Statement of Verification

BREG EN EPD No: 000235 Issue 1

ECO EPD Ref. No. 00000791

This is to verify that the

Environmental Product Declaration

provided by:

PPG Nederland B.V

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

Sigma Fresh Air Matt

Company Address

PPG Coatings Deutschland GmbH
An der Halde 1
44805 Bochum
Deutschland

Signed for BRE Global Ltd	Kim Allbury Operator	18 December 2018 Date of this Issue
18 December 2018 Date of First Issue		16 October 2022 Expiry Date

Environmental Product Declaration

EPD Number: 000235

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
PPG Nederland B.V. Amsterdamseweg 14 1422 AD, Uithoorn The Netherlands	Matthew Percy Product Stewardship Functional Expert PPG Nederland B.V. Amsterdamseweg 14 1422 AD, Uithoorn The Netherlands
Declared/Functional Unit	**Applicability/Coverage**
Sigma Fresh Air Matt paint to protect and decorate 1m² of substrate, suitably prepared, on the basis of one layer of the product.	Product Specific.
EPD Type	**Background database**
Cradle to Gate with options	ecoinvent

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Nigel Jones
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building						
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☑	☐	☑	☐

Note: Ticks indicate the Information Modules declared.

Manufacturing site

PPG Nederland B.V. Amsterdamseweg 14 1422 AD, Uithoorn The Netherlands	Click here to enter address.

Construction Product

Product Description

Sigma Fresh Air Matt is an aqueous emulsion based interior wall paint incorporating biobased binder technology and air purifying technology.

Technical Information

Property	Value, Unit
Spreading rate	8 m^2/L
Time to Touch Dry	1 hr
Time to Recoat	4 hrs
VOC Content	<1%
Gloss (at 60°)	2%
Wet scrub resistance (EN 13300)	Class 2
Hiding Power (EN 13300)	Class 2

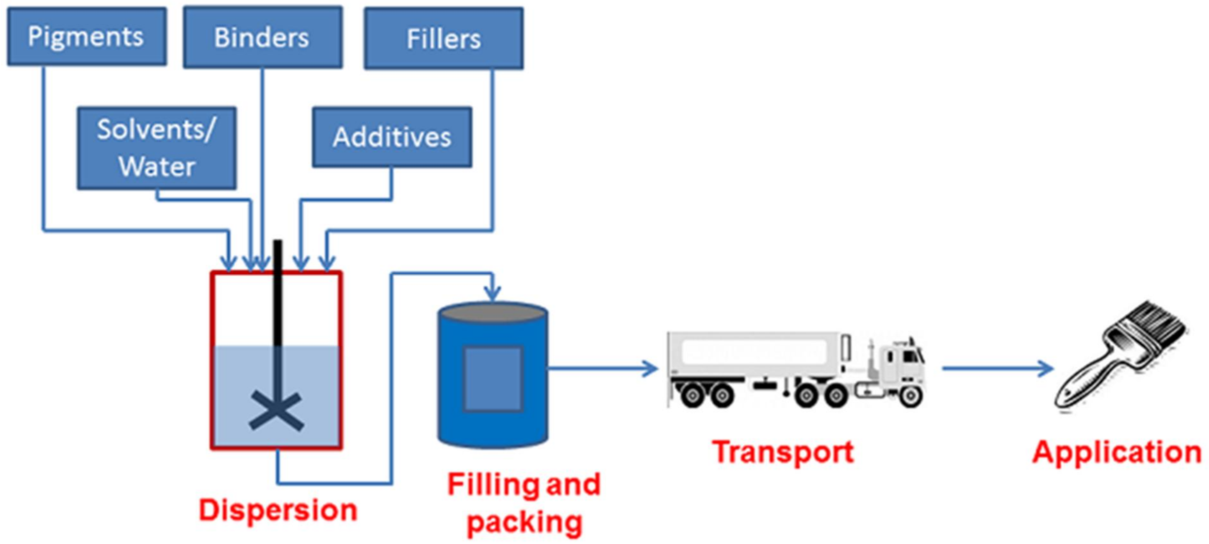
Main Product Contents

Material/Chemical Input	%
ADDITIVE	<3
BIOCIDE	<0.5
BINDER	<10
FILLER	25-30
GLYCOLS AND ESTERS	<3
TITANIUM DIOXIDE	10-20
WATER	40-45

Manufacturing Process

The manufacturing process involves the mixing and dispersing of raw materials into a homogeneous mixture. The product is then packaged for distribution to the customer.

