ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME

Electro-hydraulic control module CAN bus 8NG5

SITES

W2L Via Norvegia, 8, 42124 Reggio Emilia RE,

W3L Via Angelo Secchi, 10, 42021 Bibbiano RE,

W3M Via Angelo Secchi, 10, 42021 Bibbiano RE,

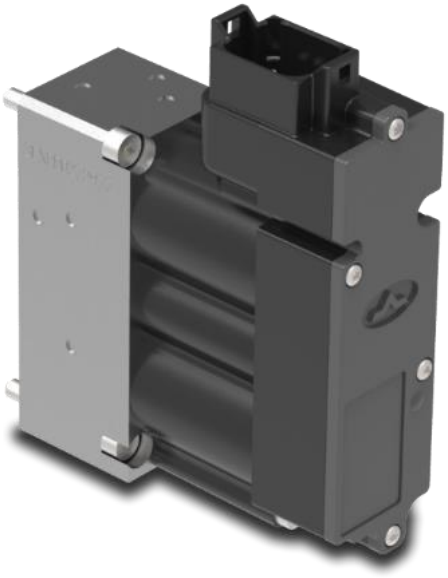
W4G Via Portella della Ginestra, 10, 42025 Corte Tegge RE

In accordance with ISO 14025 and EN 50693

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration number	*YV08707625 - Rev.04*
Registration Number	EPDITALY0818

Release Date	29/10/2024
Valid until	29/10/2029



www.epditaly.it

GENERAL INFORMATION

EPD OWNER

Company Name	Walvoil S.p.A (https://www.walvoil.com/)
Registered office	Via Adige 13/D, 42124, Reggio Emilia (RE)
Contact for EPD information	Eng. Anna Guerzoni • e-mail: guerzoni.a.@walvoil.com, • Tel: 0522932748

PROGRAM OPERATOR

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

ABOUT THE EPD

Product Name	Electro-hydraulic control module CAN bus 8NG5 - YV08707625
Sites	• W2L Via Norvegia, 8, 42124 Reggio Emilia RE, • W3L Via Angelo Secchi, 10, 42021 Bibbiano RE, • W3M Via Angelo Secchi, 10, 42021 Bibbiano RE, • W4G Via Portella della Ginestra, 10, 42025 Corte Tegge RE
Brief description and technical information of the product	The 8NG5 CAN bus electro-hydraulic control module is an advanced device designed for the precise control of hydraulic actuators on heavy machinery. Thanks to compatibility with CAN bus protocols, such as SAE J1939 and CAN open, it offers efficient management of speed, position and force, and is ideal for sectors such as construction, agriculture and industry. Designed for harsh environments, it is robust and qualified to strict OEM standards.
Product application area	Management of the movement of hydraulic actuators on vehicles for agriculture, construction and earthmoving, industrial vehicles, lifting and transport.
CPC Code https://unstats.un.org/unsd/classifications/Econ	46910 *"Electrical ignition or starting equipment of a kind used for internal combustion engines; generators and cut-outs of a kind used in conjunction with internal combustion engines; electrical lighting or signalling equipment (except filament or discharge lamps), windscreen wipers, defrosters and demisters, of a kind used for cycles or motor vehicles".*

VERIFICATION INFORMATION

PCR	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, REV. 3.0 Issue date 13.01.2023
EPDItaly Regulation	Regulations of the EPDItaly Programme Revision 6.0. Issue date 30.10.2023

Project Report LCA	*Life Cycle Assessment Report* - 8NG5 CAN bus Electro-Hydraulic Control Module - Rev. 04, 07/10/2024
Independent Verification Statement	The PCR review was performed by ICMQ S.p.A. Dr. Ing. Fabio Miseri – fabio.miseri@epdservice.it. Independent verification of the declaration and data carried out in accordance with ISO 14025:2010. ☐ Indoor ☑ Outdoor 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

