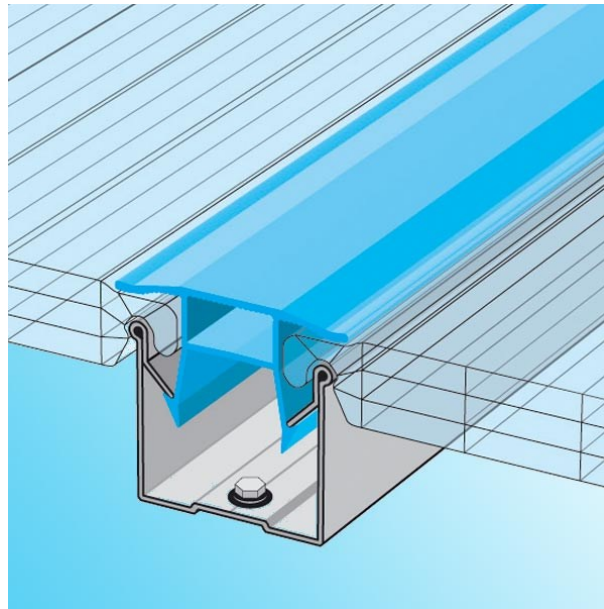




# Environmental Product Declaration



## SUN MODUL®

*Multi-wall polycarbonate extruded panels*

Declaration in compliance with ISO 14025:2010 and EN 15804:2012+A2:2019

Program Operator	EPDItaly	Issue date	16.07.2024
Publisher	EPDItaly	Current version	16.07.2024
Declaration number	AKRAPLAST 02_Rev. 01	Valid until	16.07.2029
Registration number	EPDItaly0802	Published on	www.epditaly.it

## General information

<b>Program Operator</b>	EPDItaly Via Gaetano De Castillia 10, 20124 Milano (MI), Italy <a href="http://www.epditaly.it">www.epditaly.it</a>
<b>EPD Owner</b>	AKRAPLAST Sistemi S.r.l. Via Cascina del Sole 70, 20026 Novate Milanese (MI), Italy <a href="http://www.akraplast.com">www.akraplast.com</a>
<b>Product</b>	SUN MODUL® – Extruded panels in multi-wall polycarbonate
<b>UN CPC Code</b>	3699 – Articles of plastics
<b>Production Unit</b>	Via Cascina del Sole 70, 20026 Novate Milanese (MI), Italy
<b>Declared Unit</b>	1 m <sup>2</sup> of multi-wall polycarbonate extruded panel
<b>Independent verification</b>	This declaration is in compliance with ISO 14025:2010, EN 15804:2012+A2:2019, PCR ICMQ-001/15 Revision 3 and Program Guidelines of EPDItaly Revision 6 of 30.11.2023. Independent external verification of the declaration and data, according to ISO 14025:2010. <input type="checkbox"/> internal <input checked="" type="checkbox"/> external Verification performed by TÜV Italia S.r.l., Viale Fulvio Testi 280/6, 20126 Milano (MI), Italia. Accredited by ACCREDIA.
<b>Comparability</b>	EPDs published within the same product category, but from different Program Operators, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019.
<b>Responsibility</b>	AKRAPLAST Sistemi S.r.l. relieves EPDItaly from any non-compliance with the environmental legislation self-declared by the manufacturer himself. The declaration Owner will be responsible for the information and supporting evidence; EPDItaly declines all responsibility regarding the manufacturer's information, data and results of the life cycle assessment.
<b>Reference documents</b>	EN 15804:2012+A2:2019 – <i>Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.</i> PCR ICMQ-001/15 – <i>Prodotti e servizi per le costruzioni</i> , Revision 3 of 02.12.2019, valid to 01.12.2024. <i>Regolamento del Programma EPDItaly</i> , Revision 6 of 30.11.2023.
<b>Company contacts</b>	Reinaldo Krass T +39 02 3513911 – <a href="mailto:info@akraplast.com">info@akraplast.com</a>
<b>Technical support</b>	Development of Life Cycle Assessment and EPD Arch. Michele Paleari <a href="mailto:michelepaleariarch@gmail.com">michelepaleariarch@gmail.com</a>



## AKRAPLAST Sistemi

AKRAPLAST Sistemi s.r.l. is a producer of translucent systems, sheets and panels for the building branch, especially regarding multi-wall, but also solid polycarbonate products. The headquarter and the production facilities are located in Novate Milanese, inside the polycarbonate district close to Milano / Italy.

The product range includes flat, corrugated and profiled sheets and panels and is therefore suitable for a vast variety of application: flat, pitched, curved and vaulted roofs, rooflights, northlights, domed skylights, conservatories, walkways, canopies, shelters, sheds, translucent or transparent walls, vertical glazing and cladding, light strips, suspended roofs and many more.

AKRAPLAST Sistemi operates all over Europe and on several extra-European markets.

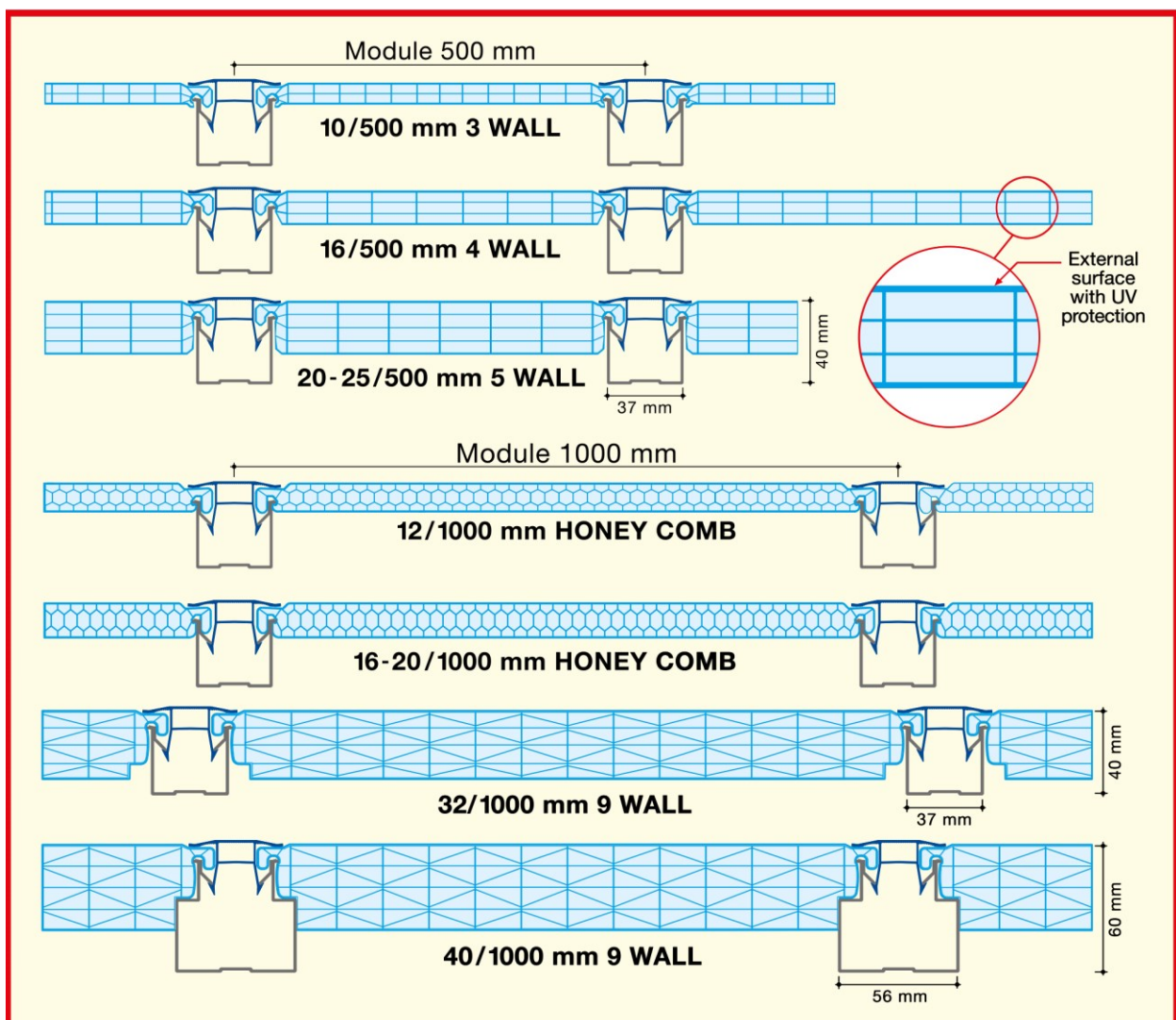


## SUN MODUL®

Selfcarrying glazing system in UV-protected polycarbonate.

The special SUN MODUL multi-wall polycarbonate panels are hooked onto straight or curved steel channels, which allow the system to support high wind and snow loads. Purpose-made polycarbonate clip profiles lock the panels firmly in place. The system is completed by a wide range of framing profiles in aluminium, seals, opening sections and other accessories for every kind of application in modern building.

The SUN MODUL system includes 8 different types of panels, 2 modules in width and 2 types of steel channels, straight or curved with required radius, allowing a great number of combinations, suitable for any specific need.



