Environmental Product Declaration

Insulated Metal Panels

KINGSPAN INSULATED PANELS NORTH AMERICA
INSULATED WALL & ROOF PANEL SYSTEMS

Kingspan Insulated Panels

Kingspan Insulated Panels North America, announces the first of its kind UL certified ISO compliant Environmental Product Declaration (EPD). The EPD describes environmental manufacturing footprints from cradle to grave based on an ISO compliant Life Cycle Assessment (LCA).

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 ISO LCA standards.

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

Follow our sustainability journey at:
www.pathtonetzero.com

UL CERTIFIED
ENVIRONMENTAL
PRODUCT DECLARATION

Kingspan Insulated Panels North America
Insulated Metal Roof and Wall Panel Systems

According to ISO 14025

UL Environment CERTIFIED

This declaration is an environmental product declaration in accordance with ISO 14025 that describes the environmental characteristics of the aforementioned product. It promotes the development of sustainable products. This is a certified declaration and all relevant environmental information is disclosed.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Kingspan
DECLARATION NUMBER	
DECLARED PRODUCT	Kingspan insulated panels manufactured in North America.
REFERENCE PCR	Building Envelope Thermal Insulation UL110116 and draft Insulated Metal Panels UL 110217.

DATE OF ISSUE	
PERIOD OF VALIDITY	5 years

CONTENTS OF THE DECLARATION	Product definition and information about building physics. Information about basic material and the material's origin. Description of the product's manufacture. Indication of product processing. Information about the in-use conditions. Life cycle assessment results. Testing results and verifications.

The PCR review was conducted by:	UL Environment Review Panel
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This declaration was independently verified by Underwriters Laboratories in accordance with ISO 14025	
☐ INTERNAL ☑ EXTERNAL	(NAME), EPD Verifier
This life cycle assessment was independently verified by in accordance with ISO 14044 and the reference PCR	
	(NAME), LCA Verifier

Kingspan Insulated Panels North America
Insulated Metal Roof and Wall Panel Systems

According to ISO 14025

Description of company / organization and product

Description of company

Kingspan Insulated Panels manufacture sustainable wall and roof systems designed for customized architectural, commercial & industrial and cold storage applications. They provide a range of U/R-values, include a weather resistant moisture / air barrier and are factory assembled ready for on-site installation. insulated metal panels (IMPs) offer many design options, including a variety of profiles and the ability to integrate these profiles with variable reveals. The panels are available in various cover widths and lengths, in curved and formed corners, and with a variety of high performance coatings and surface textures. The metal facings come in a multitude of colors and textures for both exterior and interior applications. Interior coatings also provide easy cleaning and washing as well as high light reflectivity. Panels can integrate with other building envelope solutions such as windows, louvers and sunshades.

Description of the product

The Construction Specifications Institute Master Format Structure 07 40 00 Roofing and Siding Panels.

An IMP is a wall or roof assembly composed of an insulated polyisocyanurate core material sandwiched between two cold rolled pre-coated steel (galvanized or AZ-50, pre-coated and finish coated) skins utilizing an interlocking joint for a weathertight vapor barrier and insulating system. Under code IMPs are required to resist wind, snow and thermal loads as evidenced via structural testing (ASTM E72, E330), air / water infiltration testing (ASTM E283/331), thermal testing (C518 and C1363) and fire safety accreditation by FM and UL. They are attached using various fasteners and clips to a supporting steel structure (by others).

Range of Applications

IMPs are well suited for commercial buildings due to their excellent thermal and weatherproofing performance characteristics as well as their competitive in-place costs. Buildings such as airplane hangars, banks, convention centers, distribution centers, manufacturing plants, museums, office buildings, schools, sports facilities, and cold storage and food processing facilities have proven to be excellent applications for IMPs. The design requirements of the building would determine the type of panel used. Applications can range from a large scale industrial building in Saskatoon, Canada to a customized convention center in downtown Boston.

Product Specifications

A partial list of key product standards is listed below. A complete list of standards, compliance and performance requirements for the products can be found on the Kingspan websites at www.kingspanpanels.us and www.kingspanpanels.ca under Product Specifications.

