

Environmental Product Declaration

according to ISO 14025 and EN 15804



This declaration is for:

Anova® 100X Rheology Modifier

Provided by:

Cargill B.V.



Helping the world *thrive*



program operator

Stichting MRPI®

publisher

Stichting MRPI®

www.mrpi.nl

MRPI® registration

1.1.00405.2022

date of first issue

07-02-2023

date of this issue

07-02-2023

expiry date

07-02-2028





COMPANY INFORMATION



Cargill B.V.
Evert van de Beekstraat 378
1118 CZ
Schiphol
020 5006000

<https://www.cargill.nl/en/home>

PRODUCT

Anova® 100X Rheology Modifier

DECLARED UNIT/FUNCTIONAL UNIT

kg

DESCRIPTION OF PRODUCT

Anova® 100X Rheology Modifier is a high performance bio-based rheology modifier for asphalt binder.

VISUAL PRODUCT



MRPI® REGISTRATION

1.1.00405.2022

DATE OF ISSUE

07-02-2023

EXPIRY DATE

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SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Pieter Stadhouders., EcoReview V.O.F.**

The LCA study has been done by **Ieke Bak, Ecochain Technologies B.V.**

The certificate is based on an LCA-dossier according to ISO14025 and EN15804+A2/Bepalingsmethode. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2/Bepalingsmethode. 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.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043GR
Amsterdam

ir. J-P den Hollander, Managing director MRPI®

MORE INFORMATION

<https://www.cargill.com/bioindustrial/anova-asphalt>

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR[a]

Independent verification of the declaration and data,

according to EN ISO 14025:2010:

internal: external: X

Third party verifier:

Pieter Stadhouders., EcoReview V.O.F.

[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

Anova® 100X Rheology Modifier is a high performance bio-based rheology modifier for asphalt binders to modify or shift the PG or Penetration grade of asphalt while enhancing low temperature performance. It can be used to compatibilize polymer for efficient production of polymer modified bitumen, increase the useful temperature interval (UTI), or to increase the penetration of emulsion base binders.

COMPONENT > 1% of total mass [%]

Confidential	
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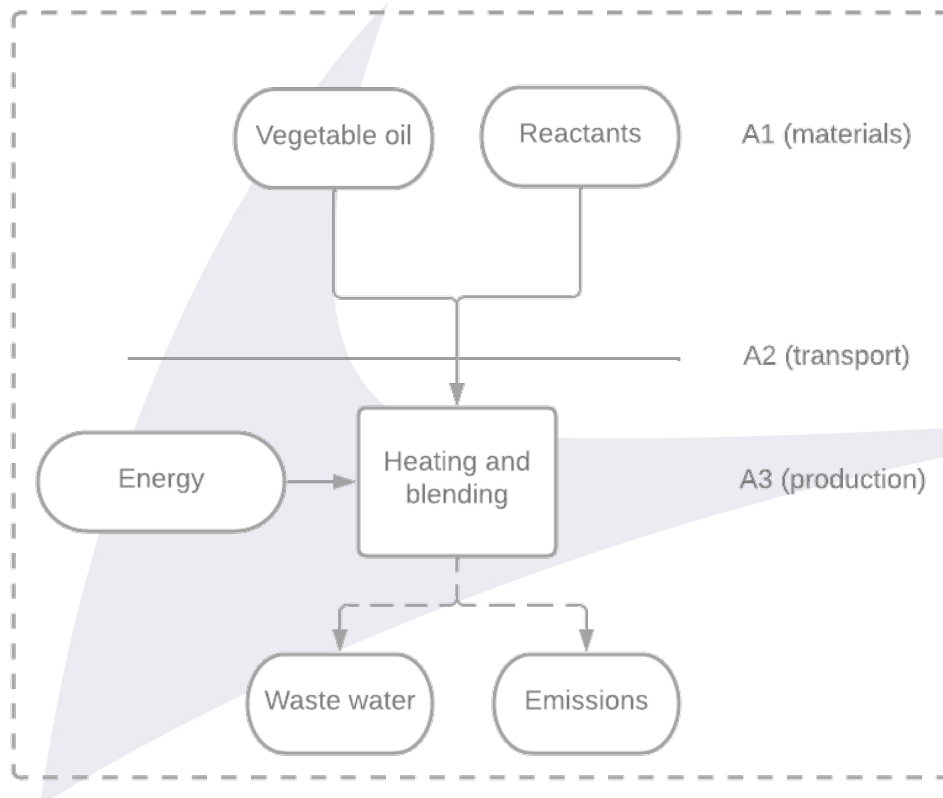
SCOPE AND TYPE

Ecochain is used as LCA software. Ecoinvent v3.6 and Nationale Milieudatabase 3.3 are used for this analysis. The study covers phases A1-A3 (from materials used to the production).

PRODUCT STAGE			CONSTRUCTION					USE STAGE					END OF LIFE				BENEFITS AND	
			PROCESS										STAGE				LOADS BEYOND THE	
			STAGE														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	ND	ND	ND	ND	ND		

X = Modules Assessed

ND = Not Declared



LCA process diagram according to EN 15804 (7.2.1)



REPRESENTATIVENESS

The data in this EPD is representative for Anova® 100X Rheology Modifier produced by Cargill B.V. at their production facility in Dronten, The Netherlands.

ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

	UNIT	A1	A2	A3	A1-A3
ADPE	kg Sb eq.	5.99E-5	1.55E-6	1.91E-9	6.15E-5
ADPF	MJ	7.19E+0	2.14E+0	7.32E-3	9.36E+0
GWP	kg CO2 eq.	9.48E-1	1.58E-1	4.68E-4	1.11E+0
ODP	kg CFC11 eq.	6.37E-8	2.27E-8	2.31E-11	8.64E-8
POCP	kg ethene eq.	9.90E-4	1.54E-4	6.97E-8	1.14E-3
AP	kg SO2 eq.	3.42E-3	2.22E-3	8.77E-7	5.64E-3
EP	kg (PO4)3- eq.	1.27E-3	3.01E-4	1.80E-7	1.57E-3

Toxicity indicators for Dutch market

HTP	kg DCB eq.	2.32E-1	7.72E-2	5.27E-5	3.09E-1
FAETP	kg DCB eq.	2.16E-2	1.30E-3	1.45E-6	2.29E-2
MAETP	kg DCB eq.	1.60E+1	5.43E+0	6.13E-3	2.15E+1
TETP	kg DCB eq.	9.85E-4	3.08E-4	2.39E-6	1.29E-3
ECI	Euro	9.82E-2	2.75E-2	3.48E-5	1.26E-1
ADPF	kg Sb. eq.	3.46E-3	1.03E-3	3.52E-6	4.50E-3

ADPE = Abiotic Depletion Potential for non-fossil resources

ADPF = Abiotic Depletion Potential for fossil resources

GWP = Global Warming Potential

ODP = Depletion potential of the stratospheric ozone layer

POCP = Formation potential of tropospheric ozone photochemical oxidants

AP = Acidification Potential of land and water

EP = Eutrophication Potential

HTP = Human Toxicity Potential

FAETP = Fresh water aquatic ecotoxicity potential

MAETP = Marine aquatic ecotoxicity potential

TETP = Terrestrial ecotoxicity potential

ECI = Environmental Cost Indicator

ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

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

	UNIT	A1	A2	A3	A1-A3
GWP-total	kg CO2 eq.	-1.88E+0	1.60E-1	4.80E-4	-1.72E+0
GWP-fossil	kg CO2 eq.	9.80E-1	1.60E-1	4.74E-4	1.14E+0
GWP-biogenic	kg CO2 eq.	-2.88E+0	1.52E-4	5.20E-6	-2.88E+0
GWP-luluc	kg CO2 eq.	2.13E-2	1.59E-4	1.40E-7	2.15E-2
ODP	kg CFC11 eq.	7.12E-8	2.81E-8	2.30E-11	9.93E-8
AP	mol H+ eq.	4.57E-3	2.84E-3	1.11E-6	7.41E-3
EP-freshwater	kg PO4 eq.	8.17E-5	2.66E-6	2.71E-8	8.44E-5
EP-marine	kg N eq.	1.51E-3	8.12E-4	2.38E-7	2.32E-3
EP-terrestrial	mol N eq.	1.51E-2	8.99E-3	2.91E-6	2.41E-2
POCP	kg NMVOC eq.	4.28E-3	2.38E-3	7.21E-7	6.66E-3
ADP-minerals & metals	kg Sb eq.	5.99E-5	1.55E-6	1.91E-9	6.15E-5
ADP-fossil	MJ, net calorific value	6.64E+0	2.11E+0	6.22E-3	8.75E+0
WDP	m3 world eq. deprived	5.75E-1	1.07E-2	4.78E-5	5.86E-1

GWP-total = Global Warming Potential total

GWP-fossil = Global Warming Potential fossil fuels

GWP-biogenic = Global Warming Potential biogenic

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 [2]

ADP-fossil = Abiotic Depletion for fossil resources potential [2]

WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

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.

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

	UNIT	A1	A2	A3	A1-A3
PM	Disease incidence	3.13E-8	1.05E-8	3.64E-12	4.18E-8
IRP	kBq U235 eq.	2.50E-2	9.31E-3	1.29E-5	3.43E-2
ETP-fw	CTUe	5.65E+1	2.04E+0	6.32E-3	5.85E+1
HTP-c	CTUh	3.17E-10	1.18E-10	1.09E-13	4.35E-10
HTP-nc	CTUh	1.05E-8	2.03E-9	3.54E-12	1.26E-8
SQP	---	3.42E+2	1.09E+0	1.28E-3	3.43E+2

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 disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

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.

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

	UNIT	A1	A2	A3	A1-A3
PERE	MJ	3.88E+1	7.06E-2	6.70E-4	3.89E+1
PERM	MJ	0.00	0.00	0.00	0.00
PERT	MJ	3.88E+1	7.06E-2	6.70E-4	3.89E+1
PENRE	MJ	7.11E+0	2.24E+0	6.66E-3	9.35E+0
PENRM	MJ	0.00	0.00	0.00	0.00
PENRT	MJ	7.11E+0	2.24E+0	6.66E-3	9.35E+0
SM	kg	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00
FW	m3	1.67E-2	4.93E-4	3.81E-6	1.72E-2

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

NRSF = Use of non renewable secondary fuels

FW = Use of net fresh water

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

	UNIT	A1	A2	A3	A1-A3
HWD	kg	1.15E-5	4.26E-6	4.80E-9	1.58E-5
NHWD	kg	1.43E-1	3.42E-2	1.21E-5	1.77E-1
RWD	kg	2.54E-5	1.31E-5	1.29E-8	3.85E-5
CRU	kg	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00
EEE	MJ	0.00	0.00	0.00	0.00
ETE	MJ	0.00	0.00	0.00	0.00

HWD = Hazardous Waste Disposed

RWD = Radioactive Waste Disposed

MFR = Materials for recycling

EEE = Exported Electrical Energy

NHWD = Non Hazardous Waste Disposed

CRU = Components for reuse

MER = Materials for energy recovery

ETE = Exported Thermal Energy

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

	UNIT	A1	A2	A3	A1-A3
BCCpr	kg C	7.90E-1	0.00	0.00	7.90E-1
BCCpa	kg C	0.00	0.00	0.00	0.00

BCCpr = Biogenic carbon content in product

BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

Data quality: In this study the data flows have been modelled as realistic 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 Anova® 100X Rheology Modifier are geographically representative, meaning that the production location of Anova® 100X Rheology Modifier 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. There is no presumption that relevant inputs or outputs have been omitted.

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

The Anova® products are manufactured through a combination of vegetable oil formulation and chemical modification to modify the chemical compatibilities and functionality for enhanced solubility and performance in bituminous products.



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.



REMARKS

None