Environmental Product Declaration

In accordance with ISO 14025:2006 for:

ENTRON eco B – PA6 GRANULES

from

ENNEATECH AG

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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PCR review was conducted by: The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com.
Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
PCR: Plastics in primary forms, PCR 2010:16; version 4.0.1, UN CPC 347
PCR review was conducted by: The Technical Committee of the International EPD System. A full list of members is available on www.environdec.com. The review panel may be contacted via support@environdec.com.
Life Cycle Assessment (LCA)
LCA calculator: Johannes Schwaiger, SKZ-KFE gGmbH
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Andreas Ciroth GreenDelta GmbH, Alt-Moabit 130/131, 10557 Berlin, Germany* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier: ☐ Yes ☐ No [Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see ISO 14025.

Update
Version 5: In the previous version, the GWP values were incorrectly transferred from the background report to the EPD document. Now all GWP values in the background report and EPD document match.

Company information

Owner of the EPD:	Enneatech AG
Contact	Schmiedestraße 34 26629 Großefehn Germany www.enneatech.com info@enneatech.com
Description of the organisation	ENNEATECH AG is a plastics recycling company in northern Germany. As a manufacturer of sustainable, technical plastics, ENNEATECH is one of the leading polymer specialists on the European market and sells its products internationally. Its range of products includes polyamide (PA) granules made in-house, customized compounds and innovative polyamide fiber products.
Name and location of production site	Holtmeedeweg 2 26629 Großefehn Germany

Product information

Product name	ENTRON eco B
Product description	The product ENTRON eco B is a PA6 granule consisting of 100% secondary materials obtained from post industrial (PI) waste. It serves as a base material for the downstream industries.
UN CPC code	347 – Plastics in primary forms
Geographical scope:	Global
Polymer	Polyamide 6
Colour	Multi-coloured, black, natural
Granules	Unfilled, reprocessed
CAS No.	25038-54-4
Monomers	ε-Caprolactam
Classification GHS	Not dangerous
Compliance RoHS	fulfilled

