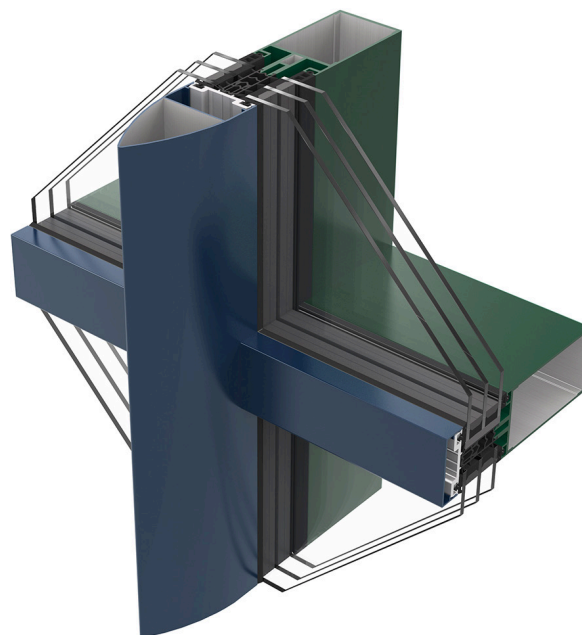


EN 15804+A2 EPD



ENVIRONMENTAL PRODUCT DECLARATION

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

Declaration number: EPDIE-21-74
Issue date 9th February 2022
Valid to 9th February 2027

EPD Programme - EPD Ireland
Programme Operator - Irish Green Building Council
www.epdireland.org



Architectural Façades

MU800 Hi double-glazed façade unit

MU800 Hi triple-glazed façade unit

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-21-74	Architectural & Metal Systems Ltd. Wallingstown, Little Island, Co. Cork T45 VP40
ECO PLATFORM EPD	DECLARED UNIT
Yes	MU800 Hi 28mm DG 7.2m x 8m double-glazed façade unit MU800 Hi 40mm TG 7.2m x 8m triple-glazed façade unit
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.	MU800 Hi double-glazed façade unit MU800 Hi triple-glazed façade unit
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 ☐ Externally ☒

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 system boundary (end of life) is reached at the point of scrap generation of the materials.

Declared functional Unit

The Declared Unit in this EPD is for the MU800 Hi 28mm DG 7.2m x 8m double-glazed façade unit, and MU800 Hi 40mm TG 7.2m x 8m triple-glazed façade unit. The impact results in this EPD are given for these façade sizes.

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

The façade profiles and frames (without glass) are assembled at the AMS factory site. Aluminium profiles are painted, cut to size, and fitted with thermal break materials, gaskets and accessories. Profiles and frames are then packaged in light plastic bubblewrap packaging for dispatch to the customer, where facades are assembled and the requisite double or triple glazing units are fitted.

The intended use of the products are as facades in residential, educational and commercial buildings. The facades are manufactured to the requirements of I.S. EN 13830-1:2015 +A1:2020 Curtain walling - Product standard. 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 assembled and 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.

The relative percentages of materials in the facades is given below:

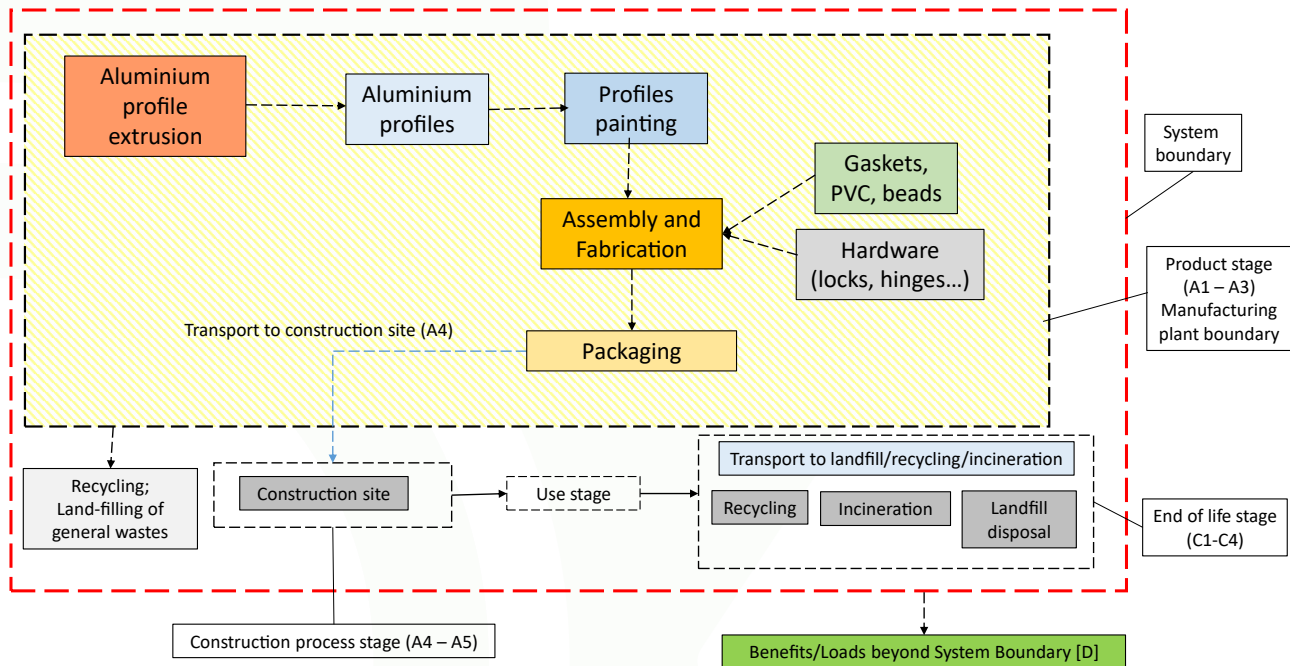
	Façade type	
	DG 7.2m x 8m	TG 7.2m x 8m
Aluminium (Profile Extrusions)	22.2	16.2
Thermal break, gaskets, insulation strips (plastics)	4.3	3.7
Powder Coating	0.4	0.3
Hardware and Accessories	0.4	0.3
Double glazing (1.3 m ² area)	72.7	79.5
Total	100.0	100.0
Additional weight of bubblewrap packaging	+0.02	+0.01

Façade type	System U-value	
MU800 Hi 28mm DG 7.2m x 8m Double-glazed façade unit	1.16	W/(m ² ·K)
MU800 Hi 40mm TG 7.2m x 8m Triple-glazed façade unit	0.87	W/(m ² ·K)

