Kingspan
Insulated Panels

ENVIRONMENTAL PRODUCT DECLARATION

Roof Panels

Based on cradle to grave
Life Cycle Assessment

Environmental Product Declaration (EPD) in accordance with ISO 14025 and EN 15804

Accroding to Product Category Rules for: Insulation Materials (multiple UN CPC codes, Version 1.0, dated 2014-04-16, and Construction Products and Construction Services (CPC 54, Version 1.2, dated 2013-03-15) as normative reference.

EPD Revision 1.00

Approval date 03/05/2016

Registration number S-P-00846

Expiry date 03/05/2021

Geographical area of application of this EPD: Australia, New Zealand and South East Asia

Year taken as a reference for the data: 2014

AUSTRALASIA EPD®
ENVIRONMENTAL PRODUCT DECLARATION

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1 EPD Detail

An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR (Product Category Rules).

Environmental product declarations within the same product category from different programmes may not be comparable. EPD of construction products may not be comparable if they do not comply with EN 15804.

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CEN standard EN 15804 served as the core PCR

PCR:	Insulation Materials PCR 2014:13 version 1.0, 2014/04/16
PCR review was conducted by:	The Technical Committee of the International EPD® System. Moderator: Stefano Rossi, rossi@studiolce.it
Independent external verification of the declaration and data, according to ISO 14025:2010:	☐ EPD process certification (Internal) ☑ EPD verification (External)
Accredited or approved by	The Australasian EPD® Programme

2. PRESENTATION OF THE COMPANY AND ITS PRODUCT

2.1 The Company and its Production

Kingspan Insulated Panels Australia and New Zealand are part of Kingspan Group plc, the world's largest manufacturer of insulated panels, and as such is committed to reducing the impact of its business operations, products and services on the environment.

The Kingspan Group has spent over 40 years manufacturing innovative products for the construction industry. The Group was founded in the late 1960s in Ireland. The founder, Eugene Murtagh remains on the Board today. Kingspan was initially involved in the manufacture of steel frame buildings and structural sections. Later, Kingspan began the manufacture of environmental products on a small scale.

During the early 1980s, the Group expanded into the manufacture of Insulated Panels and Insulation products and established numerous manufacturing plants in the U.K. and Ireland.

In the 1990s Kingspan expanded organically and through acquisitions, adding facilities and sales companies in the U.K., Benelux, Germany, Poland, Hungary and the Czech Republic, which provided the Group with additional geographic diversity.

From 2000, Kingspan entered the Access Floor market through acquisitions in the U.K. and the USA. In more recent years the Group established a much broader network in Central and Eastern Europe, North America, Australia and New Zealand.

Today Kingspan is a €1.2bn company and the insulated panel division is the largest within the Group, producing 16 million square metres of insulated panels per year around the world. The other three divisions comprise; insulation boards, access floors and renewables & environmental.

Within Kingspan Insulated Panel's core area of business, it has established a market position as a global leader in the design and manufacture of high quality, firesafe, insulated roof, wall and façade systems. These systems offer designers and architects extensive choice to create energy-efficient buildings that deliver 'signature' architectural and aesthetic impact.

Kingspan insulated panel systems offer significant advantages over conventional site-assembled systems, including:

- Fast fixing and installation;
- Reliable thermal performance;
- Insulation continuity;
- Minimal air leakage; and
- Elimination of interstitial cavity condensation and cold bridging.

2.2 Description of the Products

Kingspan's roof panel systems (KS1000RW) provide a world leading firesafe and high thermal performance building solution offering a simplified method of construction and high speed of build, when compared with traditional multi-component building systems.

Advantages of the Kingspan KS1000RW insulated panel include:

- suitability for roof and also wall applications;
- a wide range of coating systems and colours;
- a fully Factory Mutual (FM) Approved – insurance company preferred system.

The roof panels are suitable for a wide range of environments, including those for cold storage, cleanroom, food processing and high humidity applications.

The basic performance and specification characteristics for the product are provided in Table 1.

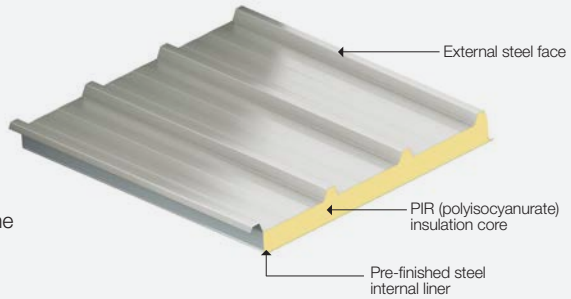


Figure 1. Typical view of a Kingspan KS1000RW roof panel

Table 1: Company data and product characteristics

Company Data	
Company	Kingspan Insulated Panels Pty Ltd
Production Facility	Kingspan Insulated Panels Pty Ltd, 38-52 Dunheved Circuit, St Marys, NSW 2760, Australia
Contact Person	Dr Mark Tatam, Technical Manager
Product Characteristics	
Products Thermal resistance [m^2K/W] measured in accordance with (EN 12667)	• KS1000 RW, 40mm thick, R2.34, 9.3 kg/m^2 • KS1000 RW, 60mm thick, R3.36, 10.0 kg/m^2 • KS1000 RW, 100mm thick, R5.35, 11.6 kg/m^2
Application Area	Insulated roof panel systems
Principal Geographical Sale Areas	Australia, New Zealand and South East Asia
Functional Unit	1m^2 of panel with a specific thermal resistance (R-value)
Thickness of each component	0.42mm top and 0.32mm bottom steel sheets, Aluminium /zinc coating (55/45 by weight) with 40, 60 or 100 mm of insulation foam.
Weight percentage of each single component [%]	See Table 2 for the technical specifications of the KS1000 RW, 60mm panel.
Compressive Strength	Varies depending on finish
Reaction to Fire	Varies depending on finish

