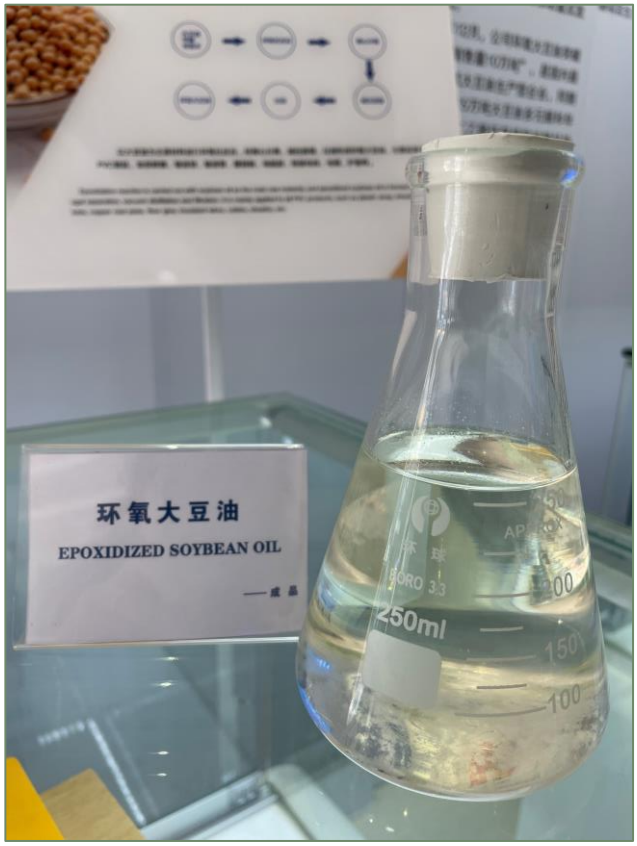
Environmental Product Declaration

In accordance with ISO 14025 for:

Epoxidized Soybean Oil (HM01-R and HM01-AD) *from*
Hairma (Nantong) Technology Co. Ltd

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-06253
Publication date:	2022-05-17
Valid until:	2027-05-17



Programme information

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

Product category rules (PCR): *<Basic chemicals, 2021:03, Version 1.0, and UN CPC 341, 342, 343, 345 (EXCEPT SUBCLASS 3451)>* General Programme Instructions (GPI) Version: *<GPI version 3.01 (2019)>*
PCR review was conducted by: *<Lars-Gunnar Lindfors, contacted via info@environdec.com>*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *<Pär Lindman, Miljögiraff AB>* *In case of recognised individual verifiers:* Approved by: The International EPD® System
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.

Company information

Owner of the EPD:
Hairma (Nantong) Technology Co. Ltd
Address: No.1 Tongshun Rd., Development Area, Nantong, Jiangsu, China
Contact person: Ms. Mao Shujing
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Email:shujing_mao@hairma.com.cn
Website: hairma.com.cn

Description of the organisation:
Hairma (Nantong) Technology Co. Ltd is a professional manufacturer and retailer of oleo chemical-related products located at Nantong Economic & Technological Development Region. Hairma has got certified on the Quality Management System ISO9001, the Environmental Management System ISO14001 and the Occupational Health and Safety Management Systems OHSAS18001.

Through years of development, Hairma has become the world's largest producer for Epoxidized Soybean Oil by capacity and sales volume, with a sales network stretching out around the globe. It takes about thirty percent market share of epoxidized soybean oil in China. Besides the domestic branches in different locations, Hairma is also serving its end-users on every continent by collaborating with professional exclusive agents. The company has 42 authorized technical patent and 8 patent in progress. All products of Hairma has passed the REACH Certification.

Name and location of production site:
Hairma Nantong Plant Address:
No.1 Tongshun Rd., Development Area, Nantong, Jiangsu, China

Hairma Guangzhou Plant Address:
No.1 Xin Chang, Yagang Industrial Park, Shimen St., Baiyun District, Guangzhou, China

Product information

Product name: Epoxidized Soybean Oil
Product identification: HM-01R; HM-01AD
UN CPC code: 34170
Geographical scope: Global

Product description:
Epoxidized Soybean Oil is Hairma's basic product. It is produced from soybean oil, hydrogen peroxide, and methanolic acid in the presence of a catalyst. Hairma developed and promoted world's first continuous production line of Epoxidized Soybean Oil. As an industry leader, Hairma also participated in developing industrial standard about Epoxidized Soybean Oil. This report covers Hairma's main Epoxidized Soybean Oil products, **HM-01R and HM-01AD**.

