

EN 15804+A2 EPD



## ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2. Owner of the Declaration – Architectural & Metal Systems Ltd.

Declaration number: EPDIE-21-72  
Issue date 9th February 2022  
Valid to 9th February 2027





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



### Architectural Windows

XT66 Performance Plus Tilt & Turn DG 1.23m x 1.48m  
XT66 Performance Plus Tilt & Turn TG 1.23m x 1.48m  
XT66 Performance Plus Tilt & Turn DG 1.48m x 2.18m  
XT66 Performance Plus Tilt & Turn TG 1.48m x 2.18m  
XT66 Tilt & Turn DG 1.23m x 1.48m  
XT66 Tilt & Turn TG 1.23m x 1.48m  
XT66 Tilt & Turn DG 1.48m x 2.18m  
XT66 Tilt & Turn TG 1.48m x 2.18m

# 1. General information

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council 19 Mountjoy Square, Dublin D01 E8P5 info@igbc.ie	Architectural & Metal Systems Ltd. Wallingstown, Little Island, Co. Cork T45 VP40 +353 21 470 5100; info@ams.ie
DECLARATION NUMBER	PRODUCTION SITE
EPDIE-21-72	Architectural & Metal Systems Ltd. Wallingstown, Little Island, Co. Cork T45 VP40
ECO PLATFORM EPD	DECLARED UNIT
Yes	XT66 Performance Plus Tilt & Turn DG 1.23m x 1.48m XT66 Performance Plus Tilt & Turn TG 1.23m x 1.48m XT66 Performance Plus Tilt & Turn DG 1.48m x 2.18m XT66 Performance Plus Tilt & Turn TG 1.48m x 2.18m
APPLICABLE PRODUCT CATEGORY RULES	DECLARED PRODUCT
EN 15804:2012+A2:2019, EPD Ireland PCR Part A I.S. EN 17213:2020 Windows and doors - Environmental Product Declarations - Product category rules for windows and pedestrian doorsets.	XT66 Performance Plus Tilt & Turn DG 1.23m x 1.48m XT66 Performance Plus Tilt & Turn TG 1.23m x 1.48m XT66 Performance Plus Tilt & Turn DG 1.48m x 2.18m XT66 Performance Plus Tilt & Turn TG 1.48m x 2.18m XT66 Tilt & Turn DG 1.23m x 1.48m XT66 Tilt & Turn TG 1.23m x 1.48m XT66 Tilt & Turn DG 1.48m x 2.18m XT66 Tilt & Turn TG 1.48m x 2.18m
DATE OF ISSUE	SCOPE OF EPD
9th February 2022	Cradle to gate with options, modules C1 - C4, and module D
DATE OF EXPIRY	LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA
9th February 2027	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 version 3.2.12
PRODUCT CLASSIFICATION OR NACE CODE	NAME AND VERSION OF INVENTORY USED
Nace code 25:12	Ecoinvent version 3.6
COMPARABILITY	
Environmental Product Declarations from different programmes may not be directly comparable if not compliant with EN 15804:2012+A2:2019. 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+A2:2019	
The CEN Norm /EN 15804 serves as the core PCR	
Independent verification of the declaration according to ISO 14025	
Internally <input type="checkbox"/> Externally <input checked="" type="checkbox"/>	
SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO - Irish Green Building Council   	Kim Allbury - Intertek Deutschland GmbH   

## 2. Scope and Type of EPD

### Scope

This EPD is Cradle to gate with options, modules C1 - C4, and module D. 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	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
MDT	MDT	MDT	OP	OP	OP	OP	OP	OP	OP	OP	OP	MDT	MDT	MDT	MDT	MDT

X = Module declared; ND = Module not declared; MDT = Mandatory; OP = Optional.

The geographical areas for which this EPD is representative - and where the results can be applied - are the regions of Europe (including the United Kingdom, post-Brexit) and North America.

The geographical region for the end-of-life disposal is assumed to be Ireland, although some products are also used in the UK regions (NI and GB).

### Declared functional Unit

The Declared Unit in this EPD is for 1.23m x 1.48m and 1.48m x 2.18m each of the XT66 Performance Plus Tilt & Turn windows, for both double-glazed and triple-glazed versions. The impact results in this EPD are given for these window sizes, for these four window products. These results also apply to and are representative of the XT66 Tilt & Turn windows (non-Performance Plus versions of the same window configurations), as the environmental impacts of these two sets of windows (i.e. Performance Plus and non-Performance Plus) are within + or - 10% of each other.

### System Boundaries

This LCA covers the Product (A1 - A3), Construction Process (A4, A5), End of Life Stage (C1 - C4) stages, as well as as the benefits and loads beyond the system boundary (D)

### 3. Detailed product description

Profiles and frames (without glass) are assembled at the AMS factory site. Aluminium profiles are painted, combined with PVC strips, filled with foam filler insulation, and then cut to size. The completed profiles are then assembled into the designed window/door/facade unit size, with the addition of handles, locks, receivers, etc.. Profiles and frames are packaged in light plastic bubblewrap packaging for dispatch to the customer, where the requisite double or triple glazing unit is fitted.

The intended use of the products are as windows in residential, educational and commercial buildings. The windows are manufactured to the requirements of I.S. EN 14351-1:2006 +A1:2010 Windows and doors - Product standard, performance characteristics. A wide variety of frame sizes are manufactured at the AMS production and fabrication sites, each specifically sized to the customers' specifications. At the customers' assembly site, the frames are fitted with double or triple glazing. As the weight of the specific glass installed is not determined by AMS, and may vary, the weight of glass in the tables below is indicative. Full technical specifications and performance characteristics for each of the products can be downloaded at [www.ams.ie](http://www.ams.ie).

The relative percentages of materials in the windows is given below. These are based on an averages between the Performance Plus and non-Performance Plus versions, as the differences in the mass of the materials between the two window version types is in the order of 1 to 2%.

