ENVIRONMENTAL PRODUCT DECLARATION

TR-EECell

From:
Trocellen Italia S.p.A.

Programme: The International EPD® System
Programme operator: EPD International AB

UN CPC 363
Other plastic products

PCR 2019:14: "Construction products" version 1.11

SUB PCR: c-PCR-005 Thermal Insulation products (EN 16783)

Geographical scope: Global
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In accordance with ISO 14025 and EN15804:2012+A2:2019

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

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1 INTRODUCTION

Type III Environmental Declarations contain verifiable and accurate information on the environmental performance of a product, quantified based on a life cycle impact assessment. Their objective is to produce reliable information expressed on a common basis that enables comparison of environmental performance between products performing the same function. In this perspective of product sustainability, Type III Environmental Declarations are developed in compliance with the requirements and prescriptions dictated by the voluntary standard EN ISO 14025:2010. To ensure that LCA studies are carried out consistently for all products within the same category, a precise set of rules and methodologies shall be respected. These rules are indicated by the PCR - Product Category Rules - which formulate specifications regarding the procedure of a life cycle analysis for a specific product category, ensuring results coherency and comparability.

2 COMPANY AND PRODUCT INFORMATION

2.1 TROCELLEN COMPANY[1]

Trocellen is a multinational company owned by Furukawa Electric Co. Ltd, internationally renowned for the design and manufacture of crosslinked polyolefin foams. Through its different Business Units, the company is able to meet the specific needs of the market with a wide range of products and solutions.

It manufactures both semi-finished and finished products. The Trocellen products stand out for their manufacturing processes and the many industrial sectors in which they can be used: Insulation, automotive, footwear, sport and leisure, adhesive tapes and packaging. Trocellen makes safety a lifestyle and turns safety into a lifestyle.

Insulation Business Unit

The Insulation Business Unit mainly specialized in Sound and Thermal insulation for the building industry. The goal is to create comfortable environments for people or rather to “help people live better!”.

Certified quality

As a guarantee of providing stable, high-performance products and services Trocellen pays particular attention to quality assurance. We aim at monitoring and improving all our production, management and customer service processes. We dedicate ourselves to continuously developing all areas that might influence the performance of our products, services and have a positive effect on cooperation with our partners and on customer satisfaction.

[1] EPD owner: Trocellen Italia Spa
Head office: Via Della Chimica 21/23, 20867 Caponago (MB), Italy
Phone: +39 02 959621

Below there is the list of ISO certificates given to Trocellen Italia S.p.A. plants:

- ISO 45001 - Occupational Health and Safety Management Systems
- ISO 9001 – Quality management
- ISO 50001 – Energy management

2.2 THE PRODUCT RANGE

TR-EECell is a bio-based cross-linked polyethylene foam. The product consists almost entirely of raw materials derived from biomass (sugar cane). The process of exploiting the sugar cane usually involves five squeezing steps: The juice from the first two steps is destined for the production of brown sugar for human consumption, while the remaining three steps generate a less valuable juice and not suitable for the production of food sugar.

The ethanol necessary for our foam comes from fermented sugar cane juices extracted during the last three squeezing steps, therefore unsuitable for human consumption. From the polymerization of this ethanol the polymers necessary for the production of bio-based PE foam are obtained. Furthermore, even the remaining parts of the sugar cane are not wasted: the final residues of the juices (bagasse) are incinerated, thus producing energy used in the production process of sugar and ethanol and thus giving a further and significant contribution that aims to increase sustainability.

Tr-EECell is:

- Bio-Sourced: Trocellen cross-linked PE foams with bio-source PE. Only the source changes, the final result is the same
- High performance: The product has the same technical features than other Trocellen polyethylene foam products.
- Versatile: Suitable for several applications, due to its high quality and processability.
- Certified: The bio-based content has been tested by accredited external laboratory according to ASTM D6866-16. Based on this test, TR-EECell foam product range (N and RN bio-based grades) successfully obtained the DIN CERTCO bio-based certification, at the highest level (>85% of Bio-based) (see more here: https://tr-eecell.trocellen.com/).
- Complete use: The processing waste from sugar cane is reused for the production of a long lasting product, increasing enormously the lifetime of the material.

Trocellen products have showed a service life of more than 23 years on site, with the same performance and no damage. This demonstrates the long-lasting life of Trocellen products.

