

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804 + A1  
Owner of the Declaration – MEDITE SMARTPLY

Declaration number EPDIE-19-17  
ECO Platform EPD no: 1019  
Issue date 11th November 2019  
Valid to 11th November 2024

EPD Programme - EPD Ireland  
Programme Operator - Irish Green Building Council  
[www.epdireland.org](http://www.epdireland.org)



## SMARTPLY Oriented Strand Boards (OSB)

SMARTPLY FLAME RETARDANT (FR)

SMARTPLY OSB2

SMARTPLY OSB3

SMARTPLY OSB3 T&G

SMARTPLY ULTIMA (OSB4)

SMARTPLY PATRESS PLUS

SMARTPLY PROPASSIV

SMARTPLY SITEPROTECT




SMARTPLY TOUGHPLY

SMARTPLY WEBSTOCK

## 1. General information

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council, 19 Mountjoy Square, Dublin D01 E8P5	SMARTPLY EUROPE DAC Belview, Slieverue, Waterford, Ireland Contact - David Murray david.murray@mdfosb.com www.mdfosb.com
DECLARATION NUMBER	PRODUCTION SITE
EPDIE-19-17	Belview, Slieverue, Waterford, Ireland
ECO PLATFORM NO.	DECLARED UNIT
1019	1 tonne panel products
APPLICABLE PRODUCT CATEGORY RULES	DECLARED PRODUCT
EN 15804:2012+A1:2013, EPD Ireland PCR Part A (issued 29.06.2018), ISO 14040, ISO 14044, ISO 14025, I.S. EN 16485:2014 PCR for Wood and Wood-based Products in Construction.	SMARTPLY Oriented Strand Boards (OSB) The full list of OSB panel products comprises: SMARTPLY FLAME RETARDANT (FR); SMARTPLY OSB2; SMARTPLY OSB3, SMARTPLY OSB3 T&G; SMARTPLY ULTIMA (OSB4); SMARTPLY PATRESS PLUS; SMARTPLY PROPASSIV; SMARTPLY SITEPROTECT; SMARTPLY TOUGHPLY; SMARTPLY WEBSTOCK
DATE OF ISSUE	SCOPE OF EPD
11.11.2019	Manufacturer specific product
DATE OF EXPIRY	LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA
11.11.2024	EcoReview, Kilkenny, CO. Kilkenny, Ireland +353 87 258 9783 / +31 646 264 9327 info@ecoreview.ie / www.ecoreview.eu
TYPE OF EPD: SINGLE OR MULTI PRODUCT	LCA SOFTWARE AND DEVELOPER IF APPLICABLE
Multi Product EPD	EcoChain software version 2.4.1
PRODUCT CLASSIFICATION OR NACE CODE	NAME AND VERSION OF INVENTORY USED
16.21 Manufacture of veneer sheets and wood-based panels	EcoInvent 3.4
COMPARABILITY	
Environmental Product Declarations from different programmes may not be directly 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+2012+A1:2013	
The CEN Norm /EN 15804 serves as the core PCR	
Independent verification of the declaration according to ISO 14025	

Internally  Externally

SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO - Irish Green Building Council  	Jane Anderson, ConstructionLCA Ltd 

## 2. Scope and Type of EPD

This is a Cradle to Gate EPD. The Modules that are declared are shown in the table below.

PRODUCT STAGE			CONSTRUCTION ON PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X - Module declared.

MND - Module not declared.

### 3. Detailed product description

The LCA underlying this EPD is carried out for SMARTPLY Europe DAC. This EPD presents the results for SMARTPLY Oriented Strand Boards (OSB). The full list of OSB panel products comprises:

- SMARTPLY FLAME RETARDANT (FR);
- SMARTPLY OSB2;
- SMARTPLY OSB3;
- SMARTPLY OSB3 T&G;
- SMARTPLY ULTIMA;
- SMARTPLY PATTRESS PLUS;
- SMARTPLY PROPASSIV;
- SMARTPLY SITEPROTECT;
- SMARTPLY TOUGHPLY;
- SMARTPLY WEBSTOCK;

All these panel products are all produced in the same way, with very minor variations in the compositions, and with two minor additional processes in the finishing phase of production.

The panels comprises cross oriented layers of strands of selected softwood timber bonded with synthetic resins and waxes. The panels are manufactured in accordance with the requirements of I.S. EN 300:2006 Oriented Strand Boards (OSB) – Definitions, classification and specifications.

The intended use of the SMARTPLY OSB panels is in the construction industry in structural and non-structural applications, such as flooring, roofing, walling, timber-frame sheathing, temporary works and external hoarding. The average density of the OSB3 panel is 600 kg/m<sup>3</sup>.

The compositions are based on the Bills of Materials supplied by SMARTPLY for the OSB products manufactured in 2018. An example of the composition (based on the OSB3 product) per tonne of product is given in the table below.