Window type (XT66 and XT66 Performance Plus)	Size	
Double Glazed Unit	1.23 x 1.48	1.48 x 2.18
Aluminium (Profile Extrusions)	28.4	23.8
Thermal break, gaskets, insulation strips (plastics)	13.3	11.4
Powder Coating	1.0	1.0
Hardware (Handle, Espag locks, hinges, restrictors etc.)	6.6	3.9
Double glazing (1.3 m <sup>2</sup> area)	50.7	59.8
Total	100.0	100.0
Additional weight of bubblewrap packaging	+1	+0.7

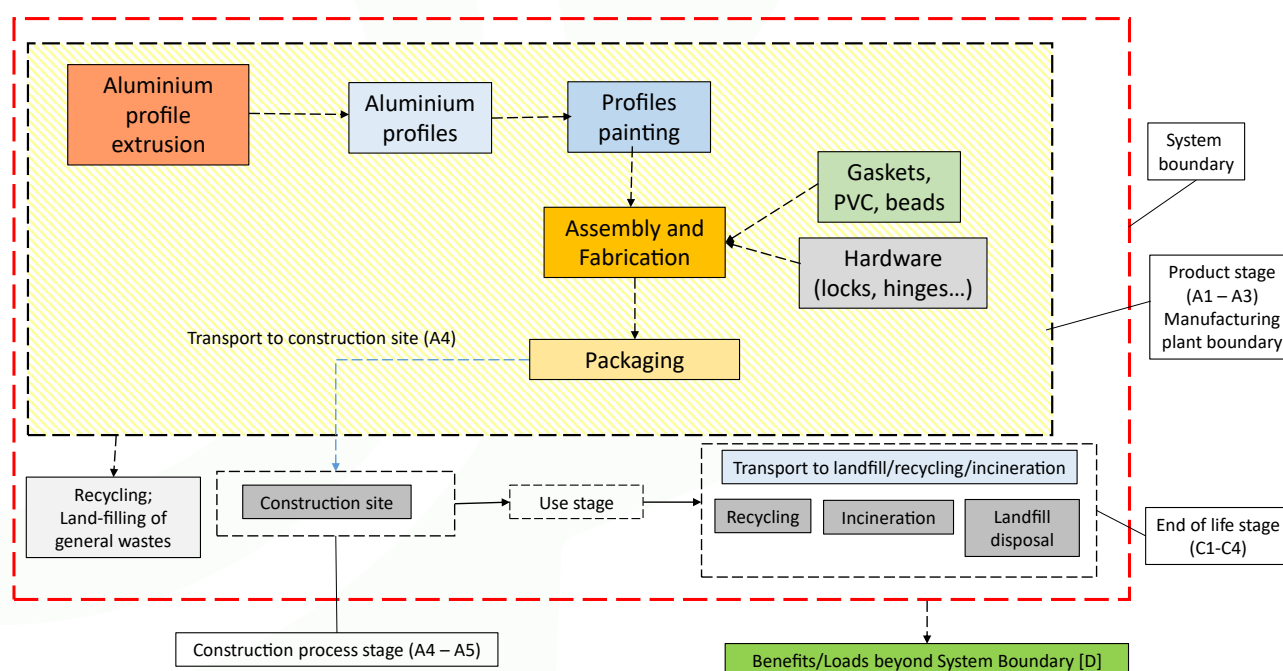
XT66 and XT66 Performance Plus	Size	
Triple Glazed Unit	1.23 x 1.48	1.48 x 2.18
Aluminium (Profile Extrusions)	22.5	18.2
Thermal break, gaskets, insulation strips (plastics)	10.7	10.5
Powder Coating	0.8	0.8
Hardware (Handle, Espag locks, hinges, restrictors etc.)	5.3	3.1
Triple glazing (1.3 m <sup>2</sup> area)	60.8	67.5
Total	100.0	100.0
Additional weight of bubblewrap packaging	+0.8	+0.7

Window type	System U-Value	
XT66 Performance Plus Tilt & Turn - DGU 1.23m x 1.48m	1.16	W/(m <sup>2</sup> ·K)
XT66 Performance Plus Tilt & Turn - TGU 1.23m x 1.48m	0.87	W/(m <sup>2</sup> ·K)
XT66 Performance Plus Tilt & Turn - DGU 1.48m x 2.18m	1.12	W/(m <sup>2</sup> ·K)
XT66 Performance Plus Tilt & Turn - TGU 1.48m x 2.18m	0.81	W/(m <sup>2</sup> ·K)

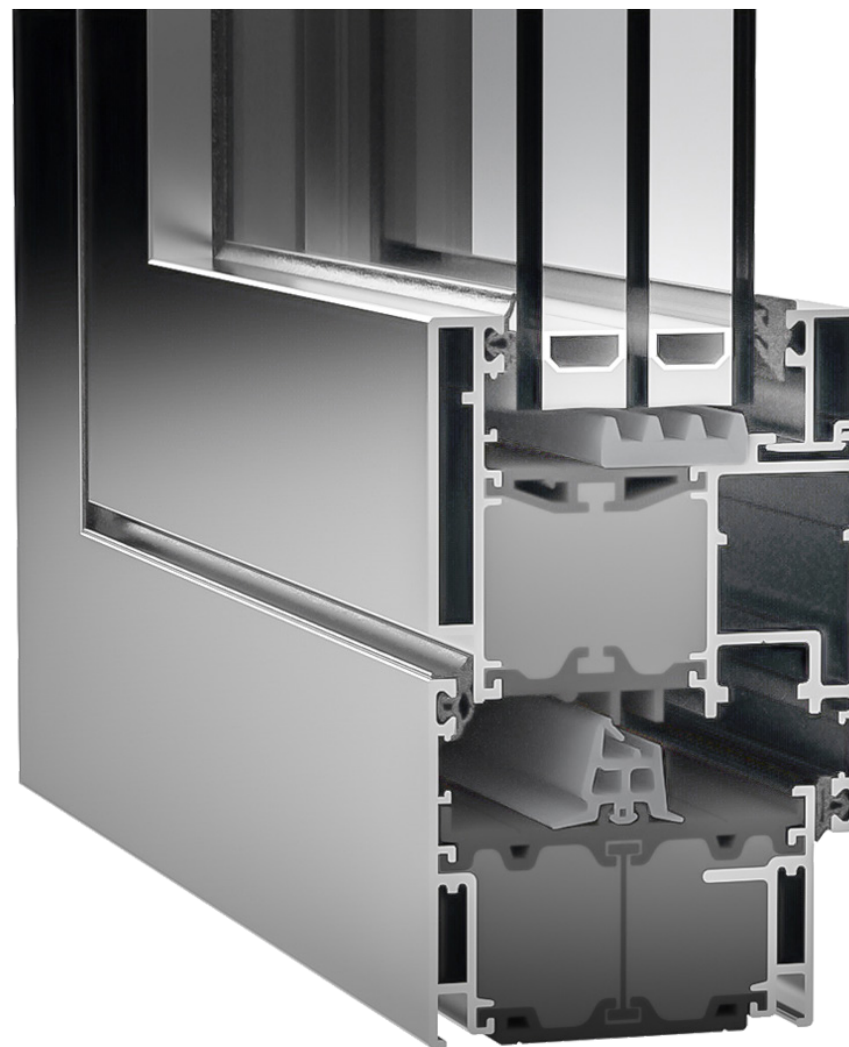
Note: window u-values are dependent on glazing unit configuration and size.

### 3.1 Manufacturing Process Description

Extruded aluminium profiles are fed into a powder-coating paint line. After powder-coating, thermal insulation components are added to the profiles (such as foam filling, and application of rubber gaskets). The profiles are then worked on in the fabrication unit, where they are then cut to final size, and the hardware pieces are added. Frames are packaged before dispatch to customers.