LCA information

Functional unit / declared unit:
One kilogram of chemical products plus its packaging ready for delivery

Time representativeness:
Year 2020

Database(s) and LCA software used:
Gabi 10.6, GaBi LCA Databases 2022 Edition (Sphera), Ecoinvent 3.7

System diagram:
See the diagram in the Figure 1.

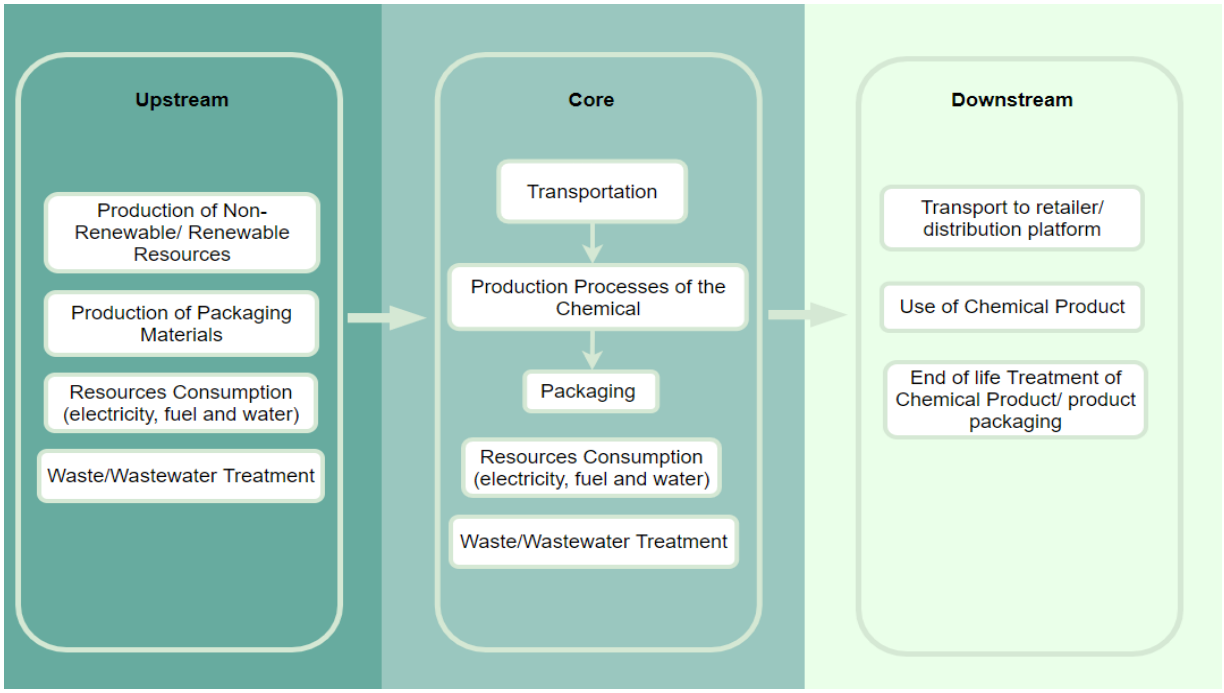

Figure 1 The flow chart of the product and boundary system used for the LCA assessment.

Description of system boundaries:
Cradle-to-grave.

More information:
The product is physically integrated with other products in subsequent life-cycle process so they cannot be physically separated from them at end of life, however, the carbon content of the product was participated in the calculation of its climate impact. The amount of carbon content specified in the end-of-life part is calculated according to stoichiometry method.

Name and contact information of LCA practitioner:
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Contact person: Sijia Yang (sijia.yang@ivl.se)

Content declaration

Raw material and product information

HM-01AD is a more refined version of HM-01R, which leads it to smell better and have less impurity. HM-01R, which is PVC plasticizer and stabilizer, can be used for PVC insulated wire and cable, paint, coating, circuit board, etc.HM-01AD-PVC plasticizer and stabilizer, can be used for medical blood bags, infusion tubes, etc.

The raw materials and chemical formulas of **HM-01R and HM-01AD** are listed in Table 1.

Table 1. Raw Materials and chemical formula of HM-01R and HM-01AD production.