The TR-EECell product range presents several types of products (thickness, density, etc) and the following one has been analyzed in this document:

TR-EECell

Bio-based chemically cross-linked, closed cell polyethylene foam, density 45 kg/m³, thickness 4 mm.

Table 1: Formula declaration per 1 kg of TR-EECELL

TR-EECELL		% (kg/kg)
PRODUCT	Bio-based Polymers	80,7%
	Additives	14,9%
	Printed PE film	4,4%
		(kg/kg)
PACKAGING	PE film	0,0622
	Cardboard tube	0,060

The products are manufactured at the company's own facilities and specifically in the following plants:

- Via Della Chimica, 21 – 23, 20867 Caponago (MB), Italy.
- Via della Tecnica, 8, Agrate Brianza (MB), Italy

3 LCA INFORMATION

3.1 DECLARED UNIT

The declared unit is 1 kg of final product.

3.2 REFERENCE SERVICE LIFE

Not applicable for the analysis.

3.3 TIME REPRESENTATIVENESS

The temporal boundaries include the period from January 2019 to December 2019, a time frame considered to be representative of the company's activities. These were chosen given the fullest availability of information relating to the analysis.

3.4 SYSTEM BOUNDARIES

In accordance with the reference standard EN 15804 and the PCR followed, the life cycle environmental impact assessment has the following boundaries: "from cradle to gate with modules C1-C4 and module D". (Figure 1, Table 6). Modules A4-A5 and B1-B7 were excluded. In the end-of-life phase, the product is only sent for disposal (landfill or incineration). Use stage has not been considered in the study: further consideration can be done about the energy saving according to insulation thermal properties of the product (See also 2.2 paragraph).

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Decostrunction, demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	IT	-	-	-	-	-	-	-	-	-	-	IT	IT	IT	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – product	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – site	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 1: ND= Module not declared.

Table 2 – Stage description

STAGE	INDICATOR	
A1 – Raw material supply	Raw material	***UPSTREAM***
	Energy constumption: Electrical/heat	
A2 – Transport	Raw material transportation Internal transportation	
A3 - Manufacturing	Materials (packaging)	***CORE***
	Waste transportation	
	Waste treatment	
C1 - De-construction demolition	Dismantling-related consumption	***END OF LIFE***
C2 - Transport	Waste transportation	
C3 - Waste processing	Waste treatment	
C4 - Disposal	Disposal	

In addition, the following assumptions have been made:

- Impacts associated with demolition (C1) are assumed to be neglectable. The eventual removal of the product does not require the use of electricity or other inputs. Removal can generally be done manually if necessary.
- The product at the end of its life is sent to landfill/incineration with appropriate CER code, therefore disposal at a distance of 53.1 km is assumed as a scenario.
- The product after demolition activities is not recovered (C3).
- The product after demolition activities is managed according to ISPRA statistics (Italian reference).
- The result of phase D is zero, because there are no end-of-life benefits (recycling, recovery and/or reuse).

3.5 SYSTEM SCHEME AND MANUFACTURING PROCESS

For each information module, characteristic environmental performance indicators were investigated. In selecting the data to be used for the study, preference was given to primary data that could be catalogued by the company. These data constitute the primary source of information for the inventory analysis. The latter can be grouped according to environmental performance indicators, to which the results of the

environmental performance will then be referred. On the basis of these indicators, the software model was elaborated and the inventory analysis was then developed according to macro-consumptions referring to the declared unit that characterizes the study. The block diagram relating to production is presented below (Figure 2).

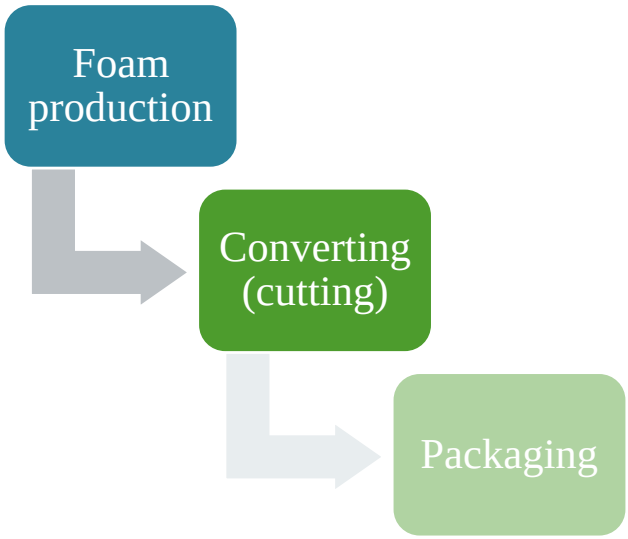

Figure 2 – Production process block diagram

3.6 DATABASE AND SOFTWARE

SimaPro calculation software (SimaPro 9) and the selected databases "ECOINVENT" were used for inventory processing and eco-profiles calculation.