1.23m x 1.48m window type  
XT66 Performance Plus Tilt  
& Turn DG (double glazed)



## 4.1.A. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

### Core Environmental impact per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	3.25E+02	6.01E-01	1.03E+00	3.27E+02	8.28E-01	3.27E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.27E-01	3.27E+00	8.98E-04	-1.39E+02
GWP-fossil	[kg CO <sub>2</sub> eq.]	3.22E+02	6.00E-01	1.02E+00	3.23E+02	8.28E-01	3.23E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.27E-01	3.22E+00	8.96E-04	-1.36E+02
GWP-biogenic	[kg CO <sub>2</sub> eq.]	9.55E-01	3.44E-04	1.03E-02	9.65E-01	4.45E-04	9.65E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.76E-04	4.91E-02	1.84E-06	-7.68E-01
GWP-luluc	[kg CO <sub>2</sub> eq.]	2.95E+00	2.18E-04	3.59E-04	2.95E+00	2.95E-04	2.95E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.16E-04	3.19E-03	2.50E-07	-2.70E+00
ODP	[kg CFC-11 eq.]	3.19E-05	1.35E-07	8.33E-08	3.21E-05	1.88E-07	3.21E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.43E-08	2.85E-07	3.68E-10	-1.57E-05
AP	[mol H <sup>+</sup> eq.]	2.27E+00	2.64E-03	2.11E-03	2.27E+00	2.38E-03	2.27E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.38E-04	1.75E-02	8.50E-06	-7.60E-01
EP-freshwater	[kg P eq.]	1.27E-02	5.20E-06	1.12E-05	1.27E-02	6.61E-06	1.27E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.61E-06	1.26E-04	1.00E-08	-6.55E-03
EP-marine	[kg N eq.]	3.20E-01	4.15E-04	4.05E-04	3.21E-01	4.71E-04	3.21E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.86E-04	3.58E-03	2.92E-06	-8.70E-02
EP-terrestrial	[mol N eq.]	3.63E+00	4.68E-03	4.63E-03	3.64E+00	5.26E-03	3.64E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.08E-03	4.14E-02	3.22E-05	-9.85E-01
POCP	[kg NMVOC eq.]	1.11E+00	1.69E-03	1.33E-03	1.11E+00	2.02E-03	1.11E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.96E-04	1.13E-02	9.36E-06	-3.58E-01
ADP-minerals&metals <sup>[2]</sup>	[kg Sb eq.]	6.74E-03	1.55E-05	3.87E-04	7.14E-03	2.28E-05	7.14E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.02E-06	1.35E-02	8.21E-09	-5.78E-04
ADP-fossils <sup>[2]</sup>	[MJ] ncv	4.04E+03	9.05E+00	1.17E+01	4.06E+03	1.25E+01	4.06E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.94E+00	3.50E+01	2.50E-02	-1.96E+03
WDP <sup>[2]</sup>	m <sup>3</sup> world eq. deprived	8.57E+01	2.88E-02	1.23E-01	8.58E+01	3.54E-02	8.58E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.40E-02	3.28E+00	1.12E-03	-2.98E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; GWP-biogenic= Global Warming Potential biogenic; GWP-luluc= Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP=Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

<sup>[2]</sup>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

ND = Module not declared; INA = Indicator not assessed.

## 4.1.B. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Resource use per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	8.99E+02	1.35E-01	7.62E-01	9.00E+02	1.79E-01	9.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.07E-02	4.81E+00	2.03E-04	-7.32E+02
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	8.99E+02	1.35E-01	7.62E-01	9.00E+02	1.79E-01	9.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.07E-02	4.81E+00	2.03E-04	-7.32E+02
PENRE	[MJ]	4.07E+03	1.03E+01	1.28E+01	4.10E+03	1.28E+01	4.34E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.24E+00	1.07E+02	2.66E-02	-2.08E+03
PENRM	[MJ]	2.39E+02	0.00E+00	0.00E+00	2.39E+02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	4.31E+03	9.60E+00	1.28E+01	4.34E+03	1.28E+01	4.34E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.24E+00	1.07E+02	2.66E-02	-2.08E+03
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.82E+03
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m <sup>3</sup> ]	5.22E+00	1.02E-03	3.07E-03	5.22E+00	1.34E-03	5.22E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.28E-04	1.51E-01	2.67E-05	-4.67E+00

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.

ND = Module not declared; INA = Indicator not assessed.

#### 4.1.C. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Output flows and waste categories per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	5.75E-03	2.26E-05	7.86E-04	6.56E-03	3.28E-05	6.56E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.29E-05	2.73E-02	3.74E-08	-1.37E-03
NHWD	[kg]	8.97E+01	4.14E-01	6.23E-02	9.01E+01	6.09E-01	9.01E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.40E-01	1.53E+01	1.69E-01	-3.48E+01
RWD	[kg]	1.32E-02	6.14E-05	2.61E-05	1.33E-02	8.52E-05	1.33E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.36E-05	1.78E-04	1.64E-07	-1.24E-02
CRU	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MFR	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MER	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EEE	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EET	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA

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.

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

ND = Module not declared; INA = Indicator not assessed.

#### 4.1.D. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Additional Environmental impact per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	2.30E-05	3.70E-08	1.16E-08	2.31E-05	5.26E-08	2.31E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.08E-08	1.66E-07	1.65E-10	-7.74E-06
IRP <sup>[1]</sup>	kBq U235 eq	1.32E+01	3.96E-02	1.97E-02	1.33E+01	5.47E-02	1.33E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.16E-02	1.33E-01	1.03E-04	-1.28E+01
ETP-fw <sup>[2]</sup>	CTUe	1.06E+04	7.23E+00	1.10E+01	1.06E+04	1.01E+01	1.06E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.98E+00	1.77E+02	1.62E-02	-2.26E+03
HTP-c <sup>[2]</sup>	CTUe	8.46E-07	2.04E-10	5.66E-10	8.47E-07	2.81E-10	8.47E-09	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.11E-10	4.69E-09	3.77E-13	-3.53E-07
HTP-nc <sup>[2]</sup>	CTUe	9.47E-06	7.47E-09	8.24E-09	9.49E-06	1.06E-08	9.49E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.19E-09	1.38E-07	1.15E-11	-4.57E-06
SQP <sup>[2]</sup>	dimensionless	8.52E+02	6.03E+00	2.02E+00	8.60E+02	8.75E+00	8.60E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.46E+00	2.15E+01	5.25E-02	-1.75E+02