All Kingspan products are backed by a comprehensive warranty package and have a life expectancy in excess of 40 years. This provides assurance for all the key performance areas of the insulated panel system. Detailed data on the composition of the product is provided in Table 2.

The panels are designed to provide a high level of building air tightness, which optimizes energy performance over the operating life of buildings.

Kingspan
Insulated Panels

Table 2: Technical specifications of the KS1000 RW, 60mm thick panel for 1m² ready for sale. Details are limited due to the degree of confidentiality of the specific formula.

Material	Quantity (net)	Units	Percentage Content	CAS No.
Steel Sheets				
Steel Coil	6.63	kg	62%	12597-69-2
Aluminium / zinc coating	0.366	kg	3%	7429-90-5, 7440-21-3, 7440-66-6
Polyester Paint 25um (incl. primer)	0.566	kg	5%	Varies
Backing Film / Filament tape	0.0861	kg	0.8%	-
Insulation Foam				
PIR Insulation foam (total)	2.40	kg	22%	
- Modified Polyisocyanurate Polymer			20-22%	-
- Hydrocarbon blowing agent			0-2%	287-92-3
- (This may not be a complete list of foam components)				
Packaging				
Polystyrene	0.324	kg	3%	9003-53-6
MDF (Medium-density fibreboard)	0.000270	m^3	2%	-
Cardboard	0.0675	kg	0.6%	-
Stretchwrap (Ethylene / Polybutene)	0.0333	kg	0.2%	26211-73-8, 9003-29-6

Kingspan insulated panels offer a high performance panel system – key issues covering aspects of the product performance include:

- **Energy**: A high performing building envelope can assist in dramatically reducing the consumption of energy. Kingspan panels are engineered for the building envelope allowing for minimal air leakage, and providing for lower cost and more efficient HVAC plant design. This reduces energy usage and in turn reduces carbon emissions;
- **Acoustics**: A basic roof panel construction detail would offer a built in sound reduction of Rw = 24 dB. The addition of other components can increase the Rw performance. Kingspan has standard designs for up to Rw = 49 dB; and
- **Fire**: Kingspan panels have very good fire performance in terms of both reaction to fire and fire resistance. When exposed to fire the exposed surface of the insulation would blacken and form a layer of 'char', which resists any further progression of fire. The use of Kingspan panels does reduce the risk of incidents (e.g., fire), when compared with some alternative construction materials.

Kingspan Insulated Panels have a number of quality and environmental management systems in place, including:

- Insulated panel systems are quality approved to ISO 9001: 2008, and for fire performance (FM 4880) and natural hazard (FM 4881) by FM Approvals;
- Target for all suppliers to be accredited to BS EN ISO 9001 / 14001 and OHSAS 18001, which cover quality, environmental management, and health and safety respectively. Although this is not currently compulsory for suppliers, they are either working towards this accreditation, or have already achieved it;
- Kingspan is working towards achieving ISO 14001 Environmental management system approval at its plant in St Mary's, Australia; and
- Regular sustainability reporting to the building market and all stakeholders. The 2010/11 report complies with the Global Reporting Index (GRI) reporting framework to level C, and covers the Kingspan Insulated Panels Division Head Office and manufacturing site at Holywell in the UK, as well as its insulated panel manufacturing sites at Sherburn in the UK, Kingscourt in Ireland, and Sydney, Australia.

3. DECLARATION OF ENVIRONMENTAL PERFORMANCE

3.1 Life Cycle Assessment

This section includes the main features as well as the results of the assessment of the environmental aspects carried out on the basis of a life cycle using the life cycle assessment (LCA) methodology.

Life cycle thinking is a core concept in sustainable consumption and production for policy and business. Upstream and downstream consequences of decisions must be taken into account to help avoid the shifting of burdens from one type of environmental impact to another, from one political region to another, or from one stage to another in a product's life cycle from the cradle to the grave.

LCA is the compilation of the inputs, outputs and environmental impacts of a product system throughout its life cycle. It is a technique that enables industries to identify the resource flows and environmental impacts (such as greenhouse gas emissions, water and energy use) associated with the provision of products and services.

Kingspan's LCA calculates the environmental footprint at each stage of the supply chain, manufacturing processes, product use and end of life. All the significant environmental impacts associated with the product, including the impact on water, air, land and climate change are reported based on international ISO LCA standards.

