
| *Global warming Potential – Biogenic* | GWP - Biogenic | kg CO2 eq | 6.91E+00 | 1.02E+00 | 1.44E+00 | 9.80E-01 | 3.25E+00 | 2.17E-01 |
| *Global warming Potential - Land use and LU change* | GWP - Luluc | kg CO2 eq | 6.77E+00 | 4.97E+00 | 7.06E-04 | 2.82E-05 | 1.80E+00 | 5.79E-04 |
| *Ozone depletion Potential* | ODP | kg CFC11 eq | 8.74E-05 | 2.72E-05 | 3.16E-08 | 1.53E-09 | 6.01E-05 | 2.34E-08 |
| *Acidification Potential* | AP | mol H+ eq | 1.41E+01 | 6.90E+00 | 5.98E-03 | 5.24E-04 | 7.17E+00 | 5.42E-03 |
| *Eutrophication Potential, freshwater* | EP - freshwater | kg P eq | 1.05E+00 | 4.59E-01 | 1.02E-04 | 9.81E-06 | 5.88E-01 | 1.73E-04 |
| *Eutrophication Potential, marine* | EP - marine | kg N eq | 2.17E+00 | 1.07E+00 | 2.28E-03 | 4.09E-04 | 1.10E+00 | 3.52E-03 |
| *Eutrophication Potential, terrestrial* | EP - terrestrial | mol N eq | 2.30E+01 | 1.15E+01 | 2.43E-02 | 2.50E-03 | 1.15E+01 | 2.35E-02 |
| *Photochemical ozone formation Potential* | POCP | kg NMVOC eq | 8.85E+00 | 4.76E+00 | 8.75E-03 | 7.12E-04 | 4.08E+00 | 6.57E-03 |
| *Resource use Potential, minerals and metals* | ADP - minerals&metals | kg Sb eq | 2.19E-01 | 1.62E-01 | 4.67E-06 | 1.75E-07 | 5.78E-02 | 1.72E-06 |
| *Resource use Potential, fossil* | ADP - fossil | MJ | 2.27E+04 | 1.07E+04 | 2.06E+01 | 8.49E-01 | 1.19E+04 | 9.16E+00 |
| *Water deprivation Potential* | WDP | m3 depriv. | 8.54E+02 | 1.65E+02 | 8.40E-02 | 2.79E-03 | 6.89E+02 | 7.25E-01 |

## 3PH 20KTL-V3

| | | | | *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 | 2.00E+03 | 8.64E+02 | 1.47E+00 | 2.90E+00 | 1.13E+03 | 1.35E+01 |
| *Global warming Potential - Fossil* | GWP - Fossil | kg CO2 eq | 1.98E+03 | 8.58E+02 | 1.34E-03 | 1.92E+00 | 1.12E+03 | 1.33E+01 |
| *Global warming Potential – Biogenic* | GWP - Biogenic | kg CO2 eq | 7.68E+00 | 1.19E+00 | 1.47E+00 | 9.80E-01 | 3.82E+00 | 2.22E-01 |
| *Global warming Potential - Land use and LU change* | GWP - Luluc | kg CO2 eq | 7.12E+00 | 5.01E+00 | 7.19E-04 | 2.82E-05 | 2.11E+00 | 6.01E-04 |
| *Ozone depletion Potential* | ODP | kg CFC11 eq | 9.85E-05 | 2.77E-05 | 3.22E-08 | 1.53E-09 | 7.07E-05 | 2.43E-08 |
| *Acidification Potential* | AP | mol H+ eq | 1.55E+01 | 7.06E+00 | 6.09E-03 | 5.24E-04 | 8.43E+00 | 5.62E-03 |
| *Eutrophication Potential, freshwater* | EP - freshwater | kg P eq | 1.16E+00 | 4.72E-01 | 1.04E-04 | 9.81E-06 | 6.91E-01 | 1.80E-04 |
| *Eutrophication Potential, marine* | EP - marine | kg N eq | 2.39E+00 | 1.09E+00 | 2.32E-03 | 4.09E-04 | 1.29E+00 | 3.64E-03 |
| *Eutrophication Potential, terrestrial* | EP - terrestrial | mol N eq | 2.52E+01 | 1.17E+01 | 2.48E-02 | 2.50E-03 | 1.35E+01 | 2.43E-02 |
| *Photochemical ozone formation Potential* | POCP | kg NMVOC eq | 9.71E+00 | 4.90E+00 | 8.91E-03 | 7.12E-04 | 4.80E+00 | 6.81E-03 |
| *Resource use Potential, minerals and metals* | ADP - minerals&metals | kg Sb eq | 2.31E-01 | 1.63E-01 | 4.75E-06 | 1.75E-07 | 6.81E-02 | 1.77E-06 |
| *Resource use Potential, fossil* | ADP - fossil | MJ | 2.51E+04 | 1.10E+04 | 2.10E+01 | 8.49E-01 | 1.40E+04 | 9.45E+00 |
| *Water deprivation Potential* | WDP | m3 depriv. | 9.80E+02 | 1.69E+02 | 8.55E-02 | 2.79E-03 | 8.11E+02 | 7.54E-01 |