Process flow diagram



Construction Installation

All surfaces should be sound, clean, dry and free from grease. Remove any crazed or flaking paint. Stir well before use and apply by brush, roller or paint pad. When using a roller, use a medium pile synthetic type. Apply liberally and evenly; avoid overspreading. Do not apply when air or surface temperature is less than 5°C or in damp conditions.

Use Information

No activities are required during the use phase

End of Life

Coatings are often not removed, so the end of life the product is that of the end of life of the underlying substrate. For interior wall paint on a mineral surface this is often landfill.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

Protecting and decorating 1m² of substrate, suitably prepared, on the basis of one layer of the product.

System boundary

The system boundaries of the product LCA follow the modular design defined by /EN15804/. This cradle-to-gate with options study includes the Product stage (A1-A3), Transport stage (A4), Installation stage (A5), End-of-life transport (C2) and Disposal (C4).

Data sources, quality and allocation

Formulation is based on the current recipe extracted from PPG recipe systems. Data related to in-house PPG manufacturing processes has been collected from PPG reporting systems for the 2015 calendar year. This is based on recorded utility use and waste disposal and is of high quality.

For life cycle modelling of the process, SimaPro V.8.1 is used. All relevant background datasets are taken from Ecoinvent V3.01 database supplied with SimaPro and are documented in supporting Ecoinvent documentation.

Many Ecoinvent processes, such as waste disposal, are multi-input and not just for the material specified. For these processes the allocation used for the material in question is the one specified in the Ecoinvent process. Allocation of waste to reuse and waste disposal streams is made on the basis of recent data from reliable sources.

In cases where allocation is necessary, this has been performed on the basis of mass. PPG manufacturing facilities are not equipped for measuring product specific usage of utilities and waste generated at a specific product level. For this reason a mass based allocation of factory impact has been applied by taking the total impact and dividing it by the total mass of production (both for the 2015 calendar year).

Cut-off criteria

Cut off criteria are: 1% of the renewable and non-renewable energy usage 1% of the mass of the process under consideration. The total neglected flows shall be no more than: 5% of the energy usage 5% of the total mass.

The inventory process in this LCA includes all data related to raw material, packaging material and consumable items, and the associated transport to the manufacturing site. Process energy and water use, direct production waste and emissions to air and water are included.

The packaging for the raw materials can vary depending on quantities ordered and on the supplier for many types of raw materials. As such it is not possible to determine the exact packaging for a given raw material. Hence, raw materials packaging has been excluded from the scope of the study. However, the disposal of packaging waste from raw materials has been included in the scope of the study as part of the A3 module through the inclusion of manufacturing waste.

Emissions during the use phase remain outside the system boundary. According to the PCR and EN 15804, in the absence of horizontal standards for the measurement of emission of harmful materials to the environment, it is not necessary to declare any emissions.
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LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	3.86E-01	6.49E-08	2.34E-03	2.90E-04	2.79E-04	1.19E-05	6.23E+00
Construction process stage	Transport	A4	5.78E-03	1.07E-09	3.49E-05	7.53E-06	2.68E-06	1.14E-09	8.24E-02
	Construction	A5	7.10E-02	1.91E-09	1.38E-04	1.68E-05	2.38E-05	2.73E-07	8.21E-01
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND	MND
	Transport	C2	3.08E-04	5.69E-11	1.86E-06	4.01E-07	1.43E-07	6.06E-11	4.39E-03
	Waste processing	C3	MND	MND	MND	MND	MND	MND	MND
	Disposal	C4	9.31E-03	2.85E-10	7.93E-06	1.54E-06	2.50E-06	1.75E-09	2.68E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND	MND

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued)