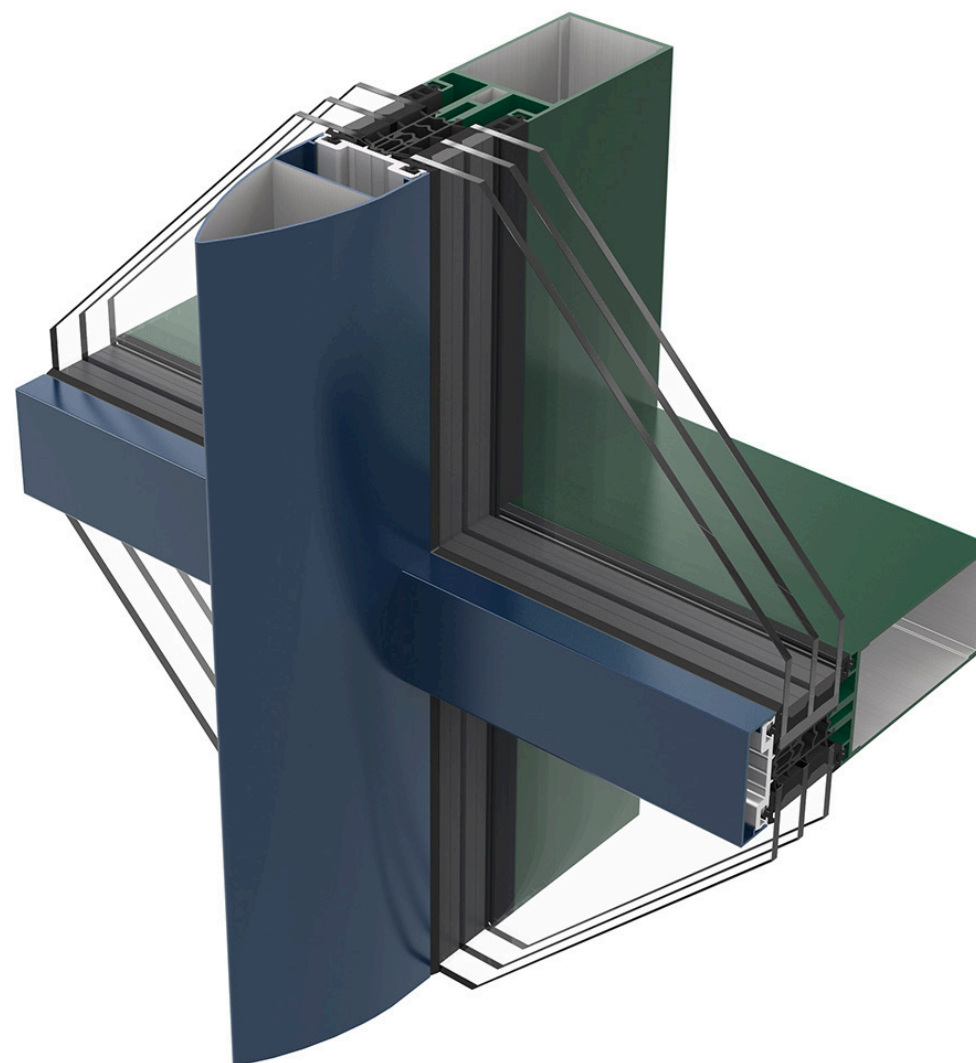
Note: facade u-values are dependent on glazing unit configuration and size.

3.1 Manufacturing Process Description

Extruded aluminium profiles are fed into a powder-coating paint line. Painted profiles then undergo the fabrication process including the fitting of thermal break materials and accessories. Framing materials are packaged and sent to the customer for façade assembly and glazing installation.