## 3PH 22KTL-V3

| | | | | *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 | 2.11E+03 | 8.64E+02 | 1.47E+00 | 2.90E+00 | 1.24E+03 | 1.35E+01 |
| *Global warming Potential - Fossil* | GWP - Fossil | kg CO2 eq | 2.10E+03 | 8.58E+02 | 1.34E-03 | 1.92E+00 | 1.23E+03 | 1.33E+01 |
| *Global warming Potential – Biogenic* | GWP - Biogenic | kg CO2 eq | 8.07E+00 | 1.20E+00 | 1.47E+00 | 9.80E-01 | 4.21E+00 | 2.22E-01 |
| *Global warming Potential - Land use and LU change* | GWP - Luluc | kg CO2 eq | 7.33E+00 | 5.01E+00 | 7.19E-04 | 2.82E-05 | 2.33E+00 | 6.01E-04 |
| *Ozone depletion Potential* | ODP | kg CFC11 eq | 1.06E-04 | 2.77E-05 | 3.22E-08 | 1.53E-09 | 7.78E-05 | 2.43E-08 |
| *Acidification Potential* | AP | mol H+ eq | 1.63E+01 | 7.06E+00 | 6.09E-03 | 5.24E-04 | 9.28E+00 | 5.62E-03 |
| *Eutrophication Potential, freshwater* | EP - freshwater | kg P eq | 1.23E+00 | 4.72E-01 | 1.04E-04 | 9.81E-06 | 7.60E-01 | 1.80E-04 |
| *Eutrophication Potential, marine* | EP - marine | kg N eq | 2.51E+00 | 1.09E+00 | 2.32E-03 | 4.09E-04 | 1.42E+00 | 3.64E-03 |
| *Eutrophication Potential, terrestrial* | EP - terrestrial | mol N eq | 2.66E+01 | 1.17E+01 | 2.48E-02 | 2.50E-03 | 1.49E+01 | 2.43E-02 |
| *Photochemical ozone formation Potential* | POCP | kg NMVOC eq | 1.02E+01 | 4.90E+00 | 8.91E-03 | 7.12E-04 | 5.28E+00 | 6.81E-03 |
| *Resource use Potential, minerals and metals* | ADP - minerals&metals | kg Sb eq | 2.38E-01 | 1.63E-01 | 4.75E-06 | 1.75E-07 | 7.49E-02 | 1.77E-06 |
| *Resource use Potential, fossil* | ADP - fossil | MJ | 2.65E+04 | 1.10E+04 | 2.10E+01 | 8.49E-01 | 1.54E+04 | 9.45E+00 |
| *Water deprivation Potential* | WDP | m3 depriv. | 1.06E+03 | 1.69E+02 | 8.55E-02 | 2.79E-03 | 8.92E+02 | 7.54E-01 |