### SUN MODUL - Characteristics

Type	Thickness	Width	Structure	Weight	Transmittance
10/500	10 mm	500 mm	3 walls	1,95 kg/m <sup>2</sup>	2,73 W/m <sup>2</sup> K
16/500	16 mm	500 mm	4 walls	2,30 kg/m <sup>2</sup>	2,04 W/m <sup>2</sup> K
25/500	25 mm	500 mm	5 walls	2,70 kg/m <sup>2</sup>	1,55 W/m <sup>2</sup> K
12/1000	12 mm	1000 mm	Honeycomb, 4 walls	2,00 kg/m <sup>2</sup>	2,20 W/m <sup>2</sup> K
16/1000	16 mm	1000 mm	Honeycomb, 4 walls	2,60 kg/m <sup>2</sup>	1,99 W/m <sup>2</sup> K
20/1000	20 mm	1000 mm	Honeycomb, 4 walls	2,70 kg/m <sup>2</sup>	1,81 W/m <sup>2</sup> K
32/1000	32 mm	1000 mm	9 walls	3,30 kg/m <sup>2</sup>	1,27 W/m <sup>2</sup> K
40/1000	40 mm	1000 mm	9 walls	4,00 kg/m <sup>2</sup>	1,13 W/m <sup>2</sup> K

### SUN MODUL - Composition

Type	Linear polycarbonate	Branch polycarbonate	UV protective	Fiber glass	Additive
10/500	0,0%	91,8% / 96,1%	3,9%	0,0%	0,0% / 4,0%
16/500	0,0%	92,5% / 96,5%	3,5%	0,0%	0,0% / 4,0%
25/500	0,0%	91,8% / 97,0%	2,9%	0,0%	0,0% / 4,0%
12/1000	0,0%	91,8% / 96,4%	4,0%	0,0%	0,0% / 4,0%
16/1000	0,0%	91,8% / 96,9%	3,1%	0,0%	0,0% / 4,0%
20/1000	0,0%	91,8% / 97,0%	3,0%	0,0%	0,0% / 4,0%
32/1000	0,0%	91,8% / 97,1%	2,4%	0,5%	0,0% / 4,0%
40/1000	0,0%	91,8% / 97,5%	2,0%	0,5%	0,0% / 4,0%

All panels are available in CLEAR, OPAL, BROWN and TRANSLUCENT COLOURS versions. The environmental impacts declared in this EPD are valid for each of the 4 solutions, considering the specific thickness of the panels, as the additives used to modify the colour and the transparency can cause a variation in the impacts relating to the raw materials below the threshold of  $\pm 1\%$ .



UV protection is always present on the external side of the panels in all versions.

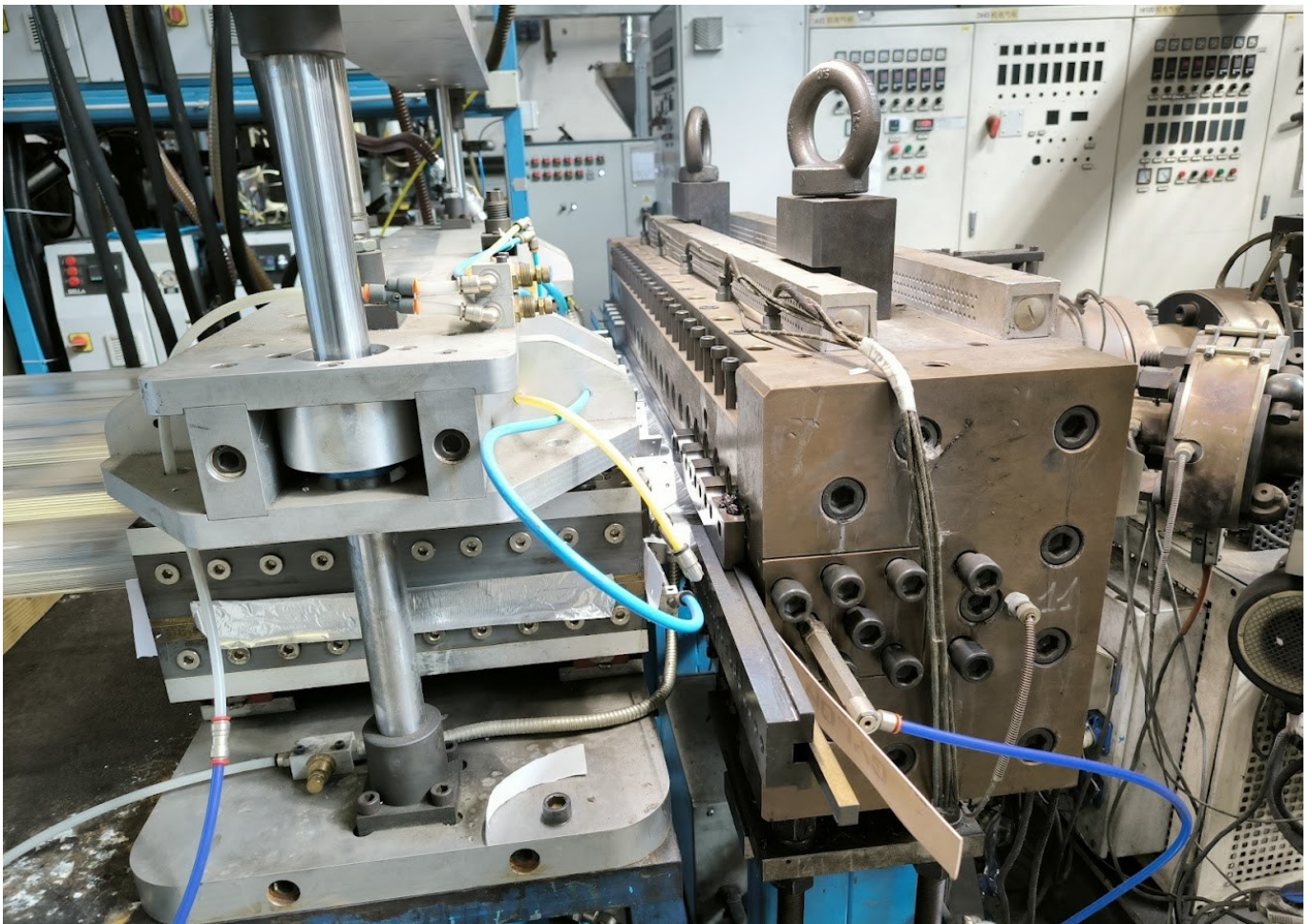
## Production process

The production process consists substantially in the extrusion of various product lines in polycarbonate in different thicknesses.

In the present case the extrusion is made in multi wall polycarbonate.

The raw material, polycarbonate granulate, is heated inside the extruder to a temperature of approximately 270 °C in order to make it sufficiently plastic and fluid. With an endless screw mechanism, the polycarbonate is forced through a properly shaped die, obtaining a continuous artefact.

The protection layer in anti-UV polycarbonate is coextruded on the external surface of the product with a second extruder.



# Life Cycle Assessment

This Environmental Product Declaration and the Life Cycle Assessment on which it is based describe the environmental profile of 8 types of multi-wall polycarbonate extruded panels, named SUN MODUL and produced by AKRAPLAST Sistemi, according to the *from cradle to gate with options* scenario. This scenario includes the stages of production (A1) and transport (A2) of the raw materials and the production process in the plant in Novate Milanese (A3), which are conducted directly by the manufacturer. Downstream of the plant gate, the phases of transport to the installation sites (A4), the installation (A5) are also considered. The use and maintenance phases (B) are excluded in the study and totally devoid of environmental relevance, since there are no replacement or refurbishment operations nor consumption of ancillary materials, energy or water during use. The end-of-life phases are then included in the assessment, i.e. deinstallation of the panels (C1), transport to the treatment centre (C2), processing of the waste for material recycling (C3), disposal of final waste (C4). The benefits achievable from the recovery and recycling processes of waste at the end of the product life are also assessed (D).

UPSTREAM			CORE		DOWNSTREAM											
Manufacturing			Distribution Installation		Use stage							End-of-life stage			Resource recovery	
Raw materials	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

**EPD type:** specific for the multi-wall polycarbonate extruded panels under assessment.

**Geographical area:** Italy, according to production; Europe, according to sale market.

**Reference year:** 2022.

**Software:** SimaPro V. 9.5.

**Database:** Ecoinvent V. 3.9.1.

**Declared unit:** 1 m<sup>2</sup> of multi-wall polycarbonate extruded panel.

**Reference Service Life:** 20 years.

## Environmental performances

The environmental performances of SUN MODUL are reported according to the Declared Unit of 1 m<sup>2</sup> of extruded multi-wall polycarbonate panels with the declared thickness.