The inventory data for the process were entered into the SimaPro LCA program and linked to the pre-existing data for the upstream feedstocks and services, primarily from the Australian Life Cycle Inventory (AusLCI) compiled by the Australian Life Cycle Assessment Society and ecoinvent (v3.1) by the ecoinvent Centre. All background data is less than 10 years old.

This product declaration is based on the report "Life Cycle Assessment and Environmental Product Declaration of Insulated Panel Products" by Edge Environment Pty Ltd and verified by Jane Anderson with thinkstep.

The declaration is for a typical 1m^2 of installed roof panel (main product for the EPD is the KS1000 RW, 60mm thick panel, R3.36) assessed from cradle to grave over a product life of 40 years use in Australia, New Zealand and South East Asia.

According to EN 15804, EPDs of construction products may not be comparable if they do not comply with this standard, and EPDs might not be comparable, particularly if different functional units are used. A summary of the life cycle assessment parameters is given in Table 3.

Table 3: LCA study parameters KS1000 RW, 60mm thick panel (R3.36).

Product Characteristics	
Functional Unit	1m^2 of panel (R3.36)
System Boundary	Cradle to Grave
Reference Service Life (RSL)	40 years assuming use in climatic conditions typical for Australia, New Zealand and South East Asia. This figure is for modelling purposes, and in general the product is expected to last the life of the building it is installed on.
Geographical Coverage	Australia, New Zealand and South East Asia
Time Period	2014

3.2 Product Life Cycle Overview

The life cycle of a building product is divided into three process modules according to the General Program Instructions (GPI[1]) and four information modules according to ISO 21930 and EN 15804, and supplemented by an optional information module on potential loads and benefits beyond the building life cycle, as given in Table 4.

Table 4: The life cycle of a building product

GPI Module	Asset life cycle stage		Reported (X = included in the EPD, "not relevant", shall not be regarded as an indicator result of zero),
Upstream	A1	Raw material supply	X
Core	A2	Transport	X
	A3	Manufacturing	X
Downstream	A4	Transport	X
	A5	Construction, installation process	X
	B1	Material emissions from usage	not relevant
	B2	Maintenance	X
	B3	Repair	not relevant
	B4	Replacement	not relevant
	B5	Refurbishment	not relevant
	C1	Deconstruction and demolition	X
	C2	Transport	X
	C3	Waste processing	X
	C4	Disposal	X
Other environmental information	D	Reuse, recycle or recovery	X
Inclusion of reference service life (RSL[2])	B1-5		

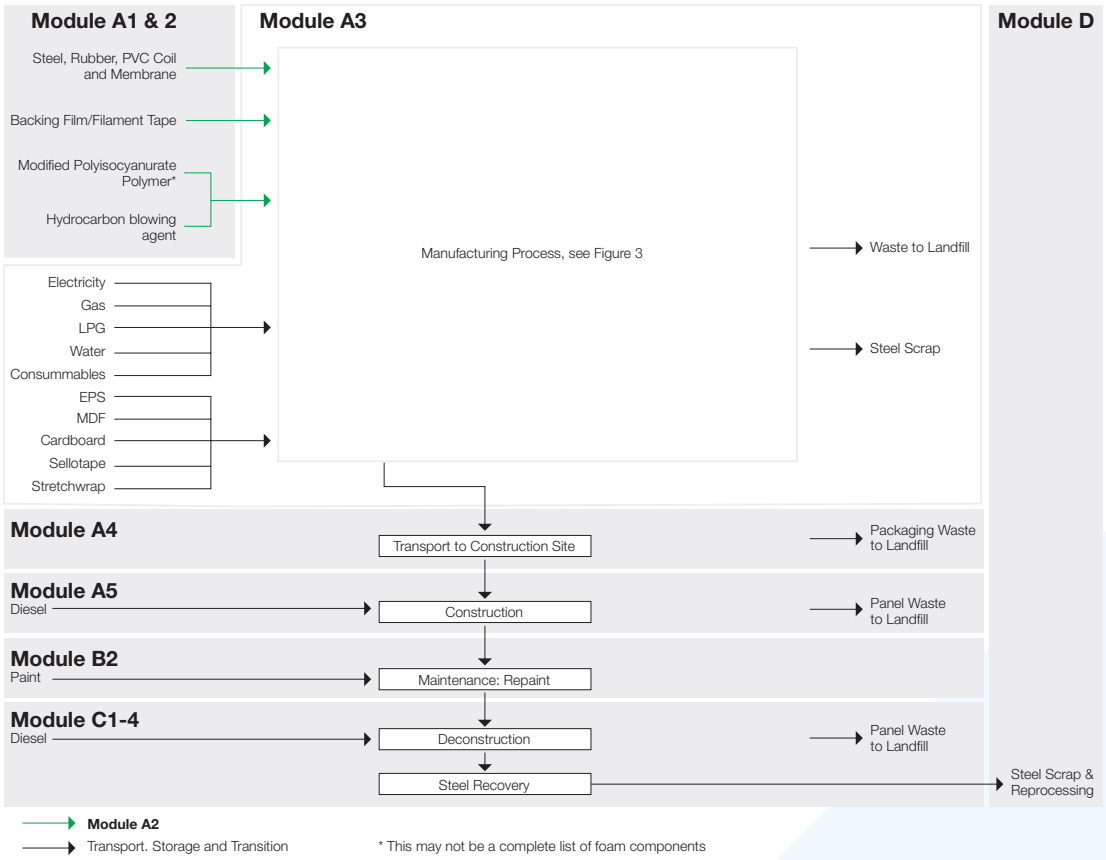
The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.
The following life cycle stages are deemed not applicable for Kingspan panels: Material emissions from usage (B1); Repair (B3); Replacement (B4); and Refurbishment (B5) over the stated RSL.