## 3PH 24KTL-V3

| | | | | *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 | 2.22E+03 | 8.64E+02 | 1.47E+00 | 2.90E+00 | 1.35E+03 | 1.35E+01 |
| *Global warming Potential - Fossil* | GWP - Fossil | kg CO2 eq | 2.21E+03 | 8.58E+02 | 1.34E-03 | 1.92E+00 | 1.35E+03 | 1.33E+01 |
| *Global warming Potential – Biogenic* | GWP - Biogenic | kg CO2 eq | 8.46E+00 | 1.20E+00 | 1.47E+00 | 9.80E-01 | 4.59E+00 | 2.22E-01 |
| *Global warming Potential - Land use and LU change* | GWP - Luluc | kg CO2 eq | 7.54E+00 | 5.01E+00 | 7.19E-04 | 2.82E-05 | 2.54E+00 | 6.01E-04 |
| *Ozone depletion Potential* | ODP | kg CFC11 eq | 1.13E-04 | 2.77E-05 | 3.22E-08 | 1.53E-09 | 8.49E-05 | 2.43E-08 |
| *Acidification Potential* | AP | mol H+ eq | 1.72E+01 | 7.06E+00 | 6.09E-03 | 5.24E-04 | 1.01E+01 | 5.62E-03 |
| *Eutrophication Potential, freshwater* | EP - freshwater | kg P eq | 1.30E+00 | 4.72E-01 | 1.04E-04 | 9.81E-06 | 8.30E-01 | 1.80E-04 |
| *Eutrophication Potential, marine* | EP - marine | kg N eq | 2.64E+00 | 1.09E+00 | 2.32E-03 | 4.09E-04 | 1.55E+00 | 3.64E-03 |
| *Eutrophication Potential, terrestrial* | EP - terrestrial | mol N eq | 2.79E+01 | 1.17E+01 | 2.48E-02 | 2.50E-03 | 1.62E+01 | 2.43E-02 |
| *Photochemical ozone formation Potential* | POCP | kg NMVOC eq | 1.07E+01 | 4.90E+00 | 8.91E-03 | 7.12E-04 | 5.76E+00 | 6.81E-03 |
| *Resource use Potential, minerals and metals* | ADP - minerals&metals | kg Sb eq | 2.44E-01 | 1.63E-01 | 4.75E-06 | 1.75E-07 | 8.17E-02 | 1.77E-06 |
| *Resource use Potential, fossil* | ADP - fossil | MJ | 2.79E+04 | 1.10E+04 | 2.10E+01 | 8.49E-01 | 1.69E+04 | 9.45E+00 |
| *Water deprivation Potential* | WDP | m3 depriv. | 1.14E+03 | 1.69E+02 | 8.55E-02 | 2.79E-03 | 9.73E+02 | 7.54E-01 |

## 5.2. USE OF RESOURCES

**3PH 15KTL-V3**

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Renewable primary energy as energy carrier* | PERE | MJ | 4.20E+04 | 1.22E+03 | 3.20E-01 | 1.57E-02 | 4.08E+04 | 4.37E-01 |
| *Renewable primary energy resource as material utilization* | PERM | MJ | 4.50E+01 | 4.50E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of renewable primary energy resources* | PERT | MJ | 4.21E+04 | 1.26E+03 | 3.20E-01 | 1.57E-02 | 4.08E+04 | 4.37E-01 |
| *Non-renewable primary energy as energy carrier* | PENRE | MJ | 2.12E+04 | 1.07E+04 | 2.06E+01 | 8.49E-01 | 1.05E+04 | 9.16E+00 |
| *Non-renewable primary energy as material utilization* | PENRM | MJ | 7.01E+01 | 7.01E+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 | 1.07E+04 | 2.06E+01 | 8.49E-01 | 1.05E+04 | 9.16E+00 |
| *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 | 2.90E+01 | 6.34E+00 | 2.94E-03 | 2.28E-04 | 2.27E+01 | 2.63E-02 |

**3PH 17KTL-V3**

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Renewable primary energy as energy carrier* | PERE | MJ | 4.75E+04 | 1.22E+03 | 3.20E-01 | 1.57E-02 | 4.62E+04 | 4.37E-01 |
| *Renewable primary energy resource as material utilization* | PERM | MJ | 4.50E+01 | 4.50E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of renewable primary energy resources* | PERT | MJ | 4.75E+04 | 1.26E+03 | 3.20E-01 | 1.57E-02 | 4.62E+04 | 4.37E-01 |
| *Non-renewable primary energy as energy carrier* | PENRE | MJ | 2.26E+04 | 1.07E+04 | 2.06E+01 | 8.49E-01 | 1.19E+04 | 9.16E+00 |
| *Non-renewable primary energy as material utilization* | PENRM | MJ | 7.01E+01 | 7.01E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of non-renewable primary energy resources* | PENRT | MJ | 2.27E+04 | 1.07E+04 | 2.06E+01 | 8.49E-01 | 1.19E+04 | 9.16E+00 |
| *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 | 3.21E+01 | 6.34E+00 | 2.94E-03 | 2.28E-04 | 2.57E+01 | 2.63E-02 |

