## EN 15804+A2 EPD











## **ENVIRONMENTAL PRODUCT** DECLARATION

as per ISO 14025 and EN 15804+A2. Owner of the Declaration – Unilin Insulation Ireland Limited

Declaration number: EPDIE-23-119 v2 Issue date 29th August 2023 Valid to 28th August 2028

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

# **SUNILIN** INSULATION

## **Unilin Insulation Boards**

**ECO 360** 



## 1. General information

Beboury

IRISH GREEN BUILDING COUNCIL

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council 19 Mountjoy Square, Dublin D01 E8P5 info@igbc.ie	Unilin Insulation Kells Road, Navan, Co. Meath C15 NP79, Ireland +353 (0) 46 906 6000; info.ui@unilin.com
DECLARATION NUMBER	PRODUCTION SITE
EPDIE-23-119 v2	Unilin Insulation Kells Road, Navan, Co. Meath C15 NP79, Ireland +353 (0) 46 906 6000; info.ui@unilin.com
ECO PLATFORM EPD	DECLARED UNIT
Yes	1m <sup>2</sup> 100mm ECO 360 PIR insulation board
APPLICABLE PRODUCT CATEGORY RULES	DECLARED PRODUCT
<ol> <li>EN 15804:2012+A2:2019</li> <li>EPD Ireland PCR Part A, Version 2.1, 2022</li> <li>I.S. EN 16783:2017 Thermal insulation products – Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations</li> </ol>	$1~m^2$ of 100 mm thickness ECO 360 CW, R-value of 5.0 $m^2 K/W$ 1 $m^2$ of 100 mm thickness ECO 360 MA, R-value of 5.0 $m^2 K/W$ 1 $m^2$ of 100 mm thickness ECO 360 CT, R-value of 4.5 $m^2 K/W$
DATE OF ISSUE	SCOPE OF EPD
29th August 2023	Cradle to gate with options, modules C1–C4, and module D
REISSUE	REISSUE DETAILS
27th February 2024	This EPD was updated to incorporate the ECO 360 CT product with High Impact Polystyrene facing
DATE OF EXPIRY	LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA
28th August 2028	Ecoreview, Kilkenny, Ireland. +353 (087) 258 9783 www.ecoreview.ie
TYPE OF EPD: SINGLE OR MULTI PRODUCT	LCA SOFTWARE AND DEVELOPER IF APPLICABLE
Multi product EPD	Ecochain version 3.5.80
PRODUCT CLASSIFICATION OR NACE CODE	NAME AND VERSION OF INVENTORY USED
Thermal insulation products	Ecoinvent version 3.8
COMPARABILITY	
Environmental Product Declarations from different programmes may 15804:2012+A2:2019. Comparability is further dependent on the spec background data sources. See clause 5.3 of EN 15804:2012+A2:2019	not be directly comparable if not compliant with EN ific product category rules, system boundaries and allocations, and
The CEN Norm /EN 15804 serves as the core PCR	
Independent verification of the declaration according to ISO 14025	
Internally Externally X	
SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO - Irish Green Building Council	Chris Foster - EuGeos SRL

Forten

uGeo



### 2. Scope and Type of EPD

#### Scope

This EPD is Cradle-to-gate with options. The Modules that are declared are shown in the table below.

PRC	DDUCT ST	AGE	CONSTR PROCES	UCTION S STAGE			ι	JSE STAG	E				END OF L	IFE 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	С3	C4	D
Х	х	х	х	х	ND	ND	ND	ND	ND	ND	ND	х	Х	Х	Х	х
MDT	MDT	MDT	ОР	ОР	ОР	ОР	ОР	ОР	ОР	ОР	ОР	MDT	MDT	MDT	MDT	MDT

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

#### **Declared Functional Unit**

1 m<sup>2</sup> of 100 mm thickness ECO 360 CW, R-value of 5.0 m<sup>2</sup>K/W, mass 3.52 kg 1 m<sup>2</sup> of 100 mm thickness ECO 360 MA, R-value of 5.0 m<sup>2</sup>K/W, mass 3.52 kg 1 m<sup>2</sup> of 100 mm thickness ECO 360 CT, R-value of 4.5 m<sup>2</sup>K/W, mass 3.59 kg

#### System Boundaries

This LCA covers the Product (A1 - A3), Construction Process (A4 - A5), end of Life (C1 - C4), and benefits and loads beyond the system boundary (D).





