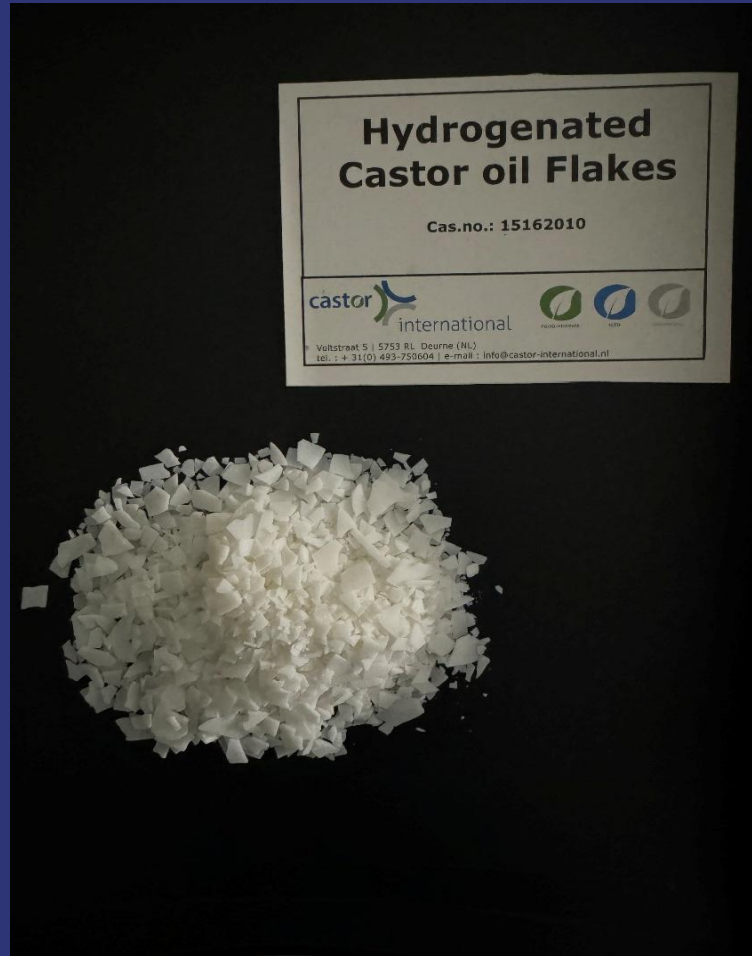


**Environmental
Product
Declaration**

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Hydrogenated Castor Oil (HCO)

Provided by:
Castor International



MRPI® registration
1.1.00745.2025

program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

date of first issue
16-12-2024
date of this issue
16-12-2024
expiry date
16-12-2029

COMPANY INFORMATION

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 Deurne
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 +31 (0)493 750 604
 Arthur de Raad
 www.castor-international.nl

PRODUCT

Hydrogenated Castor Oil (HCO)

DECLARED UNIT/FUNCTIONAL UNIT

1 kg

DESCRIPTION OF PRODUCT

Hydrogenated Castor Oil is a hydrogenated vegetable oil derived from castor oil. It is used in the chemical industry, as lubricant, and in personal care products.

MRPI® REGISTRATION

1.1.00745.2025

DATE OF THIS ISSUE

16-12-2024

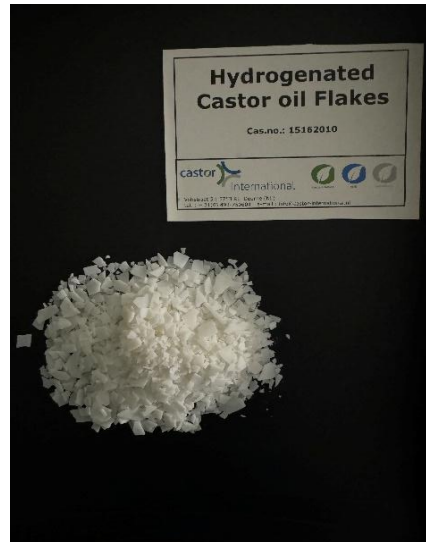
EXPIRY DATE

16-12-2029

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Martijn van Hövell, SGS Search. The LCA study has been done by Ilja Lieshout, EcoReview B.V.. The certificate is based on an LCA-dossier according to ISO14025+EN15804 A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