### 3PH 20KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Renewable primary energy as energy carrier* | PERE | MJ | 5.56E+04 | 1.25E+03 | 3.26E-01 | 1.57E-02 | 5.44E+04 | 4.53E-01 |
| *Renewable primary energy resource as material utilization* | PERM | MJ | 4.50E+01 | 4.50E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of renewable primary energy resources* | PERT | MJ | 5.57E+04 | 1.30E+03 | 3.26E-01 | 1.57E-02 | 5.44E+04 | 4.53E-01 |
| *Non-renewable primary energy as energy carrier* | PENRE | MJ | 2.50E+04 | 1.09E+04 | 2.10E+01 | 8.49E-01 | 1.40E+04 | 9.45E+00 |
| *Non-renewable primary energy as material utilization* | PENRM | MJ | 7.04E+01 | 7.04E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of non-renewable primary energy resources* | PENRT | MJ | 2.51E+04 | 1.10E+04 | 2.10E+01 | 8.49E-01 | 1.40E+04 | 9.45E+00 |
| *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 | 3.68E+01 | 6.49E+00 | 2.99E-03 | 2.28E-04 | 3.03E+01 | 2.74E-02 |

### 3PH 22KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Renewable primary energy as energy carrier* | PERE | MJ | 6.11E+04 | 1.25E+03 | 3.26E-01 | 1.57E-02 | 5.98E+04 | 4.53E-01 |
| *Renewable primary energy resource as material utilization* | PERM | MJ | 4.50E+01 | 4.50E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of renewable primary energy resources* | PERT | MJ | 6.11E+04 | 1.30E+03 | 3.26E-01 | 1.57E-02 | 5.98E+04 | 4.53E-01 |
| *Non-renewable primary energy as energy carrier* | PENRE | MJ | 2.64E+04 | 1.09E+04 | 2.10E+01 | 8.49E-01 | 1.54E+04 | 9.45E+00 |
| *Non-renewable primary energy as material utilization* | PENRM | MJ | 7.04E+01 | 7.04E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of non-renewable primary energy resources* | PENRT | MJ | 2.65E+04 | 1.10E+04 | 2.10E+01 | 8.49E-01 | 1.54E+04 | 9.45E+00 |
| *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 | 3.98E+01 | 6.49E+00 | 2.99E-03 | 2.28E-04 | 3.33E+01 | 2.74E-02 |

## 3PH 24KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Renewable primary energy as energy carrier* | PERE | MJ | 6.65E+04 | 1.25E+03 | 3.26E-01 | 1.57E-02 | 6.53E+04 | 4.53E-01 |
| *Renewable primary energy resource as material utilization* | PERM | MJ | 4.50E+01 | 4.50E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of renewable primary energy resources* | PERT | MJ | 6.66E+04 | 1.30E+03 | 3.26E-01 | 1.57E-02 | 6.53E+04 | 4.53E-01 |
| *Non-renewable primary energy as energy carrier* | PENRE | MJ | 2.78E+04 | 1.09E+04 | 2.10E+01 | 8.49E-01 | 1.68E+04 | 9.45E+00 |
| *Non-renewable primary energy as material utilization* | PENRM | MJ | 7.04E+01 | 7.04E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| *Total use of non-renewable primary energy resources* | PENRT | MJ | 2.79E+04 | 1.10E+04 | 2.10E+01 | 8.49E-01 | 1.68E+04 | 9.45E+00 |
| *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 | 4.28E+01 | 6.49E+00 | 2.99E-03 | 2.28E-04 | 3.63E+01 | 2.74E-02 |