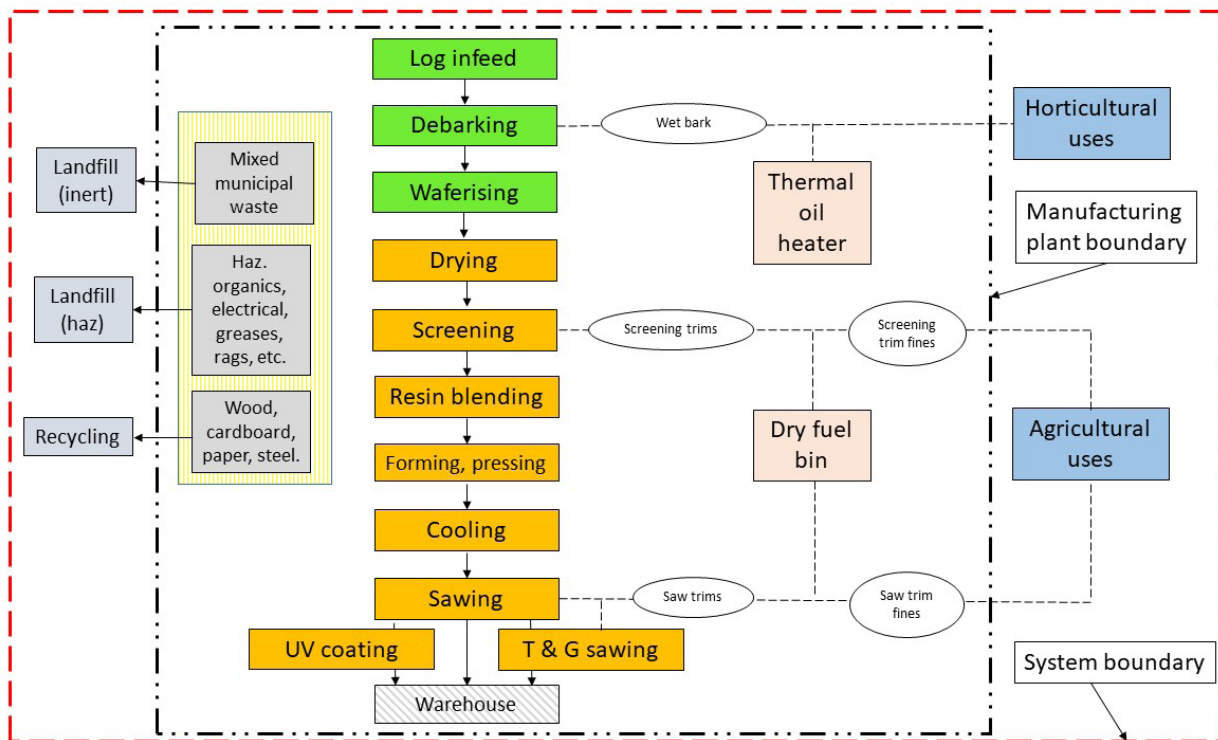
Constituent product	Weight (kg) per tonne of OSB3
Softwood pulp wood logs (at 0% moisture)	919.7
MDI	26.48
MPU	5.94
Wax (paraffin)	1.00
Release Agent	5.73
Moisture in finished product (ambient conditions)	41.15
Total	1000
<b>Packaging</b>	
Wood (Crafting and Battens)	2.01
Plastic strapping	0.28
Cardboard and paper (shrouds)	0.1

Materials used for packaging, such as cardboard, paper shrouds, wood for crating and battens, and strapping, are considered to be recycled after use.

### 3.1 Detailed process description

SMARTPLY OSB products are manufactured from small diameter pulpwood logs and forestry trimmings. Logs are fed into debarking drums to remove bark, and washed with water. Bark is used as a biomass fuel, and is also sold for horticulture. The cleaned logs are then cut into thin wafer strands (Flaking). The wet thin wafer strands are dried to a moisture content of 3-4% by four large driers (Drying). The dried strands are screened to remove fines, and then sprayed with a thermosetting resin and mixed with a small amount of wax, or other agents as required (Blending). The resin and wax-coated strands are then passed through a forming line where the strands are cross-oriented at 90 degrees in separate layers, and formed into a mat. The mat is trimmed to a pre-determined width, and is then passed into a rolling press to compress the layers of strands to a pre-determined thickness and density (Pressing). In 2015 the press used was WIW multi-daylight press, however this has since been upgraded in 2016 to a hot-rolled continuous press (ContiRoll®). After pressing, the mats are trimmed before they are air-cooled and then stacked before going into the Sawline for a final cut to specific sizes for various end-use applications. Following cutting, some panels go through two additional lines. These are: Tongue and Groove (T&G) cutting of edges to enable easy jointing in use; and a UV curable liquid coating line to impart enhanced durability, vapour control, or aesthetics. The finished panels are then stacked, strapped, packaged and labelled for onwards dispatch to the market.

All processes are accounted for in this analysis, and no processes are omitted. The processes are illustrated in the figure below.



A total of 37,885 tonnes of wet bark is generated by debarking. 12,262 (wet) tonnes of this goes to energy, used in the thermal oil heater. The balance of 25,624 (wet) tonnes goes to horticultural uses, as illustrated above. No impact is allocated to the bark in horticultural uses.