	HM-01R and HM-01AD
Input of raw materials	Soybean Oil Hydrogen Peroxide Formic Acid Sulfuric Acid
Chemical formula	

Packaging

Distribution packaging:

Over 90.28% of Hairma's chemical products are sold in bulk using truck with large containers; The rest 7.12% are sold in iron drums and 2.6% are sold in plastic drums.

Consumer packaging:

Consumer of Hairma is other industrial manufacturers, hence no other additional packaging used.

Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product:

Packaging materials (steel and plastic) are recycled.

Cut-off rules

The cut-off criteria established by the EPD International is data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary).

This study strictly follows the cut-off rule. Raw materials with high environmental impacts are reserved in calculation even though their mass is smaller than 1% of the whole product. No cut-off rules are applied in the whole LCA study.

Allocation rules

Allocation rules for multifunctional products and multiproduct processes are mentioned in PCR. However, considering that Hairma's products do not have co-product, no co-product allocation rules will be applied in this study. All burdens are allocated to the final analysed product.

Hairma produces several types of products and production data were collected at a factory level; Mass allocation was applied to assign the correct production burdens. The mass allocation applied on the calculation of electricity and steam consumption in the factory.

Hairma's products are applied in various fields in daily life, such as plastic bags, sealing strip, plastic wrap and plastic container. Customers treated the chemicals by themselves. For the most conservative estimation, the carbon content of the product is used to calculate end of life climate impact.

The packages of chemicals are recycled by customers to reuse the package. The quantity of waste produced and package recycled was declared in the study.

Data

Raw material

Raw material composition is based on Hairma product's design formula and matches the production facts in Hairma's factory. The material composition for the products presented in Table 1.

Datasets applied for the raw materials are mainly based on the Gabi database and Ecoinvent database. Examples of major raw materials are soybean oil, hydrogen peroxide and formic acid, etc. Examples of energy resources are electricity and steam. Main material data sets information for production of the Hairma in Table 2.

Table 2. Data source applied for the major raw materials of HM-01.

Raw material	Data set	Data source	Time representativeness
Soybean Oil	GLO: Market for Soybean Oil, crude	ecoinvent 3.7	2019
Hydrogen Peroxide	NL: Hydrogen Peroxide	Sphera	2021-2024
Formic Acid	RoW: market for formic acid	ecoinvent 3.7	2019
Sulphuric Acid	Sulphuric Acid (96% H2SO4) (EU-28)	Sphera	2021-2024

Energy resource

The data for the production of electricity applied represent the country average, Chinese grid mix, for the reason that the raw materials are produced in China. The data are based on the Gabi database and the mix of energy sources are presented.

Table 3. Energy data source applied for the HM-01.

Energy source	Data set	Data source	Time representativeness
Electricity	CN: Electricity grid mix 1kV-60kV (China electric power yearbook)	Sphera	2017-2023
Steam	CN: Process steam from natural gas 85%	Sphera	2017-2023

Raw material and packaging transport

Raw material transportation data is collected according to the information provided by Hairma. Distance of raw materials are listed in Table 4. Estimation has been made on raw materials which have multiple suppliers.

Table 4. Raw material transportation of HM-01.

Raw Materials	Type of transport	Distance (km) (average)
Soybean Oil	Tank Truck	17
Hydrogen Peroxide	Tank Truck	168
Formic Acid	Tank Truck	308
Sulphuric Acid	Tank Truck	63

Table 5. Packaging transportation of HM-01.

Packages	Type of transport	Distance (km) (average)
Metal bucket	Truck	90
Plastic bucket	Truck	134

Hairma Products Production

The Hairma products are produced in Hairma factories. Energy use and waste production were all collected from the factory. Hairma has two factories in China, one in Guangzhou and another one in Nantong. Two factories share the same production technology. For HM-01 products, this study only uses data provided by the Nantong Factory. A flow chart is shown in Figure 2 to simply introduce the production process of HM-01.

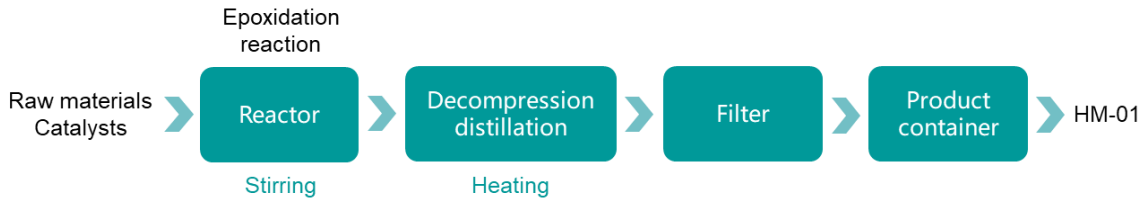

Figure 2 The main production process of HM-01.