VISUAL PRODUCT

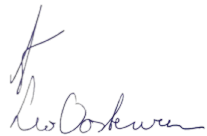



PROGRAM OPERATOR

Stichting MRPI®
 Kingsfordweg 151
 1043 GR
 Amsterdam

MORE INFORMATION

<https://www.castor-international.nl/en/product/hydrogenated-castor-oil-hco>

<p>Ing. L. L. Oosterveen MSc. MBA Managing Director MRPI</p>	<p>DEMONSTRATION OF VERIFICATION</p>
	<p>CEN standard EN15804 serves as the core PCR [1]</p>
	<p>Independent verification of the declaration and data according to ISO14025+EN15804 A2 (+indicators A1) internal: _____ external: X</p>
	<p>Third party verifier: Martijn van Hövell, SGS Search </p>
	<p>[1] PCR = Product Category Rules</p>

DETAILED PRODUCT DESCRIPTION (PART 1)

Hydrogenated castor oil is a waxy compound obtained by the hydrogenation of refined castor oil. It is a hard product with a high melting point. It is almost odourless and tasteless. HCO is supplied in flakes and powder. Hydrogenated castor oil is cream to white coloured. It is transported from India to the Netherlands by boat in bulk as flakes. The hydrogenated oil is not an end product and has a wide array of uses. The reference service life depends on the application of the product.