### 3. Detailed product description

This EPD is for Unilin (Polyisocyanurate) PIR insulation boards ECO 360 of thickness 100mm, and of designations: CT and CW/MA. The PIR board comprises of primary raw materials MDI, polyol, flame retardand, pentane, with the addition of minor amounts of admixtures. There are two types of board facings. The CW/MA board facings comprises a single cover of foil on both faces. The CT board facings comprise a HIPS sheet on one face, and a composite foil/paper/plastic sheet on the other face. The primary raw materials are mixed with various catalysts & additives and placed between the facing sheets. The insulation products are manufactured in accordance with BS EN 13165:2012+A2:2016 Thermal insulation products for buildings.

These Unilin insulation products are used in cavity & timber-frame wall, floor, pitched and flat roof insulation applications.

### 3.1 Manufacturing Process Description

The main raw materials are mixed with various catalysts and additives before being metered onto a moving conveyor. The chemical mix then starts to rise, due to the effects of the blowing agent, to produce the foam. The foam continues to rise until it contacts the top layer of facer material as it enters the oven, where it is then cured under heat to produce the rigid, thermoset foam board. The board exits the lamination oven and then reaches a cross-cut saw which cuts the board into smaller mother-boards. Each mother-board then is transported to a separate area to cure. There is a minor amount of additional cutting & work to produce speciality boards such as rebated edges. Finished boards are stored in the warehouse before despatch to customers. Off cuts from the cutting and trimming are compressed on-site and sent to landfill/incineration.



The general manufacturing process, along with end-of-life stages, is shown below:





## Unilin ECO 360 CW/MA



#### 4.1.A. LCA results - Unilin Insulation ECO 360 CW/MA

#### Core Environmental impact per 1m<sup>2</sup> ECO 360 CW/MA R-value 5.0 m<sup>2</sup>K/W

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 CO2 eq.]	8.79E+00	8.13E-02	4.76E-01	9.34E+00	7.81E-02	6.34E-01	ND	0.00E+00	6.33E-02	1.22E+00	1.38E+00	-5.60E-01						
GWP-fossil	[kg CO <sub>2</sub> eq.]	1.05E+01	8.12E-02	3.89E-01	1.10E+01	7.80E-02	7.43E-01	ND	0.00E+00	6.32E-02	6.27E-01	8.66E-02	-5.50E-01						
GWP-biogenic	[kg CO <sub>2</sub> eq.]	-1.90E+00	4.36E-05	8.72E-02	-1.82E+00	7.11E-05	-1.18E-01	ND	0.00E+00	3.40E-05	5.98E-01	1.30E+00	-9.88E-03						
GWP-luluc	[kg CO <sub>2</sub> eq.]	1.41E-01	4.25E-05	2.49E-04	1.41E-01	3.12E-05	9.19E-03	ND	0.00E+00	2.25E-05	2.35E-05	3.44E-05	-5.26E-04						
ODP	[kg CFC-11 eq.]	3.25E-07	1.78E-08	1.46E-08	3.57E-07	1.81E-08	2.45E-08	ND	0.00E+00	1.44E-08	3.86E-09	5.02E-09	-2.95E-08						
AP	[mol H+ eq.]	3.89E-02	1.13E-03	9.39E-04	4.09E-02	2.22E-04	2.70E-03	ND	0.00E+00	1.82E-04	4.02E-04	2.56E-04	-1.81E-03						
EP-freshwater <sup>[1]</sup>	[kg P eq.]	1.84E-04	4.71E-07	4.34E-06	1.89E-04	5.56E-07	1.23E-05	ND	0.00E+00	5.05E-07	7.40E-07	7.73E-06	-8.69E-06						
EP-marine	[kg N eq.]	1.17E-02	2.71E-04	2.83E-04	1.22E-02	4.40E-05	8.39E-04	ND	0.00E+00	3.59E-05	1.84E-04	1.84E-03	-2.97E-04						
EP-terrestrial	[mol N eq.]	1.01E-01	3.02E-03	2.15E-03	1.06E-01	4.91E-04	7.06E-03	ND	0.00E+00	4.02E-04	1.85E-03	6.99E-04	-3.41E-03						
РОСР	[kg NMVOC eq.]	2.38E-02	8.21E-04	5.51E-03	3.02E-02	1.89E-04	2.01E-03	ND	0.00E+00	1.54E-04	4.59E-04	1.19E-01	-9.03E-04						
ADP-minerals&metals <sup>[2]</sup>	[kg Sb eq.]	3.48E-05	2.22E-07	1.95E-06	3.70E-05	2.77E-07	2.42E-06	ND	0.00E+00	1.74E-06	1.22E-07	1.01E-07	-4.30E-06						
ADP-fossils <sup>[2]</sup>	[MJ] ncv	2.13E+02	1.16E+00	3.96E+00	2.18E+02	1.18E+00	1.43E+01	ND	0.00E+00	9.56E-01	3.68E-01	4.88E-01	-8.56E+00						
WDP <sup>[2]</sup>	m³ world eq. deprived	4.07E+00	3.01E-03	4.09E-02	4.11E+00	3.60E-03	2.70E-01	ND	0.00E+00	2.70E-03	1.68E-02	1.72E-02	-6.98E-02						