A system diagram depicting the Kingspan process in detail and showing system boundaries for each module given in Figure 2.

[1] AEPDP. (2015). General Programme Instructions of the Australasian EPD® Programme, Version 1.0, 2015-02-20. Available at http://epd-australasia.com

[2] Named 'Use' in ISO 21930.

Figure 2. Layout of the Kingspan manufacturing process, showing system boundaries in accordance with ISO 21930 and EN 15804



3.2.1 Raw Materials and Packaging (Module A1 and A2)

The panels are produced using the following materials for which generic background data was used:

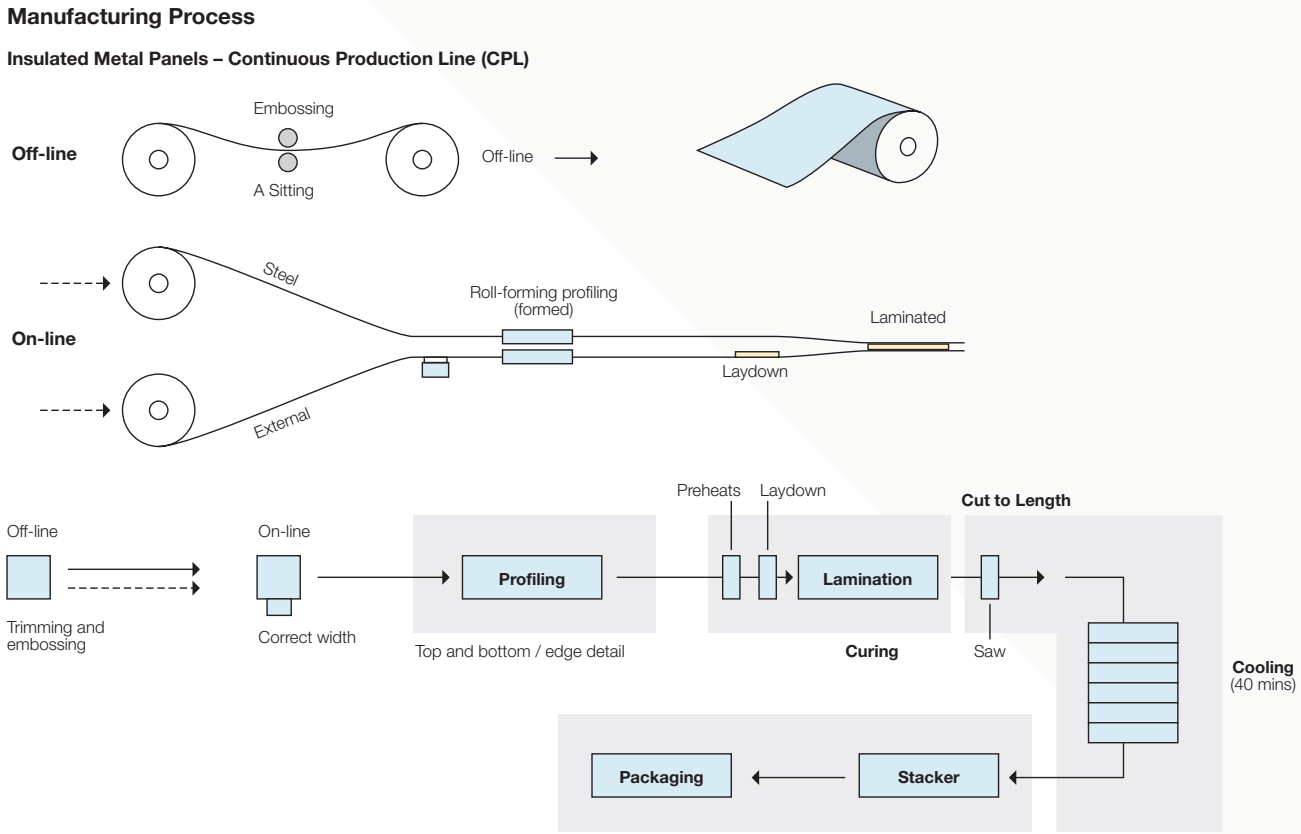
- galvanised and painted steel sheet coils;
- backing film/filament tape made of HDPE attached to the steel sheet;
- insulation foam formed from MDI, polyol, catalysts and pentane; and
- typical packaging made up from EPS, MDF, cardboard, stretch wrap and small amounts of sellotape (assumed negligible).

The electricity generation mix for NSW used, from the AusLCI database, includes (excl. import from other states: 87.5% black coal, 5.9% natural gas, 3.3% hydro-electric, 1.7% PV and 0.7% wind power.