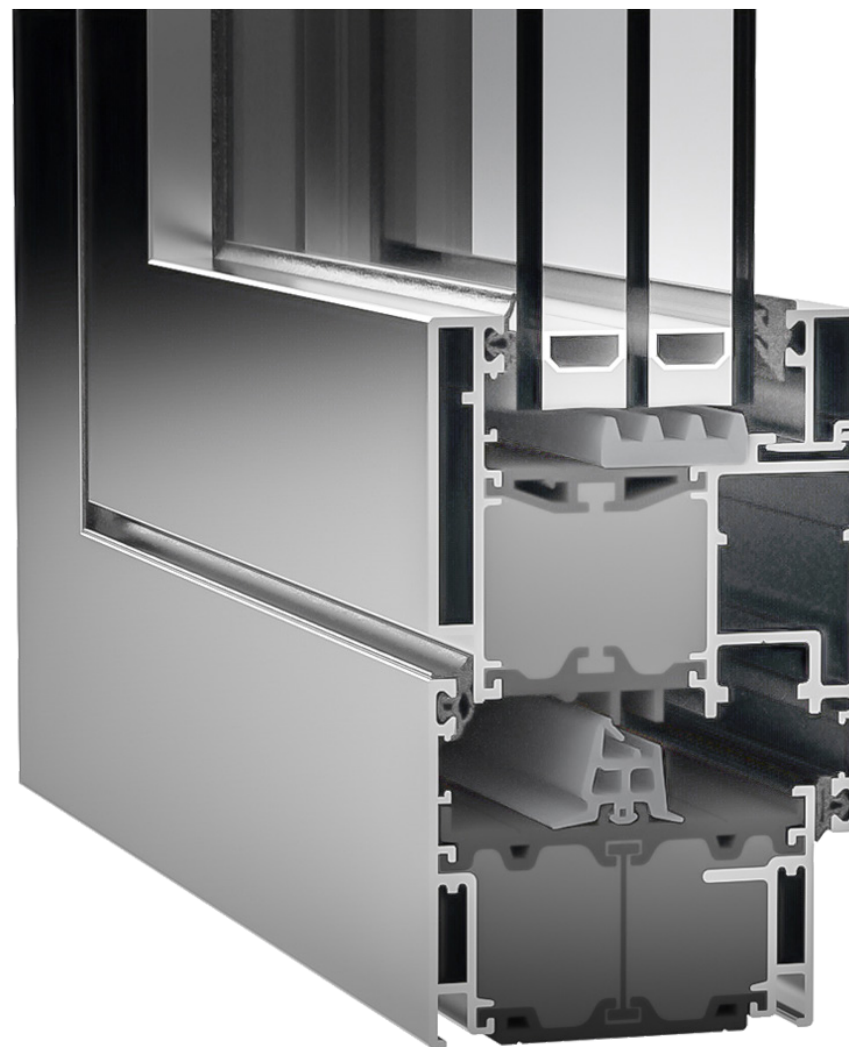
PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c: Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.

<sup>[1]</sup> This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

<sup>[2]</sup> The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ND = Module not declared; INA = Indicator not assessed.

1.23m x 1.48m window type  
XT66 Performance Plus Tilt  
& Turn TG (triple glazed)



## 4.2.A. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

### Core Environmental impact per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	3.52E+02	6.00E-01	1.03E+00	3.54E+02	8.20E-01	3.54E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.90E-01	3.22E+00	8.98E-04	-1.41E+02
GWP-fossil	[kg CO <sub>2</sub> eq.]	3.48E+02	6.00E-01	1.02E+00	3.50E+02	8.20E-01	3.50E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.90E-01	3.17E+00	8.96E-04	-1.37E+02
GWP-biogenic	[kg CO <sub>2</sub> eq.]	1.15E+00	3.44E-04	1.03E-02	1.16E+00	4.41E-04	1.16E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.63E-04	4.84E-02	1.84E-06	-7.59E-01
GWP-luluc	[kg CO <sub>2</sub> eq.]	2.95E+00	2.18E-04	3.59E-04	2.96E+00	2.92E-04	2.96E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.74E-04	3.15E-03	2.50E-07	-2.70E+00
ODP	[kg CFC-11 eq.]	3.24E-05	1.35E-07	8.33E-08	3.26E-05	1.86E-07	3.26E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.11E-07	2.81E-07	3.68E-10	-1.58E-05
AP	[mol H <sup>+</sup> eq.]	2.47E+00	2.64E-03	2.11E-03	2.48E+00	2.35E-03	2.48E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.41E-03	1.72E-02	8.50E-06	-7.67E-01
EP-freshwater	[kg P eq.]	1.37E-02	5.20E-06	1.12E-05	1.37E-02	6.55E-06	1.37E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.91E-06	1.25E-04	1.00E-08	-6.62E-03
EP-marine	[kg N eq.]	3.54E-01	4.15E-04	4.05E-04	3.55E-01	4.66E-04	3.55E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.79E-04	3.54E-03	2.92E-06	-8.83E-02
EP-terrestrial	[mol N eq.]	4.05E+00	4.68E-03	4.63E-03	4.06E+00	5.21E-03	4.06E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.12E-03	4.10E-02	3.22E-05	-9.99E-01
POCP	[kg NMVOC eq.]	1.21E+00	1.69E-03	1.33E-03	1.22E+00	2.00E-03	1.22E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.19E-03	1.11E-02	9.36E-06	-3.67E-01
ADP-minerals&metals <sup>[2]</sup>	[kg Sb eq.]	7.89E-03	1.55E-05	3.87E-04	8.30E-03	2.26E-05	8.30E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.35E-05	1.33E-02	8.21E-09	-5.82E-04
ADP-fossils <sup>[2]</sup>	[MJ] ncv	4.36E+03	9.04E+00	1.17E+01	4.38E+03	1.24E+01	4.38E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.41E+00	3.45E+01	2.50E-02	-1.98E+03
WDP <sup>[2]</sup>	m <sup>3</sup> world eq. deprived	8.75E+01	2.88E-02	1.23E-01	8.76E+01	3.51E-02	8.76E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.10E-02	3.23E+00	1.12E-03	-2.78E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; GWP-biogenic= Global Warming Potential biogenic; GWP-luluc= Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP=Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

<sup>[2]</sup>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

ND = Module not declared; INA = Indicator not assessed.

## 4.2.B. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

Resource use per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	9.21E+02	1.35E-01	7.62E-01	9.22E+02	1.77E-01	9.22E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.06E-01	4.76E+00	2.03E-04	-7.32E+02
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	9.21E+02	1.35E-01	7.62E-01	9.22E+02	1.77E-01	9.22E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.06E-01	4.76E+00	2.03E-04	-7.32E+02
PENRE	[MJ]	4.41E+03	9.60E+00	1.28E+01	4.44E+03	1.32E+01	4.15E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.87E+00	1.07E+02	2.66E-02	-2.10E+03
PENRM	[MJ]	2.39E+02	0.00E+00	0.00E+00	2.39E+02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	4.65E+03	9.60E+00	1.28E+01	4.68E+03	1.32E+01	4.68E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.87E+00	1.07E+02	2.66E-02	-2.10E+03
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.83E+03
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	5.30E+00	1.02E-03	3.07E-03	5.31E+00	1.33E-03	5.31E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.92E-04	1.50E-01	2.67E-05	-4.68E+00

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.