*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&metals* = *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.



#### 4.1.B. LCA results - Unilin Insulation ECO 360 CW/MA

#### Resource use per 1m<sup>2</sup> ECO 360 CW/MA R-value 5.0 m<sup>2</sup>K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	3.44E+01	1.36E-02	9.14E-01	3.54E+01	1.69E-02	2.30E+00	ND	0.00E+00	1.37E-02	1.13E-02	2.21E-02	-2.04E+00						
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
PERT	[MJ]	3.44E+01	1.36E-02	9.14E-01	3.54E+01	1.69E-02	2.30E+00	ND	0.00E+00	1.37E-02	1.13E-02	2.21E-02	-2.04E+00						
PENRE	[MJ]	1.37E+02	1.23E+00	4.24E+00	1.43E+02	1.26E+00	1.45E+01	ND	0.00E+00	1.01E+00	3.97E-01	5.19E-01	-9.18E+00						
PENRM	[MJ]	7.89E+01	0.00E+00	0.00E+00	7.89E+01	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
PENRT	[MJ]	2.16E+02	1.23E+00	4.24E+00	2.22E+02	1.26E+00	1.45E+01	ND	0.00E+00	1.01E+00	3.97E-01	5.19E-01	-9.18E+00						
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	5.41E-01	0.00E+00						
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
FW	[m³]	3.88E+00	1.10E-04	8.11E-04	3.88E+00	1.34E-04	2.52E-01	ND	0.00E+00	1.02E-04	6.72E-04	4.53E-04	-1.17E-03						

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; PERM = Use of renewable primary energy resources used as raw materials; PERM = Use of non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRM = 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.



#### 4.1.C. LCA results - Unilin Insulation ECO 360 CW/MA

#### Output flows and waste categories per $1m^2$ ECO 360 CW/MA R-value 5.0 $m^2$ K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	2.49E-03	2.37E-06	1.18E-06	2.49E-03	3.09E-06	1.62E-04	ND	0.00E+00	2.50E-06	1.10E-06	1.64E-06	-1.96E-06						
NHWD	[kg]	5.28E-01	4.13E-02	1.81E-01	7.50E-01	6.19E-02	2.80E-01	ND	0.00E+00	4.65E-02	7.33E-02	1.45E+00	-3.16E-02						
RWD	[kg]	6.97E-05	7.90E-06	2.15E-05	9.91E-05	7.99E-06	7.04E-06	ND	0.00E+00	6.51E-06	1.02E-06	2.53E-06	-4.70E-05						
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+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.

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



#### 4.1.D. LCA results - Unilin Insulation ECO 360 CW/MA

#### Additonal Environmental impact per 1m<sup>2</sup> ECO 360 CW/MA R-value 5.0 m<sup>2</sup>K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	В5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	3.73E-07	5.02E-09	3.14E-09	3.81E-07	6.27E-09	2.55E-08	ND	4.02E-09	3.70E-09	3.12E-09	-5.13E-09	-2.09E-07						
IRP <sup>[1]</sup>	kBq U235 eq	3.60E+00	5.01E-03	1.68E-02	3.62E+00	5.13E-03	2.36E-01	ND	4.18E-03	7.59E-04	1.95E-03	-3.70E-02	-3.20E-01						
ETP-fw <sup>[2]</sup>	CTUe	1.35E+02	8.43E-01	2.76E+00	1.38E+02	9.28E-01	9.12E+00	ND	7.70E-01	2.11E+00	7.40E+00	-4.48E+00	-5.06E+01						
HTP-c <sup>[2]</sup>	CTUe	6.68E-09	3.77E-11	9.38E-11	6.82E-09	2.98E-11	4.46E-10	ND	2.14E-11	1.36E-10	4.79E-11	-1.69E-10	-8.17E-09						
HTP-nc <sup>[2]</sup>	CTUe	1.81E-07	7.65E-10	2.82E-09	1.84E-07	9.38E-10	1.21E-08	ND	8.11E-10	6.28E-09	2.26E-09	-4.81E-09	-1.14E-07						
SQP <sup>[2]</sup>	dimensionless	1.59E+02	5.89E-01	7.15E-01	1.61E+02	8.24E-01	1.06E+01	ND	6.69E-01	2.20E-01	8.82E-01	-1.31E+00	-4.09E+00						