SUN MODUL 10/500 - 3 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	1,50 E+01	1,44 E+01	4,02 E-01	1,98 E-01	4,65 E-01	1,13 E+01	-	0,00 E+00	2,35 E-01	0,00 E+00	2,78 E+00	-1,24 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	1,45 E+01	1,40 E+01	3,99 E-01	1,40 E-01	4,62 E-01	1,00 E+01	-	0,00 E+00	2,32 E-01	0,00 E+00	2,66 E+00	-1,22 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	4,72 E-01	4,13 E-01	2,93 E-03	5,64 E-02	3,39 E-03	1,32 E+00	-	0,00 E+00	2,32 E-03	0,00 E+00	1,20 E-01	-2,20 E-01
	GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	1,11 E-02	1,02 E-02	1,97 E-04	7,80 E-04	2,28 E-04	1,78 E-02	-	0,00 E+00	1,37 E-04	0,00 E+00	2,48 E-05	-2,34 E-02
	ODP	kg CFC-11 eq.	1,03 E-06	1,02 E-06	8,70 E-09	1,32 E-09	1,01 E-08	2,05 E-07	-	0,00 E+00	5,06 E-09	0,00 E+00	2,79 E-09	-5,40 E-07
	AP	mol H <sup>+</sup> eq.	6,01 E-02	5,83 E-02	1,20 E-03	5,43 E-04	1,39 E-03	5,54 E-02	-	0,00 E+00	6,62 E-04	0,00 E+00	6,37 E-04	-6,79 E-02
	EP <sub>freshwater</sub>	kg P eq.	3,82 E-03	3,75 E-03	2,81 E-05	3,82 E-05	3,25 E-05	3,70 E-03	-	0,00 E+00	1,97 E-05	0,00 E+00	1,06 E-05	-3,96 E-03
	EP <sub>marine</sub>	kg N eq.	1,16 E-02	1,11 E-02	3,94 E-04	1,86 E-04	4,56 E-04	1,03 E-02	-	0,00 E+00	2,03 E-04	0,00 E+00	6,29 E-04	-1,18 E-02
	EP <sub>terrestrial</sub>	mol N eq.	1,19 E-01	1,13 E-01	4,14 E-03	1,59 E-03	4,79 E-03	1,06 E-01	-	0,00 E+00	2,13 E-03	0,00 E+00	3,04 E-03	-1,21 E-01
	POCP	kg NMVOC eq.	5,50 E-02	5,24 E-02	1,81 E-03	8,01 E-04	2,09 E-03	4,05 E-02	-	0,00 E+00	9,60 E-04	0,00 E+00	8,03 E-04	-4,49 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	9,28 E-05	9,11 E-05	1,29 E-06	3,57 E-07	1,49 E-06	4,72 E-05	-	0,00 E+00	1,01 E-06	0,00 E+00	1,39 E-07	-4,92 E-05
	ADP <sub>fossil</sub>	MJ	3,04 E+02	2,96 E+02	5,67 E+00	2,56 E+00	6,56 E+00	1,19 E+02	-	0,00 E+00	3,27 E+00	0,00 E+00	5,53 E-01	-1,82 E+02
WDP	m <sup>3</sup> <sub>deprived</sub> eq.	6,59 E+00	6,52 E+00	2,32 E-02	3,94 E-02	2,68 E-02	1,82 E+00	-	0,00 E+00	1,35 E-02	0,00 E+00	1,23 E-01	-4,01 E+00	

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.

The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 4,35E+00 kg C.



SUN MODUL 10/500 - 3 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Resource use	PERE	MJ	2,52 E+01	1,48 E+01	1,08 E-01	1,02 E+01	1,25 E-01	1,21 E+01	-	0,00 E+00	8,76 E-02	0,00 E+00	3,05 E-02	-1,48 E+01
	PERM	MJ	3,41 E+00	0,00 E+00	0,00 E+00	3,41 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	2,86 E+01	1,48 E+01	1,08 E-01	1,36 E+01	1,25 E-01	1,21 E+01	-	0,00 E+00	8,76 E-02	0,00 E+00	3,05 E-02	-1,48 E+01
	PENRE	MJ	2,17 E+02	2,09 E+02	6,03 E+00	1,63 E+00	6,97 E+00	1,16 E+02	-	0,00 E+00	3,47 E+00	0,00 E+00	5,99 E-01	-1,94 E+02
	PENRM	MJ	1,09 E+02	1,08 E+02	0,00 E+00	1,10 E+00	0,00 E+00	1,11 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	3,26 E+02	3,18 E+02	6,03 E+00	2,73 E+00	6,97 E+00	1,27 E+02	-	0,00 E+00	3,47 E+00	0,00 E+00	5,99 E-01	-1,94 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	1,77 E-01	1,75 E-01	8,11 E-04	1,07 E-03	9,38 E-04	6,87 E-02	-	0,00 E+00	5,34 E-04	0,00 E+00	3,86 E-03	-1,23 E-01
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 = Net use of fresh water.														
Output flows	HWD	kg	5,10 E-04	4,71 E-04	3,61 E-05	3,42 E-06	4,17 E-05	1,33 E-03	-	0,00 E+00	2,07 E-05	0,00 E+00	3,33 E-06	-2,72 E-04
	NHWD	kg	1,44 E+00	1,14 E+00	2,79 E-01	1,92 E-02	3,22 E-01	2,49 E+00	-	0,00 E+00	1,04 E-01	0,00 E+00	2,24 E-01	-2,24 E+00
	RWD	kg	3,14 E-04	3,09 E-04	1,85 E-06	3,14 E-06	2,14 E-06	1,02 E-04	-	0,00 E+00	1,61 E-06	0,00 E+00	3,07 E-07	-2,00 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	2,35 E-02	0,00 E+00	0,00 E+00	2,35 E-02	0,00 E+00	1,26 E-01	-	0,00 E+00	0,00 E+00	2,89 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,92 E-02	-	0,00 E+00	0,00 E+00	0,00 E+00	1,12 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 16/500 - 4 WALL													
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	1,71 E+01	1,64 E+01	4,60 E-01	2,56 E-01	5,15 E-01	1,17 E+01	-	0,00 E+00	2,53 E-01	0,00 E+00	3,16 E+00	-1,32 E+01
GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	1,66 E+01	1,59 E+01	4,56 E-01	1,81 E-01	5,11 E-01	1,00 E+01	-	0,00 E+00	2,50 E-01	0,00 E+00	3,04 E+00	-1,29 E+01
GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	5,44 E-01	4,66 E-01	3,35 E-03	7,42 E-02	3,75 E-03	1,68 E+00	-	0,00 E+00	2,50 E-03	0,00 E+00	1,20 E-01	-2,40 E-01
GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	1,30 E-02	1,17 E-02	2,25 E-04	1,03 E-03	2,52 E-04	1,78 E-02	-	0,00 E+00	1,47 E-04	0,00 E+00	2,78 E-05	-2,40 E-02
ODP	kg CFC-11 eq.	1,19 E-06	1,18 E-06	9,95 E-09	1,75 E-09	1,11 E-08	2,05 E-07	-	0,00 E+00	5,45 E-09	0,00 E+00	3,19 E-09	-6,07 E-07
AP	mol H <sup>+</sup> eq.	6,88 E-02	6,67 E-02	1,37 E-03	7,17 E-04	1,54 E-03	5,56 E-02	-	0,00 E+00	7,13 E-04	0,00 E+00	7,23 E-04	-7,11 E-02
EP <sub>freshwater</sub>	kg P eq.	4,39 E-03	4,30 E-03	3,22 E-05	5,06 E-05	3,60 E-05	3,71 E-03	-	0,00 E+00	2,12 E-05	0,00 E+00	1,18 E-05	-4,18 E-03
EP <sub>marine</sub>	kg N eq.	1,34 E-02	1,27 E-02	4,51 E-04	2,45 E-04	5,04 E-04	1,04 E-02	-	0,00 E+00	2,19 E-04	0,00 E+00	6,79 E-04	-1,24 E-02
EP <sub>terrestrial</sub>	mol N eq.	1,36 E-01	1,29 E-01	4,74 E-03	2,10 E-03	5,30 E-03	1,07 E-01	-	0,00 E+00	2,29 E-03	0,00 E+00	3,46 E-03	-1,28 E-01
POCP	kg NMVOC eq.	6,31 E-02	6,00 E-02	2,07 E-03	1,04 E-03	2,31 E-03	4,08 E-02	-	0,00 E+00	1,03 E-03	0,00 E+00	9,09 E-04	-4,79 E-02
ADP <sub>minerals and metals</sub>	kg Sb eq.	1,07 E-04	1,05 E-04	1,48 E-06	4,72 E-07	1,65 E-06	4,73 E-05	-	0,00 E+00	1,09 E-06	0,00 E+00	1,57 E-07	-5,50 E-05
ADP <sub>fossil</sub>	MJ	3,48 E+02	3,39 E+02	6,48 E+00	3,38 E+00	7,25 E+00	1,20 E+02	-	0,00 E+00	3,52 E+00	0,00 E+00	6,24 E-01	-1,98 E+02
WDP	m <sup>3</sup> <sub>deprived</sub> eq.	7,55 E+00	7,48 E+00	2,65 E-02	5,21 E-02	2,97 E-02	1,83 E+00	-	0,00 E+00	1,46 E-02	0,00 E+00	1,40 E-01	-4,42 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 5,78E+00 kg C.