ND = Module not declared; INA = Indicator not assessed.

## 4.2.C. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

Output flows and waste categories per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	7.69E-03	2.26E-05	7.86E-04	8.50E-03	3.25E-05	8.50E-05	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.94E-05	2.69E-02	3.74E-08	-1.53E-03
NHWD	[kg]	9.07E+01	4.14E-01	6.23E-02	9.12E+01	6.03E-01	9.12E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.60E-01	1.53E+01	1.69E-01	-3.51E+01
RWD	[kg]	1.43E-02	6.14E-05	2.61E-05	1.44E-02	8.44E-05	1.44E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.05E-05	1.76E-04	1.64E-07	-1.24E-02
CRU	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MFR	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MER	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EEE	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EET	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA

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.

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

ND = Module not declared; INA = Indicator not assessed.

## 4.2.D. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

### Additional Environmental impact per 1.23m x 1.48m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	2.48E-05	3.70E-08	1.16E-08	2.49E-05	5.21E-08	2.49E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.11E-08	1.64E-07	1.65E-10	-7.86E-06
IRP <sup>[1]</sup>	kBq U235 eq	1.44E+01	3.96E-02	1.97E-02	1.45E+01	5.42E-02	1.45E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.24E-02	1.31E-01	1.03E-04	-1.28E+01
ETP-fw <sup>[2]</sup>	CTUe	9.04E+03	7.22E+00	1.10E+01	9.05E+03	9.98E+00	9.05E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.97E+00	1.75E+02	1.62E-02	-2.31E+03
HTP-c <sup>[2]</sup>	CTUe	8.46E-07	2.04E-10	5.66E-10	8.47E-07	2.78E-10	8.47E-09	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.66E-10	4.62E-09	3.77E-13	-3.57E-07
HTP-nc <sup>[2]</sup>	CTUe	9.56E-06	7.46E-09	8.24E-09	9.57E-06	1.05E-08	9.57E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.29E-09	1.36E-07	1.15E-11	-4.47E-06
SQP <sup>[2]</sup>	dimensionless	9.59E+02	6.03E+00	2.02E+00	9.67E+02	8.67E+00	9.67E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.18E+00	2.12E+01	5.25E-02	-1.78E+02

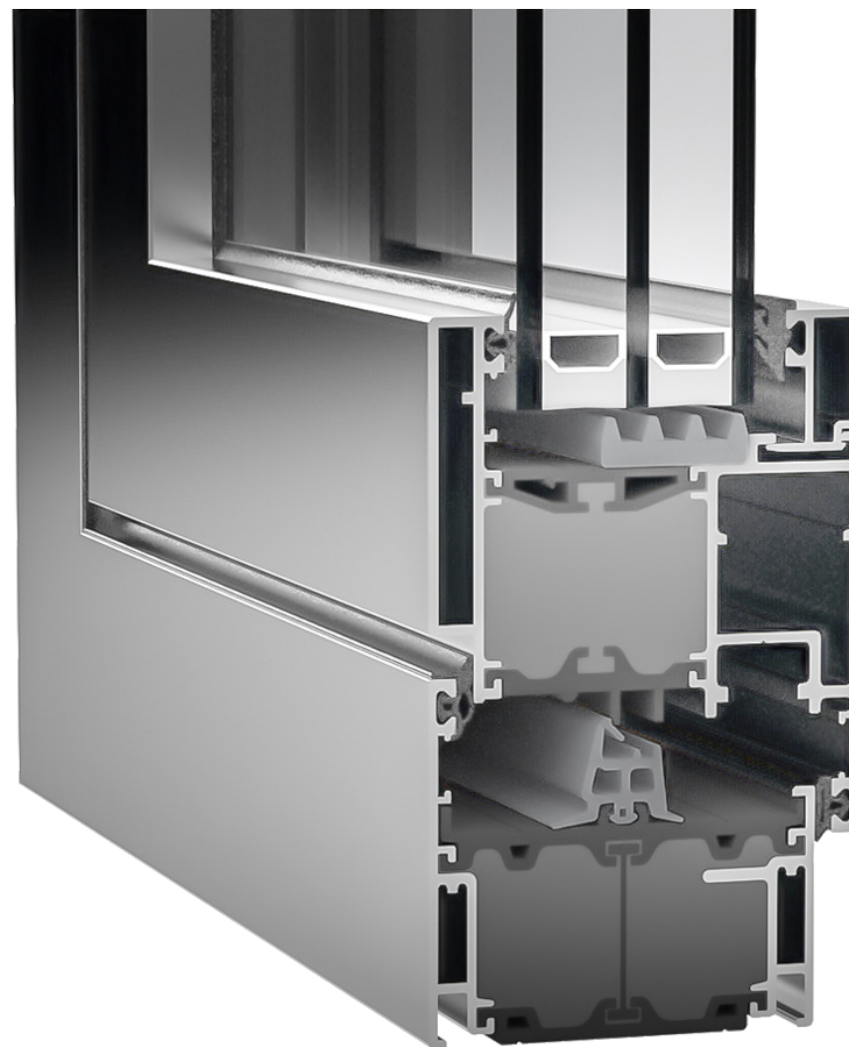
PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c: Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.

<sup>[1]</sup> This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

<sup>[2]</sup> The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ND = Module not declared; INA = Indicator not assessed.