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 experienced with the indicator.





## Unilin ECO 360 CT



#### 4.2.A. LCA results - Unilin Insulation ECO 360 CT

#### Core Environmental impact per 1m<sup>2</sup> ECO 360 CT R-value 4.5 m<sup>2</sup>K/W

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 CO₂ eq.]	7.37E+00	5.28E-02	4.76E-01	7.90E+00	7.81E-02	1.15E+00	ND	0.00E+00	6.33E-02	1.24E+00	2.52E-01	-5.60E-01						
GWP-fossil	[kg CO <sub>2</sub> eq.]	9.24E+00	5.28E-02	3.89E-01	9.68E+00	7.80E-02	1.37E+00	ND	0.00E+00	6.32E-02	6.37E-01	8.05E-02	-5.50E-01						
GWP-biogenic	[kg CO <sub>2</sub> eq.]	-2.00E+00	3.11E-05	8.72E-02	-1.91E+00	7.11E-05	-2.42E-01	ND	0.00E+00	3.40E-05	6.07E-01	1.71E-01	-9.88E-03						
GWP-luluc	[kg CO <sub>2</sub> eq.]	1.36E-01	2.67E-05	2.49E-04	1.36E-01	3.12E-05	1.80E-02	ND	0.00E+00	2.25E-05	2.39E-05	1.25E-05	-5.26E-04						
ODP	[kg CFC-11 eq.]	6.85E-07	1.17E-08	1.46E-08	7.12E-07	1.81E-08	4.28E-08	ND	0.00E+00	1.44E-08	3.92E-09	2.80E-09	-2.95E-08						
AP	[mol H+ eq.]	2.85E-02	6.53E-04	9.39E-04	3.01E-02	2.22E-04	4.64E-03	ND	0.00E+00	1.82E-04	4.09E-04	9.62E-05	-1.81E-03						
EP-freshwater <sup>[1]</sup>	[kg P eq.]	1.32E-04	3.16E-07	4.34E-06	1.36E-04	5.56E-07	2.12E-05	ND	0.00E+00	5.05E-07	7.52E-07	1.15E-06	-8.69E-06						
EP-marine	[kg N eq.]	1.02E-02	1.56E-04	2.83E-04	1.06E-02	4.40E-05	1.53E-03	ND	0.00E+00	3.59E-05	1.87E-04	3.47E-04	-2.97E-04						
EP-terrestrial	[mol N eq.]	8.44E-02	1.73E-03	2.15E-03	8.82E-02	4.91E-04	1.28E-02	ND	0.00E+00	4.02E-04	1.88E-03	3.23E-04	-3.41E-03						
РОСР	[kg NMVOC eq.]	1.90E-02	4.77E-04	5.51E-03	2.50E-02	1.89E-04	3.63E-03	ND	0.00E+00	1.54E-04	4.66E-04	1.19E-01	-9.03E-04						
ADP-minerals&metals <sup>[2]</sup>	[kg Sb eq.]	1.22E-05	1.50E-07	1.95E-06	1.43E-05	2.77E-07	3.28E-06	ND	0.00E+00	1.74E-06	1.24E-07	3.81E-08	-4.30E-06						
ADP-fossils <sup>[2]</sup>	[MJ] ncv	2.14E+02	7.60E-01	3.96E+00	2.18E+02	1.18E+00	2.86E+01	ND	0.00E+00	9.56E-01	3.73E-01	2.34E-01	-8.56E+00						
WDP <sup>[2]</sup>	m³ world eq. deprived	3.80E+00	2.03E-03	4.09E-02	3.84E+00	3.60E-03	5.23E-01	ND	0.00E+00	2.70E-03	1.70E-02	9.49E-03	-6.98E-02						

*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&metals* = *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.