SUN MODUL 16/500 - 4 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Resource use	PERE	MJ	3,06 E+01	1,70 E+01	1,24 E-01	1,35 E+01	1,38 E-01	1,22 E+01	-	0,00 E+00	9,44 E-02	0,00 E+00	3,44 E-02	-1,57 E+01
	PERM	MJ	4,52 E+00	0,00 E+00	0,00 E+00	4,52 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	3,51 E+01	1,70 E+01	1,24 E-01	1,80 E+01	1,38 E-01	1,22 E+01	-	0,00 E+00	9,44 E-02	0,00 E+00	3,44 E-02	-1,57 E+01
	PENRE	MJ	2,48 E+02	2,39 E+02	6,89 E+00	2,16 E+00	7,71 E+00	1,16 E+02	-	0,00 E+00	3,74 E+00	0,00 E+00	6,75 E-01	-2,12 E+02
	PENRM	MJ	1,26 E+02	1,25 E+02	0,00 E+00	1,46 E+00	0,00 E+00	1,15 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	3,74 E+02	3,63 E+02	6,89 E+00	3,62 E+00	7,71 E+00	1,28 E+02	-	0,00 E+00	3,74 E+00	0,00 E+00	6,75 E-01	-2,12 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	2,03 E-01	2,01 E-01	9,28 E-04	1,42 E-03	1,04 E-03	6,88 E-02	-	0,00 E+00	5,75 E-04	0,00 E+00	4,41 E-03	-1,34 E-01
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 = Net use of fresh water.														
Output flows	HWD	kg	5,79 E-04	5,34 E-04	4,13 E-05	4,52 E-06	4,62 E-05	1,33 E-03	-	0,00 E+00	2,24 E-05	0,00 E+00	3,75 E-06	-2,95 E-04
	NHWD	kg	1,65 E+00	1,31 E+00	3,19 E-01	2,50 E-02	3,57 E-01	2,49 E+00	-	0,00 E+00	1,12 E-01	0,00 E+00	2,31 E-01	-2,31 E+00
	RWD	kg	3,58 E-04	3,52 E-04	2,12 E-06	4,15 E-06	2,37 E-06	1,03 E-04	-	0,00 E+00	1,73 E-06	0,00 E+00	3,43 E-07	-2,17 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	2,80 E-02	0,00 E+00	0,00 E+00	2,80 E-02	0,00 E+00	1,67 E-01	-	0,00 E+00	0,00 E+00	3,06 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,31 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	1,28 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 25/500 - 5 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	1,95 E+01	1,86 E+01	5,59 E-01	3,59 E-01	5,76 E-01	1,25 E+01	-	0,00 E+00	2,85 E-01	0,00 E+00	3,82 E+00	-1,45 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	1,89 E+01	1,81 E+01	5,55 E-01	2,49 E-01	5,71 E-01	1,01 E+01	-	0,00 E+00	2,82 E-01	0,00 E+00	3,70 E+00	-1,42 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	6,53 E-01	5,42 E-01	4,07 E-03	1,08 E-01	4,19 E-03	2,39 E+00	-	0,00 E+00	2,82 E-03	0,00 E+00	1,20 E-01	-2,75 E-01
	GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	1,51 E-02	1,33 E-02	2,74 E-04	1,51 E-03	2,82 E-04	1,78 E-02	-	0,00 E+00	1,66 E-04	0,00 E+00	3,29 E-05	-2,51 E-02
	ODP	kg CFC-11 eq.	1,44 E-06	1,43 E-06	1,21 E-08	2,54 E-09	1,25 E-08	2,06 E-07	-	0,00 E+00	6,13 E-09	0,00 E+00	3,86 E-09	-7,21 E-07
	AP	mol H <sup>+</sup> eq.	7,83 E-02	7,56 E-02	1,67 E-03	1,03 E-03	1,72 E-03	5,61 E-02	-	0,00 E+00	8,02 E-04	0,00 E+00	8,73 E-04	-7,67 E-02
	EP <sub>freshwater</sub>	kg P eq.	5,09 E-03	4,97 E-03	3,91 E-05	7,31 E-05	4,03 E-05	3,72 E-03	-	0,00 E+00	2,39 E-05	0,00 E+00	1,37 E-05	-4,56 E-03
	EP <sub>marine</sub>	kg N eq.	1,52 E-02	1,43 E-02	5,48 E-04	3,55 E-04	5,64 E-04	1,05 E-02	-	0,00 E+00	2,46 E-04	0,00 E+00	7,64 E-04	-1,35 E-02
	EP <sub>terrestrial</sub>	mol N eq.	1,54 E-01	1,45 E-01	5,76 E-03	3,03 E-03	5,93 E-03	1,09 E-01	-	0,00 E+00	2,58 E-03	0,00 E+00	4,19 E-03	-1,38 E-01
	POCP	kg NMVOC eq.	7,24 E-02	6,84 E-02	2,51 E-03	1,46 E-03	2,59 E-03	4,12 E-02	-	0,00 E+00	1,16 E-03	0,00 E+00	1,09 E-03	-5,30 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	1,26 E-04	1,23 E-04	1,80 E-06	6,76 E-07	1,85 E-06	4,76 E-05	-	0,00 E+00	1,23 E-06	0,00 E+00	1,89 E-07	-6,50 E-05
	ADP <sub>fossil</sub>	MJ	3,90 E+02	3,77 E+02	7,88 E+00	4,83 E+00	8,12 E+00	1,22 E+02	-	0,00 E+00	3,96 E+00	0,00 E+00	7,45 E-01	-2,26 E+02
	WDP	m <sup>3</sup> <sub>deprived</sub> eq.	9,03 E+00	8,92 E+00	3,23 E-02	7,46 E-02	3,32 E-02	1,84 E+00	-	0,00 E+00	1,64 E-02	0,00 E+00	1,70 E-01	-5,14 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 8,48E+00 kg C.

SUN MODUL 25/500 - 5 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Resource use	PERE	MJ	3,97 E+01	1,97 E+01	1,50 E-01	1,99 E+01	1,55 E-01	1,23 E+01	-	0,00 E+00	1,06 E-01	0,00 E+00	4,10 E-02	-1,71 E+01
	PERM	MJ	6,65 E+00	0,00 E+00	0,00 E+00	6,65 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	4,63 E+01	1,97 E+01	1,50 E-01	2,65 E+01	1,55 E-01	1,23 E+01	-	0,00 E+00	1,06 E-01	0,00 E+00	4,10 E-02	-1,71 E+01
	PENRE	MJ	2,81 E+02	2,70 E+02	8,38 E+00	3,10 E+00	8,63 E+00	1,17 E+02	-	0,00 E+00	4,21 E+00	0,00 E+00	8,06 E-01	-2,42 E+02
	PENRM	MJ	1,37 E+02	1,34 E+02	0,00 E+00	2,06 E+00	0,00 E+00	1,24 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	4,18 E+02	4,04 E+02	8,38 E+00	5,16 E+00	8,63 E+00	1,29 E+02	-	0,00 E+00	4,21 E+00	0,00 E+00	8,06 E-01	-2,42 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	2,43 E-01	2,40 E-01	1,13 E-03	2,04 E-03	1,16 E-03	6,92 E-02	-	0,00 E+00	6,47 E-04	0,00 E+00	5,35 E-03	-1,53 E-01
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 = Net use of fresh water.														
Output flows	HWD	kg	6,72 E-04	6,15 E-04	5,02 E-05	6,57 E-06	5,17 E-05	1,33 E-03	-	0,00 E+00	2,52 E-05	0,00 E+00	4,48 E-06	-3,35 E-04
	NHWD	kg	1,90 E+00	1,47 E+00	3,88 E-01	3,55 E-02	3,99 E-01	2,50 E+00	-	0,00 E+00	1,26 E-01	0,00 E+00	2,43 E-01	-2,42 E+00
	RWD	kg	4,20 E-04	4,11 E-04	2,57 E-06	5,99 E-06	2,65 E-06	1,04 E-04	-	0,00 E+00	1,95 E-06	0,00 E+00	4,05 E-07	-2,47 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	3,30 E-02	0,00 E+00	0,00 E+00	3,30 E-02	0,00 E+00	2,44 E-01	-	0,00 E+00	0,00 E+00	3,34 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,93 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	1,55 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 12/1000 - 4 WALL HONEYCOMB														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	1,47 E+01	1,41 E+01	4,14 E-01	2,01 E-01	4,73 E-01	1,14 E+01	-	0,00 E+00	2,38 E-01	0,00 E+00	2,86 E+00	-1,26 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	1,42 E+01	1,37 E+01	4,11 E-01	1,42 E-01	4,69 E-01	9,98 E+00	-	0,00 E+00	2,36 E-01	0,00 E+00	2,74 E+00	-1,23 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	4,44 E-01	3,83 E-01	3,01 E-03	5,83 E-02	3,45 E-03	1,36 E+00	-	0,00 E+00	2,36 E-03	0,00 E+00	1,20 E-01	-2,24 E-01
	GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	1,15 E-02	1,05 E-02	2,03 E-04	7,94 E-04	2,32 E-04	1,77 E-02	-	0,00 E+00	1,39 E-04	0,00 E+00	2,54 E-05	-2,36 E-02
	ODP	kg CFC-11 eq.	1,05 E-06	1,04 E-06	8,95 E-09	1,34 E-09	1,02 E-08	2,05 E-07	-	0,00 E+00	5,13 E-09	0,00 E+00	2,87 E-09	-5,55 E-07
	AP	mol H <sup>+</sup> eq.	6,01 E-02	5,83 E-02	1,24 E-03	5,48 E-04	1,41 E-03	5,53 E-02	-	0,00 E+00	6,71 E-04	0,00 E+00	6,54 E-04	-6,85 E-02
	EP <sub>freshwater</sub>	kg P eq.	3,85 E-03	3,78 E-03	2,89 E-05	3,86 E-05	3,31 E-05	3,69 E-03	-	0,00 E+00	2,00 E-05	0,00 E+00	1,09 E-05	-4,00 E-03
	EP <sub>marine</sub>	kg N eq.	1,16 E-02	1,11 E-02	4,05 E-04	1,88 E-04	4,64 E-04	1,03 E-02	-	0,00 E+00	2,06 E-04	0,00 E+00	6,39 E-04	-1,19 E-02
	EP <sub>terrestrial</sub>	mol N eq.	1,19 E-01	1,13 E-01	4,26 E-03	1,62 E-03	4,87 E-03	1,06 E-01	-	0,00 E+00	2,16 E-03	0,00 E+00	3,12 E-03	-1,23 E-01
	POCP	kg NMVOC eq.	5,49 E-02	5,23 E-02	1,86 E-03	8,18 E-04	2,12 E-03	4,04 E-02	-	0,00 E+00	9,73 E-04	0,00 E+00	8,25 E-04	-4,55 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	9,55 E-05	9,38 E-05	1,33 E-06	3,58 E-07	1,52 E-06	4,71 E-05	-	0,00 E+00	1,03 E-06	0,00 E+00	1,42 E-07	-5,03 E-05
	ADP <sub>fossil</sub>	MJ	3,05 E+02	2,96 E+02	5,83 E+00	2,56 E+00	6,67 E+00	1,18 E+02	-	0,00 E+00	3,31 E+00	0,00 E+00	5,68 E-01	-1,85 E+02
	WDP	m <sup>3</sup> <sub>deprived</sub> eq.	6,59 E+00	6,52 E+00	2,39 E-02	3,93 E-02	2,73 E-02	1,81 E+00	-	0,00 E+00	1,37 E-02	0,00 E+00	1,26 E-01	-4,08 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 4,52E+00 kg C.