## 4. LCA results - SMARTPLY FLAME RETARDANT (FR)

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWPF	[kg CO2-Eq.]	2.41E+02	2.30E+01	1.22E+02	3.86E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.54E+03	0.00E+00	0.00E+00	-1.54E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.30E+03	2.30E+01	1.22E+02	-1.15E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	5.62E-06	4.24E-06	7.72E-06	1.76E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	1.12E+00	1.02E-01	4.21E-01	1.64E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.70E-01	1.85E-02	5.79E-02	2.46E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.40E-01	4.10E-03	1.91E-02	2.63E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	2.14E+00	1.70E-01	1.23E-01	2.44E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	4.72E+03	3.71E+02	1.93E+03	7.02E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY FLAME RETARDANT (FR)

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
PERE	[MJ]	3.94E+02	4.89E+00	2.40E+02	6.39E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.56E+04	0.00E+00	0.00E+00	1.56E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.60E+04	4.89E+00	2.40E+02	1.62E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.70E+02	3.77E+02	1.84E+03	2.48E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	4.95E+03	0.00E+00	0.00E+00	4.95E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	5.22E+03	3.77E+02	1.84E+03	7.43E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.07E+00	2.05E-02	6.56E-01	1.75E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RFS and NRSF are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY FLAME RETARDANT (FR)

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	1.09E-03	2.62E-03	9.82E-03	1.35E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.29E+01	2.16E+01	4.37E+00	3.88E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	1.70E-03	2.39E-03	9.50E-03	1.36E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY OSB2

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWPF	[kg CO2-Eq.]	1.39E+02	2.16E+01	1.22E+02	2.82E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.70E+03	0.00E+00	0.00E+00	-1.70E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.57E+03	2.16E+01	1.22E+02	-1.42E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	3.66E-06	3.98E-06	7.72E-06	1.54E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	6.63E-01	9.41E-02	4.21E-01	1.18E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	8.00E-02	1.72E-02	5.79E-02	1.55E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.29E-01	3.79E-03	1.91E-02	2.52E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	1.29E+00	1.59E-01	1.23E-01	1.58E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	3.03E+03	3.48E+02	1.93E+03	5.31E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.

## 4. LCA results - SMARTPLY OSB2

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	3.41E+02	4.57E+00	2.40E+02	5.86E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.72E+04	0.00E+00	0.00E+00	1.72E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.76E+04	4.57E+00	2.40E+02	1.78E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	1.83E+03	3.54E+02	1.84E+03	4.03E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	1.49E+03	0.00E+00	0.00E+00	1.49E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	3.32E+03	3.54E+02	1.84E+03	5.51E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	3.93E-01	1.92E-02	6.56E-01	1.07E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RSF and NRSF are not calculated by the EcoChain software.

## 4. LCA results - SMARTPLY OSB2

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	8.18E-04	2.46E-03	9.82E-03	1.31E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	9.24E+00	2.04E+01	4.37E+00	3.40E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	4.93E-04	2.24E-03	9.50E-03	1.22E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY OSB3

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWPF	[kg CO2-Eq.]	1.80E+02	2.17E+01	1.22E+02	3.24E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.68E+03	0.00E+00	0.00E+00	-1.68E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.50E+03	2.17E+01	1.22E+02	-1.36E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	4.11E-06	4.00E-06	7.72E-06	1.58E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	8.11E-01	9.61E-02	4.21E-01	1.33E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.40E-01	1.74E-02	5.79E-02	2.16E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.49E-01	3.85E-03	1.91E-02	2.72E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	1.57E+00	1.60E-01	1.23E-01	1.85E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	3.59E+03	3.50E+02	1.93E+03	5.87E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY OSB3

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
PERE	[MJ]	4.07E+02	4.61E+00	2.40E+02	6.52E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.70E+04	0.00E+00	0.00E+00	1.70E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.74E+04	4.61E+00	2.40E+02	1.77E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.21E+03	3.56E+02	1.84E+03	4.40E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	1.75E+03	0.00E+00	0.00E+00	1.75E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	3.96E+03	3.56E+02	1.84E+03	6.15E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.01E+00	1.94E-02	6.56E-01	1.68E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RSF and NRSF are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY OSB3

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
HWD	[kg]	1.21E-03	2.47E-03	9.82E-03	1.35E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	
NHWD	[kg]	1.19E+01	2.04E+01	4.37E+00	3.67E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	7.85E-04	2.26E-03	9.50E-03	1.25E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY OSB3 (T&G)

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWPF	[kg CO2-Eq.]	1.78E+02	2.15E+01	1.59E+02	3.58E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.66E+03	0.00E+00	0.00E+00	-1.66E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.48E+03	2.15E+01	1.59E+02	-1.30E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	4.09E-06	3.96E-06	9.24E-06	1.73E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	8.01E-01	9.51E-02	5.23E-01	1.42E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.39E-01	1.72E-02	6.81E-02	2.25E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.45E-01	3.81E-03	2.44E-02	2.74E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	1.55E+00	1.59E-01	1.23E-01	1.83E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	3.54E+03	3.46E+02	2.52E+03	6.41E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY OSB3 (T&G)

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
PERE	[MJ]	6.12E+02	4.56E+00	3.22E+02	9.39E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.67E+04	0.00E+00	0.00E+00	1.67E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.73E+04	4.56E+00	3.22E+02	1.77E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.18E+03	3.52E+02	2.40E+03	4.93E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	1.73E+03	0.00E+00	0.00E+00	1.73E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	3.91E+03	3.52E+02	2.40E+03	6.66E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.02E+00	1.92E-02	7.89E-01	1.83E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RSF and NRSF are not calculated by the EcoChain software.