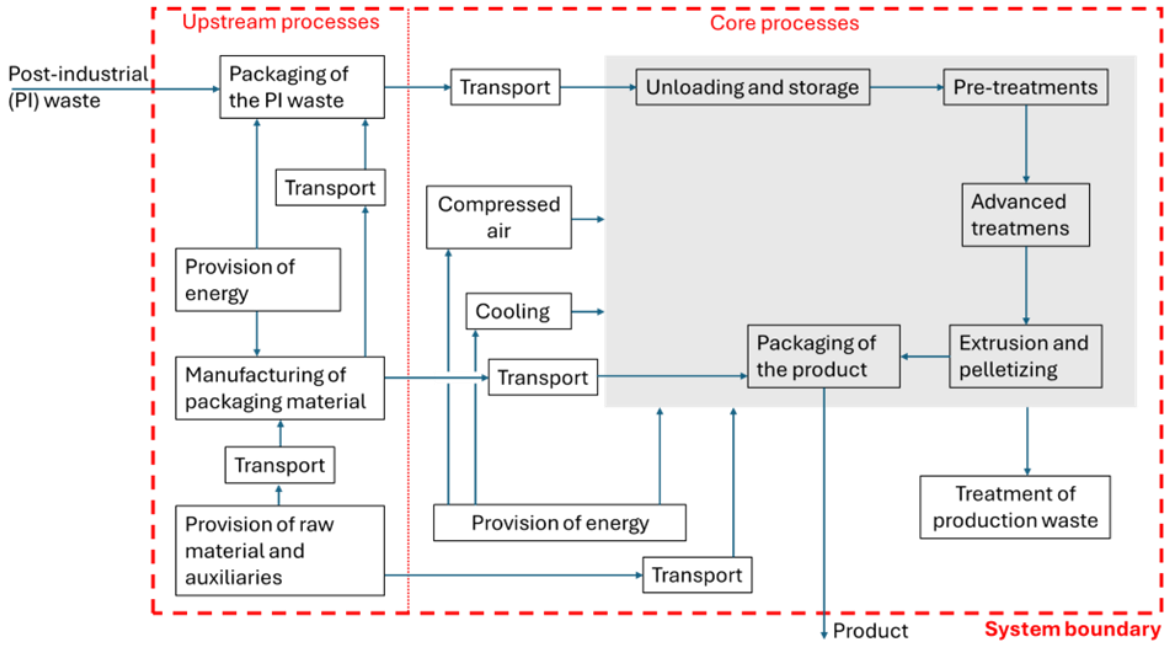
Product properties

Property	Unit	ENTRON eco B
Density [ISO 1183-2:2019]	g/cm3	1.13 – 1.14
Melting temperature [DIN EN ISO 11357]	°C	220 - 230
Charpy impact strength [DIN EN ISO 179-1/1eU]	kJ/m²	80 - 300
Charpy notched impact strength [DIN EN ISO 179-1/1eA]	kJ/m²	4 - 10
Tensile modulus [DIN EN ISO 527-2 /1A]	MPa	2800 - 3200
Tensile strength [DIN EN ISO 527-2 /1A]	MPa	65 - 85
Elongation at break [DIN EN ISO 527-2 /1A]	%	20-30
Relative viscosity [ISO 307 / Sulfuric acid, 25 °C]	kJ/m²	2.3 – 3.4
Viscosity number [ISO 307 / Sulfuric acid, 25 °C]	ml/g	120 - 235
Ash content [600 °C, Muffle furnace]	%	< 1
Colour	-	multi-coloured, black, natural

LCA information

Declared unit	1 kg of ENTRON eco B (PA6 granules)
Reference service life	A reference service life is not applicable for this product category
Time representativeness	The information underlying this EPD is taken from the reference year 2023, taking into account inputs and outputs for the whole calendar year.
Database(s) and LCA software used	The background data was taken exclusively from the Sphera MLC database (formerly GaBi Professional+Extension, version 2025.1). The modeling and the linking with the background data was carried out in the software LCA for Experts (version 10.9, formerly GaBi).

System diagram



Description of system boundaries

Upstream processes:

The post-industrial waste loses its waste status right after collection at the point of waste generation. The recovered material is then packed for transportation. The relevant upstream processes are the following:

- External production of packaging material for post-industrial waste used as raw mate-rial
- External production of packaging materials for products
- Provision of energy carriers for upstream processes
- Provision of raw material and auxiliaries for upstream processes
- All relevant transport processes

Core processes:

The packed recovered material is then transported to Enneatech site.

The necessary raw materials and intermediate products are supplied to the production plant, where the production of the product takes place by standard and customized manufacturing processes:

	• Provision of energy carriers for upstream processes • Production of product (pre-treatments, advanced treatments, extrusion and pelletizing • Packing of final product • Transport of raw material, packaging material to Enneatech site • Transport of raw material packaging and production waste to waste treatment • Waste treatment of packaging and production waste
Excluded lifecycle stages	The scope of the underlying PCR is cradle-to-gate and therefore downstream processes are not included. ENTRON eco B is a basic material for which the life cycle and disposal depend largely on further processing. Corresponding assumptions cannot be made here. Personnel-related processes, such as transportation of employees to and from work, are not accounted for. The production and end-of-life processes of infrastructure or capital goods used in the product system are excluded.
Biogenic carbon	The characterisation factors of biogenic CO_2 uptake and emissions were set to zero (“0/0 approach“)
More information	https://enneatech.com

Content declaration

Product

As it is a base material, the product is made of 100% polyamide 6.6. The recycled content is 100 % (post-industrial recycled content).

The product contains no substances from the candidate list of SVHC for Authorisation.
The product contains no CMR substances in categories 1A or 1B which are not on the candidate list.
No biocide products were added to this construction product as defined by the EU Regulation No. 528/2012).

Packaging

ENTRON eco B is packaged in various product packages.
66 % of the granules produced are supplied in silos. Big bags make up 29 % and octabin packaging accounts for 5 % of product packaging.

The content of

- Silo packaging is 24 t
- Big bag packaging is 1 t
- Octabin packaging is 1 t

Recycled material

The recycled content is 100 % (post-industrial recycled content).

Results of the environmental performance indicators

The EN 15804+A2 method (based on EF 3.1.) was used to evaluate the environmental impacts, except for the GWP indicators. In accordance with the specifications in the PCR, the 0/0 approach was chosen for the analysis of biogenic carbon. For this reason, the evaluation method according to GHG protocol (EF 3.1) was used for the GWP indicators.

