EPD®

Environmental Product Declaration

In accordance with ISO 14025 for:

Permanent Magnet Heater ZPE (Zero Pollution Energy)

from

Presezzi Extrusion

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
PCR: *Industrial furnaces and ovens, PCR 2022:10, version 1.0.1, UN CPC 43420*
PCR review was conducted by: *Paola Borla. The Chair of the PCR review can be contacted via the PCR review panel: Technical Committee of the International EPD® System,* info@environdec.com
Life Cycle Assessment (LCA)
LCA accountability: *Life Cycle Assessment (LCA) of Presezzi Extrusion's products, Studio Fieschi & soci*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD pre-certification by individual verifier Third-party verifier: *Chris Foster, EuGeos Srl* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier: ☐ Yes ☒ No

Company information

Owner of the EPD:
Presezzi Extrusion S.p.A.
Via Rovereto, 1/d
20871 Vimercate (MB) – Italy

Contacts:
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EPD Project Coordinator
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Description of the organisation:
Presezzi Extrusion S.p.A. was founded in 1994 as a company initially specialized in the production of extrusion presses and for revamping activities on pre-existing plants.
The first important corporate evolution took place in 2013 with the acquisition and merger with Profile Automation S.r.l. of Castelbelforte (MN), a company dedicated to the production of extrusion handling systems. This operation thus allowed the Presezzi Extrusion Group with headquarters in Vimercate (Province of Monza and Brianza, Northern Italy) to be set up, together with Coim S.r.l of Castelcovati, specialized in the production of gas furnaces for log and billet heating (an upstream component of the press for complete plants).Through this expansion process, the Group has achieved the ambitious goal of obtaining the complete control of the entire production cycle for extruded aluminum, copper and brass profiles.
Apart from efficiency and technology, the group also pays great attention to the environment and the reduction in energy consumption which has been available since 2009 thanks to the sale of the first extrusion press equipped with the Energy Saving System (with the installation of low energy consumption hydraulic pumps), while in 2015 there was the sale of the first Z.P.E. (Zero Pollution Energy), magnetic heating furnace for billets. The growth of the Group did not stop there, and it is above all in the years between 2019 and 2021 that its greatest milestones were reached thanks to achieving the record of the sale and installation of 200 presses and 200 gas billet heating ovens worldwide. Today, the Presezzi Group is an international leader in the design, production, and marketing of complete plants for the extrusion of non-ferrous metals such as aluminum, copper and brass and looks forward to achieving further important successes in the future as well as being determined to face and overcome any future challenges the market presents.

Product-related or management system-related certifications:
Presezzi has implemented and certified ISO 9001:2015 “Quality Management System” and ISO 45001:2018 “Occupational health and safety management systems”.

Name and location of production site:
Via Rovereto, 1/d
20871 Vimercate (MB) – Italy

Product information

Product name:
ZPE + 3SF permanent magnets heating technology

Product identification:
Permanent Magnet Heater for aluminium billets

Product description:
ZPE is used for heating billets before they are loaded into the Press to be extruded. This thermal treatment is produced with a rotating magnetic body system consisting of permanent magnets.

The oven described here is considered as representative of the range of ZPE ovens, based on variation between models when indicators for 1 t of metal thermally treated; these indicators are declared as additional information in this EPD.

Commercial name	ZPE + 3SF permanent magnets heating technology for aluminium billets
Type of metal worked and alloy	Aluminium Alloys: 6063, 6061, 6060, 6082, 6005, 7005, 7075, 7003, 7046, 1xxx, 3xxx, 4xxx.
Billet diameter	10’’
Max billet length	1 500 mm
Max. heating temperature	520 °C
Max. skin temperature	540 °C
Taper	Up to 100 °C/m
Size and dimension	7 430 (length) x 1 180 (width) x 1 739 (height) mm
Weight	13,3 t
Main power supply	3 phases / 400V / 50Hz (460V / 60Hz)
Heating sections	3 (or 4)
Energy consumption	42 kWh/t for heating from 380°C to 480°C 165 kWh/t for heating from 20°C to 480°C (141 kWh/t according to field tests[1])
Energy consumption for cooling process	2,5 kWh/t
Energy consumption for hydraulic system	1,0 kWh/t
Expected lifetime	20 years
Productivity	7,6 t/h for heating from 380°C to 480°C 2,05 t/h for heating from 20°C to 480°C
Foreseen production	45 600 t/year for heating from 380°C to 480 12 300 t/year for heating from 20°C to 480°C
Installed Power	980 kW
Processing material(s) consumption	Not relevant

[1] Average value of test results measuring the actual energy consumption of the ZPE according to different operational parameters (type of alloy, billet length, billet weight)

Refrigerating fluid type and consumption	No consumption. Closed-loop Chiller System with total capacity of 3,96 m^3/h
Compressed air	150 m^3/h, 20 h/d, 300 d/y

The physical modules of ZPE in its standard configuration are:

- Main Cores
- Fixed Pad
- Mobile Pad
- Thermocouple
- Turning Table
- Galvanic unit
- Frame
- Hydraulic Unit
- Pneumatic Circuit
- Electrical cabinets
- Cooling system
- Inverter and support
- Tooling
- Magnets

UN CPC code:
43420 *Industrial or laboratory furnaces and ovens, except non-electric bakery ovens; other industrial or laboratory induction or dielectric heating equipment.*

Geographical scope: Global
The product performance has been modelled based on Presezzi market distribution.

LCA information

Functional unit: the thermal treatment of aluminium billets by means of an oven during a Reference Service Life of 20 years at the following operating conditions:

Billet diameter	10''
Max billet length	1 500 mm
Set-up	Heating from 20 °C to 480 °C
Energy consumption	141 kWh/t
Energy consumption for cooling process	2,5 kWh/t
Energy consumption for hydraulic system	1,0 kWh/t
Expected lifetime	20 years
Productivity	2,05 t/h
Foreseen production	12 300 t/year
Processing material(s) consumption	Not relevant
Refrigerating fluid type and consumption	No consumption. Closed-loop Chiller System with total capacity of 3,96 m^3/h
Compressed air	150 m^3/h, 20 h/d, 300 d/y

Reference service life (RSL): 20 years.

Time representativeness: 2021

Database used: Ecoinvent 3.8

LCA software used: Simapro 9.1

LCA practitioner:
Studio Fieschi & soci Srl
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www.studiofieschi.it

Description of system boundaries:
The type of EPD adopted for the products under study is **cradle-to-grave.**
This LCA and the associated EPD therefore include the following information modules:

Upstream:

- extraction and production of raw material for all parts of the oven;
- recycling processes of secondary materials from other product life cycles;
- production of parts of the oven;
- transportation of raw material and components;
- the manufacturing of primary and secondary packaging;
- generation of electricity and production of fuels; steam and other energy carriers used in the upstream processes.

Core:

- transportation of materials, semi-products and packaging to Presezzi manufacturing site;
- external transportation from Presezzi manufacturing site (e.g. wastes to the landfills);
- internal transports within the manufacturing plant;
- production of auxiliary materials;

- manufacturing of the oven (assembly, welding, painting);
- testing of the product including the energy and materials used;
- waste treatment of waste generated during manufacturing of machine;
- preparation and packaging of the final product for shipment;
- generation of electricity and production of fuels, steam and other energy carriers used in core processes.

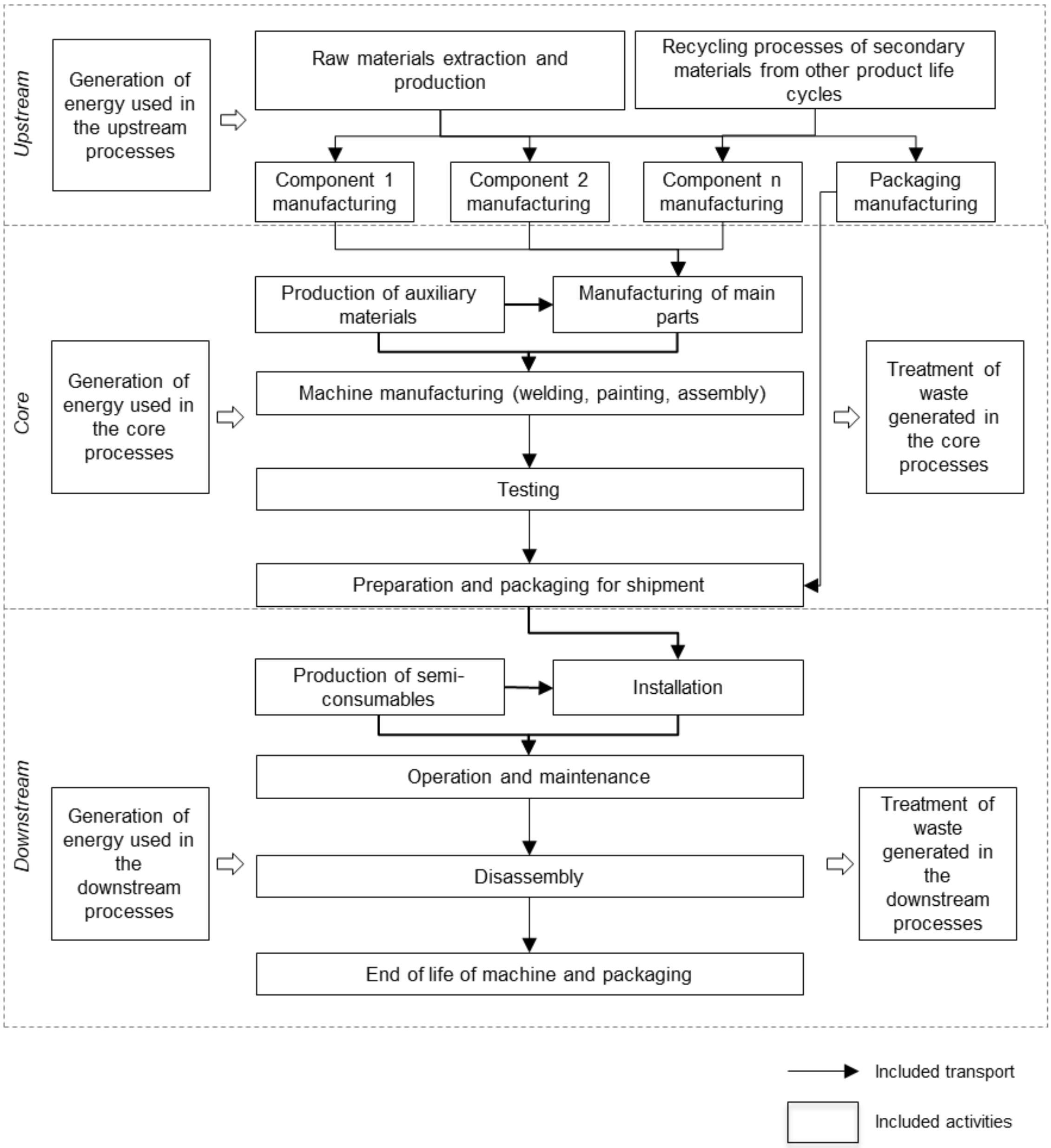
Downstream:

- transportation of ZPE furnace to user,
- installation of ZPE furnace at site, including used material, energy and waste generated from installation;
- production of semi-consumables installed in the machine at delivery (e.g. hydraulic fluid, etc.),
- operation of the product including energy and material consumptions and emissions;
- ordinary maintenance during RSL;
- disassembling of the product;
- end-of-life treatment of the product after its use stage and final disassembly;
- end-of-life processes of packaging and any wasted part of the oven;
- generation of electricity and production of fuels, steam and other energy carriers used in the downstream processes.

<u>The system boundaries do not include:</u>

- Input and output flows related to personnel (e.g. energy used in head offices and sales offices, transports of employees to and from workplace, water use for toilets, etc);
- Input and output flows related to production and maintenance of equipment, other than the machinery under analysis;
- The oven under analysis is not expected to be refurbished within the RSL above declared. Possible revamping activities occurring after the RSL are not included.

System diagram:



Upstream

Upstream processes include the production of the components involved in the manufacturing of the ZPE and the packaging for its distribution. Primary data have been used for the material and the weight of each component and for the amount of packaging employed. Global and European average datasets from Ecoinvent and data from Plastics Europe and have been used to model the production of components and packaging.
More details regarding raw materials and packaging are shown in the tables in the **Content declaration** section.

Core

The Core phase comprise the transport of the components from the suppliers to Presezzi's plant and the manufacturing process of the ZPE. Primary data about supplier's location has been used for components representing at least the 80% of the total weight. For components representing the remaining 20% of the total weight of the machines, a distance of 200 km by truck was assumed. Data related to the inputs (energy consumption, chemicals etc.) as well as outputs (air emissions, water emissions etc.) of the plant are primary data provided by Presezzi's staff.
The electricity used is supplied from the grid. The fuel mix declared by the supplier is the following:

- Renewables: 23,41%
- Coal: 8,73%
- Natural gas: 59,33%
- Oil: 0,65%
- Nuclear: 4,19%
- Other sources: 3,69%

Waste flows sent to recovery do not carry environmental burdens, whereas their transport from the plant to the recovery facilities is considered. The other waste flows are assumed to be destined to landfill or to incineration. Transports to recovery/disposal facilities were modelled according to actual distances from Presezzi's plant, travelled by truck.

Downstream

Downstream processes are the distribution of the final product to the market, the use and maintenance stages and the end-of-life. Both the distribution and the use and maintenance scenarios have been modelled using primary data provided by Presezzi, considering the entire range of machines produced in the reference year. The ZPE is installed at customers' sites and tested by Presezzi staff; the use of machinery is required only for its positioning on the basement, and it is considered negligible. During installation the chiller closed circuit is filled with coolant.
ZPE can operate under two main starting conditions of the metal to be heated: either at room temperature, from 20 °C to 480 °C, or after a pre-heating process, from 380 °C to 480 °C. The use scenario was modelled considering that the metal to be treated is at room temperature, i.e. T_0 20 °C and ΔT 460 °C. Field tests measuring actual energy consumption for a mixture of aluminium alloys were taken into consideration and the energy mix has been modelled according to the market distribution of the whole production in 2019, 2020 and 2021, considering either national residual mix on the market, for countries where this data is available, or national consumption mix on the market. So, the energy mix consists of a share of energy produced in each country considered and allocated as follows:

- Renewables: 23,94%. Of which:
  - Biomass 1,59%
  - Geothermal 1,05%
  - Hydro 12,40%
  - Solar 2,92%
  - Wind 5,98%
- Coal 26,92%

- Lignite 8,75%
- Natural gas 27,78%
- Nuclear 10,58%
- Oil 1,46%
- Other 0,57%

The use of the machines requires some ordinary maintenance activities during their useful life, thus the components that need to be replaced have been modelled the same way as in the manufacturing stage.

The end-of-life scenario was modelled according to the most recent Eurostat statistics on generic waste and WEEE treatment in Europe.
Accordingly, the EoL scenario was set up based on the following assumptions:

- The use of energy for installation and dismantling processes is considered negligible;
- metal components are fully recovered;
- a standard distance of 50 km by truck was assumed for the transport of waste disposed or recovered.

Permanent magnets in the ZPE were assumed to undergo a thermal treatment for demagnetization (up to 450°C for 60 minutes) before being shredded and destined to landfill.

The useful life of ZPE is 20 years, corresponding to the time the machines could be in use without the need for revamping. Although the core parts of the oven may last longer than the period considered, in absence of reliable information regarding the possible duration of each main component and as a conservative assumption, the above-mentioned useful life is assumed as representative of all components of the machine.

Cut-off:
Energy used for installation and dismantling of the ZPE.

Allocation procedures:
Impacts generated by manufacturing processes (assembly, welding, painting) were allocated based on the mass of products and co-products.

Environmental impact indicators

The default environmental performance indicators required by the International EPD System®, Version 2.0, and their methods are used.

The characterization factors applied are derived from the EF 3.0 method (adapted).

The characterization model of each impact indicator is detailed in the following table.

Impact category	Abbreviation	Characterization model	Unit
Global Warming Potential	GWP	GWP100, EN 15804. Version: August 2021 IPCC (2013)	kg CO_2 eq.
Acidification Potential	AP	AP, accumulated exceedance, EN 15804. Version: August 2021. Seppälä et al. 2006, Posch et al. 2008	mol H+ eq.
Eutrophication Potential, freshwater	EPf	EP, aquatic freshwater, EUTREND model, EN 15804. Version: August 2021. Struijs et al. 2009 as implemented in ReCiPe	kg P eq.

Impact category	Abbreviation	Characterization model	Unit
Eutrophication Potential, marine	EPm	EP, aquatic marine, EUTREND model EN 15804. Version: August 2021. Struijs et al. 2009 as implemented in ReCiPe	kg N eq.
Eutrophication Potential, terrestrial	EPt	EP, terrestrial, accumulated, exceedance EN 15804. Version: August 2021. Seppälä et al. 2006, Posch et al. 2008	mol N eq.
Photochemical Oxidant Creation Potential	POCP	POCP, LOTOS-EUROS as applied in ReCiPe, EN 15804. Version: August 2021. Van Zelm et al. 2008, ReCiPe 2008	kg NMVOC eq.
Ozone Depletion Potential	ODP	ODP, EN 15804. Version: August 2021. WMO 2014	kg CFC 11
Abiotic Depletion Potential for minerals and metals (non-fossil resources)	ADPmm	ADP minerals & metals, EN 15804. Version: August 2021. Guinée et al. 2002, van Oers et al. 2002, CML 2001 baseline (Version: January 2016)	kg Sb eq.
Abiotic Depletion Potential for fossil fuels	ADPff	ADP fossil fuels, EN 15804. Version: August 2021. Guinée et al. 2002, van Oers et al. 2002, CML 2001 baseline (Version: January 2016)	MJ
Water deprivation potential	WDP	Available water remaining (AWARE) method Boulay et al (2017)	m^3 world eq. deprived

Content declaration

Product

Materials	Weight (t)	% on total weight	% recycled content
Steel	9,4	71%	0%
Plastic	1,3	9,7%	0%
Electronics	1,2	9%	0%
Magnet	0,7	5,1%	0%
Copper	0,6	4,5%	0%
Aluminium	0,1	0,8%	0%
Other metals	0,01	0,1%	0%
Other materials	0,01	<0,1%	0%
Total	**13**	**100%**	**0%**

Environmental/hazardous properties: No substance listed in the Candidate List of Substances of Very High Concern for Authorisation under the REACH Regulations is present in this product, either above the limits for registration with the European Chemicals Agency or in excess of 0,1 weight-% of the product.

Packaging

Type of packaging	Description	Material	Weight for 1 oven (t)
Distribution packaging	Pallet, beams, wedges, supports 80% EU - 20% Extra EU	Wood	0,3

Environmental performance

Results per one ZPE oven

Potential environmental impact

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	8,80E+04	3,31E+03	2,34E+07	2,35E+07
	Biogenic	kg CO_2 eq.	1,27E+03	4,01E+00	4,37E+04	4,50E+04
	Land use and land transformation	kg CO_2 eq.	1,54E+02	5,41E-01	6,88E+04	6,90E+04
	TOTAL	kg CO_2 eq.	8,95E+04	3,31E+03	2,35E+07	2,36E+07
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	6,89E-03	6,29E-04	9,07E-01	9,15E-01
Acidification potential (AP)		kg mol H^+ eq.	9,79E+02	2,56E+01	1,20E+05	1,21E+05
Eutrophication potential (EP)	Aquatic freshwater	kg P eq.	7,37E+00	3,05E-02	1,78E+03	1,79E+03
	Aquatic marine	kg N eq.	5,73E+02	6,93E+00	1,89E+04	1,95E+04
	Aquatic terrestrial	mol N eq.	1,28E+03	7,65E+01	2,07E+05	2,09E+05
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	3,26E+02	1,88E+01	5,36E+04	5,39E+04
Abiotic depletion potential (ADP)	Metals and minerals	kg Sb eq.	1,76E+01	4,09E-03	3,47E+01	5,23E+01
	Fossil resources	MJ, net calorific value	1,06E+06	4,72E+04	3,08E+08	3,10E+08
Water deprivation potential (WDP)		m^3 world eq.	3,25E+04	7,01E+02	6,20E+06	6,23E+06

Use of resources

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	4,05E+05	3,54E+03	3,96E+07	4,00E+07
	Used as raw materials	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	TOTAL	MJ, net calorific value	4,05E+05	3,54E+03	3,96E+07	4,00E+07
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1,06E+06	4,72E+04	3,08E+08	3,10E+08
	Used as raw materials	MJ, net calorific value	3,54E+02	0,00E+00	0,00E+00	3,54E+02
	TOTAL	MJ, net calorific value	1,06E+06	4,72E+04	3,08E+08	3,10E+08

Additional information: Results per 1 t of aluminium extruded

Potential environmental impact

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	3,58E-01	1,34E-02	9,52E+01	9,55E+01
	Biogenic	kg CO_2 eq.	5,16E-03	1,63E-05	1,78E-01	1,83E-01
	Land use and land transformation	kg CO_2 eq.	6,26E-04	2,20E-06	2,80E-01	2,80E-01
	TOTAL	kg CO_2 eq.	3,64E-01	1,35E-02	9,56E+01	9,60E+01
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	2,80E-08	2,56E-09	3,69E-06	3,72E-06
Acidification potential (AP)		kg mol H^+ eq.	3,98E-03	1,04E-04	4,90E-01	4,94E-01
Eutrophication potential (EP)	Aquatic freshwater	kg P eq.	3,00E-05	1,24E-07	7,25E-03	7,28E-03
	Aquatic marine	kg N eq.	2,33E-03	2,82E-05	7,70E-02	7,94E-02
	Aquatic terrestrial	mol N eq.	5,18E-03	3,11E-04	8,43E-01	8,48E-01
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	1,33E-03	7,64E-05	2,18E-01	2,19E-01
Abiotic depletion potential (ADP)	Metals and minerals	kg Sb eq.	7,14E-05	1,66E-08	1,41E-04	2,12E-04
	Fossil resources	MJ, net calorific value	4,30E+00	1,92E-01	1,25E+03	1,26E+03
Water deprivation potential (WDP)		m^3 world eq.	1,32E-01	2,85E-03	2,52E+01	2,53E+01

Use of resources

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1,65E+00	1,44E-02	1,61E+02	1,63E+02
	Used as raw materials	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	TOTAL	MJ, net calorific value	1,65E+00	1,44E-02	1,61E+02	1,63E+02
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	4,30E+00	1,92E-01	1,25E+03	1,26E+03
	Used as raw materials	MJ, net calorific value	1,44E-03	0,00E+00	0,00E+00	1,44E-03
	TOTAL	MJ, net calorific value	4,30E+00	1,92E-01	1,25E+03	1,26E+03

References

General Programme Instructions of the International EPD® System. Version 4.0

ISO 14025:2010 *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*

ISO 14040:2006 *Environmental management – Life cycle assessment – Principles and framework*

ISO 14044:2006 *Environmental management – Life cycle assessment - Requirements and guidelines*

Product Category Rules (PCR) 2022:10 *Industrial furnaces and ovens*. Version 1.0.1

Studio Fieschi & soci Srl, *Life Cycle Assessment (LCA) of of Presezzi Extrusion's products: Extrusion Press (with Energy Saving System), ZPE (Zero Pollution Energy) Permanent Magnet Heater*

Other references and databases:

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Other references:

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