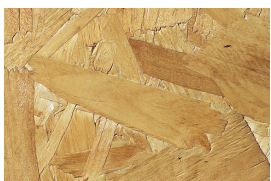
## 4. LCA results - SMARTPLY OSB3 (T&G)

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	1.19E-03	2.44E-03	1.26E-02	1.63E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.31E+01	2.02E+01	5.85E+00	3.92E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	7.81E-04	2.23E-03	1.22E-02	1.53E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY ULTIMA (OSB4)

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWPF	[kg CO2-Eq.]	1.52E+02	2.19E+01	1.22E+02	2.95E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.73E+03	0.00E+00	0.00E+00	-1.73E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.58E+03	2.19E+01	1.22E+02	-1.43E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	3.87E-06	4.04E-06	7.72E-06	1.56E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	6.86E-01	9.62E-02	4.21E-01	1.20E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.24E-01	1.75E-02	5.79E-02	1.99E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.42E-01	3.86E-03	1.91E-02	2.65E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	1.23E+00	1.62E-01	1.23E-01	1.51E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	2.88E+03	3.54E+02	1.93E+03	5.16E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY ULTIMA (OSB4)

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.79E+04	4.65E+00	2.40E+02	1.82E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.79E+04	4.65E+00	2.40E+02	1.82E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	3.19E+03	3.60E+02	1.84E+03	5.38E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	3.19E+03	3.60E+02	1.84E+03	5.38E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	8.89E-01	1.96E-02	6.56E-01	1.56E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RSF and NRSF are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY ULTIMA (OSB4)

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	8.90E-04	2.50E-03	9.82E-03	1.32E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.05E+01	2.07E+01	4.37E+00	3.56E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	6.26E-04	2.28E-03	9.50E-03	1.24E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY PATTRESS PLUS

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWPF	[kg CO2-Eq.]	1.80E+02	2.17E+01	1.22E+02	3.24E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.70E+03	0.00E+00	0.00E+00	-1.70E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.52E+03	2.17E+01	1.22E+02	-1.38E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	4.11E-06	4.00E-06	7.72E-06	1.58E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	8.11E-01	9.61E-02	4.21E-01	1.33E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.40E-01	1.74E-02	5.79E-02	2.16E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.49E-01	3.85E-03	1.91E-02	2.72E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	1.57E+00	1.60E-01	1.23E-01	1.85E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	3.59E+03	3.50E+02	1.93E+03	5.87E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY PATTRESS PLUS

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
PERE	[MJ]	4.07E+02	4.61E+00	2.40E+02	6.52E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	
PERM	[MJ]	1.70E+04	0.00E+00	0.00E+00	1.70E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.74E+04	4.61E+00	2.40E+02	1.77E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	2.21E+03	3.56E+02	1.84E+03	4.40E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	1.75E+03	0.00E+00	0.00E+00	1.75E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	3.96E+03	3.56E+02	1.84E+03	6.15E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.01E+00	1.94E-02	6.56E-01	1.68E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RFS and NRSF are not calculated by the EcoChain software.



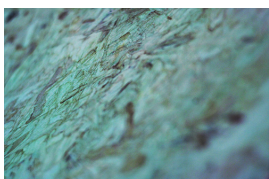
## 4. LCA results - SMARTPLY PATTRESS PLUS

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	1.21E-03	2.47E-03	9.82E-03	1.35E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.19E+01	2.04E+01	4.37E+00	3.67E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	7.85E-04	2.26E-03	9.50E-03	1.25E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY PROPASSIV

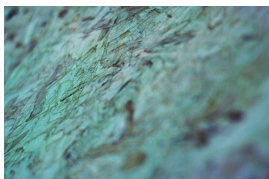
### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWPF	[kg CO2-Eq.]	2.58E+02	2.16E+01	1.59E+02	4.39E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.64E+03	0.00E+00	0.00E+00	-1.64E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.38E+03	2.16E+01	1.59E+02	-1.20E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	4.85E-06	3.99E-06	9.26E-06	1.81E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	1.33E+00	9.61E-02	5.25E-01	1.95E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	2.29E-01	1.74E-02	6.83E-02	3.15E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.65E-01	3.85E-03	2.45E-02	2.93E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	2.13E+00	1.60E-01	1.23E-01	2.42E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	4.71E+03	3.49E+02	2.53E+03	7.59E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.





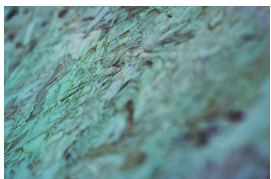
## 4. LCA results - SMARTPLY PROPASSIV

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
PERE	[MJ]	4.44E+02	4.60E+00	3.23E+02	7.71E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.72E+04	0.00E+00	0.00E+00	1.72E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.77E+04	4.60E+00	3.23E+02	1.80E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	3.05E+03	3.55E+02	2.40E+03	5.81E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	2.17E+03	0.00E+00	0.00E+00	2.17E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	5.22E+03	3.55E+02	2.40E+03	7.98E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.09E+00	1.93E-02	7.91E-01	1.90E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RSF and NRSF are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY PROPASSIV