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	7.84E-01	1.57E-01	9.41E-01	6.40E+00	4.13E-01	6.81E+00
Construction process stage	Transport	A4	3.42E-04	0.00E+00	3.42E-04	8.31E-02	0.00E+00	8.31E-02
	Construction	A5	3.56E-02	1.73E-01	2.08E-01	7.26E-01	1.88E-01	9.14E-01
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND
	Transport	C2	1.82E-05	0.00E+00	1.82E-05	4.42E-03	0.00E+00	4.42E-03
	Waste processing	C3	MND	MND	MND	MND	MND	MND
	Disposal	C4	7.69E-04	0.00E+00	7.69E-04	2.77E-02	0.00E+00	2.77E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary 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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	8.09E-03
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	6.44E-06
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	2.75E-04
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	3.43E-07
	Waste processing	C3	MND	MND	MND	MND
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	2.84E-05
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	6.38E-02	2.24E-01	1.71E-05
Construction process stage	Transport	A4	1.40E-05	1.75E-04	6.06E-07
	Construction	A5	2.10E-03	6.21E-03	1.02E-06
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND
	Transport	C2	7.47E-07	9.33E-06	3.22E-08
	Waste processing	C3	MND	MND	MND
	Disposal	C4	2.54E-05	1.04E-01	1.65E-07
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

Other environmental information describing output flows – at end of life			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	1.28E-02
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	1.68E-03	0.00E+00	6.23E-02
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	MND	MND	MND	MND
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Description of scenario		
	Fuel type / Vehicle type	Diesel L/km	0.32
	Distance:	km	300
	Capacity utilisation (incl. empty returns)	%	50
	Bulk density of transported products	kg/m^3	1440
A5 – Installation in the building	The coating is applied to an interior wall substrate by use of a roller. The area coated is a room 5m by 5m and 2.5 m high, (50 m^2, doors and windows ignored). One disposable plastic sheet is used to protect the floor from drops and spills for the entire job. After the job the roller, roller tray and plastic sheeting will be disposed of.		
	Roller for application	g (per FU)	2.14
	Polypropylene sheeting for spill protection	g (per FU)	2.28
	Polypropylene roller tray	g (per FU)	4.00
	Amount of paint lost during application due drips splashes, and residue in the can/bucket	%	1
	Disposal of polypropylene (Form primary packaging, roller components and spill sheeting. Assume 3% landfill, 97% incineration)	g (per FU)	11.2
	Disposal of wood (From pallet. Assume 25% recycling, 73% incineration and 2% landfill)	g (per FU)	6.47
	Disposal of polyethylene (From pallet wrap and roller packaging. Assume: 3% landfill, 97% incineration)	g (per FU)	2.39
	Disposal of miscellaneous polymer waste (From roller. Assume: 3% landfill, 97% incineration)	g (per FU)	0.55
	VOC Emissions to air	g (per FU)	0.026
B2 – Maintenance	Not applicable		
B3 – Repair	Not applicable		
B4 – Replacement	Not applicable		
B5 – Refurbishment	Not applicable		
Reference service life	Not applicable		
B6 – Use of energy; B7 – Use of water	Not applicable		

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C1 to C4 End of life,	The final dried paint (57.4% solids of the applied wet paint) remain on the wall at end of life. Demolished building products are transported 30km to the site of disposal. For interior wall the paint is disposed of with the substrate and is assumed to be by landfill.		
	Transport to site of disposal	km	30
	Disposal of product by landfill (solids only)	kg (per FU)	0.104
Module D	Not applicable		

Summary, comments and additional information

Analysis

Analysis of the relative contributions of each Module shows that most of the impact comes from the raw materials stage (A1) for most of the indicators (Figure 1). This high contribution of raw materials to the impact indicators is not unexpected. As paints are at the end of the chemical value chain much of the expenditure of energy, raw materials, processing, waste processing, etc. in bringing the product to existence has occurred prior to the entry of the raw materials onto the PPG production site.

A further breakdown of the contribution of the different raw material types to environmental indicators in Module A1 shows that the majority of each impact comes from the titanium dioxide and the binder (Figure 2). This is typical for coatings products and not unexpected given these two raw materials are often present in high proportions and have a relatively high environmental impact.

Analysis of Module A3 shows the factors which contribute to this portion of the impact (Figure 3). As can be seen the majority of the impact for this module comes from the packaging for the product (including raw materials, processing and transport to PPG production site), and not the production process itself. This is expected as paint is a formulated product. The production process is mixing, dispersing, and some grinding, and does not comprise energy intensive processes such as heating or cooling that would be required for chemical reaction processes. Hence the contribution from PPG the PPG factory to the environmental impact is low.