**SUN MODUL 12/1000 - 4 WALL HONEYCOMB**

Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
<b>Resource use</b>	PERE	MJ	2,55 E+01	1,48 E+01	1,11 E-01	1,06 E+01	1,27 E-01	1,21 E+01	-	0,00 E+00	8,89 E-02	0,00 E+00	3,13 E-02	-1,50 E+01
	PERM	MJ	3,53 E+00	0,00 E+00	0,00 E+00	3,53 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	2,90 E+01	1,48 E+01	1,11 E-01	1,41 E+01	1,27 E-01	1,21 E+01	-	0,00 E+00	8,89 E-02	0,00 E+00	3,13 E-02	-1,50 E+01
	PENRE	MJ	2,12 E+02	2,04 E+02	6,20 E+00	1,64 E+00	7,09 E+00	1,15 E+02	-	0,00 E+00	3,52 E+00	0,00 E+00	6,14 E-01	-1,97 E+02
	PENRM	MJ	1,15 E+02	1,14 E+02	0,00 E+00	1,10 E+00	0,00 E+00	1,07 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	3,27 E+02	3,18 E+02	6,20 E+00	2,74 E+00	7,09 E+00	1,26 E+02	-	0,00 E+00	3,52 E+00	0,00 E+00	6,14 E-01	-1,97 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	1,77 E-01	1,75 E-01	8,34 E-04	1,08 E-03	9,54 E-04	6,85 E-02	-	0,00 E+00	5,41 E-04	0,00 E+00	3,97 E-03	-1,25 E-01
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 = Net use of fresh water.														
<b>Output flows</b>	HWD	kg	4,84 E-04	4,44 E-04	3,71 E-05	3,47 E-06	4,24 E-05	1,32 E-03	-	0,00 E+00	2,10 E-05	0,00 E+00	3,41 E-06	-2,77 E-04
	NHWD	kg	1,47 E+00	1,16 E+00	2,87 E-01	1,96 E-02	3,28 E-01	2,49 E+00	-	0,00 E+00	1,06 E-01	0,00 E+00	2,26 E-01	-2,25 E+00
	RWD	kg	3,05 E-04	3,00 E-04	1,90 E-06	3,18 E-06	2,18 E-06	1,02 E-04	-	0,00 E+00	1,63 E-06	0,00 E+00	3,15 E-07	-2,03 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	2,45 E-02	0,00 E+00	0,00 E+00	2,45 E-02	0,00 E+00	1,30 E-01	-	0,00 E+00	0,00 E+00	2,92 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,03 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	1,15 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 16/1000 - 4 WALL HONEYCOMB														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	1,81 E+01	1,73 E+01	5,24 E-01	2,87 E-01	5,46 E-01	1,19 E+01	-	0,00 E+00	2,73 E-01	0,00 E+00	3,59 E+00	-1,40 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	1,75 E+01	1,68 E+01	5,20 E-01	2,03 E-01	5,42 E-01	1,00 E+01	-	0,00 E+00	2,70 E-01	0,00 E+00	3,47 E+00	-1,37 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	5,59 E-01	4,72 E-01	3,82 E-03	8,26 E-02	3,98 E-03	1,85 E+00	-	0,00 E+00	2,70 E-03	0,00 E+00	1,20 E-01	-2,63 E-01
	GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	1,44 E-02	1,30 E-02	2,57 E-04	1,15 E-03	2,67 E-04	1,78 E-02	-	0,00 E+00	1,59 E-04	0,00 E+00	3,11 E-05	-2,47 E-02
	ODP	kg CFC-11 eq.	1,34 E-06	1,32 E-06	1,13 E-08	1,97 E-09	1,18 E-08	2,05 E-07	-	0,00 E+00	5,88 E-09	0,00 E+00	3,62 E-09	-6,82 E-07
	AP	mol H <sup>+</sup> eq.	7,41 E-02	7,17 E-02	1,57 E-03	8,05 E-04	1,63 E-03	5,57 E-02	-	0,00 E+00	7,69 E-04	0,00 E+00	8,20 E-04	-7,47 E-02
	EP <sub>freshwater</sub>	kg P eq.	4,79 E-03	4,70 E-03	3,67 E-05	5,68 E-05	3,82 E-05	3,71 E-03	-	0,00 E+00	2,29 E-05	0,00 E+00	1,31 E-05	-4,42 E-03
	EP <sub>marine</sub>	kg N eq.	1,43 E-02	1,36 E-02	5,14 E-04	2,75 E-04	5,35 E-04	1,04 E-02	-	0,00 E+00	2,36 E-04	0,00 E+00	7,34 E-04	-1,31 E-02
	EP <sub>terrestrial</sub>	mol N eq.	1,46 E-01	1,38 E-01	5,40 E-03	2,35 E-03	5,62 E-03	1,07 E-01	-	0,00 E+00	2,47 E-03	0,00 E+00	3,93 E-03	-1,34 E-01
	POCP	kg NMVOC eq.	6,80 E-02	6,44 E-02	2,35 E-03	1,16 E-03	2,45 E-03	4,08 E-02	-	0,00 E+00	1,12 E-03	0,00 E+00	1,03 E-03	-5,11 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	1,20 E-04	1,18 E-04	1,69 E-06	5,31 E-07	1,75 E-06	4,73 E-05	-	0,00 E+00	1,18 E-06	0,00 E+00	1,77 E-07	-6,15 E-05
	ADP <sub>fossil</sub>	MJ	3,73 E+02	3,61 E+02	7,39 E+00	3,81 E+00	7,69 E+00	1,20 E+02	-	0,00 E+00	3,80 E+00	0,00 E+00	7,02 E-01	-2,16 E+02
	WDP	m <sup>3</sup> <sub>deprived</sub> eq.	8,32 E+00	8,23 E+00	3,03 E-02	5,87 E-02	3,15 E-02	1,82 E+00	-	0,00 E+00	1,57 E-02	0,00 E+00	1,59 E-01	-4,87 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 6,41E+00 kg C.