**MU800 Hi 28mm DG 7.2m
x 8m Double-glazed façade
unit**



4.1.A. LCA results - MU800 Hi 28mm DG 7.2m x 8m Double-glazed façade unit

Core Environmental impact per 7.2m x 8m Double-glazed façade unit

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 ₂ eq.]	7.17E+03	7.10E-01	5.80E+00	7.17E+03	1.35E+01	7.17E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.81E+00	6.85E+01	1.84E-03	-2.83E+03
GWP-fossil	[kg CO ₂ eq.]	7.09E+03	7.10E-01	5.74E+00	7.10E+03	1.35E+01	7.10E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.80E+00	6.74E+01	1.83E-03	-2.75E+03
GWP-biogenic	[kg CO ₂ eq.]	1.23E+01	3.93E-04	5.77E-02	1.23E+01	7.28E-03	1.23E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.27E-03	1.08E+00	6.34E-06	-1.54E+01
GWP-luluc	[kg CO ₂ eq.]	6.53E+01	2.55E-04	2.01E-03	6.53E+01	4.82E-03	6.53E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.49E-03	7.03E-02	5.17E-07	-5.97E+01
ODP	[kg CFC-11 eq.]	6.63E-04	1.61E-07	4.67E-07	6.64E-04	3.08E-06	6.64E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.23E-06	5.49E-06	7.29E-10	-3.38E-04
AP	[mol H ⁺ eq.]	5.32E+01	2.52E-03	1.18E-02	5.32E+01	3.89E-02	5.32E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.82E-02	3.47E-01	1.72E-05	-1.58E+01
EP-freshwater	[kg P eq.]	2.61E-01	5.88E-06	6.30E-05	2.61E-01	1.08E-04	2.61E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.83E-05	2.78E-03	2.09E-08	-1.38E-01
EP-marine	[kg N eq.]	7.56E+00	4.42E-04	2.27E-03	7.56E+00	7.70E-03	7.56E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.57E-03	6.18E-02	5.94E-06	-1.76E+00
EP-terrestrial	[mol N eq.]	8.64E+01	4.97E-03	2.60E-02	8.64E+01	8.61E-02	8.64E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.23E-02	7.26E-01	6.54E-05	-1.99E+01
POCP	[kg NMVOC eq.]	2.68E+01	1.85E-03	7.46E-03	2.68E+01	3.30E-02	2.68E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.39E-02	1.97E-01	1.90E-05	-7.26E+00
ADP-minerals&metals ^[2]	[kg Sb eq.]	1.81E-01	1.90E-05	2.17E-03	1.84E-01	3.74E-04	1.84E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.71E-04	2.98E-01	1.75E-08	-1.19E-02
ADP-fossils ^[2]	[MJ] ncv	8.52E+04	1.07E+01	6.58E+01	8.52E+04	2.05E+02	8.52E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.48E+02	7.22E+02	5.00E-02	4.04E+04
WDP ^[2]	m ³ world eq. deprived	1.72E+03	3.20E-02	6.90E-01	1.72E+03	5.79E-01	1.72E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.19E-01	7.25E+01	2.25E-03	-9.41E+01

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.

^[2]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 - MU800 Hi 28mm DG 7.2m x 8m Double-glazed façade unit

Resource use per 7.2m x 8m Double-glazed façade unit

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.87E+04	1.56E-01	4.27E+00	1.87E+04	2.93E+00	1.87E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.12E+00	8.38E+01	4.30E-04	-1.58E+04
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]	1.87E+04	1.56E-01	4.27E+00	1.87E+04	2.93E+00	1.87E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.12E+00	8.38E+01	4.30E-04	-1.58E+04
PENRE	[MJ]	8.86E+04	1.14E+01	7.19E+01	8.87E+04	2.17E+02	9.10E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.57E+02	1.29E+03	5.31E-02	-4.28E+04
PENRM	[MJ]	2.31E+03	0.00E+00	0.00E+00	2.31E+03	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]	9.09E+04	1.14E+01	7.19E+01	9.10E+04	2.17E+02	9.10E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.57E+02	1.29E+03	5.31E-02	-4.28E+04
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	0.00E+00
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 ³]	1.11E+02	1.17E-03	1.72E-02	1.11E+02	2.19E-02	1.11E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.58E-02	2.43E+00	5.36E-05	-1.03E+02

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 - MU800 Hi 28mm DG 7.2m x 8m Double-glazed façade unit

Output flows and waste categories per 7.2m x 8m Double-glazed façade unit

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	1.72E-01	2.75E-05	4.41E-03	1.77E-01	5.36E-04	1.77E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.88E-04	6.01E-01	7.56E-08	-2.36E-02
NHWD	[kg]	1.64E+03	5.07E-01	3.49E-01	1.65E+03	9.95E+00	1.65E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.21E+00	1.23E+02	3.18E-01	-7.54E+02
RWD	[kg]	2.94E-01	7.29E-05	1.46E-04	2.95E-01	1.39E-03	2.95E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.01E-03	2.78E-03	3.25E-07	-2.62E-01
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 - MU800 Hi 28mm DG 7.2m x 8m Double-glazed façade unit