## 5.3. WASTE AND OUTPUT FLOWS

### 3PH 15KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter/indicator*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Hazardous waste disposed* | HWD | Kg | 1.01E+01 | 1.18E+00 | 5.10E-04 | 1.80E-02 | 7.83E+00 | 1.27E+00 |
| *Non-hazardous waste disposed* | NHWD | Kg | 2.25E+02 | 9.57E+01 | 1.01E+00 | 4.61E-01 | 1.26E+02 | 6.52E+00 |
| *Radioactive waste disposed* | RWD | Kg | 3.93E-02 | 2.03E-02 | 6.69E-06 | 2.69E-07 | 1.90E-02 | 8.26E-06 |
| *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 | 1.04E+01 | 0.00E+00 | 0.00E+00 | 1.98E+00 | 0.00E+00 | 8.43E+00 |
| *Materials for energy recovery* | MER | Kg | 1.63E+00 | 0.00E+00 | 0.00E+00 | 8.43E-01 | 0.00E+00 | 7.88E-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 17KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter/indicator*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Hazardous waste disposed* | HWD | Kg | 1.12E+01 | 1.26E+00 | 5.10E-04 | 1.80E-02 | 8.87E+00 | 1.27E+00 |
| *Non-hazardous waste disposed* | NHWD | Kg | 2.42E+02 | 9.57E+01 | 1.01E+00 | 4.61E-01 | 1.43E+02 | 6.52E+00 |
| *Radioactive waste disposed* | RWD | Kg | 4.19E-02 | 2.03E-02 | 6.69E-06 | 2.69E-07 | 2.15E-02 | 8.26E-06 |
| *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 | 1.04E+01 | 0.00E+00 | 0.00E+00 | 1.98E+00 | 0.00E+00 | 8.43E+00 |
| *Materials for energy recovery* | MER | Kg | 1.63E+00 | 0.00E+00 | 0.00E+00 | 8.43E-01 | 0.00E+00 | 7.88E-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 20KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter/indicator*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Hazardous waste disposed* | HWD | Kg | 1.29E+01 | 1.39E+00 | 5.19E-04 | 1.80E-02 | 1.04E+01 | 1.28E+00 |
| *Non-hazardous waste disposed* | NHWD | Kg | 2.70E+02 | 9.82E+01 | 1.03E+00 | 4.61E-01 | 1.68E+02 | 6.74E+00 |
| *Radioactive waste disposed* | RWD | Kg | 4.62E-02 | 2.09E-02 | 6.82E-06 | 2.69E-07 | 2.53E-02 | 8.58E-06 |
| *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 | 1.04E+01 | 0.00E+00 | 0.00E+00 | 1.98E+00 | 0.00E+00 | 8.43E+00 |
| *Materials for energy recovery* | MER | Kg | 1.65E+00 | 0.00E+00 | 0.00E+00 | 8.43E-01 | 0.00E+00 | 8.06E-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 22KTL-V3

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter/indicator*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Hazardous waste disposed* | HWD | Kg | 1.41E+01 | 1.48E+00 | 5.19E-04 | 1.80E-02 | 1.15E+01 | 1.28E+00 |
| *Non-hazardous waste disposed* | NHWD | Kg | 2.87E+02 | 9.82E+01 | 1.03E+00 | 4.61E-01 | 1.85E+02 | 6.74E+00 |
| *Radioactive waste disposed* | RWD | Kg | 4.88E-02 | 2.09E-02 | 6.82E-06 | 2.69E-07 | 2.79E-02 | 8.58E-06 |
| *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 | 1.04E+01 | 0.00E+00 | 0.00E+00 | 1.98E+00 | 0.00E+00 | 8.43E+00 |
| *Materials for energy recovery* | MER | Kg | 1.65E+00 | 0.00E+00 | 0.00E+00 | 8.43E-01 | 0.00E+00 | 8.06E-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 24KTL-V3**

| | | | | *Upstream - Core* | *Downstream* | | | |
|---|---|---|---|---|---|---|---|---|
| ***Parameter/indicator*** | **Nomenclatures** | **Unit** | **Total** | **Manufacturing** | **Distribution** | **Installation** | **Use & Maintenance** | **End of Life** |
| *Hazardous waste disposed* | HWD | Kg | 1.52E+01 | 1.56E+00 | 5.19E-04 | 1.80E-02 | 1.25E+01 | 1.28E+00 |
| *Non-hazardous waste disposed* | NHWD | Kg | 3.04E+02 | 9.82E+01 | 1.03E+00 | 4.61E-01 | 2.02E+02 | 6.74E+00 |
| *Radioactive waste disposed* | RWD | Kg | 5.13E-02 | 2.09E-02 | 6.82E-06 | 2.69E-07 | 3.04E-02 | 8.58E-06 |
| *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 | 1.04E+01 | 0.00E+00 | 0.00E+00 | 1.98E+00 | 0.00E+00 | 8.43E+00 |
| *Materials for energy recovery* | MER | Kg | 1.65E+00 | 0.00E+00 | 0.00E+00 | 8.43E-01 | 0.00E+00 | 8.06E-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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