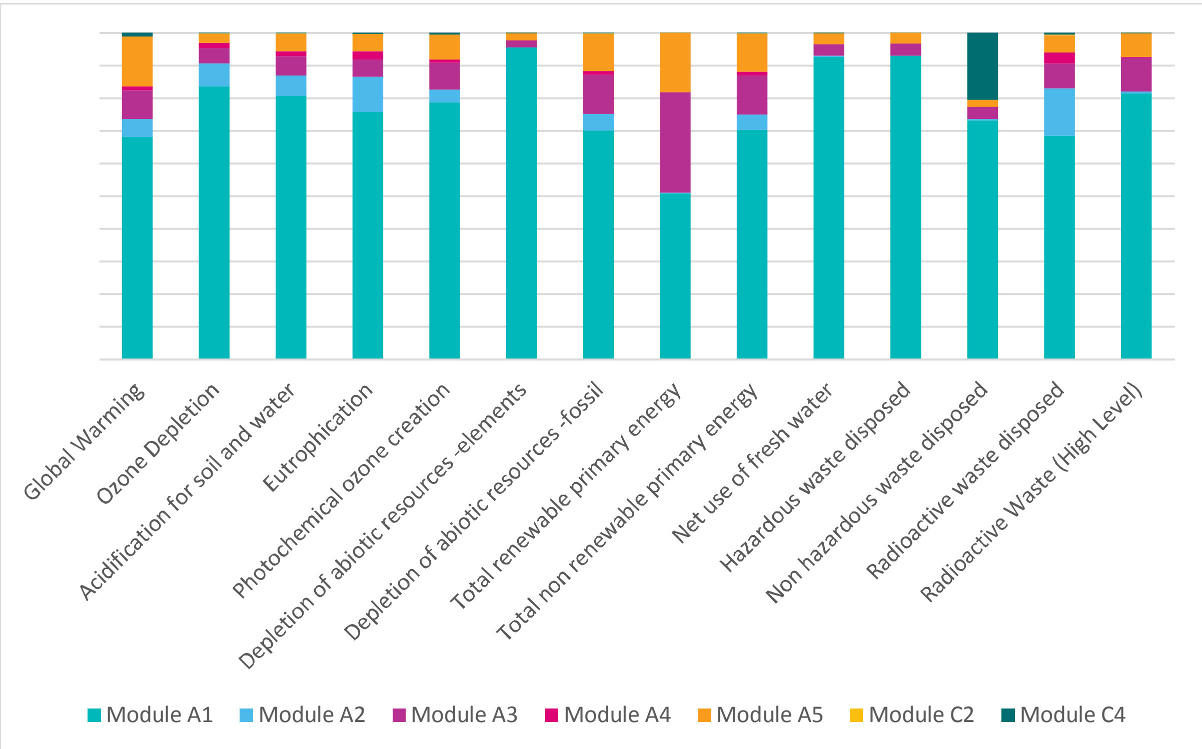

Figure 1

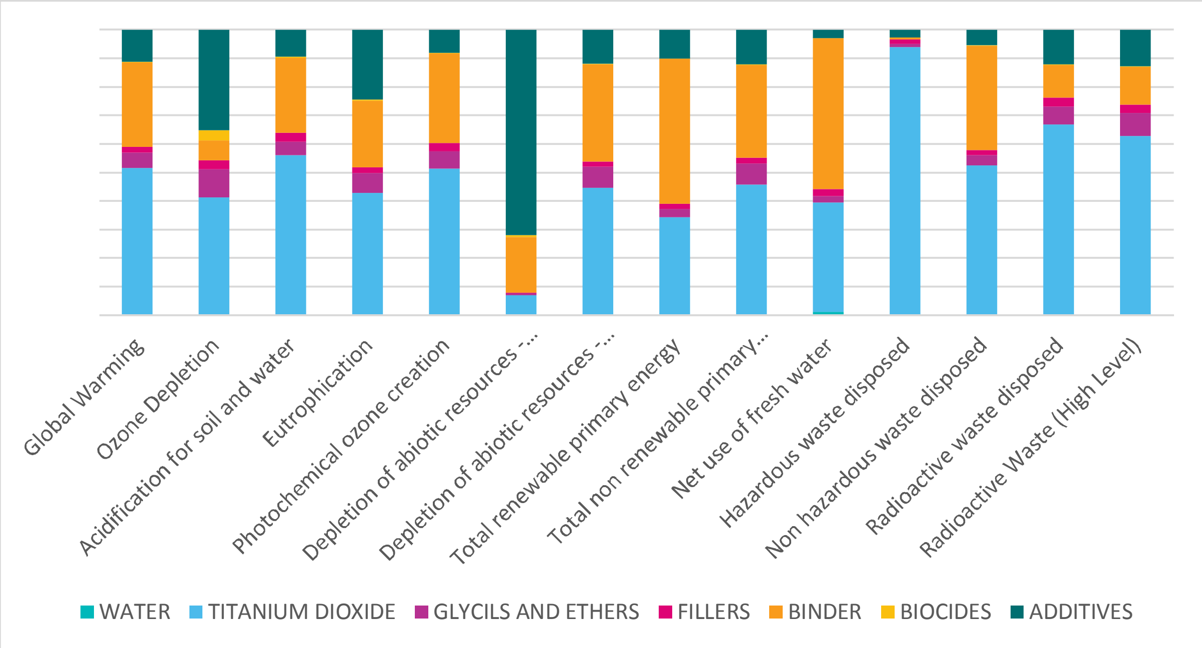

Figure 2