Additional Environmental impact per 7.2m x 8m Double-glazed façade unit

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	5.31E-04	4.45E-08	6.49E-08	5.31E-04	8.60E-07	5.31E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.23E-07	2.62E-06	3.36E-10	-1.65E-04
IRP ^[1]	kBq U235 eq	2.85E+02	4.69E-02	1.10E-01	2.85E+02	8.94E-01	2.85E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	6.48E-01	2.72E+00	2.03E-04	-2.75E+02
ETP-fw ^[2]	CTUe	2.74E+05	8.60E+00	6.18E+01	2.74E+05	1.65E+02	2.74E+03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.19E+02	3.88E+03	3.32E-02	-4.60E+04
HTP-c ^[2]	CTUe	1.27E-05	2.41E-10	3.17E-09	1.27E-05	4.59E-09	1.27E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.32E-09	1.03E-07	8.41E-13	-7.61E-06
HTP-nc ^[2]	CTUe	1.98E-04	8.98E-09	4.62E-08	1.98E-04	1.74E-07	1.98E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.26E-07	3.02E-06	2.31E-11	-1.05E-04
SQP ^[2]	dimensionless	1.90E+04	7.34E+00	1.13E+01	1.91E+04	1.43E+02	1.91E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.04E+02	4.68E+02	1.06E-01	-3.14E+03

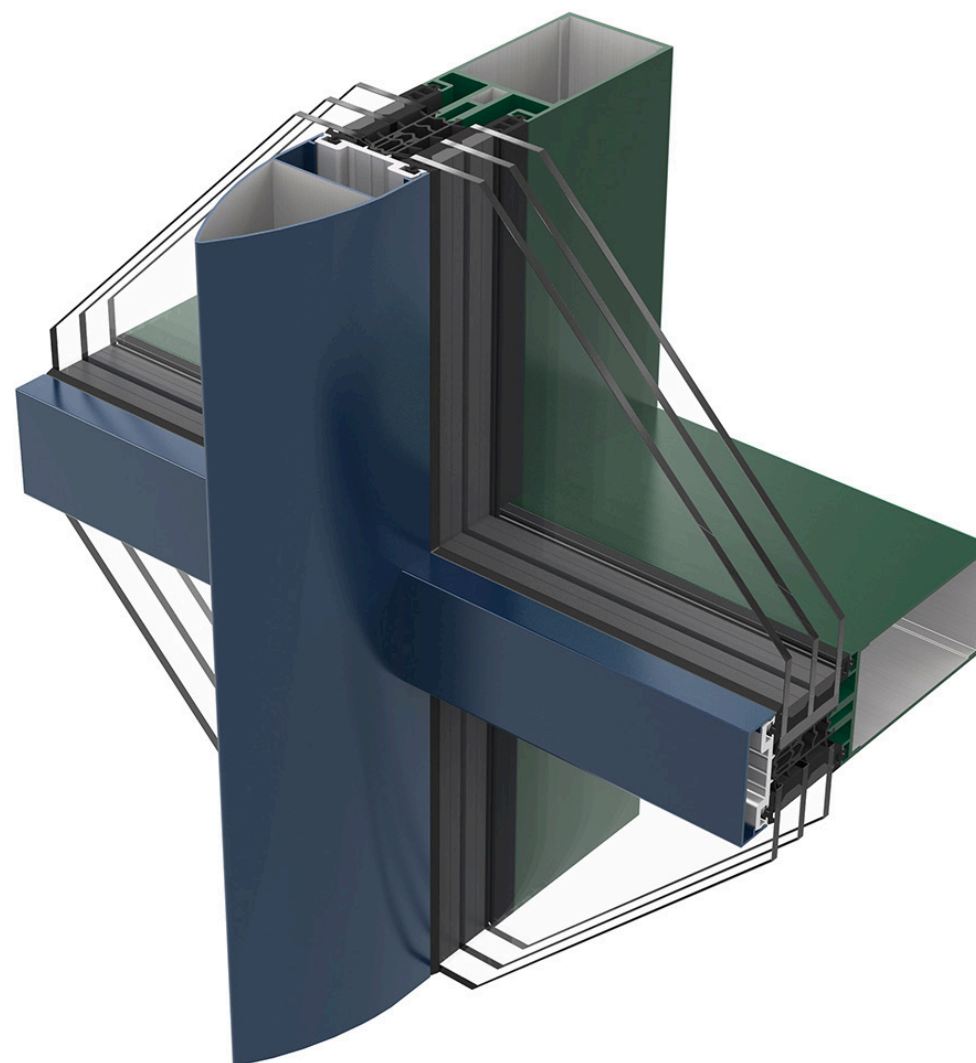
PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c: Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil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