Since 2015, Walvoil has been the 'Valves Division' of Interpump Group, integrating the experiences and brands of Walvoil, Hydrocontrol and Galtech. The company is one of the world's leading manufacturers of integrated solutions that combine hydraulic products, electronics and complete mechatronic systems. Walvoil is committed to designing the future of the movement, working closely with customers and partners from different industries and markets. With a solid presence in Italy and an ever-expanding global network of branches and sales offices, Walvoil stands out for its creativity, innovation and passion. The company is dedicated to creating and sharing value with all its stakeholders, offering integrated and safe hydraulic power solutions to alleviate human fatigue. For decades, Walvoil has been developing and supplying hydraulic, electronic and mechatronic products worldwide, ensuring that complex customer needs are met with fast and reliable service. Walvoil S.p.A. pursues an integrated policy oriented towards quality and environmental sustainability. Operating in the hydraulics sector, the company provides products and systems for industrial, agricultural and mobile applications, with the aim of meeting customer needs and complying with regulatory requirements. Walvoil's mission includes the continuous improvement of production processes, technological innovation and the reduction of environmental impacts. Quality and attention to environmental performance are considered essential management tools, with a constant commitment to customer satisfaction and compliance with safety and environmental regulations. Walvoil adopted the Organization, Management and Control Model provided for by Article 6 of Legislative Decree no. 231/2001 on March 8, 2016. This model, which is periodically updated, represents a concrete commitment by the company to transparency and accountability. The adoption of the Organization, Management and Control Model underscores Walvoil's focus on regulatory compliance and the prevention of misconduct, further strengthening the confidence of customers, partners and shareholders in the soundness and integrity of its operations. With this in mind, Walvoil has established a Quality Management System compliant with the UNI EN ISO 9001 standard and an Environmental Management System compliant with the UNI EN ISO 14001 standard. Strategic objectives include customer satisfaction, sustainable economic development, and effective management of environmental aspects, pursuing continuous improvement of overall performance.

2. THE PRODUCT

The 8NG5 CAN bus electro-hydraulic control module is an advanced device designed to manage the movement of hydraulic actuators on heavy machinery, such as excavators and cranes. By integrating electronic technology with hydraulic systems, the module allows precise control of the speed, position and force of the actuators. Compatible with the CAN bus communication protocol including SAE J1939 and CANopen, the 8NG5 ensures an efficient connection with other electronic devices in the vehicle. Designed to operate in harsh environments, it is robust and reliable, ideal for applications in industries such as construction, agriculture and industry. The electro-hydraulic module has been qualified to the most stringent OEM reliability standards. The Deutsch connector allows IP67/IPx9K protection and strong resistance to all adverse conditions (vibrations, shocks, EMC). In addition, the module complies with ISO 14982 and ISO 13766 standards, which relate to electromagnetic compatibility (EMC) and the environmental impact of agricultural and forestry equipment.

Electrical Data	Value	Hydraulic Data	Value
Supply voltage	8 to 32 V	Max Inlet Pressure	50 bar / 725 psi
Maximum current consumption (logic)	1500 mA	Maximum back pressure	5 bar / 72.5 psi
No-load current	200 mA	Degree of contamination	-/18/15-ISO 4406
CAN bus output	SAE J1939, CANopen	Fluid	Mineral-based
CAN bus input	SAE J1939, CANopen	Maximum mechanical stroke	+/- 10 mm
Analog Input	0.5 V - 4.5 V		
Sensor Type	Hall Effect		
Working Temperature	-40°C to 85°C		
Storage Temperature	-40°C to 105°C		
Optional power output	6A max		
Redundancy	Present		
Accuracy	< 3.5% (+/- 10 mm)		
Environmental Protection Index	IP 67/IPx9K		
EMC Compatibility	ISO 14982 / 13766		
Connector	DT04-08P A		

2.1. COMPOSITION

The 8NG5 electro-hydraulic CAN bus control module, whose total weight is approx. 1.03 kg, is composed of different materials, including steel, aluminum and brass for the rigid parts that make up the structure, polyurethane for the seals, plastic for the label and other materials and components such as a neodymium-iron-boron magnet, a PCB board and a coil block made of different materials such as copper, steel, brass and glass fibre reinforced plastic. Packaging is excluded from the composition just presented.

Material	% by weight of total
Steel	20,4%
Brass	1,9%
Aluminium	28,9%
Rubber	0,5%
Plastic	2,2%
Other	46,2%

The 8NG5 electro-hydraulic CAN bus control module is shipped assembled to the DPX100 distributor, on which four modules are mounted for each distributor. It was therefore decided to relate the quantities of packaging material of the complete shipping package to the final weight of a single 8NG5 module. The packaging consists of a wooden pallet, a polyamide nylon sheet and a cardboard box.