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	3.00E-01	2.46E-03	1.27E-02	3.15E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.66E+01	2.03E+01	5.87E+00	4.28E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	1.13E-03	2.25E-03	1.23E-02	1.57E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY SITEPROTECT

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
GWPF	[kg CO2-Eq.]	3.23E+02	2.20E+01	1.73E+02	5.18E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.64E+03	0.00E+00	0.00E+00	-1.64E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.31E+03	2.20E+01	1.73E+02	-1.12E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	5.07E-06	4.06E-06	9.82E-06	1.90E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	1.62E+00	9.86E-02	5.62E-01	2.28E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	2.53E-01	1.77E-02	7.20E-02	3.42E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.73E-01	3.94E-03	2.64E-02	3.04E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	2.91E+00	1.63E-01	1.23E-01	3.20E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	6.32E+03	3.55E+02	2.75E+03	9.42E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY SITEPROTECT

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
PERE	[MJ]	4.53E+02	4.69E+00	3.53E+02	8.10E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.65E+04	0.00E+00	0.00E+00	1.65E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.70E+04	4.69E+00	3.53E+02	1.73E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	4.11E+03	3.62E+02	2.61E+03	7.08E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	2.86E+03	0.00E+00	0.00E+00	2.86E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	6.97E+03	3.62E+02	2.61E+03	9.94E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.19E+00	1.97E-02	8.39E-01	2.05E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RFS and NRSF are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY SITEPROTECT

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	3.01E-01	2.51E-03	1.37E-02	3.17E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.82E+01	2.07E+01	6.40E+00	4.53E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	1.27E-03	2.29E-03	1.33E-02	1.68E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

## 4. LCA results - SMARTPLY TOUGHPLY

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWPF	[kg CO2-Eq.]	3.24E+02	2.20E+01	2.01E+02	5.47E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.73E+03	0.00E+00	0.00E+00	-1.73E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.41E+03	2.20E+01	2.01E+02	-1.19E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	5.07E-06	4.06E-06	1.10E-05	2.01E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	1.62E+00	9.86E-02	6.42E-01	2.36E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	2.53E-01	1.77E-02	7.99E-02	3.50E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.73E-01	3.94E-03	3.05E-02	3.08E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	2.91E+00	1.63E-01	1.23E-01	3.20E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	6.32E+03	3.56E+02	3.21E+03	9.88E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.

## 4. LCA results - SMARTPLY TOUGHPLY

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	4.59E+02	4.69E+00	4.17E+02	8.81E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.65E+04	0.00E+00	0.00E+00	1.65E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.70E+04	4.69E+00	4.17E+02	1.74E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	4.11E+03	3.62E+02	3.04E+03	7.52E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	2.86E+03	0.00E+00	0.00E+00	2.86E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	6.97E+03	3.62E+02	3.04E+03	1.04E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	1.19E+00	1.97E-02	9.43E-01	2.15E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RFS and NRSF are not calculated by the EcoChain software.

## 4. LCA results - SMARTPLY TOUGHPLY

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	3.01E-01	2.51E-03	1.59E-02	3.19E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.82E+01	2.07E+01	7.54E+00	4.64E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	1.27E-03	2.29E-03	1.54E-02	1.90E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.





## 4. LCA results - SMARTPLY WEBSTOCK

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWPF	[kg CO2-Eq.]	1.50E+02	2.17E+01	1.22E+02	2.93E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPb	[kg CO2-Eq.]	-1.54E+03	0.00E+00	0.00E+00	-1.54E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
GWPt	[kg CO2-Eq.]	-1.39E+03	2.17E+01	1.22E+02	-1.25E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ODP	[kg CFC11-Eq.]	4.11E-06	4.00E-06	7.72E-06	1.58E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
AP	[kg SO2-Eq.]	6.78E-01	9.59E-02	4.21E-01	1.19E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EP	[kg (PO4) -Eq.]	1.30E-01	1.74E-02	5.79E-02	2.06E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP	[kg ethene-Eq.]	2.48E-01	3.85E-03	1.91E-02	2.71E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPE	[kg Sb-Eq.]	1.20E+00	1.60E-01	1.23E-01	1.48E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADPF	[MJ]	2.82E+03	3.50E+02	1.93E+03	5.10E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

GWPF = Global warming potential fossil; GWPb = Global warming potential biogenic; GWPt = Global warming potential total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources.

Note - MND - Module not declared INA - Indicator not assessed.



## 4. LCA results - SMARTPLY WEBSTOCK

### Resource use per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
PERE	[MJ]	8.30E+02	4.61E+00	2.40E+02	1.07E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERM	[MJ]	1.71E+04	0.00E+00	0.00E+00	1.71E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PERT	[MJ]	1.79E+04	4.61E+00	2.40E+02	1.82E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRE	[MJ]	1.42E+03	3.56E+02	1.84E+03	3.61E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRM	[MJ]	1.72E+03	0.00E+00	0.00E+00	1.72E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
PENRT	[MJ]	3.14E+03	3.56E+02	1.84E+03	5.33E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
FW	[m <sup>3</sup> ]	9.79E-01	1.94E-02	6.56E-01	1.65E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water. INA = Indicator not assessed. MND = Module not declared.

SM, RSF and NRSF are not calculated by the EcoChain software.