4 ENVIRONMENTAL RESULTS

4.1 POTENTIAL ENVIRONMENTAL IMPACTS

Below are the results of the eco-profile obtained from the life cycle analysis of products subject to environmental declaration, along the impact categories in accordance with UNI EN 15804.

TR-EECELL

Table 3: Ecoprofile assessment according to declared unit

TR-EECELL		Result for 1 kg of final product						
Impact category	**Unit measure**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**TOTAL**	**D**
Climate change	kg CO2 eq	8,53E-01	0,00E+00	9,82E-03	0,00E+00	3,85E+00	4,71E+00	0,00E+00
Climate change - Fossil	kg CO2 eq	3,54E+00	0,00E+00	9,79E-03	0,00E+00	1,13E-01	3,66E+00	0,00E+00
Climate change - Biogenic	kg CO2 eq	-2,69E+00	0,00E+00	2,36E-05	0,00E+00	3,73E+00	1,04E+00	0,00E+00
Climate change - Land use and LU change	kg CO2 eq	4,23E-03	0,00E+00	3,32E-06	0,00E+00	2,26E-05	4,26E-03	0,00E+00
Ozone depletion	kg CFC11 eq	1,01E-06	0,00E+00	2,24E-09	0,00E+00	6,31E-09	1,01E-06	0,00E+00
Acidification	mol H+ eq	3,32E-02	0,00E+00	4,90E-05	0,00E+00	3,98E-04	3,37E-02	0,00E+00
Eutrophication, freshwater	kg P eq	1,02E-02	0,00E+00	6,63E-07	0,00E+00	2,06E-05	1,02E-02	0,00E+00
Eutrophication, marine	kg N eq	1,35E-02	0,00E+00	1,71E-05	0,00E+00	1,97E-03	1,54E-02	0,00E+00
Eutrophication, terrestrial	mol N eq	5,18E-02	0,00E+00	1,87E-04	0,00E+00	1,49E-03	5,35E-02	0,00E+00
Photochemical ozone formation	kg NMVOC eq	1,41E-02	0,00E+00	5,32E-05	0,00E+00	7,15E-04	1,49E-02	0,00E+00
Resource use, minerals and metals*	kg Sb eq	-1,17E-03	0,00E+00	3,55E-08	0,00E+00	1,14E-07	-1,17E-03	0,00E+00
Resource use, fossils*	MJ	6,04E+01	0,00E+00	1,49E-01	0,00E+00	5,31E-01	6,11E+01	0,00E+00
Water use*	m3 depriv.	2,94E+00	0,00E+00	4,24E-04	0,00E+00	1,46E-02	2,95E+00	0,00E+00
Particulate matter	disease inc.	1,67E-07	0,00E+00	7,04E-10	0,00E+00	3,11E-08	1,99E-07	0,00E+00
Ionising radiation	kBq U-235 eq	3,37E-01	0,00E+00	7,79E-04	0,00E+00	3,14E-03	3,41E-01	0,00E+00
Ecotoxicity, freshwater*	CTUe	8,60E+02	0,00E+00	1,14E-01	0,00E+00	1,29E+02	9,89E+02	0,00E+00
Human toxicity, non-cancer*	CTUh	6,96E-08	0,00E+00	1,16E-10	0,00E+00	7,21E-09	7,70E-08	0,00E+00
Human toxicity, cancer*	CTUh	4,21E-09	0,00E+00	4,06E-12	0,00E+00	1,28E-09	5,50E-09	0,00E+00
Land use*	Pt	1,45E+01	0,00E+00	1,03E-01	0,00E+00	7,88E-01	1,54E+01	0,00E+00

* Disclaimer: The results of this environmental impact must be treated with caution due to the high uncertainties and limited experience with the indicator.

Table 4: The indicator includes all greenhouse gases included in the total GWP, but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is therefore equal to the GWP indicator originally defined in EN 15804: 2012 + A1: 2013.