3.2.2 Panel Manufacturing (Module A3)

Kingspan's panel manufacturing facility is illustrated in Figure 3 below. The main input, besides from raw material and packaging, are electricity (1.73kWh/m^2), natural gas (2.47MJ/m^2) and water (2.9L/m^2). The electricity mix used during product manufacturing was assumed to be the average for NSW.

Figure 3. The continuous manufacturing process for Kingspan insulated panels



3.2.3 Transport (Module A4)

Within the Australian market, panel distribution by truck, rail and sea freight from Kingspan's gate is calculated based on national annual sales volumes by state and conservative average transport distance assumptions.

For New Zealand and South East Asia distribution the assessment includes inbound sea freight and regional road distribution.

3.2.4 Installation (Module A5) and Deconstruction (Module C1)

Diesel fuel consumption for machinery used during construction and deconstruction has been included in the assessment. Construction waste from damaged panels is accounted for by assuming 1% wastage i.e. the production of 1.01m^2 of panels produced and delivered to site for each square metre of panel installed in the building. This is likely a conservative estimate for the average Kingspan panel construction project.

3.2.5 Maintenance (Module B2)

The exterior facing (top) panel side is assumed to be re-painted once over the 40-year life of the panel.

3.2.6 Disposal / Reuse / Recycling (Module C2-C4)

Kingspan have limited empirical evidence of what the end of life fate is for their panels. Based on anecdotal evidence the panels are either deconstructed and transported for reuse in a second building, or diverted for material recovery and disposal. With the large degree of uncertainty of the panels' end of life fate, the cradle to grave environmental profile is calculated based on the most conservative scenarios where the majority of used panels are deconstructed and transported to material recovery facilities, where the steel is recovered and returned into the recycling stream, and the insulation foam is diverted to landfill.

Approximately 6% of the panels are assumed to be disposed in landfill with no immediate material recovery.

Reuse is always the preferred option for panels, and features of the panel system such as the ability to be removed off the building at end of life facilitate this aspect. Where this is not possible or practical, the steel is stripped from the panels and fully recycled. Economics for specific buildings will depend on transport distances and the prevailing price of scrap steel.

Steel is a major component of Kingspan's insulated panels. Kingspan's ongoing work with environmental consultants on environmental profiles means that it continues to identify environmental impacts in its supply chain. It is using this to identify priorities for engagement with key suppliers to find ways to reduce this impact.

3.3 Other Environmental Information

3.3.1 Benefits and loads beyond the system boundary (Module D)

Product Category Rules for construction products states that the information in module D may contain technical information as well as LCA results from post-consumer recycling, i.e. environmental benefits or loads resulting from reusable products, recyclable materials and/or useful energy carriers leaving a product system e.g. as secondary materials or fuels. The net flow of post consumer recycled materials is limited to panel steel scrap after use. The net benefit has been calculated in accordance with the specific guidance by Leroy et al (2014).

The recycled content per tonne steel sheet produced in the LCI is assumed to be:

- 90% in the steel sheets produced in EAF, and
- 10% in the steel sheets produced BF/BOS.

The recovery rate after use is 94% (see previous section), resulting in a net flow of

- 4% of the steel sheets produced in Electric Arc Furnace (EAF), and
- 84% in the steel sheets produced Blast Furnace (BF)/Basic Oxygen Steelmaking (BOS).

Considering melting losses, 1.09 tonne of scrap at the end of life, saves the production of one tonne of steel made with 100% iron ore in a blast furnace (primary production) but it requests the production of 1 tonne of steel through an Electric Arc Furnace (secondary production) from scrap.

3.4 LCA Results

The following tables provide the environmental information produced using LCA.

Table 5: Environmental information for roof panel: KS1000 RW, 60mm thick, R3.36 (Main Product for the EPD).