## 4. LCA results - SMARTPLY WEBSTOCK

### Output flows and waste categories per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
HWD	[kg]	1.14E-03	2.47E-03	9.82E-03	1.34E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
NHWD	[kg]	1.13E+01	2.04E+01	4.37E+00	3.60E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
RWD	[kg]	8.32E-04	2.26E-03	9.50E-03	1.26E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
EET	[MJ]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.



## 5. LCA results - Additional Impact Indicators - SMARTPLY FLAME RETARDANT (FR)

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	4.34E+01	9.94E+00	2.78E+01	8.12E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.95E+01	3.29E-01	3.58E-01	2.02E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	3.00E+04	4.46E+03	2.89E+03	3.74E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.54E+00	5.26E-02	6.20E-01	8.22E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.

## 5. LCA results - Additional Impact Indicators - SMARTPLY OSB2

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Human toxicity potential	kg 1,4-DB-eq	1.75E+01	9.30E+00	2.78E+01	5.47E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.85E+00	3.10E-01	3.58E-01	2.52E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.04E+04	4.18E+03	2.89E+03	1.75E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	3.00E-01	4.94E-02	6.20E-01	9.69E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



## 5. LCA results - Additional Impact Indicators - SMARTPLY OSB3

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	3.23E+01	9.38E+00	2.78E+01	6.95E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.76E+01	3.11E-01	3.58E-01	1.83E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.55E+04	4.21E+03	2.89E+03	2.26E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.28E+00	4.97E-02	6.20E-01	7.95E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



## 5. LCA results - Additional Impact Indicators - SMARTPLY OSB3 (T&G)

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	3.20E+01	9.28E+00	3.35E+01	7.48E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.76E+01	3.08E-01	4.36E-01	1.84E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.53E+04	4.17E+03	3.39E+03	2.29E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.27E+00	4.92E-02	8.35E-01	8.16E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



## 5. LCA results - Additional Impact Indicators - SMARTPLY ULTIMA (OSB4)

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	2.83E+01	9.46E+00	2.78E+01	6.56E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.74E+01	3.15E-01	3.58E-01	1.81E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.16E+04	4.25E+03	2.89E+03	1.87E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.23E+00	5.02E-02	6.20E-01	7.90E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



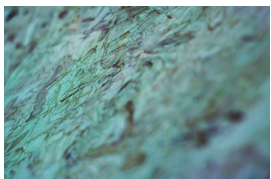


## 5. LCA results - Additional Impact Indicators - SMARTPLY PATRESS PLUS

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	3.23E+01	9.38E+00	2.78E+01	6.95E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.76E+01	3.11E-01	3.58E-01	1.83E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.55E+04	4.21E+03	2.89E+03	2.26E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.28E+00	4.97E-02	6.20E-01	7.95E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



## 5. LCA results - Additional Impact Indicators - SMARTPLY PROPASSIV

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Human toxicity potential	kg 1,4-DB-eq	3.64E+01	9.35E+00	3.36E+01	7.93E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.84E+01	3.10E-01	4.37E-01	1.92E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	2.41E+04	4.20E+03	3.40E+03	3.17E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.70E+00	4.95E-02	8.38E-01	8.59E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



## 5. LCA results - Additional Impact Indicators - SMARTPLY SITEPROTECT

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	4.21E+01	9.53E+00	3.57E+01	8.73E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.90E+01	3.16E-01	4.66E-01	1.98E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	2.96E+04	4.28E+03	3.58E+03	3.75E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.80E+00	5.05E-02	9.17E-01	8.77E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.

## 5. LCA results - Additional Impact Indicators - SMARTPLY TOUGHPLY

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Human toxicity potential	kg 1,4-DB-eq	4.21E+01	9.54E+00	4.01E+01	9.17E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.90E+01	3.16E-01	5.26E-01	1.99E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	2.96E+04	4.28E+03	3.97E+03	3.79E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.80E+00	5.05E-02	1.08E+00	8.94E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note - MND - Module not declared INA - Indicator not assessed.



## 5. LCA results - Additional Impact Indicators - SMARTPLY WEBSTOCK

### Environmental impact per tonne

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Human toxicity potential	kg 1,4-DB-eq	2.99E+01	9.37E+00	2.78E+01	6.71E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Freshwater aquatic ecotoxicity potential	kg 1,4-DB-eq	1.74E+01	3.11E-01	3.58E-01	1.80E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Marine aquatic ecotoxicity potential	kg 1,4-DB-eq	1.31E+04	4.21E+03	2.89E+03	2.02E+04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Terrestrial ecotoxicity potential	kg 1,4-DB-eq	7.23E+00	4.97E-02	6.20E-01	7.90E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

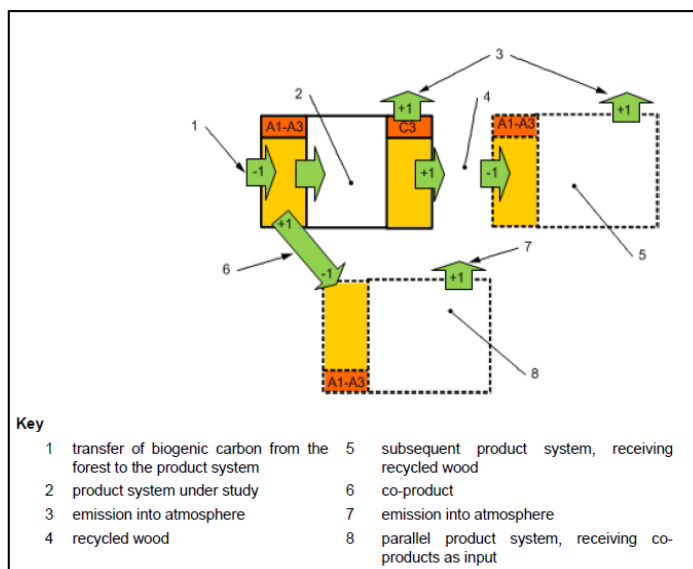
Note - MND - Module not declared INA - Indicator not assessed.