#### 4.2.B. LCA results - Unilin Insulation ECO 360 CT

#### Resource use per 1m<sup>2</sup> ECO 360 CT R-value 4.5 m<sup>2</sup>K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	3.66E+01	9.22E-03	9.14E-01	3.75E+01	1.69E-02	4.74E+00	ND	0.00E+00	1.37E-02	1.15E-02	6.41E-03	-2.04E+00						
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
PERT	[MJ]	3.66E+01	9.22E-03	9.14E-01	3.75E+01	1.69E-02	4.74E+00	ND	0.00E+00	1.37E-02	1.15E-02	6.41E-03	-2.04E+00						
PENRE	[MJ]	1.39E+02	8.07E-01	4.24E+00	1.44E+02	1.26E+00	2.90E+01	ND	0.00E+00	1.01E+00	4.04E-01	2.49E-01	-9.18E+00						
PENRM	[MJ]	7.89E+01	0.00E+00	0.00E+00	7.89E+01	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
PENRT	[MJ]	2.17E+02	8.07E-01	4.24E+00	2.22E+02	1.26E+00	2.90E+01	ND	0.00E+00	1.01E+00	4.04E-01	2.49E-01	-9.18E+00						
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
FW	[m³]	4.03E+00	7.40E-05	8.11E-04	4.03E+00	1.34E-04	5.14E-01	ND	0.00E+00	1.02E-04	6.83E-04	2.37E-04	-1.17E-03						

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; PERM = Use of renewable primary energy resources used as raw materials; PERM = Use of non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRM = 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.



#### 4.2.C. LCA results - Unilin Insulation ECO 360 CT

#### Output flows and waste categories per $1m^2$ ECO 360 CT R-value 4.5 $m^2K\!/\!W$

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	В5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	8.27E-05	1.62E-06	1.18E-06	8.55E-05	3.09E-06	1.68E-04	ND	0.00E+00	2.50E-06	1.12E-06	4.73E-07	-1.96E-06						
NHWD	[kg]	1.84E-01	2.89E-02	1.81E-01	3.94E-01	6.19E-02	3.06E-01	ND	0.00E+00	4.65E-02	7.45E-02	8.57E-01	-3.16E-02						
RWD	[kg]	3.88E-05	5.17E-06	2.15E-05	6.54E-05	7.99E-06	1.13E-05	ND	0.00E+00	6.51E-06	1.04E-06	1.33E-06	-4.70E-05						
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00						
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+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.

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



#### 4.2.D. LCA results - Unilin Insulation ECO 360 CT

#### Additonal Environmental impact per 1m<sup>2</sup> ECO 360 CT R-value 4.5 m<sup>2</sup>K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	В5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	2.39E-07	3.40E-09	3.14E-09	2.45E-07	6.27E-09	4.13E-08	ND	0.00E+00	4.02E-09	3.76E-09	1.61E-09	-5.13E-09						
IRP <sup>[1]</sup>	kBq U235 eq	3.68E+00	3.29E-03	1.68E-02	3.70E+00	5.13E-03	4.76E-01	ND	0.00E+00	4.18E-03	7.71E-04	9.23E-04	-3.70E-02						
ETP-fw <sup>[2]</sup>	CTUe	8.78E+01	5.59E-01	2.76E+00	9.11E+01	9.28E-01	1.50E+01	ND	0.00E+00	7.70E-01	2.15E+00	1.25E+00	-4.48E+00						
HTP-c <sup>[2]</sup>	CTUe	4.34E-09	2.39E-11	9.38E-11	4.46E-09	2.98E-11	7.32E-10	ND	0.00E+00	2.14E-11	1.39E-10	1.17E-11	-1.69E-10						
HTP-nc <sup>[2]</sup>	CTUe	1.36E-07	5.16E-10	2.82E-09	1.40E-07	9.38E-10	2.11E-08	ND	0.00E+00	8.11E-10	6.38E-09	4.34E-10	-4.81E-09						
SQP <sup>[2]</sup>	dimensionless	1.78E+02	4.07E-01	7.15E-01	1.79E+02	8.24E-01	2.22E+01	ND	0.00E+00	6.69E-01	2.24E-01	5.11E-01	-1.31E+00						

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 experienced with the indicator.