**SUN MODUL 16/1000 - 4 WALL HONEYCOMB**

Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
<b>Resource use</b>	PERE	MJ	3,35 E+01	1,84 E+01	1,41 E-01	1,50 E+01	1,47 E-01	1,22 E+01	-	0,00 E+00	1,02 E-01	0,00 E+00	3,86 E-02	-1,66 E+01
	PERM	MJ	5,03 E+00	0,00 E+00	0,00 E+00	5,03 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	3,85 E+01	1,84 E+01	1,41 E-01	2,00 E+01	1,47 E-01	1,22 E+01	-	0,00 E+00	1,02 E-01	0,00 E+00	3,86 E-02	-1,66 E+01
	PENRE	MJ	2,60 E+02	2,50 E+02	7,86 E+00	2,43 E+00	8,18 E+00	1,16 E+02	-	0,00 E+00	4,04 E+00	0,00 E+00	7,60 E-01	-2,31 E+02
	PENRM	MJ	1,39 E+02	1,38 E+02	0,00 E+00	1,65 E+00	0,00 E+00	1,14 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	3,99 E+02	3,88 E+02	7,86 E+00	4,07 E+00	8,18 E+00	1,27 E+02	-	0,00 E+00	4,04 E+00	0,00 E+00	7,60 E-01	-2,31 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	2,23 E-01	2,20 E-01	1,06 E-03	1,60 E-03	1,10 E-03	6,88 E-02	-	0,00 E+00	6,21 E-04	0,00 E+00	5,02 E-03	-1,46 E-01
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 = Net use of fresh water.														
<b>Output flows</b>	HWD	kg	5,98 E-04	5,46 E-04	4,71 E-05	5,06 E-06	4,90 E-05	1,33 E-03	-	0,00 E+00	2,41 E-05	0,00 E+00	4,23 E-06	-3,22 E-04
	NHWD	kg	1,82 E+00	1,43 E+00	3,64 E-01	2,80 E-02	3,78 E-01	2,49 E+00	-	0,00 E+00	1,21 E-01	0,00 E+00	2,39 E-01	-2,38 E+00
	RWD	kg	3,80 E-04	3,73 E-04	2,41 E-06	4,66 E-06	2,51 E-06	1,03 E-04	-	0,00 E+00	1,87 E-06	0,00 E+00	3,83 E-07	-2,36 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	3,12 E-02	0,00 E+00	0,00 E+00	3,12 E-02	0,00 E+00	1,87 E-01	-	0,00 E+00	0,00 E+00	3,23 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,46 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	1,46 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 20/1000 - 4 WALL HONEYCOMB														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	2,13 E+01	2,03 E+01	6,57 E-01	3,20 E-01	5,64 E-01	1,21 E+01	-	0,00 E+00	3,15 E-01	0,00 E+00	4,48 E+00	-1,58 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	2,06 E+01	1,98 E+01	6,52 E-01	2,28 E-01	5,59 E-01	1,00 E+01	-	0,00 E+00	3,12 E-01	0,00 E+00	4,36 E+00	-1,55 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	6,63 E-01	5,66 E-01	4,78 E-03	9,13 E-02	4,11 E-03	2,02 E+00	-	0,00 E+00	3,12 E-03	0,00 E+00	1,21 E-01	-3,10 E-01
	GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	1,70 E-02	1,54 E-02	3,22 E-04	1,30 E-03	2,76 E-04	1,78 E-02	-	0,00 E+00	1,84 E-04	0,00 E+00	3,80 E-05	-2,62 E-02
	ODP	kg CFC-11 eq.	1,68 E-06	1,66 E-06	1,42 E-08	2,23 E-09	1,22 E-08	2,06 E-07	-	0,00 E+00	6,79 E-09	0,00 E+00	4,54 E-09	-8,39 E-07
	AP	mol H <sup>+</sup> eq.	8,73 E-02	8,45 E-02	1,96 E-03	9,14 E-04	1,68 E-03	5,57 E-02	-	0,00 E+00	8,88 E-04	0,00 E+00	1,02 E-03	-8,23 E-02
	EP <sub>freshwater</sub>	kg P eq.	5,76 E-03	5,65 E-03	4,60 E-05	6,45 E-05	3,94 E-05	3,71 E-03	-	0,00 E+00	2,64 E-05	0,00 E+00	1,57 E-05	-4,94 E-03
	EP <sub>marine</sub>	kg N eq.	1,68 E-02	1,59 E-02	6,44 E-04	3,11 E-04	5,52 E-04	1,04 E-02	-	0,00 E+00	2,73 E-04	0,00 E+00	8,50 E-04	-1,45 E-02
	EP <sub>terrestrial</sub>	mol N eq.	1,71 E-01	1,61 E-01	6,76 E-03	2,65 E-03	5,81 E-03	1,08 E-01	-	0,00 E+00	2,86 E-03	0,00 E+00	4,92 E-03	-1,49 E-01
	POCP	kg NMVOC eq.	8,07 E-02	7,64 E-02	2,95 E-03	1,30 E-03	2,53 E-03	4,08 E-02	-	0,00 E+00	1,29 E-03	0,00 E+00	1,28 E-03	-5,80 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	1,47 E-04	1,44 E-04	2,11 E-06	6,08 E-07	1,81 E-06	4,73 E-05	-	0,00 E+00	1,36 E-06	0,00 E+00	2,20 E-07	-7,51 E-05
	ADP <sub>fossil</sub>	MJ	4,33 E+02	4,19 E+02	9,26 E+00	4,36 E+00	7,95 E+00	1,20 E+02	-	0,00 E+00	4,39 E+00	0,00 E+00	8,66 E-01	-2,53 E+02
	WDP	m <sup>3</sup> <sub>deprived</sub> eq.	1,03 E+01	1,02 E+01	3,79 E-02	6,74 E-02	3,25 E-02	1,82 E+00	-	0,00 E+00	1,81 E-02	0,00 E+00	2,00 E-01	-5,81 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 7,07E+00 kg C.

**SUN MODUL 20/1000 - 4 WALL HONEYCOMB**

Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
<b>Resource use</b>	PERE	MJ	3,88 E+01	2,21 E+01	1,77 E-01	1,65 E+01	1,52 E-01	1,22 E+01	-	0,00 E+00	1,18 E-01	0,00 E+00	4,76 E-02	-1,86 E+01
	PERM	MJ	5,57 E+00	0,00 E+00	0,00 E+00	5,57 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	4,44 E+01	2,21 E+01	1,77 E-01	2,21 E+01	1,52 E-01	1,22 E+01	-	0,00 E+00	1,18 E-01	0,00 E+00	4,76 E-02	-1,86 E+01
	PENRE	MJ	3,06 E+02	2,93 E+02	9,84 E+00	2,77 E+00	8,45 E+00	1,16 E+02	-	0,00 E+00	4,66 E+00	0,00 E+00	9,38 E-01	-2,71 E+02
	PENRM	MJ	1,58 E+02	1,56 E+02	0,00 E+00	1,90 E+00	0,00 E+00	1,14 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	4,64 E+02	4,49 E+02	9,84 E+00	4,67 E+00	8,45 E+00	1,27 E+02	-	0,00 E+00	4,66 E+00	0,00 E+00	9,38 E-01	-2,71 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	2,77 E-01	2,74 E-01	1,32 E-03	1,83 E-03	1,14 E-03	6,88 E-02	-	0,00 E+00	7,16 E-04	0,00 E+00	6,29 E-03	-1,71 E-01
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 = Net use of fresh water.														
<b>Output flows</b>	HWD	kg	7,15 E-04	6,51 E-04	5,89 E-05	5,70 E-06	5,06 E-05	1,33 E-03	-	0,00 E+00	2,78 E-05	0,00 E+00	5,22 E-06	-3,76 E-04
	NHWD	kg	2,17 E+00	1,68 E+00	4,55 E-01	3,13 E-02	3,91 E-01	2,49 E+00	-	0,00 E+00	1,40 E-01	0,00 E+00	2,55 E-01	-2,54 E+00
	RWD	kg	4,61 E-04	4,53 E-04	3,02 E-06	5,28 E-06	2,59 E-06	1,03 E-04	-	0,00 E+00	2,16 E-06	0,00 E+00	4,66 E-07	-2,76 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	3,27 E-02	0,00 E+00	0,00 E+00	3,27 E-02	0,00 E+00	2,08 E-01	-	0,00 E+00	0,00 E+00	3,61 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,62 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	1,83 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 32/1000 - 9 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	2,53 E+01	2,41 E+01	6,80 E-01	4,44 E-01	6,47 E-01	1,27 E+01	-	0,00 E+00	3,21 E-01	0,00 E+00	4,61 E+00	-1,61 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	2,44 E+01	2,35 E+01	6,75 E-01	3,18 E-01	6,42 E-01	1,00 E+01	-	0,00 E+00	3,17 E-01	0,00 E+00	4,48 E+00	-1,57 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	7,91 E-01	6,62 E-01	4,95 E-03	1,24 E-01	4,71 E-03	2,67 E+00	-	0,00 E+00	3,17 E-03	0,00 E+00	1,21 E-01	-3,16 E-01
	GWP <sub>lutuc</sub>	kg CO <sub>2</sub> eq.	2,00 E-02	1,78 E-02	3,33 E-04	1,82 E-03	3,17 E-04	1,78 E-02	-	0,00 E+00	1,87 E-04	0,00 E+00	3,90 E-05	-2,64 E-02
	ODP	kg CFC-11 eq.	1,78 E-06	1,76 E-06	1,47 E-08	3,18 E-09	1,40 E-08	2,06 E-07	-	0,00 E+00	6,91 E-09	0,00 E+00	4,67 E-09	-8,61 E-07
	AP	mol H <sup>+</sup> eq.	1,03 E-01	9,95 E-02	2,03 E-03	1,30 E-03	1,93 E-03	5,58 E-02	-	0,00 E+00	9,04 E-04	0,00 E+00	1,05 E-03	-8,34 E-02
	EP <sub>freshwater</sub>	kg P eq.	6,57 E-03	6,43 E-03	4,76 E-05	9,19 E-05	4,53 E-05	3,70 E-03	-	0,00 E+00	2,69 E-05	0,00 E+00	1,61 E-05	-5,01 E-03
	EP <sub>marine</sub>	kg N eq.	2,00 E-02	1,89 E-02	6,66 E-04	4,39 E-04	6,34 E-04	1,05 E-02	-	0,00 E+00	2,77 E-04	0,00 E+00	8,66 E-04	-1,47 E-02
	EP <sub>terrestrial</sub>	mol N eq.	2,04 E-01	1,93 E-01	7,00 E-03	3,72 E-03	6,66 E-03	1,08 E-01	-	0,00 E+00	2,91 E-03	0,00 E+00	5,06 E-03	-1,51 E-01
	POCP	kg NMVOC eq.	9,40 E-02	8,92 E-02	3,05 E-03	1,79 E-03	2,90 E-03	4,10 E-02	-	0,00 E+00	1,31 E-03	0,00 E+00	1,31 E-03	-5,89 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	1,63 E-04	1,60 E-04	2,18 E-06	8,77 E-07	2,08 E-06	4,73 E-05	-	0,00 E+00	1,38 E-06	0,00 E+00	2,26 E-07	-7,70 E-05
	ADP <sub>fossil</sub>	MJ	5,22 E+02	5,06 E+02	9,58 E+00	6,30 E+00	9,12 E+00	1,19 E+02	-	0,00 E+00	4,46 E+00	0,00 E+00	8,89 E-01	-2,58 E+02
	WDP	m <sup>3</sup> <sub>deprived</sub> eq.	1,12 E+01	1,11 E+01	3,92 E-02	9,78 E-02	3,73 E-02	1,82 E+00	-	0,00 E+00	1,85 E-02	0,00 E+00	2,05 E-01	-5,93 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 9,57E+00 kg C.