## 6. LCA Results - Additional LCI Indicators

The primary component of SMARTPLY products is wood, which as it grows sequesters atmospheric CO<sub>2</sub>.

For clarity in the EPD, the biogenic CO<sub>2</sub> is reported separately so that the biogenic CO<sub>2</sub> component can be incorporated into any end-of-life scenarios, where these are considered.

Biogenic CO<sub>2</sub> is calculated according to EN 16485:2014 Round and sawn timber – Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction and EN 16449:2014 Wood and wood-based products – Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.



The figure shows that if we assess the product system as a whole, (represented graphically by each full rectangle above, which includes the “+1” arrow, representing release at end-of-life), eventually this CO<sub>2</sub> will be released back into the atmosphere.

The formula used to calculate the biogenic CO<sub>2</sub> is given:

$$\text{where } P_{CO_2} = \frac{44}{12} \times cf \times \frac{\rho_w \times V_w}{1 + \frac{\omega}{100}}$$

$P_{CO_2}$  is the biogenic carbon oxidized as carbon dioxide emission from the product system into the atmosphere (e.g. energy use at the end-of-life) (kg);

$cf$  is the carbon fraction of woody biomass (oven dry mass), 0,5 as the default value;

$\omega$  is the moisture content of the product (e.g. 12 (%));

$\rho_w$  is the density of woody biomass of the product at that moisture content (kg/m<sup>3</sup>);

$V_w$  is the volume of the solid wood product at that moisture content (m<sup>3</sup>).

For wood-based products, wood volume content  $V_w = VP \times \text{percentage of wood}$ .

$VP$  is the gross volume of the wood-based product.

## 6. LCA Results - Additional LCI Indicators

At the end of life (module C, Figure 2) the biogenic CO<sub>2</sub> will be released back into the atmosphere. Although this LCA covers modules A1 – A3 (cradle to factory gate), the release of the biogenic CO<sub>2</sub> at the end of life is also reported separately on the EPD certificate.

Table with input values used to calculate biogenic CO<sub>2</sub> per m<sup>3</sup> wood.

Parameter	Value	Notes
<i>cf</i> , carbon fraction of woody biomass	0.5	As per EN 16449
$\omega$ , moisture content of wood	0 %	
<i>V<math>\omega</math></i> , volume of solid wood at above $\omega$	1.0 m <sup>3</sup>	Calculation is done per m <sup>3</sup>
$\rho_{\omega}$ , density of wood	410 kg/m <sup>3</sup>	Density of wood @ m.c. of 0% (figures supplied by SMARTPLY)

The wood types used in the OSB boards comprises 25% spruce and 75% pine. The oven-dry (at 0% moisture content) densities of these two woods are given by SMARTPLY as 380 and 420 kg/m<sup>3</sup> respectively (data supplied by SMARTPLY). Thus a density of 410 kg/m<sup>3</sup> is used in the biogenic calculation.

The biogenic CO<sub>2</sub> per m<sup>3</sup> of wood =  $(44/12) \times 0.5 \times (410 \times 1.0)/(1 + (0/100)) = 751.67$  kg per cubic metre (m<sup>3</sup>). The wood density is 410 kg/m<sup>3</sup>, thus biogenic CO<sub>2</sub> per kg wood =  $751.67/410 = 1.83$  kg CO<sub>2</sub> per kg. The biogenic CO<sub>2</sub> for the SMARTPLY products are presented in the table below.

Product	Average board density kg/m <sup>3</sup>	kg dry wood per tonne of OSB board	kg biogenic CO <sub>2</sub> per tonne of OSB board	kg biogenic CO <sub>2</sub> per m <sup>3</sup> of OSB board
SMARTPLY FLAME RETARDANT (FR)	600	843.66	1,543.90	926.34
SMARTPLY OSB2	600	931.56	1,704.75	1,022.85
SMARTPLY OSB3	600	919.67	1,683.00	1,009.80
SMARTPLY OSB3 T&G	600	905.34	1,656.77	994.06
SMARTPLY ULTIMA (OSB4)	590	947.14	1,733.27	1,022.63
SMARTPLY PATRESS PLUS	630	931.39	1,704.44	1,073.80
SMARTPLY PROPASSIV	630	894.10	1,636.20	1,030.81
SMARTPLY SITEPROTECT	630	894.46	1,636.86	1,031.22
SMARTPLY TOUGHPLY	660	946.57	1,732.22	1,143.27
SMARTPLY WEBSTOCK	600	843.66	1,543.90	926.34

Taking into account the biogenic CO<sub>2</sub>, the resultant net CO<sub>2</sub> for the SMARTPLY products “at the factory gate”, i.e. as they leave the production plant is given in the table below. This has been carried out so that the total GWP provided is calculated in accordance with EN 16485 and CEN/TR 16970.