This study applied mass allocation on energy consumption on each product that produced from the Hairma's factory. To be noted that the studied products do not have co-product in the production process, therefore no co-product allocation rules will be applied in this study. In this case, energy allocation is based on the proportion of production. That is, the

proportion of energy used in the production of the studied product to the total energy consumption of the factory is set as the proportion of the production of the studied product to the total production of all products in the factory. The same allocation principle is applied to the allocation of emissions and the use of auxiliary materials.

Table 6. Energy consumption of Hairma HM-01 products' production

		HM-01R	HM-01AD
Input energy	**Unit**	**Amount**	**Amount**
Electricity	kWh	3.71E-02	3.71E-02
Steam	t	1.43E-01	1.43E-01

Table 7. Emissions of Hairma HM-01 products' production.

		HM-01R	HM-01AD
Emissions	**Unit**	**Amount**	**Amount**
NMVOC	kg	8.22E-06	8.22E-06
Formic acid	kg	9.50E-06	9.50E-06
Hazardous waste	kg	1.29E-03	1.29E-03
Industrial waste	kg	9.00E-04	9.00E-04

For treating the waste gas and wastewater in the factory, some auxiliary materials are used, which are listed in Table 8. The amount of them is corresponding to produce one declared unit of the product.

Table 8. Auxiliary materials for treating emissions in the Nantong Factory.

		HM-01R	HM-01AD
Auxiliary materials	**Unit**	**Amount**	**Amount**
Ferrous sulfate, FeSO4	kg	1.25E-04	1.25E-04
Sodium hydroxide, NaOH	kg	1.37E-03	1.37E-03
Polyaluminium chloride	kg	7.83E-04	7.83E-04
Polyacrylamide (C3H5NO)n	kg	1.11E-05	1.11E-05
Active carbon	kg	4.09E-05	4.09E-05
Total auxiliary materials amount	**kg**	**2.33E-03**	**2.33E-03**

Transport of final chemical products

The data for the transport of final products to the site were provided by Hairma. See Table 9 below.

Table 9. Transport pattern and distance for HM-01.

Product	Type of transport	Distance (km) (average)
HM-01R	Truck	388
HM-01AD	Truck	388
HM-01R	Tank truck	388
HM-01AD	Tank truck	388

The truck transport distance is an estimation number provided by Hairma's experts. Hairma's products are selling in more than ten provinces in China and this distance is an average of several distributed platforms.

Use stage and end-of-life treatment

The chemical products are distributed to various consumers by distribution platforms. Usually the waste treatment will be handled by the purchaser and following the basic waste principles. According to PCR, it is not mandatory to declare any quantitative information about the use stage. Concerning the end-of-life treatment, as the important raw material (soybean oil) for the studied product is extracted from the plant and the studied product itself is considered a biogenic product, the wood treatment process has been chosen as the end-of-life scenario for this study. The reason is the databases do not have more relevant datasets about the treatment process for the studied product, in this case, wood, which is a common biogenic product, is a relatively reasonable alternative for the studied product in the treatment stage. In the model, the carbon emission difference between Harima's products and the wood is adjusted by adding a correction factor according to the carbon content of the studied product.

In the package part, steel and plastic materials will be treated by customers as recycle materials for other uses. For a conservative calculation, the unrecyclable materials have been stated in the analysis, which can be found in Table 10.

Table 10. Recyclable materials from HM-01 packaging.

Materials	Declare unit	Percent of total selling	Amount on per declare unit
Steel for recycle	1 kg of product	7.12%	5.70E-03
Plastic for recycle	1 kg of product	2.6%	1.43E-03

Please note, to evaluate the environmental impact in a conservative way, no energy or materials are obtained during the waste treatment process to be considered in the LCA study.