^[1] 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.

^[2] 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.

**MU800 Hi 40mm TG 7.2m
x 8m Triple-glazed façade
unit**



4.2.A. LCA results - MU800 Hi 40mm TG 7.2m x 8m Triple-glazed façade unit

Core Environmental impact per 7.2m x 8m Triple-glazed façade unit

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 ₂ eq.]	8.49E+03	8.05E-01	5.80E+00	8.50E+03	1.40E+01	8.50E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.36E+01	6.86E+01	2.13E-03	-2.85E+03
GWP-fossil	[kg CO ₂ eq.]	8.41E+03	8.04E-01	5.74E+00	8.41E+03	1.40E+01	8.41E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.36E+01	6.74E+01	2.12E-03	-2.77E+03
GWP-biogenic	[kg CO ₂ eq.]	2.06E+01	4.44E-04	5.77E-02	2.07E+01	7.50E-03	2.07E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.29E-03	1.08E+00	6.92E-06	-1.56E+01
GWP-luluc	[kg CO ₂ eq.]	6.72E+01	2.89E-04	2.01E-03	6.72E+01	4.97E-03	6.72E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.83E-03	7.03E-02	5.99E-07	-5.98E+01
ODP	[kg CFC-11 eq.]	7.11E-04	1.82E-07	4.67E-07	7.12E-04	3.17E-06	7.12E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.08E-06	5.50E-06	8.49E-10	-3.39E-04
AP	[mol H ⁺ eq.]	6.30E+01	2.79E-03	1.18E-02	6.30E+01	4.01E-02	6.30E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.89E-02	3.47E-01	2.00E-05	-1.59E+01
EP-freshwater	[kg P eq.]	3.12E-01	6.64E-06	6.30E-05	3.12E-01	1.11E-04	3.12E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.08E-04	2.78E-03	2.41E-08	-1.38E-01
EP-marine	[kg N eq.]	9.18E+00	4.96E-04	2.27E-03	9.19E+00	7.93E-03	9.19E-02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	7.71E-03	6.21E-02	6.89E-06	-1.77E+00
EP-terrestrial	[mol N eq.]	1.06E+02	5.57E-03	2.60E-02	1.06E+02	8.88E-02	1.06E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.62E-02	7.29E-01	7.60E-05	-2.01E+01
POCP	[kg NMVOC eq.]	3.18E+01	2.08E-03	7.46E-03	3.18E+01	3.40E-02	3.18E-01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.30E-02	1.98E-01	2.20E-05	-7.29E+00
ADP-minerals&metals ^[2]	[kg Sb eq.]	2.32E-01	2.16E-05	2.17E-03	2.34E-01	3.85E-04	2.34E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	3.74E-04	2.98E-01	2.01E-08	-1.20E-02
ADP-fossils ^[2]	[MJ] ncv	1.01E+05	1.21E+01	6.58E+01	1.01E+05	2.11E+02	1.01E+03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.05E+02	7.22E+02	5.82E-02	-4.06E+04
WDP ^[2]	m ³ world eq. deprived	1.86E+03	3.60E-02	6.90E-01	1.86E+03	5.97E-01	1.86E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.80E-01	7.25E+01	2.61E-03	-9.22E+01

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.