Impact Category	A1 - 3	A4	A5	B2	C1	C2	C3	C4	D
Potential Environmental Impacts									
Global warming ($kgCO_2$ eq)	45.1	3.44	0.747	3.23	6.02E-04	0.373	0.00	0.0938	-4.01
Ozone depletion (kgCFC11 eq)	2.43E-06	1.26E-07	2.66E-08	6.40E-08	7.50E-11	1.23E-08	0.00	7.22E-09	-1.99E-07
Acidification of land and water ($kgSO_2$ eq)	5.73E-01	1.15E-02	6.30E-03	9.08E-03	4.62E-06	1.19E-03	0.00	3.74E-04	-1.25E-02
Eutrophication ($kgPO_4^{3-}$ eq)	1.63E-01	3.12E-03	1.77E-03	2.84E-03	1.08E-06	3.26E-04	0.00	9.47E-05	-7.77E-03
Photochemical ozone creation (kgC_2H_2 eq)	1.63E-01	7.13E-04	2.55E-04	3.13E-04	1.18E-07	7.72E-05	0.00	2.31E-05	-3.77E-03
Depletion of abiotic resources (elements) (kgSb eq)	1.47E-03	1.55E-05	1.49E-05	2.33E-06	9.53E-11	1.87E-06	0.00	3.89E-07	-3.10E-06
Depletion of abiotic resources (fossil) (MJ)	688.55	52.2	6.85	38.7	0.00827	5.75	0.00	1.36	-51.3
Use of Resources									
Renewable primary energy (excl. raw materials) (MJ)	35.2	0.633	0.909	0.375	3.46E-05	0.0677	0.00	0.0164	0.162
Renewable primary energy (raw materials) (MJ)	3.46								
Total use of renewable primary energy (MJ)	**38.65**	**0.633**	**0.909**	**0.375**	**3.46E-05**	**0.0677**	**0.00**	**0.0164**	**0.162**
Non-renewable primary energy (excl. raw materials) (MJ)	701.9	52.5	6.993	39.9	0.0091	5.77	0.0	1.42	-32.8
Non-renewable primary energy (raw materials) (MJ)									
Total use of non-renewable primary energy (MJ)	**701.9**	**52.5**	**6.993**	**39.9**	**0.0091**	**5.77**	**0.0**	**1.42**	**-32.8**
Use of secondary material (kg)	2.56								
Use of renewable secondary fuels MJ)									
Use of net fresh water (m^3)	4.1	1.71	0.0231	1.060	2.04E-04	0.184	0.00	0.0415	-0.01
Waste Categories									
Hazardous waste disposed (kg)	1.26E-03	6.17E-05	1.33E-05	1.40E-05	4.37E-09	6.28E-06	0.00	1.49E-06	-5.48E-04
Non-hazardous waste disposed (kg)	7.987	0.335	0.633	0.0453	5.61E-06	0.0237	0.00	2.73	-1.02
Radioactive waste disposed/stored (kg)	8.36E-04	1.39E-06	8.38E-06	1.33E-05	2.51E-09	1.55E-07	0.00	3.24E-08	-2.21E-05

Table 6: Environmental information for roof panel: KS1000 RW, 40mm thick, R2.34.

Impact Category	A1 - 3	A4	A5	B2	C1	C2	C3	C4	D
Potential Environmental Impacts									
Global warming ($kgCO_2$ eq)	41.5	3.16	0.708	3.23	5.54E-04	0.337	0.00	0.0847	-4.01
Ozone depletion (kgCFC11 eq)	2.30E-06	1.16E-07	2.52E-08	6.40E-08	6.90E-11	1.09E-08	0.00	6.40E-09	-1.99E-07
Acidification of land and water ($kgSO_2$ eq)	5.57E-01	1.05E-02	6.13E-03	9.08E-03	4.25E-06	1.07E-03	0.00	3.37E-04	-1.25E-02
Eutrophication ($kgPO_4^{3-}$ eq)	1.58E-01	2.87E-03	1.73E-03	2.84E-03	9.93E-07	2.94E-04	0.00	8.53E-05	-7.77E-03
Photochemical ozone creation (kgC_2H_2 eq)	1.58E-01	6.56E-04	2.46E-04	3.13E-04	1.09E-07	6.95E-05	0.00	2.08E-05	-3.77E-03
Depletion of abiotic resources (elements) (kgSb eq)	1.47E-03	1.43E-05	1.49E-05	2.33E-06	8.77E-11	1.69E-06	0.00	3.53E-07	-3.10E-06
Depletion of abiotic resources (fossil) (MJ)	617.68	48.0	6.10	38.7	0.00761	5.20	0.00	1.23	-51.3
Use of Resources									
Renewable primary energy (excl. raw materials) (MJ)	33.3	0.583	0.890	0.375	3.18E-05	0.0612	0.00	0.0149	0.162
Renewable primary energy (raw materials) (MJ)	3.46								
Total use of renewable primary energy (MJ)	**36.78**	**0.583**	**0.890**	**0.375**	**3.18E-05**	**0.0612**	**0.00**	**0.0149**	**0.162**
Non-renewable primary energy (excl. raw materials) (MJ)	620.9	48.3	6.139	39.9	0.0083	5.21	0.0	1.28	-32.8
Non-renewable primary energy (raw materials) (MJ)									
Total use of non-renewable primary energy (MJ)	**620.9**	**48.3**	**6.139**	**39.9**	**0.0083**	**5.21**	**0.0**	**1.28**	**-32.8**
Use of secondary material (kg)	2.56								
Use of renewable secondary fuels MJ)									
Use of net fresh water (m^3)	4.0	1.57	0.0206	1.060	1.88E-04	0.166	0.00	0.0375	-0.01
Waste Categories									
Hazardous waste disposed (kg)	1.25E-03	5.67E-05	1.32E-05	1.40E-05	4.03E-09	5.68E-06	0.00E+00	1.34E-06	-5.48E-04
Non-hazardous waste disposed (kg)	7.835	0.309	0.631	0.0453	5.16E-06	0.0186	0.0000	2.14	-1.02
Radioactive waste disposed/stored (kg)	8.11E-04	1.27E-06	8.13E-06	1.33E-05	2.31E-09	1.40E-07	0.00E+00	2.93E-08	-2.21E-05

Table 7: Environmental information for roof panel: KS1000 RW, 100mm thick, R5.35.