SUN MODUL 32/1000 - 9 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Resource use	PERE	MJ	4,77 E+01	2,52 E+01	1,83 E-01	2,23 E+01	1,74 E-01	1,22 E+01	-	0,00 E+00	1,20 E-01	0,00 E+00	4,89 E-02	-1,89 E+01
	PERM	MJ	7,60 E+00	0,00 E+00	0,00 E+00	7,60 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	5,53 E+01	2,52 E+01	1,83 E-01	2,99 E+01	1,74 E-01	1,22 E+01	-	0,00 E+00	1,20 E-01	0,00 E+00	4,89 E-02	-1,89 E+01
	PENRE	MJ	3,64 E+02	3,50 E+02	1,02 E+01	3,97 E+00	9,69 E+00	1,16 E+02	-	0,00 E+00	4,74 E+00	0,00 E+00	9,63 E-01	-2,76 E+02
	PENRM	MJ	1,96 E+02	1,93 E+02	0,00 E+00	2,77 E+00	0,00 E+00	1,10 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	5,60 E+02	5,43 E+02	1,02 E+01	6,74 E+00	9,69 E+00	1,27 E+02	-	0,00 E+00	4,74 E+00	0,00 E+00	9,63 E-01	-2,76 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	3,01 E-01	2,97 E-01	1,37 E-03	2,64 E-03	1,30 E-03	6,88 E-02	-	0,00 E+00	7,29 E-04	0,00 E+00	6,47 E-03	-1,75 E-01
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 = Net use of fresh water.														
Output flows	HWD	kg	8,35 E-04	7,66 E-04	6,10 E-05	8,03 E-06	5,80 E-05	1,33 E-03	-	0,00 E+00	2,83 E-05	0,00 E+00	5,36 E-06	-3,84 E-04
	NHWD	kg	2,49 E+00	1,98 E+00	4,71 E-01	4,35 E-02	4,48 E-01	2,50 E+00	-	0,00 E+00	1,42 E-01	0,00 E+00	2,57 E-01	-2,56 E+00
	RWD	kg	5,24 E-04	5,14 E-04	3,13 E-06	7,50 E-06	2,98 E-06	1,03 E-04	-	0,00 E+00	2,20 E-06	0,00 E+00	4,78 E-07	-2,82 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	4,04 E-02	0,00 E+00	0,00 E+00	4,04 E-02	0,00 E+00	2,88 E-01	-	0,00 E+00	0,00 E+00	3,66 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,21 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	1,88 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

SUN MODUL 40/1000 - 9 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Environmental impacts	GWP <sub>total</sub>	kg CO <sub>2</sub> eq.	3,18 E+01	3,03 E+01	9,50 E-01	5,58 E-01	7,38 E-01	1,36 E+01	-	0,00 E+00	4,05 E-01	0,00 E+00	6,39 E+00	-1,96 E+01
	GWP <sub>fossil</sub>	kg CO <sub>2</sub> eq.	3,08 E+01	2,95 E+01	9,43 E-01	3,90 E-01	7,32 E-01	1,01 E+01	-	0,00 E+00	4,01 E-01	0,00 E+00	6,27 E+00	-1,92 E+01
	GWP <sub>biogenic</sub>	kg CO <sub>2</sub> eq.	1,03 E+00	8,58 E-01	6,92 E-03	1,65 E-01	5,37 E-03	3,57 E+00	-	0,00 E+00	4,01 E-03	0,00 E+00	1,21 E-01	-4,10 E-01
	GWP <sub>luluc</sub>	kg CO <sub>2</sub> eq.	2,54 E-02	2,26 E-02	4,65 E-04	2,34 E-03	3,61 E-04	1,78 E-02	-	0,00 E+00	2,36 E-04	0,00 E+00	5,28 E-05	-2,93 E-02
	ODP	kg CFC-11 eq.	2,47 E-06	2,44 E-06	2,06 E-08	3,98 E-09	1,60 E-08	2,06 E-07	-	0,00 E+00	8,72 E-09	0,00 E+00	6,51 E-09	-1,18 E-06
	AP	mol H <sup>+</sup> eq.	1,30 E-01	1,25 E-01	2,84 E-03	1,63 E-03	2,20 E-03	5,60 E-02	-	0,00 E+00	1,14 E-03	0,00 E+00	1,46 E-03	-9,87 E-02
	EP <sub>freshwater</sub>	kg P eq.	8,52 E-03	8,33 E-03	6,65 E-05	1,15 E-04	5,16 E-05	3,70 E-03	-	0,00 E+00	3,39 E-05	0,00 E+00	2,14 E-05	-6,05 E-03
	EP <sub>marine</sub>	kg N eq.	2,50 E-02	2,35 E-02	9,31 E-04	5,54 E-04	7,23 E-04	1,06 E-02	-	0,00 E+00	3,50 E-04	0,00 E+00	1,10 E-03	-1,76 E-02
	EP <sub>terrestrial</sub>	mol N eq.	2,54 E-01	2,39 E-01	9,79 E-03	4,74 E-03	7,60 E-03	1,09 E-01	-	0,00 E+00	3,67 E-03	0,00 E+00	7,04 E-03	-1,80 E-01
	POCP	kg NMVOC eq.	1,20 E-01	1,13 E-01	4,27 E-03	2,27 E-03	3,31 E-03	4,12 E-02	-	0,00 E+00	1,66 E-03	0,00 E+00	1,81 E-03	-7,27 E-02
	ADP <sub>minerals and metals</sub>	kg Sb eq.	2,17 E-04	2,13 E-04	3,05 E-06	1,08 E-06	2,37 E-06	4,73 E-05	-	0,00 E+00	1,75 E-06	0,00 E+00	3,12 E-07	-1,04 E-04
	ADP <sub>fossil</sub>	MJ	6,41 E+02	6,20 E+02	1,34 E+01	7,71 E+00	1,04 E+01	1,19 E+02	-	0,00 E+00	5,64 E+00	0,00 E+00	1,22 E+00	-3,33 E+02
	WDP	m <sup>3</sup> <sub>deprived</sub> eq.	1,52 E+01	1,51 E+01	5,48 E-02	1,19 E-01	4,26 E-02	1,82 E+00	-	0,00 E+00	2,33 E-02	0,00 E+00	2,86 E-01	-7,82 E+00

GWP = Global warming potential (total, fossil fuels, biogenic, land use and land use change); ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential (freshwater, marine, terrestrial); POCP = Formation potential of tropospheric ozone; ADP<sub>minerals and metals</sub> = Abiotic depletion potential for non-fossil resources; ADP<sub>fossil</sub> = Abiotic depletion potential for fossil resources; WDP = Water user deprivation potential.  
 The results of the environmental impact indicators of ADP<sub>minerals and metals</sub>, ADP<sub>fossil</sub> and WDP shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.  
 The additional environmental impact indicators have been calculated for all the products, but not reported in the EPD.

The biogenic carbon content in the accompanying packaging is: 1,30E+01 kg C.

SUN MODUL 40/1000 - 9 WALL														
Parameter	Unit	Total A1-A3	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D	
Resource use	PERE	MJ	6,34 E+01	3,27 E+01	2,56 E-01	3,04 E+01	1,98 E-01	1,22 E+01	-	0,00 E+00	1,51 E-01	0,00 E+00	6,69 E-02	-2,29 E+01
	PERM	MJ	1,02 E+01	0,00 E+00	0,00 E+00	1,02 E+01	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PERT	MJ	7,36 E+01	3,27 E+01	2,56 E-01	4,06 E+01	1,98 E-01	1,22 E+01	-	0,00 E+00	1,51 E-01	0,00 E+00	6,69 E-02	-2,29 E+01
	PENRE	MJ	4,57 E+02	4,37 E+02	1,42 E+01	4,92 E+00	1,11 E+01	1,16 E+02	-	0,00 E+00	5,99 E+00	0,00 E+00	1,32 E+00	-3,56 E+02
	PENRM	MJ	2,31 E+02	2,28 E+02	0,00 E+00	3,34 E+00	0,00 E+00	1,09 E+01	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	PENRT	MJ	6,87 E+02	6,65 E+02	1,42 E+01	8,25 E+00	1,11 E+01	1,27 E+02	-	0,00 E+00	5,99 E+00	0,00 E+00	1,32 E+00	-3,56 E+02
	SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	FW	m <sup>3</sup>	4,09 E-01	4,04 E-01	1,92 E-03	3,24 E-03	1,49 E-03	6,88 E-02	-	0,00 E+00	9,21 E-04	0,00 E+00	9,04 E-03	-2,25 E-01
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 = Net use of fresh water.														
Output flows	HWD	kg	1,08 E-03	9,81 E-04	8,53 E-05	1,02 E-05	6,62 E-05	1,33 E-03	-	0,00 E+00	3,58 E-05	0,00 E+00	7,35 E-06	-4,93 E-04
	NHWD	kg	3,18 E+00	2,47 E+00	6,59 E-01	5,50 E-02	5,11 E-01	2,50 E+00	-	0,00 E+00	1,80 E-01	0,00 E+00	2,90 E-01	-2,87 E+00
	RWD	kg	6,89 E-04	6,75 E-04	4,37 E-06	9,44 E-06	3,39 E-06	1,03 E-04	-	0,00 E+00	2,77 E-06	0,00 E+00	6,45 E-07	-3,62 E-04
	CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	MFR	kg	4,86 E-02	0,00 E+00	0,00 E+00	4,86 E-02	0,00 E+00	3,78 E-01	-	0,00 E+00	0,00 E+00	4,41 E+00	0,00 E+00	0,00 E+00
	MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,96 E-01	-	0,00 E+00	0,00 E+00	0,00 E+00	2,63 E+00	0,00 E+00
	EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
	EET	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	-	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
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; EET = Exported thermal energy.														