^[2]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 - MU800 Hi 40mm TG 7.2m x 8m Triple-glazed façade unit

Resource use per 7.2m x 8m Triple-glazed façade unit

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	2.02E+04	1.77E-01	4.27E+00	2.02E+04	3.02E+00	2.02E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.93E+00	8.56E+01	4.96E-04	-1.58E+04
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]	2.02E+04	1.77E-01	4.27E+00	2.02E+04	3.02E+00	2.02E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.93E+00	8.56E+01	4.96E-04	-1.58E+04
PENRE	[MJ]	1.05E+05	1.29E+01	7.19E+01	1.05E+05	2.24E+02	1.08E+03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.18E+02	1.39E+03	6.18E-02	-4.31E+04
PENRM	[MJ]	2.75E+03	0.00E+00	0.00E+00	2.75E+03	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]	1.08E+05	1.29E+01	7.19E+01	1.08E+05	2.24E+02	1.08E+03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.18E+02	1.39E+03	6.18E-02	-4.31E+04
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	0.00E+00
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]	1.18E+02	1.32E-03	1.72E-02	1.18E+02	2.26E-02	1.18E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	2.19E-02	2.53E+00	6.23E-05	1.03E+02

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 - MU800 Hi 40mm TG 7.2m x 8m Triple-glazed façade unit

Output flows and waste categories per 7.2m x 8m Triple-glazed façade unit

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	2.57E-01	3.12E-05	4.41E-03	2.61E-01	5.53E-04	2.61E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	5.37E-04	6.01E-01	8.79E-08	-2.36E-02
NHWD	[kg]	1.74E+03	5.77E-01	3.49E-01	1.74E+03	1.03E+01	1.74E+01	ND	ND	ND	ND	ND	ND	ND	0.00E+00	9.97E+00	1.45E+02	3.73E-01	-7.55E+02
RWD	[kg]	3.49E-01	8.26E-05	1.46E-04	3.50E-01	1.44E-03	3.50E-03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.40E-03	2.86E-03	3.79E-07	-2.63E-01
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 - MU800 Hi 40mm TG 7.2m x 8m Triple-glazed façade unit

Additional Environmental impact per 7.2m x 8m Triple-glazed façade unit

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	6.20E-04	5.05E-08	6.49E-08	6.20E-04	8.87E-07	6.20E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.62E-07	2.64E-06	3.89E-10	-1.65E-04
IRP ^[1]	kBq U235 eq	3.45E+02	5.31E-02	1.10E-01	3.45E+02	9.22E-01	3.45E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	8.96E-01	2.73E+00	2.37E-04	-2.75E+02
ETP-fw ^[2]	CTUe	2.12E+05	9.75E+00	6.18E+01	2.12E+05	1.70E+02	2.12E+03	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.65E+02	3.88E+03	3.85E-02	-4.62E+04
HTP-c ^[2]	CTUe	1.31E-05	2.73E-10	3.17E-09	1.32E-05	4.73E-09	1.32E-07	ND	ND	ND	ND	ND	ND	ND	0.00E+00	4.60E-09	1.03E-07	9.63E-13	-7.62E-06
HTP-nc ^[2]	CTUe	2.07E-04	1.02E-08	4.62E-08	2.07E-04	1.79E-07	2.07E-06	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.74E-07	3.02E-06	2.69E-11	-1.05E-04
SQP ^[2]	dimensionless	2.41E+04	8.34E+00	1.13E+01	2.41E+04	1.48E+02	2.41E+02	ND	ND	ND	ND	ND	ND	ND	0.00E+00	1.43E+02	4.68E+02	1.24E-01	-3.19E+03

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.

^[1] 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.

^[2] 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 façades.

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 MU800 Hi 28mm DG 7.2m x 8m double-glazed façade unit	kg of carbon, C	0
Biogenic carbon content in MU800 Hi 40mm TG 7.2m x 8m triple-glazed façade unit	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, Schaduw prijzen 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.