Impact Category	A1 - 3	A4	A5	B2	C1	C2	C3	C4	D
Potential Environmental Impacts									
Global warming ($kgCO_2$ eq)	52.4	3.99	0.826	3.23	6.98E-04	0.454	0.00	0.1141	-4.01
Ozone depletion (kgCFC11 eq)	2.69E-06	1.47E-07	2.94E-08	6.40E-08	8.69E-11	1.57E-08	0.00	9.20E-09	-1.99E-07
Acidification of land and water ($kgSO_2$ eq)	6.05E-01	1.33E-02	6.64E-03	9.08E-03	5.36E-06	1.46E-03	0.00	4.60E-04	-1.25E-02
Eutrophication ($kgPO_4^{3-}$ eq)	1.72E-01	3.62E-03	1.87E-03	2.84E-03	1.25E-06	3.99E-04	0.00	1.16E-04	-7.77E-03
Photochemical ozone creation (kgC_2H_2 eq)	1.72E-01	8.27E-04	2.74E-04	3.13E-04	1.37E-07	9.47E-05	0.00	2.84E-05	-3.77E-03
Depletion of abiotic resources (elements) (kgSb eq)	1.47E-03	1.80E-05	1.50E-05	2.33E-06	1.11E-10	2.26E-06	0.00	4.70E-07	-3.10E-06
Depletion of abiotic resources (fossil) (MJ)	830.27	60.5	8.35	38.7	0.00959	6.98	0.00	1.66	-51.3
Use of Resources									
Renewable primary energy (excl. raw materials) (MJ)	38.9	0.734	0.947	0.375	4.01E-05	0.0822	0.00	0.0200	0.162
Renewable primary energy (raw materials) (MJ)	3.46								
Total use of renewable primary energy (MJ)	**42.40**	**0.734**	**0.947**	**0.375**	**4.01E-05**	**0.0822**	**0.00**	**0.0200**	**0.162**
Non-renewable primary energy (excl. raw materials) (MJ)	864.0	60.9	8.699	39.9	0.0105	7.01	0.0	1.72	-32.8
Non-renewable primary energy (raw materials) (MJ)									
Total use of non-renewable primary energy (MJ)	**864.0**	**60.9**	**8.699**	**39.9**	**0.0105**	**7.01**	**0.0**	**1.72**	**-32.8**
Use of secondary material (kg)	2.56								
Use of renewable secondary fuels MJ)									
Use of net fresh water (m^3)	4.3	1.98	0.0279	1.060	2.36E-04	0.222	0.00	0.0502	-0.01
Waste Categories									
Hazardous waste disposed (kg)	1.28E-03	7.15E-05	1.37E-05	1.40E-05	5.07E-09	7.62E-06	0.00E+00	1.80E-06	-5.48E-04
Non-hazardous waste disposed (kg)	8.291	0.389	0.637	0.0453	6.50E-06	0.0383	0.0000	4.42	-1.02
Radioactive waste disposed/stored (kg)	8.85E-04	1.61E-06	8.87E-06	1.33E-05	2.91E-09	1.87E-07	0.00E+00	3.91E-08	-2.21E-05

4 ADDITIONAL ENVIRONMENTAL INFORMATION

Kingspan Insulated Panels is fully committed to developing products that are sustainable throughout their lifecycle, from manufacture and application to their disposal. Kingspan continues to work with the BRE (British Research Establishment) in the UK and leading waste management companies to further quantify and reduce the impact of its products on the environment at all stages of their lifecycles.

Since January 2004, all Kingspan insulated panels have been manufactured without any Ozone Depleting Substances (ODS). Kingspan panels also have low volatile organic compounds (VOCs) in manufacture, and zero in use. In manufacture, Kingspan polyisocyanurate insulation is made using an isocyanurate prepolymer feedmix, which is vacuum stabilized to ensure extremely low volatility. In addition, a state of the art extraction system in areas of potential exposure, and nitrogen blankets on storage tanks and road tankers ensures zero emissions during loading / unloading.

There may be VOC exposure to workers and perhaps neighbours in the vicinity of the manufacturing plant using the insulation foam ingredients. The disposal of Kingspan products to landfill may (by burning in accidental landfill fires) contribute to Persistent Bioaccumulative Toxic emissions (but arguably no more so than any other combustible material).

Kingspan insulated panels have no other known or foreseeable impact that can adversely affect the environment or biodiversity beyond what is reported in this declaration.

The coating steel facings and the inert polyisocyanurate foam core combine to produce products that are designed to have low environmental impact and have no known adverse effects on human health in use.

A small amount of chromium oxide is used in some of the zinc / aluminium sheet protective paint coatings, for some Kingspan products. This comes from the steel coil feed products from steel suppliers and is designed to provide corrosion resistance for finished products. This is understood to be in the form of chromium (III) oxide. Kingspan is currently working with suppliers to find suitable chromium free coating systems.

The main known potential toxicity impacts over the product life cycle are from Kingspan's supply chain, primarily production, coating of steel coil and production of isocyanurate monomer and polyol.