Result

This LCA analysis applied the EN 15084 as the calculation method. The EN 15804 is the EPD standard for the sustainability of construction works and services. This standard harmonizes the structure for EPDs in the construction sector, making the information transparent and comparable. First published in 2012, it is formally known as the EN 15804+A1 “Sustainability of construction works -Environmental product declarations – Core rules for the product category of construction products”. In 2019, a second version of the standard was updated, called EN 15804+A2, which is currently in use more general. According to the General Programme Instructions of the International EPD System, one of the fundamental methodologies of the PCR development is EN15804. Thus, this LCA analysis applied the EN 15804 as the calculation methodology. All results in this LCA analysis are calculated by the EN 15804+A2.

The results for each impact category assessed in this LCA study are described in detail in the following sections. In the accompanying charts, the total impacts are shown and then the contributions from each stage in the life cycle are shown.

Environmental performance - Potential environmental impact

In the result tables below, each products’ environment-influential categories are listed. 错误!未找到引用源。The results are categorized into “Upstream module”, “Core module”, “Downstream module”. The column named “Total” is the sum of upstream module, core module, and downstream module. Tow products’ influential environmental categories are listed in separate tables. 31 categories are mentioned in each table.

In addition, depending on the requirement of the PCR, the environmental impacts of the product and the packaging of the studied product shall be reported separately. In this case, the following tables follows this rule to show all results by three sections respectively: the product + package, the product, and the package. Every section has its own upstream, core, downstream, and total results in each category. All result figures are using the value from “the product + package” to show the whole environmental impacts of the product through its life cycle.

Result Table 1. HM-01R product's influential environmental categories:

Indicator	Unit	The product + package				The product				The packaging			
		Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total
Environmental impact indicators													
Climate Change - total	kg CO2 eq.	3.75E+00	4.30E-02	2.72E+00	6.51E+00	3.71E+00	4.30E-02	2.72E+00	6.48E+00	3.48E-02	3.66E-05	2.65E-03	3.75E-02
Climate Change, fossil	kg CO2 eq.	1.65E+00	4.24E-02	-4.03E-02	1.65E+00	1.62E+00	4.24E-02	-4.29E-02	1.62E+00	3.48E-02	3.64E-05	2.65E-03	3.75E-02
Climate Change, biogenic	kg CO2 eq.	-2.76E+00	4.60E-04	2.76E+00	5.30E-03	-2.76E+00	4.60E-04	2.76E+00	5.29E-03	8.16E-06	-5.06E-08	-8.50E-07	7.26E-06
Climate Change, land use and land use change	kg CO2 eq.	4.85E+00	4.14E-05	1.17E-04	4.85E+00	4.85E+00	4.12E-05	1.18E-04	4.85E+00	8.21E-06	2.04E-07	-1.40E-08	8.40E-06
Ozone depletion	kg CFC-11 eq.	1.04E-07	2.37E-10	6.61E-13	1.04E-07	1.04E-07	2.37E-10	2.49E-13	1.04E-07	3.31E-14	2.19E-18	4.12E-13	4.45E-13
Acidification	Mole of H+ eq.	7.45E-03	1.43E-04	4.41E-04	8.03E-03	7.34E-03	1.43E-04	4.41E-04	7.92E-03	1.05E-04	2.03E-07	2.03E-07	1.05E-04
Eutrophication, freshwater	kg P eq.	7.61E-04	7.79E-07	1.31E-07	7.62E-04	7.61E-04	7.79E-07	1.16E-07	7.62E-04	1.90E-08	1.09E-10	1.45E-08	3.36E-08
Eutrophication, marine	kg N eq.	1.44E-02	3.95E-05	1.47E-04	1.45E-02	1.43E-02	3.94E-05	1.47E-04	1.45E-02	1.97E-05	9.91E-08	1.01E-07	1.99E-05
Eutrophication, terrestrial	Mole of N eq.	2.50E-02	4.32E-04	2.19E-03	2.76E-02	2.48E-02	4.31E-04	2.19E-03	2.74E-02	2.05E-04	1.10E-06	1.60E-06	2.08E-04
Photochemical ozone formation, human health	kg NMVOC eq.	8.11E-03	1.12E-04	3.47E-04	8.57E-03	8.04E-03	1.12E-04	3.47E-04	8.50E-03	6.81E-05	1.91E-07	2.00E-07	6.85E-05
Resource use, mineral and metals	kg Sb eq.	4.27E-05	2.79E-08	7.78E-09	4.28E-05	4.27E-05	2.78E-08	7.76E-09	4.27E-05	2.99E-08	3.06E-12	1.90E-11	2.99E-08
Resource use, fossils	MJ	1.75E+01	4.91E-01	6.84E-01	1.87E+01	1.70E+01	4.91E-01	6.81E-01	1.82E+01	4.53E-01	4.89E-04	2.80E-03	4.56E-01
Water use	m^3 world equiv.	5.86E-01	9.98E-03	1.87E-01	7.83E-01	5.02E-01	9.98E-03	1.86E-01	6.98E-01	8.42E-02	3.29E-07	3.53E-04	8.46E-02
Resource use indicators													
Use of renewable primary energy (PERE)	MJ	5.89E+01	8.69E-02	1.32E-01	5.91E+01	5.89E+01	8.68E-02	1.31E-01	5.91E+01	2.89E-02	2.78E-05	2.69E-04	2.92E-02
Primary energy resources used as raw materials (PERM)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (PERT)	MJ	5.89E+01	8.69E-02	1.32E-01	5.91E+01	5.89E+01	8.68E-02	1.31E-01	5.91E+01	2.89E-02	2.78E-05	2.69E-04	2.92E-02