2.2. REFERENCE SERVICE LIFE (RSL)

The reference service life of the product has been assumed to be 10 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 8NG5 CAN bus electro-hydraulic control module manufactured by Walvoil S.p.A. It is an advanced device designed for precise control of hydraulic actuators on heavy machinery. The study is based on a "cradle to grave" LCA methodology, in accordance with ISO 14040 and 14044 standards. The spatio-temporal scope of the data used in this study is global, with the reference year set at 2023, considering the current technological level. The results were generated using SimaPro 9.5 modeling software.

Representativeness	Scope
Spatial	Global
Thunderstorm	2023

3.1. DECLARED UNIT

The declared unit identified for the LCA study is one unit of product (pc). In this case, identifying a part as a "declared unit" refers to a single 8NG5 module produced by Walvoil S.p.A.

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 three distinct modules: upstream, core and downstream, with reference to the EN 50693 standard. 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 product.
- **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 product is 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 product after it is made 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.

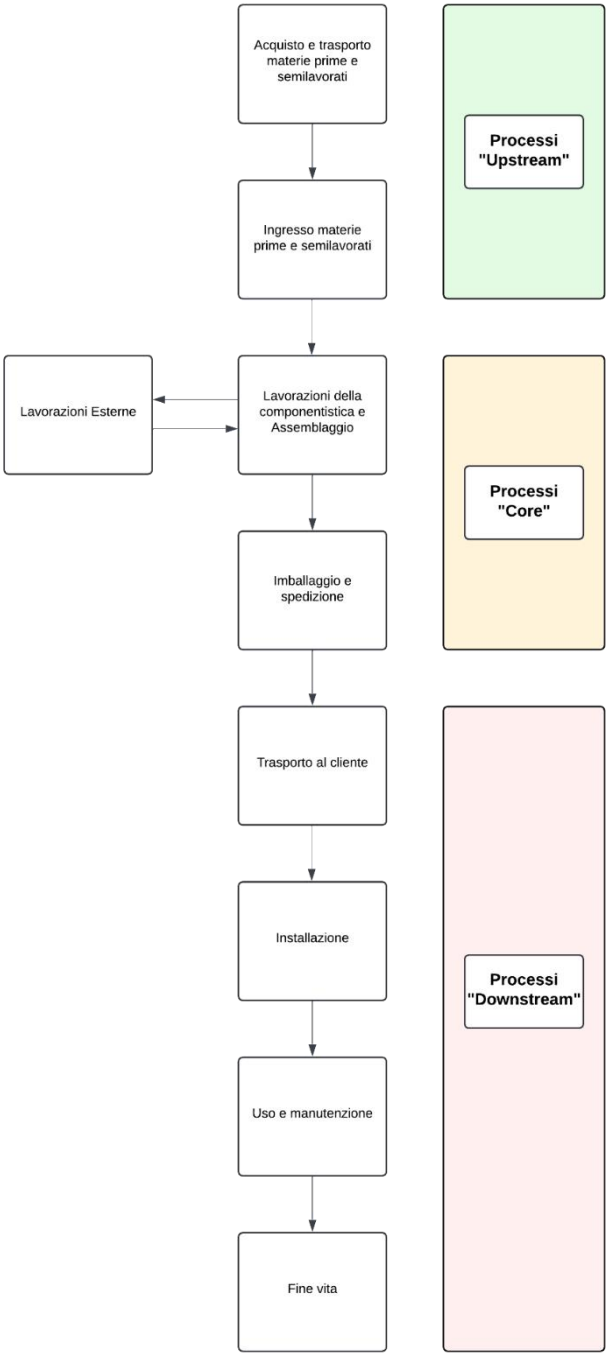
Manufacturing	Distribution	Installation	Use	End of Life
Upstream - Core	Downstream	Downstream	Downstream	Downstream
√	√	√	√	√

3.4. DATA QUALITY

The data used in the LCA study include both primary and secondary data. The primary data were obtained directly from Walvoil S.p.A., collecting information at the production plant. This data is under the complete 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 product within the system boundary considered in relation to the scope of the study.



4.1. MANUFACTURING STAGE

The Life Cycle Study (LCA) for Walvoil S.p.A.'s 8NG5 module 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 transport to the Walvoil plants, where the various processes take place. The plants involved in the production process include the Reggio Emilia site, in Via Norvegia, and those in Bibbiano, in Via Angelo Secchi, as well as the Corte Tegge plant.

The core processes concern all the internal processes to which the product and its components are subjected within these plants. However, internal movements of raw materials between different plants were not considered in the study due to a lack of data. To model these processes, data collected by Walvoil was used, including data related to the transportation of raw materials and information on component suppliers. These data, extracted from the bill of materials (BOM), were entered into the SimaPro software to calculate the environmental impact of the production cycle of the 8NG5 module.

Some components are subcontracted to external suppliers, and to report the emissions associated with these processes, Walvoil has asked suppliers for the total energy consumption, the total quantity of parts machined in the reference year and the specific quantity of parts machined on Walvoil's behalf. This data was then integrated into the modeling software.

In addition to materials, quantities of various energy carriers, such as electricity, natural gas, emulsifiable oils and other resources required for component processing, were accounted for. The production process also generates waste, such as emulsions and waste oils deriving from processing.

The core phase ends with the packaging of the product at the Bibbiano plant, where, in addition to the shipping package, the complete DPX100 distributor is prepared, on which four 8NG5 modules are mounted. By estimating the cycle times for each process, it was possible to relate energy and resource consumption to the processing time, distributing them for each component, thus making it possible to accurately estimate the resources used at each stage of the production process.

4.2. DISTRIBUTION STAGE

This form reports on the environmental impacts related to the distribution of the product from the gate of Walvoil's W3M plant in Bibbiano, Reggio Emilia, to the customers' sites. For transport within the European Union, it is assumed that shipments are made exclusively by road. For non-EU transport, there is a route by ship. A distance by road between the W3M plant and the Port of Genoa was also considered.

4.3. INSTALLATION STAGE

This module calculates the environmental impacts associated with the installation of the 8NG5 module. During this phase, no specific data are available on the use of carriers such as electricity or auxiliary materials such as lubricating oils and chemicals. Therefore, only emissions from packaging material waste were reported.

4.4. USE & MAINTENANCE STAGE

This module analyzes the environmental impacts associated with the use and maintenance of the 8NG5 module 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 Walvoil, on the product data sheet. The aim was to estimate the diesel consumption of the vehicle powering the module to determine the impacts over its life cycle.

The following assumptions were made for the analysis: the module operates for 8 hours a day, of which 6 hours at full load and 2 hours in stand-by, with a total of 250 days of operation per year and a life cycle of ten years. The efficiency of the vehicle's generator was assumed to be 35%. Energy consumption was converted to litres of diesel using the conversion factor of 9.92 kWh per litre of diesel provided by the Department for Environment, Food & Rural Affairs (DEFRA).

4.5. END OF LIFE STAGE

This section examines product end-of-life, for which Walvoil does not have primary data that can be used in the LCA study. End-of-life includes the disassembly of the product, which is assumed to occur at the same

time as the cessation of use of the machinery using it, and the transport of the 8NG5 module from the collection site to the final treatment site.

For this phase, an Ecoinvent process was associated those concerns used industrial electronic devices.

5. RESULTS

In this section, the results of the study 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 3.0. The additional environmental impacts were calculated in the LCA study but are not highlighted in the EPD document.

5.1. ENVIRONMENTAL IMPACTS

8NG5

Impact category	**Nomenclatures**	**Head**	**Total**	**Manufacturing**		**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
-	-	-	-	*Upstream*	*Core*	*Downstream*			
Global warming Potential - Total	GWP - Total	kg CO2 eq	8,93E+01	2,48E+01	9,26E+00	1,78E+00	9,51E-08	5,31E+01	3.29E-01
Global warming Potential – Biogenic	GWP - Biogenic	kg CO2 eq	3.34E-01	1.35E-01	1.27E-01	1.62E-03	2.22E-08	7.04E-02	1.63E-05
Global warming Potential - Fossil	GWP - Fossil	kg CO2 eq	8,89E+01	2,46E+01	9,14E+00	1,78E+00	7,28E-08	5,31E+01	3.29E-01
Global warming Potential - Land use and LU change	GWP - Luluc	kg CO2 eq	6.45E-02	4.81E-02	1.31E-03	8,68E-04	3.57E-11	1.41E-02	1.26E-04
Ozone depletion Potential	ODP	kg CFC11 eq	7,67E-06	1.97E-06	4.08E-07	3.89E-08	1,60E-15	5,25E-06	6,23E-10
Acidification Potential	AP	mol H+ eq	4.75E-01	2.07E-01	2.60E-02	7,35E-03	3,43E-10	2.35E-01	3.81E-04
Eutrophication Potential, marine	EP - marine	kg N eq	9,20E-02	3.66E-02	5,17E-03	2.81E-03	1.57E-10	4.74E-02	1.11E-04
Eutrophication Potential, freshwater	EP - freshwater	kg P eq	3.77E-02	3.31E-02	1.30E-03	1.25E-04	5,40E-12	3.13E-03	2.72E-05
Eutrophication Potential, terrestrial	EP - terrestrial	mol N eq	8.78E-01	3.78E-01	5,53E-02	2.99E-02	1.46E-09	4.14E-01	1.06E-03
Photochemical ozone formation Potential	POCP	kg NMVOC eq	6.31E-01	1.08E-01	2.99E-02	1.08E-02	5.09E-10	4.82E-01	2.95E-04
Resource use Potential, minerals and metals	ADP - minerals&metals	kg Sb eq	8,86E-03	8,81E-03	9,38E-06	5,74E-06	2.26E-13	3.72E-05	4.81E-07
Resource use Potential, fossil	ADP - fossil	MJ	3,72E+03	3.12E+02	1,47E+02	2,53E+01	1.05E-06	3,23E+03	7.82E-01
Water deprivation Potential	WDP	m3 depriv.	1,22E+01	5,78E+00	2,27E+00	1.03E-01	5.02E-09	4,05E+00	1.38E-02

5.2. USE OF RESOURCES

8NG5									
Use of Resources Impact category	**Nomenclatures**	**Head**	**Total**	**Manufacturing**		**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
-	-	-	-	*Upstream*	*Core*	*Downstream*			
Non-renewable primary energy as energy carrier	PENRE	MJ	3,40E+03	5,47E-01	1,47E+02	2,53E+01	1.05E-06	3,23E+03	7.82E-01
Renewable primary energy as energy carrier	PEARS	MJ	1,65E+01	8,50E-03	4,47E+00	3.94E-01	1.68E-08	1.16E+01	8.72E-02
Non-renewable primary energy as material utilization	PENRM	MJ	3.12E+02	3.12E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable primary energy resource as material utilization	PERM	MJ	3,55E+01	3,55E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	PENRT	MJ	3,72E+03	3.12E+02	1,47E+02	2,53E+01	1.05E-06	3,23E+03	7.82E-01
Total use of renewable primary energy resources	PERT	MJ	5,20E+01	3,55E+01	4,47E+00	3.94E-01	1.68E-08	1.16E+01	8.72E-02
Net use of fresh water	FW	m3	4.55E-01	2.22E-01	6.69E-02	3.61E-03	1,69E-10	1.61E-01	5.23E-04
Use of secondary material	SM	Kg	3.95E-01	0.00E+00	3.95E-01	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	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	0.00E+00

5.3. WASTE PRODUCED

8NG5									
Waste Impact category	**Nomenclatures**	**Head**	**Total**	**Manufacturing**		**Distribution**	**Installation**	**Use & Maintenance**	**End of Life**
-	-	-	-	*Upstream*	*Core*	*Downstream*			
Hazardous waste disposed	HWD	Kg	7,38E-02	2.58E-02	2,44E-03	6,28E-04	1.01E-10	2.59E-02	1.90E-02
Non-hazardous waste disposed	NHWD	Kg	5,91E+00	2,44E+00	3.60E-01	1,24E+00	1.25E-07	1,85E+00	1.72E-02
Radioactive waste disposed	RWD	Kg	1.34E-03	7,39E-04	2.69E-04	8,24E-06	3.54E-13	3.27E-04	1.67E-06
Materials for energy recovery	MER	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	Kg	2,87E+00	0.00E+00	2,02E+00	0.00E+00	3,90E-06	0.00E+00	8,53E-01
Components for re-use	CRU	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy	EET	MJ	2,51E+00	0.00E+00	2,51E+00	0.00E+00	1.36E-05	0.00E+00	0.00E+00
Exported electricity energy	EEE	MJ	4,96E+00	0.00E+00	4,96E+00	0.00E+00	2.68E-05	0.00E+00	0.00E+00

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