Kingspan roof panel systems have Global GreenTag™ certification. They have been certified as Greentag™ Gold Plus with a GreenRate® Level A. Global GreenTag is a Type 1 ecolabel in conformance with ISO 14024, and is recognized by both the Green Building Councils of Australia and New Zealand under the Green Star programs.

Sustainability Policy and Strategy

Kingspan Insulated Panels operates an innovative and sustainable business practice which delivers clear environmental benefits to

- assess and take action to reduce the environmental impact of its operations
- support the local community
- work for the advancement of knowledge in the insulated panels industry
- use third party accreditation to monitor and verify its activities

Research and investment into new ideas ensures that the Kingspan product offering is constantly improving and this information is communicated through training and technical support to its various stakeholders.

Kingspan Insulated Panels has a sustainability vision to be a global leader in sustainable business and establish a leading position in providing sustainable, renewable and affordable best practice solutions for the construction sector. Kingspan is the most highly recognized brand for insulated panels across the world.

Striving for sustainability in all business products and operations is Kingspan Insulated Panels corporate and personal responsibility. Kingspan Insulated Panels aims to adopt and apply best practice sustainability principles by ensuring environmental, social and economic parameters are considered in an integrated way in product and service delivery.

To this end, Kingspan Insulated Panels commits to

- incorporate the ethos of sustainability into the vision and values of the organisation
- continually improve operational performance through the setting of long-term objectives and targets related to sustainability and review progress regularly
- comply or exceed applicable legal and policy requirements related to the environmental and social aspects of the organisation
- optimise energy and raw material usage and prevent or minimise pollution and environmental damage
- communicate and actively promote awareness and acceptance of this policy to everyone working for or on behalf of the organisation
- ensure employees are given adequate training in sustainability issues and are fully involved in helping deliver the sustainability vision and policy
- implement a Code of Conduct and supporting sustainability guidelines for key suppliers and contractors and other interested parties to ensure they comply with the Kingspan sustainabilty policy

Kingspan Insulated Panels is dedicated to adopting and becoming fully involved in supporting the implementation of its sustainability policy, and the responsibility for implementing this vision and strategy lies with the Divisional Managing Director.

This policy forms a framework for the company activities, product design, services and decision-making and promotes engagement of the entire organisation.

Long term sustainability objectives of the business are founded on

- **Product Stewardship:** Ensure sustainability is considered in the design and manufacture, and promoted in the installation, use and disposal of Kingspan Insulated Panel's products and services
- **Carbon Management:** Measure and actively reduce Kingspan Insulated Panels' carbon footprint with the long-term aim of going beyond carbon neutrality
- **Optimise Use of Resources:** Minimise waste, harmful emissions and water usage associated with the manufacture, distribution and, where possible, the end-of-life management of Kingspan Insulated Panel's products and services

- **Sustainable Building Design:** Consider best practice sustainable building design when constructing or refurbishing Kingspan Insulated Panels manufacturing facilities, and ensure the sustainable management of all sites used by Kingspan Insulated Panels
- **Ethical Procurement & Supply Chain Management:** Develop an ethical procurement strategy for procuring materials and services. Engage with prioritised suppliers and contractors to ensure that they operate to similar sustainability standards, and seek to build long-term relationships with key suppliers and contractors
- **Stakeholder Engagement:** Engage key stakeholders in Kingspan Insulated Panels sustainability strategy and ensure its employees are fully involved in helping deliver the sustainability policy
- **Social Responsibility:** Support Kingspan Insulated Panels employees and uphold its corporate social responsibility to the communities in which they do business

Field Training and Support

Kingspan is committed to the training of the persons involved in the installation process to alleviate life / safety risks, and also incorrect installation of product which may affect product longevity.

Training is critical in reducing mistakes and therefore waste in the construction process. Correct installation improves the air tightness of the completed building and energy efficiency in use, improves the life expectancy of the product, and minimizes maintenance during its life. Additionally, Kingspan reviews project specific exposure information for their products and offer warranty advice and recommended maintenance regimes.

Kingspan Insulated Panels offers a comprehensive Field Services Engineering Support Package, and assists its customers with contractor training on the installation of products. Kingspan also provides both theoretical and practical workshops along with ongoing training courses, and issues identification cards certifying successfully completed training. Kingspan as an example works closely with many of its key customers and clients on improving health and safety by providing mechanical handling solutions for its products.

The use of mechanical handling plant and equipment can reduce the time spent working at height and the need to manually handle panels, dramatically accelerating build times and reducing health and safety risks posed on-site.

Kingspan provides regular reviews of its site health and safety systems involving both internal and external audits and reviews, to ensure the safety of its workforce and all stakeholders in the building industry associated with the use of panels.

5 REFERENCES

EN 15804:2012. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products

ISO 14040:2006, Environmental management - LCA - Principles and procedures

ISO 14044:2006, Environmental management - LCA - Requirements and guidelines

ISO 14025:2006. Environmental labels and declarations - Type III environmental declarations- Principles and procedures

Leroy, C., et al., 2014, Tackling Recycling Aspects in EN15804, http://www.metalsustainability.eu/wp-content/uploads/2014/06/11-11-15-ModuleD-metals.pdf , last viewed 15 January 2015.