(E)-12-hydroxyoctadec-9-enoic acid; (9E,11E)-octadeca-9,11-dienoic acid	kg
	1

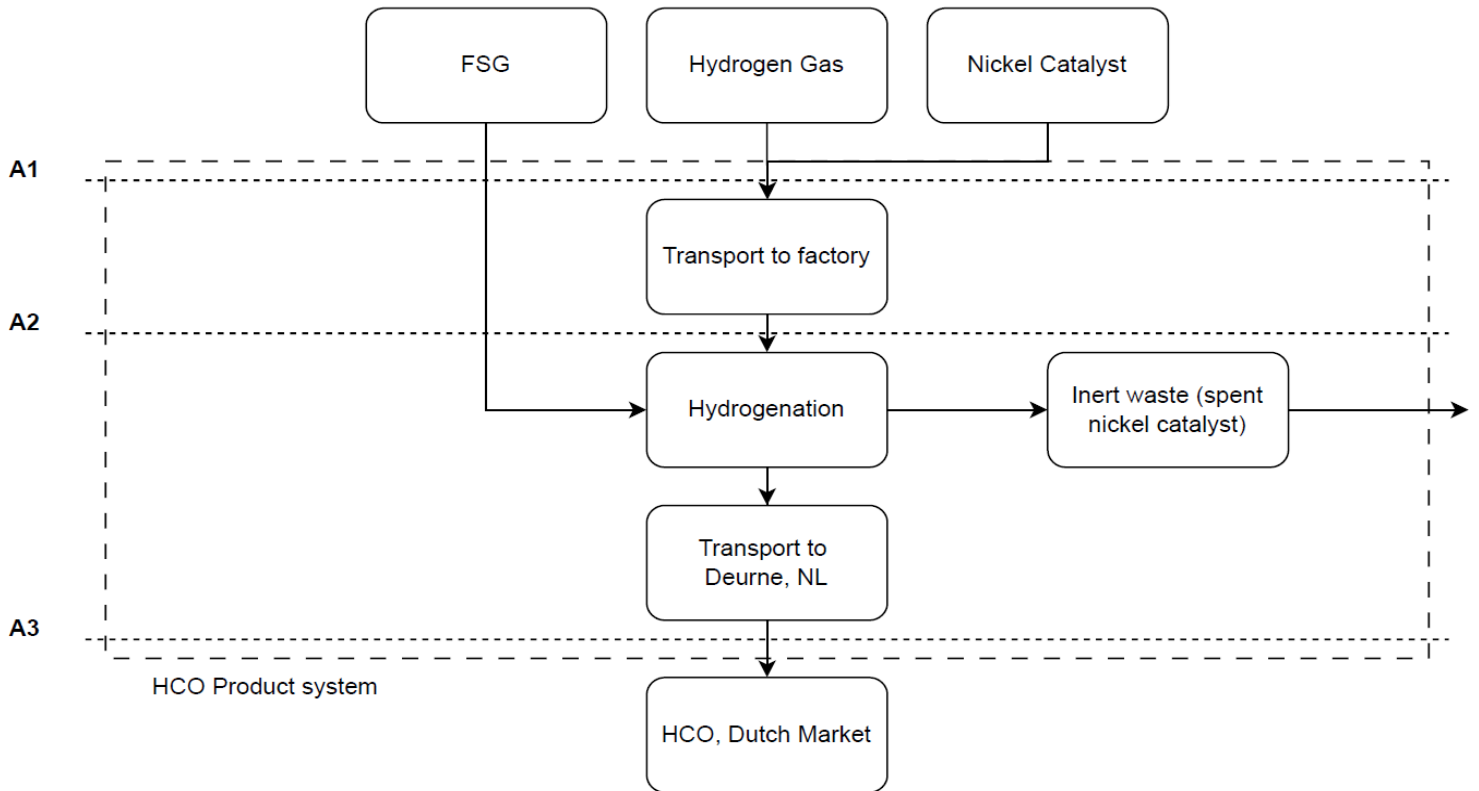
SCOPE AND TYPE

Cradle-to-gate with options. The study was done as a cradle-to-gate, but contains biogenic carbon. According to EN 15804 (section 5.2) an end-of-life has to be taken into account for products that contain biogenic carbon. Therefore, module C and D are also modelled. The product is produced in India and applied in Europe, end-of-life location unknown. The background database is Ecoinvent 3.6. SimaPro software is used. This is a specific EPD from a specific factory dataset.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction 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

X = Modules Assessed

ND = Not Declared



REPRESENTATIVENESS

The data in this EPD is representative for Hydrogenated Castor Oil (HCO) produced by Castor International in a single production plant in India, sold on the European market from Deurne, The Netherlands.

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	7,10E+00	1,31E-01	8,00E-01	8,03E+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	6,75E-03	9,11E-01	3,65E+00	0,00E+00
GWP-fossil	kg CO2 eq	8,48E+00	1,31E-01	8,00E-01	9,41E+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	6,75E-03	0,00E+00	1,88E+00	0,00E+00
GWP-biogenic	kg CO2 eq	-2,68E+00	0,00E+00	0,00E+00	-2,68E+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	9,11E-01	1,77E+00	0,00E+00
GWP-luluc	kg CO2 eq	1,30E+00	8,32E-05	4,30E-05	1,30E+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	2,47E-06	0,00E+00	6,35E-06	0,00E+00
ODP	kg CFC11 eq	5,49E-07	2,67E-08	2,24E-08	5,98E-07	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	1,49E-09	0,00E+00	2,48E-09	0,00E+00
AP	mol H+ eq.	3,17E-01	3,66E-03	4,88E-03	3,26E-01	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	3,91E-05	0,00E+00	1,70E-04	0,00E+00
EP-freshwater	kg PO4 eq.	1,44E-03	6,67E-07	2,99E-05	1,47E-03	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	6,81E-08	0,00E+00	8,25E-06	0,00E+00
EP-marine	kg N eq.	1,24E-01	9,13E-04	3,48E-04	1,25E-01	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	1,38E-05	0,00E+00	5,89E-05	0,00E+00
EP-terrestrial	mol N eq.	1,38E+00	1,02E-02	3,97E-03	1,39E+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	1,52E-04	0,00E+00	7,54E-04	0,00E+00
POCP	kg NMVOC eq.	9,26E-02	2,64E-03	4,47E-03	9,97E-02	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	4,34E-05	0,00E+00	1,63E-04	0,00E+00
ADP-minerals & metals	kg Sb eq.	2,43E-04	1,37E-06	3,36E-07	2,44E-04	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	1,71E-07	0,00E+00	2,55E-07	0,00E+00
ADP-fossil	MJ, net calorific value	5,49E+01	1,72E+00	5,95E+00	6,26E+01	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	1,02E-01	0,00E+00	1,86E-01	0,00E+00
WDP	m3 world eq. Deprived	3,08E+00	3,22E-03	2,18E-02	3,11E+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	3,64E-04	0,00E+00	2,46E-02	0,00E+00

- GWP-total = Global Warming Potential total
- GWP-fossil = Global Warming Potential fossil fuels
- GWP-biogenic = Global Warming Potential biogenictotal
- GWP-luluc = Global Warming Potential land use and land use change
- ODP = Depletion potential of the stratospheric ozone layer
- AP = Acidification Potential, Accumulated Exceedence
- EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
- EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment
- EP-terrestrial = Eutrophication Potential, Accumulated Exceedence
- POCP = Formation potential of tropospheric ozone photochemical oxidants
- ADP-minerals & metals = Abiotic Depletion Potential for non-fossil resources [1]
- ADP-fossil = Abiotic Depletion for fossil resources potential [1]
- WDP = Water (user) deprivation potential, deprivation-weighted water consumption [1]

Disclaimer [1]:

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



ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	2,10E-06	5,32E-09	5,08E-08	2,15E-06	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	6,06E-10	0,00E+00	7,19E-09	0,00E+00
IRP	kBq U235 eq.	1,55E-01	7,35E-03	2,21E-03	1,65E-01	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	4,26E-04	0,00E+00	3,83E-04	0,00E+00
ETP-fw	CTUe	1,76E+02	1,19E+00	2,50E+01	2,02E+02	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	9,07E-02	0,00E+00	6,63E-01	0,00E+00
HTP-c	CTUh	5,23E-08	7,12E-11	4,83E-09	5,72E-08	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	2,94E-12	0,00E+00	1,71E-10	0,00E+00
HTP-nc	CTUh	5,06E-06	1,04E-09	4,04E-08	5,10E-06	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	9,92E-11	0,00E+00	2,39E-09	0,00E+00
SQP	-	1,69E+03	4,76E-01	1,35E+00	1,69E+03	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	8,83E-02	0,00E+00	7,19E-02	0,00E+00

- PM = Potential incidence of disease due to PM emissions
- IRP = Potential Human exposure efficiency relative to U235 [1]
- ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
- HTP-c = Potential Comparative Toxic Unit for humans [2]
- HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
- SQP = Potential soil quality index [2]

Disclaimer [1]:

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]:

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

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	3,31E-04	2,11E-06	1,05E-06	3,34E-04	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	2,58E-07	0,00E+00	3,39E-06	0,00E+00
NHWD	kg	5,17E-01	2,43E-02	1,98E-02	5,61E-01	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	6,46E-03	0,00E+00	2,36E-02	0,00E+00
RWD	kg	2,10E-04	1,18E-05	2,19E-06	2,24E-04	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	6,68E-07	0,00E+00	4,47E-07	0,00E+00
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