1.48m x 2.18m window type  
XT66 Performance Plus Tilt  
& Turn DG (double glazed)



### 4.3.A. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Core Environmental impact per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	4.62E+02	7.32E-01	1.40E+00	4.64E+02	1.09E+00	4.64E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.90E-01	4.39E+00	9.22E-04	-1.79E+02
GWP-fossil	[kg CO <sub>2</sub> eq.]	4.57E+02	7.31E-01	1.38E+00	4.59E+02	1.09E+00	4.59E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.90E-01	4.32E+00	9.19E-04	-1.74E+02
GWP-biogenic	[kg CO <sub>2</sub> eq.]	1.14E+00	4.20E-04	1.39E-02	1.16E+00	5.87E-04	1.16E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.63E-04	6.68E-02	1.95E-06	-9.86E-01
GWP-luluc	[kg CO <sub>2</sub> eq.]	4.04E+00	2.66E-04	4.85E-04	4.04E+00	3.89E-04	4.04E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.74E-04	4.34E-03	2.57E-07	-3.44E+00
ODP	[kg CFC-11 eq.]	4.65E-05	1.65E-07	1.13E-07	4.68E-05	2.49E-07	4.68E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.11E-07	3.74E-07	3.78E-10	-2.01E-05
AP	[mol H <sup>+</sup> eq.]	3.28E+00	3.24E-03	2.85E-03	3.28E+00	3.14E-03	3.28E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.41E-03	2.31E-02	8.72E-06	-9.75E-01
EP-freshwater	[kg P eq.]	1.77E-02	6.35E-06	1.52E-05	1.77E-02	8.73E-06	1.77E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.91E-06	1.72E-04	1.03E-08	-8.39E-03
EP-marine	[kg N eq.]	4.66E-01	5.07E-04	5.47E-04	4.67E-01	6.21E-04	4.67E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.79E-04	4.58E-03	3.00E-06	-1.12E-01
EP-terrestrial	[mol N eq.]	5.31E+00	5.72E-03	6.25E-03	5.32E+00	6.95E-03	5.32E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.12E-03	5.32E-02	3.31E-05	-1.27E+00
POCP	[kg NMVOC eq.]	1.60E+00	2.06E-03	1.80E-03	1.60E+00	2.66E-03	1.60E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.19E-03	1.45E-02	9.61E-06	-4.62E-01
ADP-minerals&metals <sup>[2]</sup>	[kg Sb eq.]	1.05E-02	1.89E-05	5.23E-04	1.11E-02	3.02E-05	1.11E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.35E-05	1.84E-02	8.45E-09	-7.42E-04
ADP-fossils <sup>[2]</sup>	[MJ] ncv	5.73E+03	1.10E+01	1.59E+01	5.75E+03	1.65E+01	5.75E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.41E+00	4.67E+01	2.57E-02	-2.52E+03
WDP <sup>[2]</sup>	m <sup>3</sup> world eq. deprived	1.23E+02	3.51E-02	1.66E-01	1.23E+02	4.68E-02	1.23E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.10E-02	4.47E+00	1.15E-03	-3.55E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; GWP-biogenic= Global Warming Potential biogenic; GWP-luluc= Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP=Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

<sup>[2]</sup>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

ND = Module not declared; INA = Indicator not assessed.

### 4.3.B. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Resource use per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.22E+03	1.65E-01	1.03E+00	1.22E+03	2.37E-01	1.22E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.06E-01	6.57E+00	2.09E-04	-9.34E+02
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.22E+03	1.65E-01	1.03E+00	1.22E+03	2.37E-01	1.22E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.06E-01	6.57E+00	2.09E-04	-9.34E+02
PENRE	[MJ]	5.69E+03	1.17E+01	1.73E+01	5.72E+03	1.75E+01	6.14E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.87E+00	1.47E+02	2.72E-02	-2.68E+03
PENRM	[MJ]	4.21E+02	0.00E+00	0.00E+00	4.21E+02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	6.11E+03	1.17E+01	1.73E+01	6.14E+03	1.75E+01	6.14E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.97E+00	1.53E+02	2.75E-02	-2.68E+03
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.61E+03
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m <sup>3</sup> ]	7.27E+00	1.24E-03	4.15E-03	7.28E+00	1.77E-03	7.28E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.92E-04	2.07E-01	2.74E-05	-5.94E+00

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.

ND = Module not declared; INA = Indicator not assessed.

### 4.3.C. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Output flows and waste categories per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	9.45E-03	2.75E-05	1.06E-03	1.05E-02	4.33E-05	1.05E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.94E-05	3.71E-02	3.84E-08	-1.82E-03
NHWD	[kg]	1.19E+02	5.04E-01	8.41E-02	1.20E+02	8.03E-01	1.20E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.60E-01	2.12E+01	1.73E-01	-4.45E+01
RWD	[kg]	1.88E-02	7.49E-05	3.53E-05	1.89E-02	1.13E-04	1.89E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.05E-05	2.37E-04	1.68E-07	-1.58E-02
CRU	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MFR	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MER	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EEE	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EET	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA

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.

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

ND = Module not declared; INA = Indicator not assessed.

#### 4.3.D. LCA results - Window type XT66 Performance Plus Tilt & Turn DG (double glazed)

Additional Environmental impact per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	3.30E-05	4.51E-08	1.56E-08	3.31E-05	6.94E-08	3.31E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.11E-08	2.08E-07	1.69E-10	-9.91E-06
IRP <sup>[1]</sup>	kBq U235 eq	1.86E+01	4.83E-02	2.66E-02	1.87E+01	7.22E-02	1.87E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.24E-02	1.78E-01	1.05E-04	-1.63E+01
ETP-fw <sup>[2]</sup>	CTUe	1.61E+04	8.80E+00	1.49E+01	1.61E+04	1.33E+01	1.61E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.97E+00	2.41E+02	1.67E-02	-2.91E+03
HTP-c <sup>[2]</sup>	CTUe	1.07E-06	2.49E-10	7.64E-10	1.07E-06	3.70E-10	1.07E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.66E-10	6.37E-09	3.89E-13	-4.51E-07
HTP-nc <sup>[2]</sup>	CTUe	1.30E-05	9.09E-09	1.11E-08	1.30E-05	1.40E-08	1.30E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.29E-09	1.87E-07	1.18E-11	-5.79E-06
SQP <sup>[2]</sup>	dimensionless	1.25E+03	7.34E+00	2.73E+00	1.26E+03	1.16E+01	1.26E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.18E+00	2.91E+01	5.39E-02	-2.28E+02