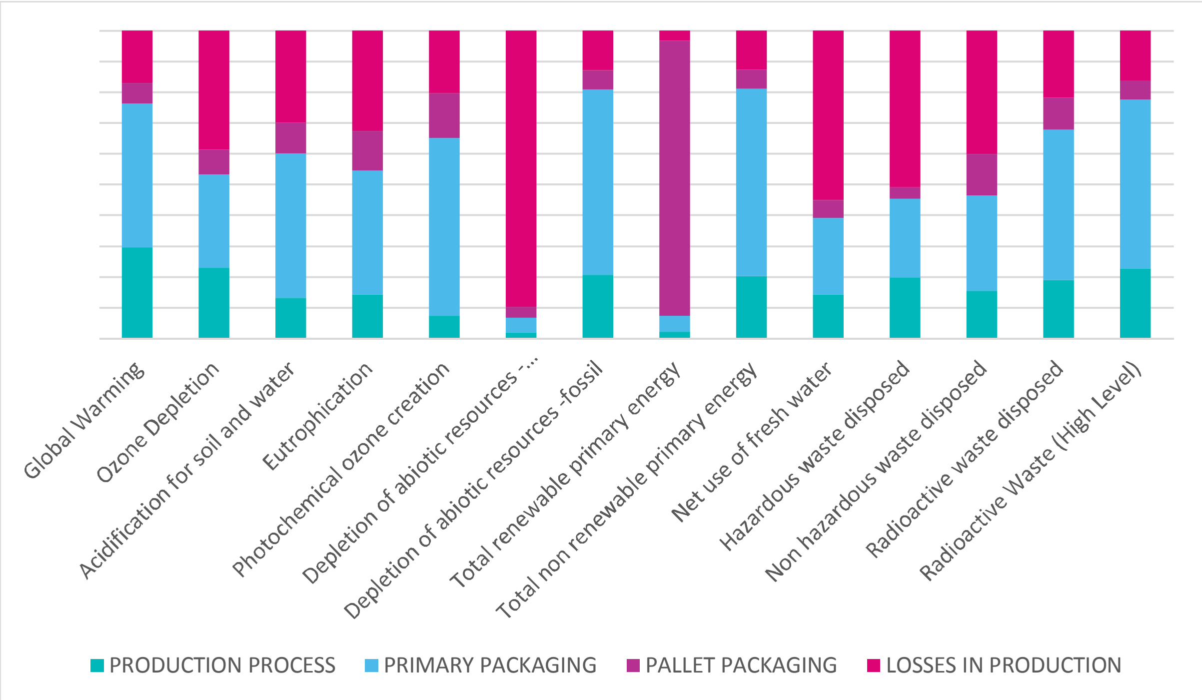

Figure 3

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