TR-EECELL		Result for 1 kg of final product						
Potential environmental impacts – additional indicator	**UNIT**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**TOTAL**	**D**
GWP - GHG	Kg CO2 eq	3,45E+00	0,00E+00	9,70E-03	0,00E+00	7,11E-01	4,17E+00	0,00E+00

Table 5: Results of use of resources according to declared unit

TR-EECELL		Result for 1 kg of final product							
PARAMETER		UNIT	A1-A3	C1	C2	C3	C4	TOTAL	D
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	2,89E+00	0,00E+00	1,46E-03	0,00E+00	1,59E+00	4,48E+00	0,00E+00
	Used as raw materials	MJ, net calorific value	1,57E+00	0,00E+00	5,47E-04	0,00E+00	-1,57E+00	0,00E+00	0,00E+00
	TOTAL	MJ, net calorific value	4,46E+00	0,00E+00	2,01E-03	0,00E+00	1,84E-02	4,48E+00	0,00E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	2,34E-03	0,00E+00	3,07E-06	0,00E+00	5,95E+01	5,95E+01	0,00E+00
	Used as raw materials	MJ, net calorific value	5,88E+01	0,00E+00	1,49E-01	0,00E+00	-5,90E+01	0,00E+00	0,00E+00
	TOTAL	MJ, net calorific value	5,88E+01	0,00E+00	1,49E-01	0,00E+00	5,31E-01	5,95E+01	0,00E+00
Secondary material		kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-renewable secondary fuels		MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water		m^3	7,16E-02	0,00E+00	1,50E-05	0,00E+00	3,71E-04	7,20E-02	0,00E+00

Table 6: Results of waste production according to declared unit

TR-EECELL	Result for 1 kg of final product							
PARAMETER	UNIT	A1-A3	C1	C2	C3	C4	TOTAL	D
Hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 7: Results of output flows according to declared unit

TR-EECELL	Result for 1 kg of final product							
PARAMETER	UNIT	A1-A3	C1	C2	C3	C4	TOTAL	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 8: Biogenic carbon content in the product and related packaging for declared unit

TR-EECELL			
UNIT	**Product**	**Packaging**	
		Pallet	**Paper**
Kg C	2,73E+00	Not significant	8,86E-02

5 ADDITIONAL ENVIRONMENTAL INFORMATION

REACH Declaration:

None of the substances on the current version of the Candidate List of European Regulation 1907/2006/EC (REACH Registration, Evaluation, Authorisation and Restriction of Chemicals) is present in concentrations higher than 0.1% by weight in the mentioned articles.

CAM Compliance:

Trocellen Class product range are in compliance with CAM ("Criteri ambientali minimi" – Minimum enviromental criteria") for construction according to Italian Law D.M. 11 Ottobre 2017 (https://insulation.trocellen.com/cam/).

LEED and WELL sustainability protocols:

Trocellen class product can support the achievement of LEED (Green Building council) and WELL (WELL building institute) sustainability certifications for buildings (https://insulation.trocellen.com/leed-well/).

6 REFERENCES

PCR 2019:14: "Construction products" version 1.11

SUB PCR: c-PCR-005 Thermal Insulation products (EN 16783)

EN 15804 – Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

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

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

EN ISO 14044:2018 – Environmental management — Life cycle assessment — Requirements and guidelines

GENERAL PROGRAMME INSTRUCTIONS FOR THE INTERNATIONAL EPD® SYSTEM VERSION 3.01 (2019-09-18)

Report LCA_TROCELLEN – V4 – Date: 18/02/2022. Authors: Qualitynet srl in collaboration with Ecamricert Srl.

PROGRAMME INFORMATION

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

ISO standard 21930 and CEN standard EN 15804 serve as main rules for product category (PCR)
Product category rules (PCR): PCR 2019:14: "Construction products" version 1.11 **SUB PCR:** c-PCR-005 Thermal Insulation products (EN 16783)
PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile. Review chair may be contacted on www.environdec.com/contact.
EPD registration number: S-P-04715
Independent third-party verification of the declaration and data, according to ISO 14025:2006 ☒ External ☐ Internal ☐ EPD process certification ☒ EPD verification
Third party verifier: < *DNV GL - Business Assurance* >
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

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

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

EPD Owner	Trocellen Italia Spa		**https://trocellen.com/it/** Contact: info@trocellen.com fcaiazzo@trocellen.com
Technical support	**QualityNet srl** In collaboration with **EcamRicert Srl**		**http://qualitynet.it/** **https://ecamricert.com/**