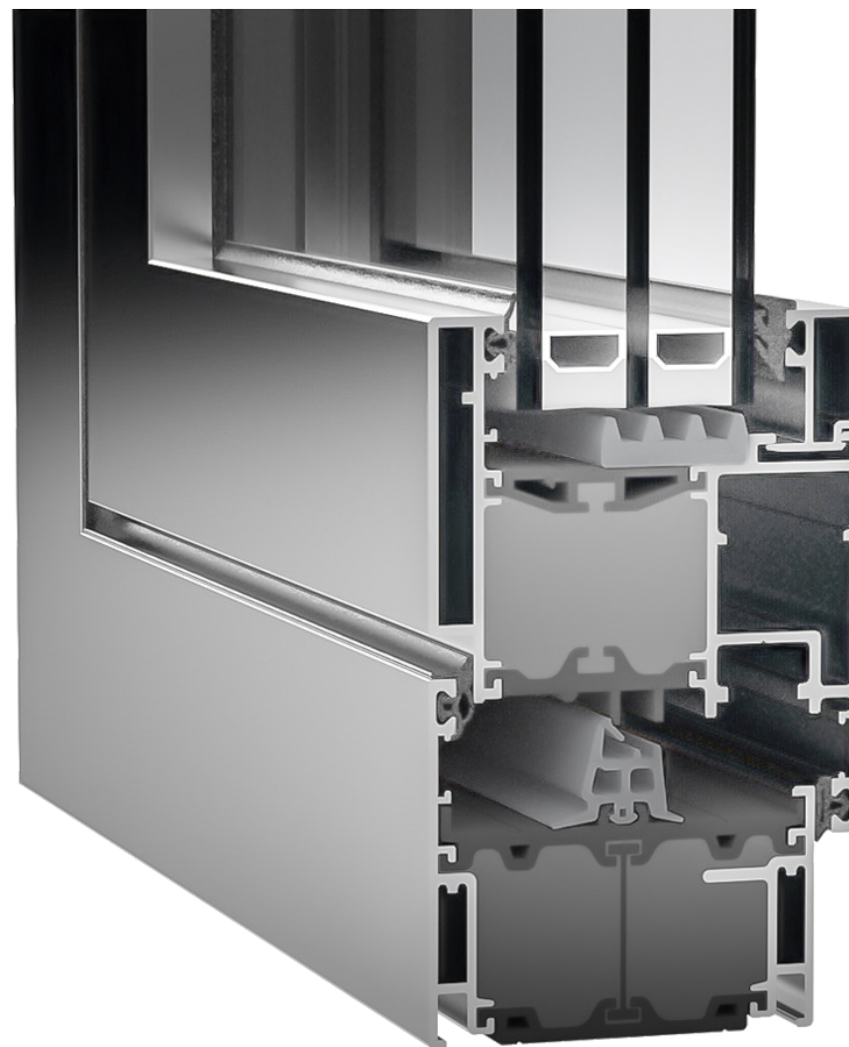
PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c: Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.

<sup>[1]</sup> This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

<sup>[2]</sup> The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ND = Module not declared; INA = Indicator not assessed.

1.48m x 2.18m window type  
XT66 Performance Plus Tilt  
& Turn TG (triple glazed)



#### 4.4.A. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

##### Core Environmental impact per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	5.15E+02	7.32E-01	1.40E+00	5.17E+02	1.08E+00	5.17E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.54E-01	4.32E+00	9.22E-04	-1.79E+02
GWP-fossil	[kg CO <sub>2</sub> eq.]	5.09E+02	7.31E-01	1.38E+00	5.11E+02	1.08E+00	5.11E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.53E-01	4.25E+00	9.19E-04	-1.74E+02
GWP-biogenic	[kg CO <sub>2</sub> eq.]	1.53E+00	4.20E-04	1.39E-02	1.54E+00	5.82E-04	1.54E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.51E-04	6.57E-02	1.95E-06	-9.86E-01
GWP-luluc	[kg CO <sub>2</sub> eq.]	4.06E+00	2.66E-04	4.85E-04	4.06E+00	3.85E-04	4.06E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.33E-04	4.27E-03	2.57E-07	-3.44E+00
ODP	[kg CFC-11 eq.]	4.76E-05	1.65E-07	1.13E-07	4.79E-05	2.46E-07	4.79E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.49E-07	3.69E-07	3.78E-10	-2.01E-05
AP	[mol H <sup>+</sup> eq.]	3.68E+00	3.24E-03	2.85E-03	3.68E+00	3.11E-03	3.68E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.88E-03	2.28E-02	8.72E-06	-9.75E-01
EP-freshwater	[kg P eq.]	1.97E-02	6.34E-06	1.52E-05	1.97E-02	8.64E-06	1.97E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.22E-06	1.69E-04	1.03E-08	-8.39E-03
EP-marine	[kg N eq.]	5.34E-01	5.07E-04	5.47E-04	5.35E-01	6.15E-04	5.35E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.72E-04	4.52E-03	3.00E-06	-1.12E-01
EP-terrestrial	[mol N eq.]	6.12E+00	5.72E-03	6.25E-03	6.13E+00	6.88E-03	6.13E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.16E-03	5.25E-02	3.31E-05	-1.27E+00
POCP	[kg NMVOC eq.]	1.80E+00	2.06E-03	1.80E-03	1.81E+00	2.64E-03	1.81E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.59E-03	1.43E-02	9.61E-06	-4.62E-01
ADP-minerals&metals <sup>[2]</sup>	[kg Sb eq.]	1.27E-02	1.89E-05	5.23E-04	1.33E-02	2.99E-05	1.33E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.80E-05	1.81E-02	8.45E-09	-7.42E-04
ADP-fossils <sup>[2]</sup>	[MJ] ncv	6.36E+03	1.10E+01	1.59E+01	6.38E+03	1.64E+01	6.38E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.88E+00	4.61E+01	2.57E-02	-2.52E+03
WDP <sup>[2]</sup>	m <sup>3</sup> world eq. deprived	1.27E+02	3.51E-02	1.66E-01	1.27E+02	4.63E-02	1.27E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.80E-02	4.40E+00	1.15E-03	-3.55E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; GWP-biogenic= Global Warming Potential biogenic; GWP-luluc= Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP=Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

<sup>[2]</sup>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

ND = Module not declared; INA = Indicator not assessed.

#### 4.4.B. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

Resource use per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.27E+03	1.65E-01	1.03E+00	1.27E+03	2.34E-01	1.27E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.41E-01	6.49E+00	2.09E-04	-9.34E+02
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.27E+03	1.65E-01	1.03E+00	1.27E+03	2.34E-01	1.27E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.41E-01	6.49E+00	2.09E-04	-9.34E+02
PENRE	[MJ]	6.36E+03	1.17E+01	1.73E+01	6.39E+03	1.74E+01	6.81E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.05E+01	1.46E+02	2.72E-02	-2.68E+03
PENRM	[MJ]	4.21E+02	0.00E+00	0.00E+00	4.21E+02	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	6.78E+03	1.17E+01	1.73E+01	6.81E+03	1.74E+01	6.81E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.05E+01	1.46E+02	2.72E-02	-2.68E+03
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.61E+03
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m <sup>3</sup> ]	7.46E+00	1.24E-03	4.15E-03	7.47E+00	1.75E-03	7.47E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.06E-03	2.05E-01	2.74E-05	-5.94E+00

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.

ND = Module not declared; INA = Indicator not assessed.

#### 4.4.C. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

Output flows and waste categories per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	1.32E-02	2.75E-05	1.06E-03	1.43E-02	4.28E-05	1.43E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.59E-05	3.65E-02	3.84E-08	-1.82E-03
NHWD	[kg]	1.22E+02	5.04E-01	8.41E-02	1.22E+02	7.95E-01	1.22E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.80E-01	2.12E+01	1.73E-01	-4.45E+01
RWD	[kg]	2.10E-02	7.48E-05	3.53E-05	2.11E-02	1.11E-04	2.11E-04	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.73E-05	2.34E-04	1.68E-07	-1.58E-02
CRU	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MFR	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
MER	[kg]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EEE	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA
EET	[MJ]	INA	INA	INA	INA	INA	INA	ND	ND	ND	ND	ND	ND	ND	INA	INA	INA	INA	INA

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.