### 5. Calculation rules

The measurement of environmental impacts in this EPD uses the LCIA methodologies recommended for PEF3.0. The indicator values for polyol and MDI are from Plastics Europe Ecoprofile (GaBi); and the impact assessment results of these materials were calculated using OpenLCA. As this EPD is based on Ecoinvent database, there can be a lack of consistency between GaBi and Ecoinvent indicators such as toxicities, ozone depletion and hazardous waste disposal, although there is good agreement on global warming potential.

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 Unilin Ecochain account.

#### Electricity modelling

The electricity supplier has confirmed that GoOs have been cancelled in relation to the electricity supplied to Unilin, thus electricity is modelled as wind, onshore, with 0.033 kg CO2 (GWPt) per kWh.

#### Cut-off criteria

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 2022. 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 Unilin, 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

The product and data used in this EPD are based on the being manufactured in the Republic of Ireland, and transported a mean distance of 60 km from the production site in Co. Meath, to customers within the island of Ireland.

#### A4. Transport to customer

Distance to the customer is 60 km.

Parameter	Value / Description
Transport vehicle type	Freight lorry 16-32 metric ton, EURO6
Distance	60 km
Capacity Utilisation	64%
Bulk density of transported goods	32 kg/m <sup>3</sup>



#### A5. Installation

Parameter	Value / Description
Transport vehicle type	Freight lorry 16-32 metric ton, EURO6
On-site losses due to damage, off-cuts, etc.	6.5%
Distance of transport of losses to landfill	50 km
Landfilling of installation losses	0.229 kg

#### C. End of Life Scenarios, Module

#### C1. De-construction demolition

In the deconstruction/demolition phase C1 it is assumed that the insulation panels are removed manually from the building, thus no energy or materials are required for module C1, and the impacts are assumed to be zero in C1.

In deconstruction, it is assumed that 100% of the aluminium foil facing is recovered and this all sent to recycling. Of the remaining PIR component of the insulation, it is assumed, based on information supplied by the manufacturer, that 70% is landfilled, and 30% is incinerated.

#### C2. Transport

In the transport phase C2, it is assumed that the removed materials travel 50km to landfill and 250km to incineration, as applicable. Transport vehicle type: Freight lorry 16-32 metric ton, EURO6.

#### C3. Waste processing

30% of the PIR material at end of life is incinerated.

#### C4. Disposal

70% of the PIR material at end of life is landfilled.

#### D. Reuse - Recovery - Recycling potential

It is assumed that of the mass of material incinerated, 40% of this mass is converted to energy. It is assumed that in calculating this energy amount, that the efficiency of the incineration in converting NCV to energy is 70%.

Of this energy, 48% becomes electricity, according to conversion factor supplied by Sustainable Energy Authority of Ireland [12].

100% of the aluminium foil facing is sent to aluminium recycling.

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

Biogenic carbon (kg per declared unit)	ECO 360 CW/MA	ECO 360 CT	Unit
Biogenic carbon content in product	0.23	0.31	kg C
Biogenic carbon content in packaging	0.24	0.24	kg C



# 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, ISO14040:2006.
- [2] ISO 14044 Environmental management Life cycle assessment Requirements and guidelines', International Organization for Standardization, ISO14044:2006
- [3] ISO 14025 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.
- [4] I.S. EN 15804:2012+A1:2013 Sustainability of construction works Environmental product declarations -Core rules for the product category of construction products', EN 15804:2012+A1:2013.
- [5] 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 2.1
- [6] I.S. EN 16783:2017 Thermal insulation products Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations.
- [7] Ecochain Helix, V 3.5.80 (2023), web: http://app.ecochain.com.
- [8] I.S. EN 13165:2008, Thermal insulation products for buildings. Factory made rigid polyurethane foam (PUR) products. Specification.
- [9] CML Department of Industrial Ecology, CML-IA Characterisation Factors, August 2016, Leiden University, Leiden, Netherlands.
- [10] Ministerie van Verkeer en Waterstaat, 8 maart 2004, Toxiciteit heeft z'n prijs, Schaduwprijzen voor ecotoxiciteit en uitputting van abiotische grondstoffen binnen DuboCalc.
- [11] http://timeforchange.org/co2-emissions-for-shipping-of-goods/
- [12] https://www.seai.ie/publications/DEAP-Elec-Factors-2017.pdf

#### 10. Annex

N/A.