- HWD = Hazardous Waste Disposed
- NHWD = Non Hazardous Waste Disposed
- RWD = Radioactive Waste Disposed
- CRU = Components for reuse
- MFR = Materials for recycling
- MER = Materials for energy recovery
- EEE = Exported Electrical Energy
- ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	5,20E+00	1,35E-02	8,63E-02	5,30E+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	1,27E-03	0,00E+00	8,55E-03	0,00E+00
PERM	MJ	3,81E+01	0,00E+00	0,00E+00	3,81E+01	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	0,00E+00	0,00E+00
PERT	MJ	4,33E+01	1,35E-02	8,63E-02	4,34E+01	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	1,27E-03	0,00E+00	8,55E-03	0,00E+00
PENRE	MJ	5,88E+01	1,83E+00	6,26E+00	6,69E+01	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	1,08E-01	0,00E+00	2,01E-01	0,00E+00
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	5,88E+01	1,83E+00	6,26E+00	6,69E+01	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	1,08E-01	0,00E+00	2,01E-01	0,00E+00
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NSRF	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	7,55E-02	1,13E-04	6,71E-04	7,62E-02	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	1,24E-05	0,00E+00	5,93E-04	0,00E+00

- PERE = Use of renewable energy excluding renewable primary energy resources
- PERM = Use of renewable energy resources used as raw materials
- PERT = Total use of renewable primary energy resources
- PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials
- PENRM = Use of non-renewable primary energy resources used as raw materials
- PENRT = Total use of non-renewable primary energy resources
- SM = Use of secondary materials
- RSF = Use of renewable secondary fuels
- NSRF = Use of non-renewable secondary fuels
- FW = Use of net fresh water

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	kg C	-7,31E-01	0,00E+00	0,00E+00	-7,31E-01	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	2,49E-01	4,83E-01	0,00E+00
BCCpa	kg C	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

- BCCpr = Biogenic carbon content in product
- BCCpa = Biogenic carbon content in packaging

CALCULATION RULES (PART 1)

In this study, the data flows have been modelled as realistically as possible within the practical feasibility of the LCA practitioner. The data quality is based on the principle that the primary data used for processes, occurring at the production site, must be of higher quality than background data of other processes. The processes used in the production of Hydrogenated Castor Oil are geographically representative, meaning that the production location of Hydrogenated Castor Oil lies within the region for which the relevant Ecoinvent environmental records have been selected. All environmental impacts and economic flows – from sources such as resources, energy, emissions and waste – were quantified and qualified in environmental effects. The rerelease of biogenic carbon dioxide in C has been modelled to compensate for any stored carbon. All known inputs and outputs - like emissions, energy and materials – have been considered in this LCA. And in accordance with EN15804+A2, the total neglected input flows per module do not exceed 5% of energy usage or mass. The capital goods used (reactor vats, bulk transport containers, factory buildings) have been cut-off, as their contribution to the overall impact per kg is assumed insignificant, considering the amount of kg produced during the lifetime of the factory or the amount of kg transported by a single bulk container. The reference year for the data is 2022.

CALCULATION RULES (PART 2)

Methodology and reproducibility: The process descriptions and quantities in this study are entirely quantitatively reproducible in accordance to the reference standards that have been used. The references of all sources, both primary and public sources and literature, have been documented in the LCA report.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 1)

Within A1-A3, Castor oil is fully hydrogenated. It is also transported to the factory gate in Deurne, NL. Beyond, it can be used as input for the chemical industry. It can also be used as lubricant or in the personal care product industry. Assumption is made that 34% of the oil is used as secondary fuel in a blast furnace and 66% of oil is incinerated without energy recovery at end of life. MSDS available upon request.

Standard specifications	
Appearance	white to creamish flakes or powder
Melting point	83-87 °C
Colour	max. 3 Gardner
Colour (on 1" Lovibond)	max. 20 yellow / max. 2 red
Acid value	max. 5 mg KOH/g
Iodine value	max. 5 g/100g
Hydroxyl value	155 - 165

Saponification value	180 - 190 mg KOH/g
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DECLARATION OF SVHC

None of the substances contained in the product are listed in the "Candidate List of Substances of Very High Concern for authorisation", or they do not exceed the threshold with the European Chemicals Agency.

REFERENCES

The LCA report is conform ISO14025, EN15804+A2 (incl. A1) and the NMD Bepalingsmethode 1.1.