## Calculation rules

The environmental profiles of SUN MODUL polycarbonate panels presented in this EPD are based on a Life Cycle Assessment, conducted according to the UNI EN ISO 14040:2006, UNI EN ISO 14044:2006, UNI EN ISO 14025:2010, EN 15804:2012+A2:2019, PCR ICMQ-001/15 Revision 3 and Regolamento del Programma EPDItaly Revision 6. The environmental analysis covers the entire life-cycle of the product, according to the *from cradle to grave* scenario, in which infrastructures, production plants and their maintenance are not considered.

The LCA study is based on primary data collected by AKRAPLAST Sistemi regarding the bill of materials, raw materials characteristics, packaging materials, electrical energy and natural gas consumed in production, transport for raw and packaging materials and for finished product delivery to the clients. Ecoinvent V. 3.9.1 database was adopted to describe the processes for which primary data were not available; the LCA model was built with SimaPro V. 9.5 software in order to obtain the environmental results presented in this EPD.

AKRAPLAST Sistemi produces many series of polycarbonate panels with different characteristics but the extrusion processes are similar for all; for this reason, the electricity consumptions for production, offices and general services and the natural gas consumption for heating were allocated in linear way on the total production.

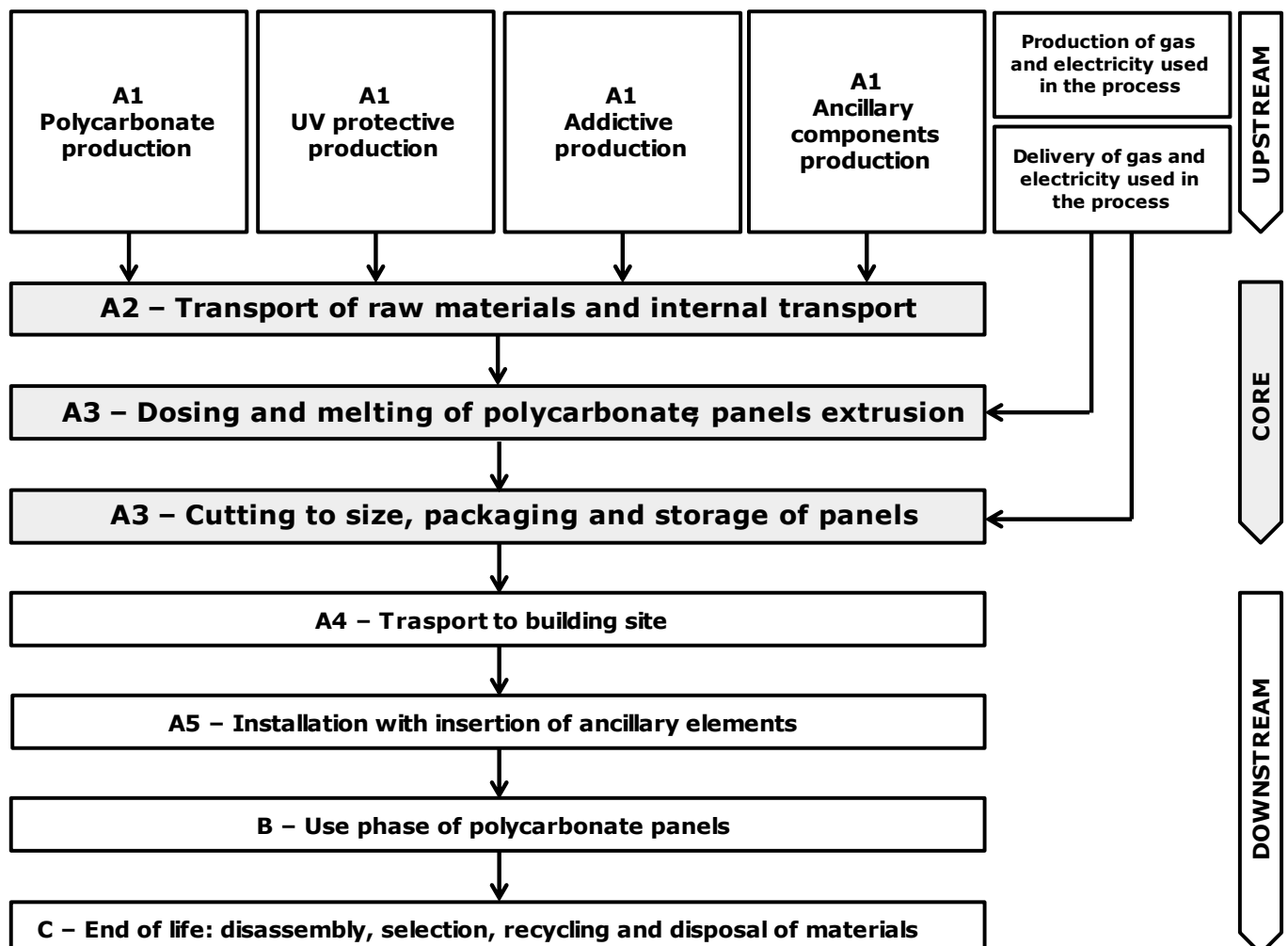
According to the cut-off rules, the energy consumption for manual devices in installation and deinstallation were excluded, together with the production plant maintenance.





## System boundaries

The system boundaries of the analysed process include all the phases from the procurement of raw materials to the management of waste at the end of the product's life, with the subdivision into Upstream, Core and Downstream process. The Upstream phase (A1-A2) includes the activities of materials production and the generation of the energy carriers. The Core process includes the raw materials delivery to AKRAPLAST production site in Novate Milanese and the manufacturing of polycarbonate panels; the production of packaging materials and the production waste management are also included. The Downstream phase comprises the transport to the client, installation, use and maintenance, deinstallation and end-of-life scenarios of the product with the collection of waste materials to be sent to recycling process.



# Assumptions

## *Marketing*

AKRAPLAST Sistemi markets its products mainly in Europe and the weighted average transport distances may vary according to the market conditions. The average delivery distance for SUN MODUL in 2022 is 577 km and transport were carried out exclusively on trucks.

## *Installation*

During the installation phase, battery-powered tools are used for a very short time, therefore the impacts are considered negligible. On the contrary, the impacts caused by ancillary elements, such as extruded aluminum and polycarbonate profiles, steel profiles, polyethylene and EPDM gaskets, are included in the assessment and are evaluated considering an average use per m<sup>2</sup> of polycarbonate panels.

## *End of life*

The deinstallation phase generates the product itself as waste which is separated from the metallic ancillary elements and transferred to treatment centers which is assumed to be at a distance of 100 km. In case of waste recycling processes, the materials selection is assumed to be not necessary, as they are homogeneous elements already separable during deinstallation and not contaminated by other elements. The final destinations shown in the table below are assumed for the materials in the product.

Material	Treatment	Percentage
Polycarbonate panels	Recycling	50%
	Waste-to-energy	50%
Steel elements	Recycling	95%
	Landfill	5%
Aluminium profiles	Recycling	95%
	Landfill	5%
Polyethylene gaskets	Recycling	80%
	Waste-to-energy	20%
EPDM gaskets	Landfill	100%

## References

- UNI EN ISO 14040:2006 – *Valutazione del ciclo di vita – Principi e quadro di riferimento*;
- UNI EN ISO 14044:2006 – *Valutazione del ciclo di vita – Requisiti e linee guida*;
- UNI EN ISO 14025:2010 – *Etichette e dichiarazioni ambientali – Dichiarazioni ambientali di Tipo III - Principi e procedure*;
- EN 15804:2012+A2:2019 – *Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*;
- PCR ICMQ-001/15 – *Prodotti e servizi per le costruzioni*, Revision 3 of 02.12.2019, valid to 01.12.2024;
- *Regolamento del Programma EPDIItaly*, Revision 6 of 30.11.2023
- *Report di Analisi di Life Cycle Assessment e Environmental Product Declaration di lastre estruse in policarbonato alveolare*, Revision 2 of 10.06.2024.





**SUN MODUL®**

*Multi-wall polycarbonate extruded panels*