Impact category indicators

PARAMETER		UNIT	Upstream	Core	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	3.02E-02	1.51E-01	1.81E-01
	Biogenic	kg CO_2 eq.	1.51E-04	3.09E-03	3.24E-03
	Land use and land transformation	kg CO_2 eq.	7.87E-05	3.95E-03	4.02E-03
	TOTAL	kg CO_2 eq.	3.05E-02	1.58E-01	1.88E-01
Ozone layer depletion (ODP)		kg CFC 11 eq.	1.96E-13	3.24E-14	2.28E-13
Acidification potential (AP)		mol H^+ eq.	6.71E-05	9.29E-04	9.96E-04
Eutrophication potential (EP)	Aquatic freshwater	kg P eq.	1.87E-07	1.95E-07	3.81E-07
	Aquatic marine	kg N eq.	2.49E-05	4.20E-04	4.44E-04
	Terrestrial	mol N eq.	2.50E-04	4.60E-03	4.85E-03
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	7.08E-05	1.10E-03	1.17E-03
Abiotic depletion potential (ADP)*	Metals and minerals	kg Sb eq.	6.46E-09	2.29E-08	2.93E-08
	Fossil resources	MJ, net calorific value	7.51E-01	1.60E+00	2.35E+00
Water deprivation potential (WDP)*		m^3 world eq. deprived	3.00E-03	7.72E-01	7.75E-01

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

Resource use indicators

PARAMETER		UNIT	Upstream	Core	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	4.14E-01	2.06E+00	2.47E+00
	Used as raw materials	MJ, net calorific value	1.24E-01	0.00E+00	1.24E-01
	TOTAL	MJ, net calorific value	5.38E-01	2.06E+00	2.60E+00
Primary energy	Use as energy carrier	MJ, net calorific value	7.51E-01	1.91E+00	2.67E+00

resources – Non-renewable	Used as raw materials	MJ, net calorific value	4.00E-02	0.00E+00	4.00E-02
	TOTAL	MJ, net calorific value	7.91E-01	1.91E+00	2.71E+00
Secondary material (optional)		kg	1.06E+00	0.00E+00	1.06E+00
Renewable secondary fuels (optional)		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels (optional)		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (optional)		m^3	1.14E-03	1.10E-02	1.22E-02

Waste indicators (optional)

PARAMETER	UNIT	Upstream	Core	TOTAL
Hazardous waste disposed	kg	1.47E-09	2.11E-10	1.68E-09
Non-hazardous waste disposed	kg	6.97E-04	9.34E-04	1.63E-03
Radioactive waste disposed	kg	1.39E-05	5.01E-06	1.89E-05

Output flow indicators (optional)

PARAMETER	UNIT	Upstream	Core	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ per energy carrier	0.00E+00	7.31E-03	7.31E-03
Exported energy, thermal	MJ per energy carrier	0.00E+00	1.53E-02	1.53E-02

Other environmental performance indicators

PARAMETER	UNIT	Upstream	Core	TOTAL
Particulate matter	Disease incidence	2.76E-09	2.32E-08	2.60E-08
Ionising radiation, human health	kBq U235 eq	1.87E-03	4.90E-04	2.36E-03
Ecotoxicity, freshwater	CTUe	4.59E-01	1.37E+00	1.83E+00
Human toxicity, cancer	CTUh	1.04E-11	6.31E-11	7.36E-11
Human toxicity, non-cancer	CTUh	2.59E-10	7.84E-10	1.04E-09
Land Use	SQP	3.36E+00	3.07E-01	3.67E+00

References

THE INTERNATIONAL EPD SYSTEM	General Programme Instructions for the International EPD System: Version 5.0.1, Version 5.0.1, EPD International AB, Feb. 2025.
THE INTERNATIONAL EPD SYSTEM	Product Category Rules (PCR): Plastics in primary forms. Version 4.0.0, PCR 2010:16, EPD International AB, Jul. 2024.
THE INTERNATIONAL EPD SYSTEM	Product Category Rules (PCR): Plastic waste and scrap recovery (recycling) services. Version 2:13, PCR 2013:08, EPD International AB, Apr. 2021.
DIN EN ISO 14040	Umweltmanagement – Ökobilanz – Grundsätze und Rahmenbedingungen: Deutsche und Englische Fassung EN ISO 14040:2006, DIN EN ISO 14040:2006, DIN Deutsches Institut für Normung e.V., Berlin, Nov. 2009.
DIN EN ISO 14044	Umweltmanagement – Ökobilanz – Anforderungen und Anleitungen: Deutsche und Englische Fassung EN ISO 14044:2006, DIN EN ISO 14044:2006, DIN Deutsches Institut für Normung e.V., Berlin, Oct. 2006.
DIN EN ISO 14025	Umweltkennzeichnungen und -deklarationen: Typ III Umweltdeklarationen – Grundsätze und Verfahren, DIN EN ISO 14025:2006, Berlin, Oct. 2011.
DIN EN ISO 15804	Nachhaltigkeit von Bauwerken – Umweltproduktdeklarationen – Grundregeln für die Produktkategorie Bauprodukte, DIN EN 15804:2012+A2:2019 + AC:2021, Mar. 2022.
SOFTWARE	LCA for Experts (LfE) (2025). Sphera Solutions GmbH

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