Product	GWP from fossil sources per tonne for A1 – A3	Biogenic CO <sub>2</sub> per tonne	Net GWP per tonne for A1 – A3	A1 – A3 GWP per m <sup>3</sup>	Biogenic CO <sub>2</sub> per m <sup>3</sup>	Net GWP per m <sup>3</sup>
SMARTPLY FLAME RETARDANT (FR)	385.66	1,543.90	-1,158.24	231.40	926.34	-694.94
SMARTPLY OSB2	282.06	1,704.75	-1,422.69	169.24	1,022.85	-853.61
SMARTPLY OSB3	323.69	1,683.00	-1,359.31	194.22	1,009.80	-815.58
SMARTPLY OSB3 T&G	358.50	1,656.77	-1,298.27	215.10	994.06	-778.96
SMARTPLY ULTIMA (OSB4)	295.17	1,733.27	-1,438.10	174.15	1,022.63	-848.48
SMARTPLY PATRESS PLUS	323.69	1,704.44	-1,380.75	194.22	1,073.80	-879.58
SMARTPLY PROPASSIV	438.66	1,636.20	-1,197.54	276.36	1,030.81	-754.45
SMARTPLY SITEPROTECT	518.24	1,636.86	-1,118.62	326.49	1,031.22	-704.73
SMARTPLY TOUGHPLY	547.05	1,732.22	-1,185.17	344.64	1,143.27	-798.63
SMARTPLY WEBSTOCK	293.28	1,543.90	-1,250.62	193.57	926.34	-732.77

## 7. Calculation rules

### Methodology and reproducibility

The process descriptions and quantities in this study are 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. In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated which can be accessed via the EcoChain tool. This data portfolio contains a summary of all the data used in this LCA, and correspondingly, in the SMARTPLY EcoChain account.

### Data quality

Data flows have been modeled as realistically as possible. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site is selected in the first instance. Where this is not available, other reference data is selected from appropriate sources.

### Data collection period

The dataset is representative for the production processes used in 2018.

## 8. Scenarios and additional technical information

### A1. Raw materials supply

All relevant resources and materials in production module A1 have been included in this study. This module considers the extraction and processing of all raw materials and energy which occur upstream to the SMARTPLY manufacturing process, as well as waste processing up to the end-of waste state.



## A2. Transport of raw materials to manufacturer

All relevant transport of materials to SMARTPLY's production plant has been included in this study. This includes the transport distance of the raw materials to the manufacturing facility via road, boat and/or train.

## A3. Manufacturing

The production processes are modelled using specific values from primary data collection at the production site. All relevant production processes in module A3 are included in this assessment. All processes in the production of SMARTPLY products use electricity. There is no discrete sub-metering of electrical energy for the various individual processes, hence energy use across the different processes has been allocated based on estimates supplied by SMARTPLY.

Heat is required for two of the processes in the production of SMARTPLY products. These are the flake drying process and the pressing process. Both these processes use biomass fuel that originates at various stages of the manufacturing process. Of the biomass fuel, 35% is allocated to the pressing process and the remaining 65% is allocated to the flake drying process.

Some of the production scraps, i.e. trims, that are used as biomass, also contain MDI, wax and resin, which has been added during the blending stage. The weight of the MDI, wax and resin is accounted for and the weight of the biomass is adjusted accordingly, net of the weight of the MDI, wax and resin. These values presented in rows 6 and 7 in Table 5b, section 4.2.2. This weight of MDI, wax and resin is included as a fuel, as diesel as a proxy in the fuel burning.

In this analysis an equivalent weight of diesel fuel is used as a proxy for the weight of MDI, wax and resin in the biomass that is burnt in the burners.

Diesel was selected as a proxy for the MDI, wax and resin, because the calculated CO<sub>2</sub> emissions from the burning of MDI, wax and resin – based on the assumption that all the carbon in the MDI, wax and resin (determined from molecular weight calculations of their chemical constituents) combines with oxygen in their burning to form CO<sub>2</sub> – is slightly less (approximately 10%) than the CO<sub>2</sub> of burning diesel.

The production site does not have any dangerous waste streams. All other substances and emissions that are released during the production process are included in this assessment.

## 9. Mandatory additional information on release of dangerous substances to indoor air, soil and water

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.

## 10. Other optional additional environmental information

It is not determined as to how the OSB panels are to be processed at the end of life (after 50 years). Therefore this module is not considered in this LCA study. As new and improved systems for the recycling of building products are developed over time, these can be determined and then applied to a future LCA study.

## 11. References

EPD Ireland Product Category Rules: PART A Implementation and use of IS 15804:2012 and CEN TR 16970 in Ireland for the development of Environmental Product Declarations,29.06.2018 -[www.epdireland.org](http://www.epdireland.org)

[1] ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

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[3] ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[4] I.S. EN 15804:2012+A1:2013,; Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', EN 15804:2012+A1:2013.

[5] EcoChain, 2017, web: <http://app.ecochain.com>.

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[9] I.S. EN 16485:2014 Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction.