

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025

Owner of the declaration:  
Program operator:  
Publisher:  
Declaration number:  
Issue date:  
Valid to:

Borregaard AS  
The Norwegian EPD Foundation  
The Norwegian EPD Foundation  
NEPD-2972-1657-EN  
10.08.2021  
10.08.2026

## EuroVanillin Supreme - wood vanillin

Borregaard AS

[www.epd-norge.no](http://www.epd-norge.no)



## General information

### Product

EuroVanillin Supreme - Wood vanillin

### Program holder

The Norwegian EPD foundation  
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 e-mail: [post@epd-norge.no](mailto:post@epd-norge.no)

### Declaration number

NEPD-2972-1657-EN

### This declaration is based on Product Category Rules:

Basic organic chemicals 2011:17 v. 2.11 (Environdec 2019)

### Statements:

The owner of the declaration shall be liable for the underlying information and evidence.  
 EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

### Declared unit:

The declared unit is 1 kg DM of EuroVanillin Supreme.

### Declared unit with option:

1 kg DM of EuroVanillin Supreme with transport to customers.

### Functional unit:

### Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal  external

Third party verifier:



Mie Vold, CSO, LCA.no AS  
 (Independent verifier approved by EPD Norway)

### Owner of the declaration

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### Manufacturer

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### Place of production:

Sarpsborg, Norway

### Management system:

ISO 9001 (Quality Management), ISO 14001 (Environmental Management) and ISO 50001 (Energy Management)

### Organisation no:

895623032

### Issue date

10.08.2021

### Valid to

10.08.2026

### Year of study:

2019

### Comparability:

EPDs from other programmes than the Norwegian EPD Foundation may not be comparable.


### The EPD has been worked out by:

Ellen Soldal      Ingunn Saur Modahl



**NORSUS**  
 Norsk institutt for  
 bærekraftsforskning

Approved



Håkon Hauan  
 Managing Director of EPD-Norway

## Product

### Product description:

Borregaard is the only producer of vanillin from the natural and renewable raw material Norway spruce.

Building on six decades of experience Borregaard have developed a wide range of specially adapted varieties of vanillin for different applications.

These include food and beverage, flavour and fragrance, personal care and cosmetics, pharmaceuticals, microbiome and plant-based crop protection products.

### Product specification

Materials*	g	%
Vanillin	999 g	99,9 %
Water	1 g	0,1 %

\*Here the product content is given on wet basis as sold to customer. However, the data and results in this EPD are given per ton dry matter (DM).

### Technical data:

Dry matter (DM) content: 99.9%

### Market:

Global

### Reference service life:

Not relevant

## LCA: Calculation rules

### Declared unit:

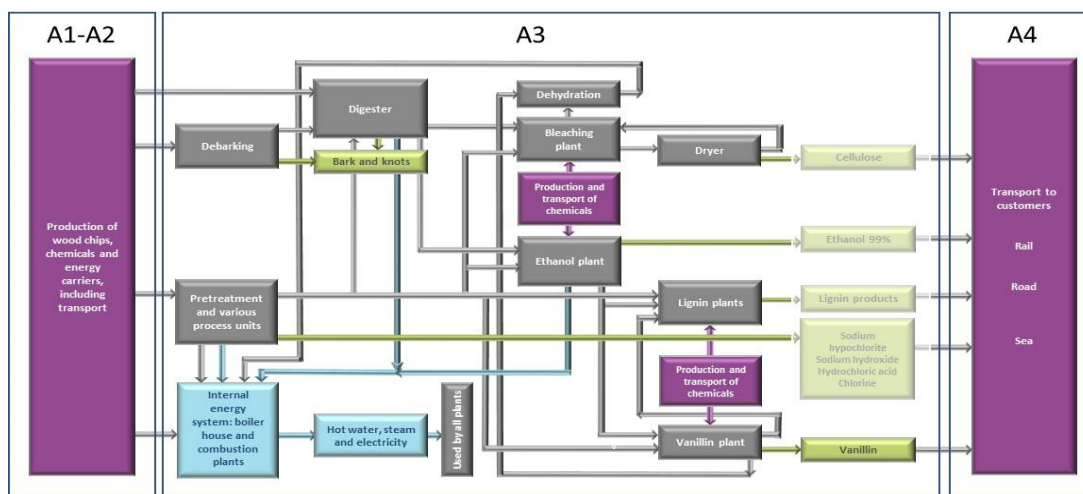
The declared unit is 1 kg DM of EuroVanillin Supreme, including 1000 km of transport to customer (A4). Transportation to customer has been corrected to account for the burden of transporting water.

### System boundary:

The system boundary includes the modules A1-A4, illustrated by the flowchart. A1-A4 includes extraction, transportation and processing of natural resources, manufacturing of the product and transportation of the product 1000 km by typical transportation modes.

Further description of system boundaries are described in Soldal & Modahl (2021) and Modahl & Soldal (2021)

Figure 1: Technical flow chart illustrating the life cycle stages included in the EPD.



### Data quality:

Data on consumption of natural resources, energy carriers, and chemicals, and transport modes are site specific from Borregaard Sarpsborg in Norway. Foreground data refer to the year 2019. For the background data, representative data fromecoinvent version 3.6, dated September 2019, is used (Wernet et al. 2016).

### Cut-off criteria:

All major raw materials and all the essential energy is included. This cut-off rule does not apply for hazardous materials and substances.

The energy mix used in steam production is averaged over seven years (2014-2020). This was done because the input of electricity and natural gas fluctuates between years depending on price. To get a representative annual value for energy in steam production, the input of electricity and natural gas was averaged over the 7-year period. In this period, the average share of electricity input in the steam boiler was 63%, while the average share of natural gas was 37%.

**Allocation:**

The allocation is made in accordance with the provisions of ISO 14025. Allocation has as far as possible, been avoided by modelling the processes at Borregaard on a detailed level. When allocation has been necessary, allocation based on mass (DM) has been used. In processes with hot water as an outflow and where the hot water is exploited in other processes, the energy content has been calculated into mass through use of the heat value for biological dry matter.

**Deviations from the PCR:**

This EPD deviates from the PCR regarding inclusion of energy used in office space. All energy consumption has been collected and reported collectively. The energy used in office spaces are assumed to be negligible compared to the energy used in production processes.

The declared unit is 1 kg DM of EuroVanillin Supreme - wood vanillin, and not 1000 kg, and packaging is not included.

**LCA: Scenarios and additional technical information**

The following information describe the scenarios in the different modules of the EPD.

Production takes place in Sarpsborg, Norway, and transport to customers is included. Transport from production place to customer is based on information from Borregaard regarding typical transport distance and transport modes.

Vanillin is transported 1000 km. Vanillin is transported on sea (50%) and road (50%). Transport distances have been corrected in order to include transport of water.

No scenario after A4 is included.

**Transport from production place to assembly/user (A4)**

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	55%*	Lorry, 16-32 metric ton, EURO5	501	0,032 l/tkm	1,60E+01
Boat	70%*	Container ship	501	2,00E-03 l/tkm	1,00E+00

\*For the transport processes, average data from ecoinvent 3.6 is used and it is assumed the same average capacity load here.

**LCA: Results**

A1-A3 are the most influential life cycle stages in all impact categories compared to A4. A1-A3 contributes to between 89% and >99% of the total impacts. For climate change impact category, A1-A3 is responsible for 90% of the impacts of A1-A4 combined. Steam and sodium hydroxide are the most important input for the climate change impact of EuroVanillin Supreme.

**System boundaries (X=included, MND=module not declared, MNR=module not relevant)**

Product stage				Assembly stage	Use stage								End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	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	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	

**Environmental impact**

Parameter	Unit	A1-A3	A4	A1-A4
GWP	kg CO <sub>2</sub> -eqv	7,02E-01	7,31E-02	7,75E-01
ODP	kg CFC11-eqv	2,66E-07	1,34E-08	2,80E-07
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	3,40E-04	9,83E-06	3,50E-04
AP	kg SO <sub>2</sub> -eqv	7,65E-03	3,05E-04	7,96E-03
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	2,01E-03	4,46E-05	2,05E-03
ADPM	kg Sb-eqv	9,44E-06	4,25E-09	9,44E-06
ADPE	MJ	8,80E+00	1,03E+00	9,84E+00

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Resource use				
Parameter	Unit	A1-A3	A4	A1-A4
RPEE	MJ	6,05E+00	1,45E-03	6,05E+00
RPEM	MJ	1,91E+01	0,00E+00	1,91E+01
TPE	MJ	2,51E+01	1,45E-03	2,51E+01
NRPE	MJ	1,09E+01	1,04E+00	1,19E+01
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	1,09E+01	1,04E+00	1,19E+01
SM	kg	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00
W	m <sup>3</sup>	8,32E-02	1,65E-06	8,32E-02

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE 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; W Use of net fresh water

End of life - Waste				
Parameter	Unit	A1-A3	A4	A1-A4
HW	kg	4,31E-05	2,63E-06	4,58E-05
NHW	kg	3,30E-01	4,08E-04	3,31E-01
RW	kg	4,35E-05	7,51E-06	5,10E-05

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life - Output flow				
Parameter	Unit	A1-A3	A4	A1-A4
CR	kg	0,00E+00	0,00E+00	0,00E+00
MR	kg	3,69E-05	0,00E+00	3,69E-05
MER	kg	6,61E-03	0,00E+00	6,61E-03
EEE	MJ	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example:  $9.0 \text{ E-03} = 9.0 \cdot 10^{-3} = 0.009$

## Additional environmental information

Borregaard uses Norway spruce harvested in Norway (approx. 78%), Sweden (approx. 20%) and Germany (approx. 2%). All timber purchased is harvested according to the country of origin regulations of harvest, forest management and biological diversity (PEFC Chain of custody certificate SA-PEFC/COC-006557, FSC Chain of custody certificate SA-COC-006557). All timber harvested in Norway is certified according to the PEFC standard.

## Additional Norwegian requirements

### Greenhouse gas emission from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Data source	Amount	Unit
Econinvent v3.6 (September 2019)	23,3	g CO <sub>2</sub> -eqv/kWh

### Dangerous substances





- The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskriften, Annex III), see table.

### Indoor environment

No tests have been carried out on the product concerning indoor climate.

## Bibliography

EN 15804:2012+A1:2013	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>
Environdec, 2019	<i>Product Category Rules for preparing an Environmental Product Declaration (EPD) for CPC Division 341 BASIC ORGANIC CHEMICALS. VERSION 2.11. Dated: 2019-09-06. www.environdec.com</i>
FCS, 2018	<i>FSC Chain of custody certificate. Certificate No SA-COC-006557</i>
ISO 14025:2010	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
Modahl, I. and Soldal, E., 2021	<i>The 2019 LCA of products from the Borregaard biorefinery, Sarpsborg. OR.14.21. NORSUS. Fredrikstad, Norway.</i>
PEFC, 2018	<i>PEFC chain of custody certificate PEFC ST:2002:2013 Chain of custody of Forest Based Products. Certificate no. SA-PEFC/COC-006557.</i>
Soldal, E. and Modahl, I., 2021	<i>EPD 8 products from Borregaard LCA report for verification. OR.19.21. NORSUS. Fredrikstad, Norway.</i>
Wernet, G., et al., 2016	<i>The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment 21(9): 1218-1230.</i>

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