Indicator	Unit	The product + package				The product				The packaging			
		Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total
Use of non-renewable primary energy (PENRE)	MJ	1.75E+01	4.91E-01	6.85E-01	1.87E+01	1.70E+01	4.91E-01	6.82E-01	1.82E+01	4.53E-01	4.91E-04	2.79E-03	4.56E-01
Non-renewable primary energy resources used as raw materials (PENRM)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	2.48E+01	4.92E-01	6.85E-01	2.60E+01	2.44E+01	4.91E-01	6.82E-01	2.56E+01	4.53E-01	4.91E-04	2.79E-03	4.56E-01
Input of secondary material (SM)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW)	m3	1.47E-02	2.42E-04	4.41E-03	1.93E-02	1.27E-02	2.42E-04	4.40E-03	1.73E-02	1.97E-03	3.15E-08	7.73E-06	1.98E-03
Output flows and waste categories													
Hazardous waste disposed (HWD)	kg	1.15E-09	3.80E-11	4.57E-11	1.23E-09	1.02E-09	3.80E-11	4.56E-11	1.10E-09	1.26E-10	2.35E-15	1.15E-13	1.26E-10
Non-hazardous waste disposed (NHWD)	kg	9.81E-03	1.37E-03	1.27E-02	2.39E-02	7.43E-03	1.37E-03	1.24E-02	2.12E-02	2.39E-03	7.03E-08	2.95E-04	2.68E-03
Radioactive waste disposed (RWD)	kg	8.73E-05	7.82E-06	1.32E-05	1.08E-04	8.53E-05	7.82E-06	1.31E-05	1.06E-04	1.97E-06	6.04E-10	5.43E-08	2.03E-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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for Recycling (MFR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material 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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Result Table 2. HM-01AD product's influential environmental categories:

Indicator	Unit	The product + package				The product				The packaging			
		Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total
Environmental impact indicators													
Climate Change - total	kg CO2 eq.	3.77E+00	4.30E-02	2.72E+00	6.53E+00	3.73E+00	4.30E-02	2.72E+00	6.49E+00	3.49E-02	3.68E-05	2.65E-03	3.76E-02
Climate Change, fossil	kg CO2 eq.	1.67E+00	4.25E-02	-4.03E-02	1.67E+00	1.63E+00	4.25E-02	-4.29E-02	1.63E+00	3.49E-02	3.67E-05	2.64E-03	3.76E-02
Climate Change, biogenic	kg CO2 eq.	-2.75E+00	4.60E-04	2.76E+00	5.52E-03	-2.75E+00	4.60E-04	2.76E+00	5.51E-03	8.15E-06	-5.09E-08	-8.45E-07	7.25E-06
Climate Change, land use and land use change	kg CO2 eq.	4.85E+00	4.19E-05	1.17E-04	4.85E+00	4.85E+00	4.17E-05	1.18E-04	4.85E+00	8.22E-06	2.05E-07	-1.20E-08	8.41E-06
Ozone depletion	kg CFC-11 eq.	1.05E-07	2.37E-10	6.58E-13	1.05E-07	1.05E-07	2.37E-10	2.49E-13	1.05E-07	3.32E-14	2.21E-18	4.09E-13	4.42E-13
Acidification	Mole of H+ eq.	7.48E-03	1.43E-04	4.41E-04	8.07E-03	7.38E-03	1.43E-04	4.41E-04	7.96E-03	1.05E-04	2.04E-07	2.04E-07	1.05E-04
Eutrophication, freshwater	kg P eq.	7.63E-04	7.79E-07	1.31E-07	7.63E-04	7.63E-04	7.79E-07	1.16E-07	7.63E-04	1.90E-08	1.10E-10	1.44E-08	3.35E-08
Eutrophication, marine	kg N eq.	1.44E-02	3.97E-05	1.47E-04	1.45E-02	1.43E-02	3.96E-05	1.47E-04	1.45E-02	1.98E-05	9.97E-08	1.01E-07	2.00E-05
Eutrophication, terrestrial	Mole of N eq.	2.51E-02	4.33E-04	2.19E-03	2.77E-02	2.49E-02	4.32E-04	2.19E-03	2.75E-02	2.06E-04	1.10E-06	1.61E-06	2.09E-04
Photochemical ozone formation, human health	kg NMVOC eq.	8.14E-03	1.13E-04	3.47E-04	8.60E-03	8.07E-03	1.12E-04	3.47E-04	8.53E-03	6.83E-05	1.92E-07	2.01E-07	6.87E-05
Resource use, mineral and metals	kg Sb eq.	4.28E-05	2.79E-08	7.78E-09	4.28E-05	4.28E-05	2.79E-08	7.76E-09	4.28E-05	2.99E-08	3.08E-12	1.90E-11	2.99E-08
Resource use, fossils	MJ	1.77E+01	4.93E-01	6.84E-01	1.89E+01	1.73E+01	4.93E-01	6.81E-01	1.85E+01	4.55E-01	4.92E-04	2.80E-03	4.58E-01
Water use	m^3 world equiv.	5.97E-01	9.98E-03	1.87E-01	7.94E-01	5.13E-01	9.98E-03	1.86E-01	7.09E-01	8.43E-02	3.30E-07	3.52E-04	8.47E-02
Resource use indicators													
Use of renewable primary energy (PERE)	MJ	5.89E+01	8.69E-02	1.32E-01	5.92E+01	5.89E+01	8.69E-02	1.31E-01	5.91E+01	2.90E-02	2.80E-05	2.69E-04	2.93E-02
Primary energy resources used as raw materials (PERM)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (PERT)	MJ	5.89E+01	8.69E-02	1.32E-01	5.92E+01	5.89E+01	8.69E-02	1.31E-01	5.91E+01	2.90E-02	2.80E-05	2.69E-04	2.93E-02
Use of non-renewable primary energy (PENRE)	MJ	1.77E+01	4.94E-01	6.85E-01	1.89E+01	1.73E+01	4.93E-01	6.82E-01	1.85E+01	4.55E-01	4.93E-04	2.78E-03	4.58E-01

Indicator	Unit	The product + package				The product				The packaging			
		Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total	Upstream	Core	Downstream	Total
Non-renewable primary energy resources used as raw materials (PENRM)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	2.51E+01	4.93E-01	6.85E-01	2.63E+01	2.47E+01	4.93E-01	6.82E-01	2.58E+01	4.55E-01	4.93E-04	2.78E-03	4.58E-01
Input of secondary material (SM)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW)	m3	1.50E-02	2.42E-04	4.41E-03	1.96E-02	1.30E-02	2.42E-04	4.40E-03	1.76E-02	1.97E-03	3.16E-08	7.72E-06	1.98E-03
Output flows and waste categories													
Hazardous waste disposed (HWD)	kg	1.17E-09	3.80E-11	4.57E-11	1.25E-09	1.04E-09	3.80E-11	4.56E-11	1.12E-09	1.26E-10	2.36E-15	1.14E-13	1.26E-10
Non-hazardous waste disposed (NHWD)	kg	9.94E-03	1.37E-03	1.27E-02	2.40E-02	7.55E-03	1.37E-03	1.24E-02	2.14E-02	2.39E-03	7.07E-08	2.94E-04	2.68E-03
Radioactive waste disposed (RWD)	kg	8.88E-05	7.82E-06	1.32E-05	1.10E-04	8.68E-05	7.82E-06	1.31E-05	1.08E-04	1.98E-06	6.08E-10	5.42E-08	2.03E-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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for Recycling (MFR)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material 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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Result Table 1 & 2 show Hairma HM-01 products' performances in 31 impact categories. The environmental impacts are calculated according to the PCR's requirements and divided into upstream, core and downstream modules.

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