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

ND = Module not declared; INA = Indicator not assessed.

#### 4.4.D. LCA results - Window type XT66 Performance Plus Tilt & Turn TG (triple glazed)

Additional Environmental impact per 1.48m x 2.18m window

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	3.66E-05	4.51E-08	1.56E-08	3.67E-05	6.87E-08	3.67E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.15E-08	2.06E-07	1.69E-10	-9.91E-06
IRP <sup>[1]</sup>	kBq U235 eq	2.10E+01	4.82E-02	2.66E-02	2.11E+01	7.15E-02	2.11E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.32E-02	1.75E-01	1.05E-04	-1.63E+01
ETP-fw <sup>[2]</sup>	CTUe	1.32E+04	8.80E+00	1.49E+01	1.32E+04	1.32E+01	1.32E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.96E+00	2.37E+02	1.67E-02	-2.91E+03
HTP-c <sup>[2]</sup>	CTUe	1.07E-06	2.49E-10	7.64E-10	1.07E-06	3.67E-10	1.07E-08	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.22E-10	6.27E-09	3.89E-13	-4.51E-07
HTP-nc <sup>[2]</sup>	CTUe	1.32E-05	9.09E-09	1.11E-08	1.33E-05	1.39E-08	1.33E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.38E-09	1.84E-07	1.18E-11	-5.79E-06
SQP <sup>[2]</sup>	dimensionless	1.46E+03	7.34E+00	2.73E+00	1.47E+03	1.14E+01	1.47E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.91E+00	2.87E+01	5.39E-02	-2.28E+02

PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c: Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.

<sup>[1]</sup> This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

<sup>[2]</sup> The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ND = Module not declared; INA = Indicator not assessed.

## 5. Calculation rules

The measurement of environmental impacts in this EPD uses the LCIA methodologies recommended for PEF3.0.

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. The 'polluter pays' and 'modularity' principles have been followed.

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 LCA tool. This data portfolio contains a summary of all the data used in this LCA, and correspondingly, in the AMS Ecochain account.

### Cut-off criteria

Packaging has been excluded from the LCA, as it is 1% or less of the weight of the product units. The cut-off criteria of section 6.3.6 of EN15804 +A2 have been followed.

### Data Quality

The dataset is representative for the production processes used in 2019. The data Quality Level, according to Table E.1 of EN 15804 +A2, Annex E, is 'very good'.

### Allocations

Allocation of electricity types and amounts to the various manufacturing processes has been provided by AMS along with production waste and direct emissions; allocation of impacts to the products is based on the product composition mass.

## 6. Scenarios and additional technical information

### A4. Transport to market

The transport to market is based on the frames being manufactured in Little Island, Co. Cork, and transported to customers on the island of Ireland. The default distance of 200 km transport to customer is used, according to EPD Ireland's PCR, version 2.0 [\[6\]](#).

### A5. Construction installation

The A5 stage, installation on site assumes 1% installation losses, as per default values in the Product Category Rules (PCR) for EPD Ireland [\[6\]](#).

### C1. De-construction demolition

It is assumed that no energy or materials are required for Module C1.

### C2. Transport

In the transport phase C2 it is assumed that these materials travel 50km to landfill/recycling, and 250km to incineration, as per default values in the Product Category Rules (PCR) for EPD Ireland [\[6\]](#).

### C3. Waste processing

In the Waste Processing phase (C3), and disposal phase (C4), the assumptions outlined below are made for recycling, landfilling and incineration. These are in accordance with the default end-of-life scenarios in the windows/doors PCR I.S. EN 17213:2020 (Annex B). These percentages are applied to the individual material components of the windows.

End of life Scenario	Component element - percentage to each scenario		
	Glass	Metals	Plastics
Landfill	70	5	5
Recycling	30	95	
Incineration			95

### C4. Disposal

See above for amounts of materials per disposal/EoL scenario. The electricity grid mix used in avoided electricity is: "kWh Electricity mix average low voltage Ireland".

### D. Reuse – Recovery – Recycling potential

Beyond the system, benefits accrue from the following scenarios:

1. Avoided electricity generation from incineration of plastics
2. Avoided primary aluminium and steel production from use of recycled aluminium and steel

### Declaration of biogenic carbon content at the production gate

The amount of packaging is 1% or less than the mass of the products. (See bill of materials table, Section 3). Thus packaging biogenic carbon is not declared.

BIOGENIC CARBON PER DECLARED UNIT	UNIT	QUANTITY
Biogenic carbon content in 1.23m x 1.48m window type XT66 Performance Plus Tilt & Turn DG (double glazed)	kg of carbon, C	0
Biogenic carbon content in 1.23m x 1.48m window type XT66 Performance Plus Tilt & Turn TG (triple glazed)	kg of carbon, C	0
Biogenic carbon content in 1.48m x 2.18m window type XT66 Performance Plus Tilt & Turn DG (double glazed)	kg of carbon, C	0
Biogenic carbon content in 1.48m x 2.18m window type XT66 Performance Plus Tilt & Turn TG (triple glazed)	kg of carbon, C	0
Biogenic carbon content in packaging		N/A

## 7. 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 limit for registration with the European Chemicals Agency.

## 8. Other optional additional environmental information

N/A.

## 9. References

- [1] ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO 14040:2006.
- [2] ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO 14044:2006.
- [3] ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO 14025:2006.
- [4] I.S. EN 15804:2012+A2:2019,; Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', EN 15804:2012+A2:2019.
- [5] Ecochain, 2019, web: <http://app.ecochain.com>.
- [6] Product Category Rules : Part A Version 2 Implementation and use of I.S. EN 15804:2012 and CEN TR 16970:2016 in Ireland. Product Category Rules: Part A, version 2.
- [7] CML - Department of Industrial Ecology, CML-IA Characterisation Factors, Dated August 2016, Leiden University, Leiden, Netherlands Available at: <https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors>
- [8] Ministerie van Verkeer en Waterstaat, 8 maart 2004, Toxiciteit heeft z'n prijs, Schaduwprijzen voor (eco-) toxiciteit en uitputting van abiotische grondstoffen binnen DuboCalc.
- [9] I.S. EN 17213:2020 Windows and doors - Environmental Product Declarations - Product category rules for windows and pedestrian doorsets.
- [10] I.S. EN 13351-1:2006 +A1:2010 Windows and doors - Product standard, performance characteristics
- [11] PEF methodology final draft.pdf (europa.eu)

## 10. Annex

N/A.