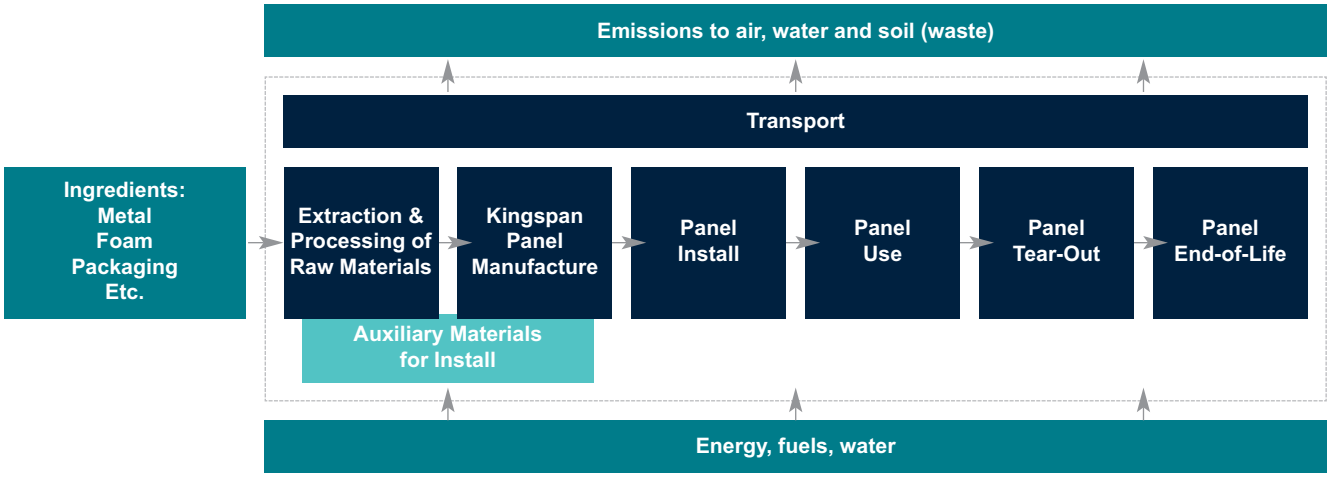
- AAMA 501.1: Standard Test Method for Metal Curtain Walls for Water Penetration using Dynamic Pressure.
- AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
- ASCE 7: Minimum Design Loads for Buildings and Other Structures.
- ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- ASTM C1363: Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
- ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- ASTM D1654: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics.
- ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- ASTM E283: Test for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors (Air Infiltration).
- ASTM E331: Test for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- ASTM E1646: Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
- ASTM E1680: Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
- FM Approval Standard 4880; Class 1 Fire Rating of Insulated Wall or Wall and Roof / Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems.

- FM Approval Standard 4881; Class 1 Exterior Wall Systems.
- NFPA 259: Standard Test Method for Potential Heat of Building Materials.
- NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

UL Canada (ULC) Approvals:

- CAN/ULC-S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- CAN/ULC-S102: Standard Method of Test for Surface Building Characteristics of Building Materials and Assemblies.
- CAN/ULC-S126: Standard Method of Test for Fire Spread Under Roof Deck Assemblies.
- CAN/ULC-S127: Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials.
- CAN/ULC-S134: Fire Test of Exterior Wall Assemblies.

Main Production Process



Environmental Benefits During Use of the Product in a Building

The function of wall and roof IMPs is to insulate buildings, reducing energy demand and therefore greenhouse gases and energy bills. To evaluate these energy savings, an independent simulation analysis was performed by a third party (Architectural Energy Corporation) to evaluate the energy efficiency impact of improving typical buildings with insulated metal panel wall and roof systems, and the additional steps necessary to achieve netzero energy buildings. Net-zero energy demand buildings require additional energy conservation measures and the installation of onsite renewables, which are outside the scope of this LCA and EPD.

Three baseline buildings compliant with ASHRAE Standard 90.1-2004 and 90.1-2007 (school, office, and warehouse) were simulated in four locations. Each building's envelope was then improved with the insulated metal panel wall and roof systems. The manufacturing of the alternative building constructions are not compared – only the Use phase energy effects for the building itself.

Requirements for the underlying LCA

Functional unit

The functional unit (cradle to end of life) defined by the Thermal Insulation PCR is:

1 m^2 of insulation material with a thickness that gives an average thermal resistance R_{SI}= 1 m^2K/W and with a building service life of 60 years (packaging included).

For the purposes of this EPD, the functional unit has been set to 100 ft^2 of insulated metal panel that gives an average thermal resistance R_{US} = 24 $h{\cdot}ft^{2}{\cdot}°F/Btu$ for Kingspan panels produced on a continuous production line (CPL) and R_{US} = 15 $h{\cdot}ft^{2}{\cdot}°F/Btu$ for Kingspan panels produced by a laminated process, and with a building service life of 60 years, keeping the other considerations consistent. The reasoning for this change is that an Insulated Metal Panel neither scales down in thickness nor is sold as an R-1 panel in any form. Such an R-1 representation for a fictional product would potentially cause confusion. The current functional unit is derived from Kingspan's ISO 14040/44 verified LCA and is representative of the product as sold.

Product content

Typical Insulated Metal Panel Example

Material Definitions

Galvanized or AZ-50 coil – hot-dipped, galvanized or AZ-50 steel coil.

Plastic peelcoat – polyethylene wrap to protect the face of the coil, to be removed during installation.

Foamstock – insulation material consisting of polyisocyanurate foam (which is sandwiched between two metal facings to complete the panel assembly).

Seam Tape – polyethylene tape used to contain the foam within the steel sheets during processing.

Adhesive – structural adhesive used to bond the foam to the panel's metal facings.

Material Content

Base Materials

Component	Material	Availability	Mass % (Deland CPL)	Mass % (Modesto CPL)	Mass % (Columbus Laminated)	Origin
Galvanized Coil	Steel sheet 1.5mm hot dip Galvanized (or AZ-50)	Fossil resource, limited	69.33%	71.82%	81.86%	Global
Plastic Peelcoat	Polyethylene film	Fossil resource, limited	0.49%	0.51%	0.47%	North America
Foamstock	Polyisocyanurate foam	Fossil resource, limited	29.44%	26.66%	13.77%	North America
Seam Tape	Polyethylene film	Fossil resource, limited	0.17%	0.17%	0.00%	North America
Adhesive	Structural adhesive	Fossil resource, limited	0.57%	0.84%	3.89%	North America

Packaging

Panels are wrapped in polyethylene wrap and stacked on pallets of plywood with dividers made of factory foam scrap or Expanded Polystyrene foam (EPS).

System boundaries

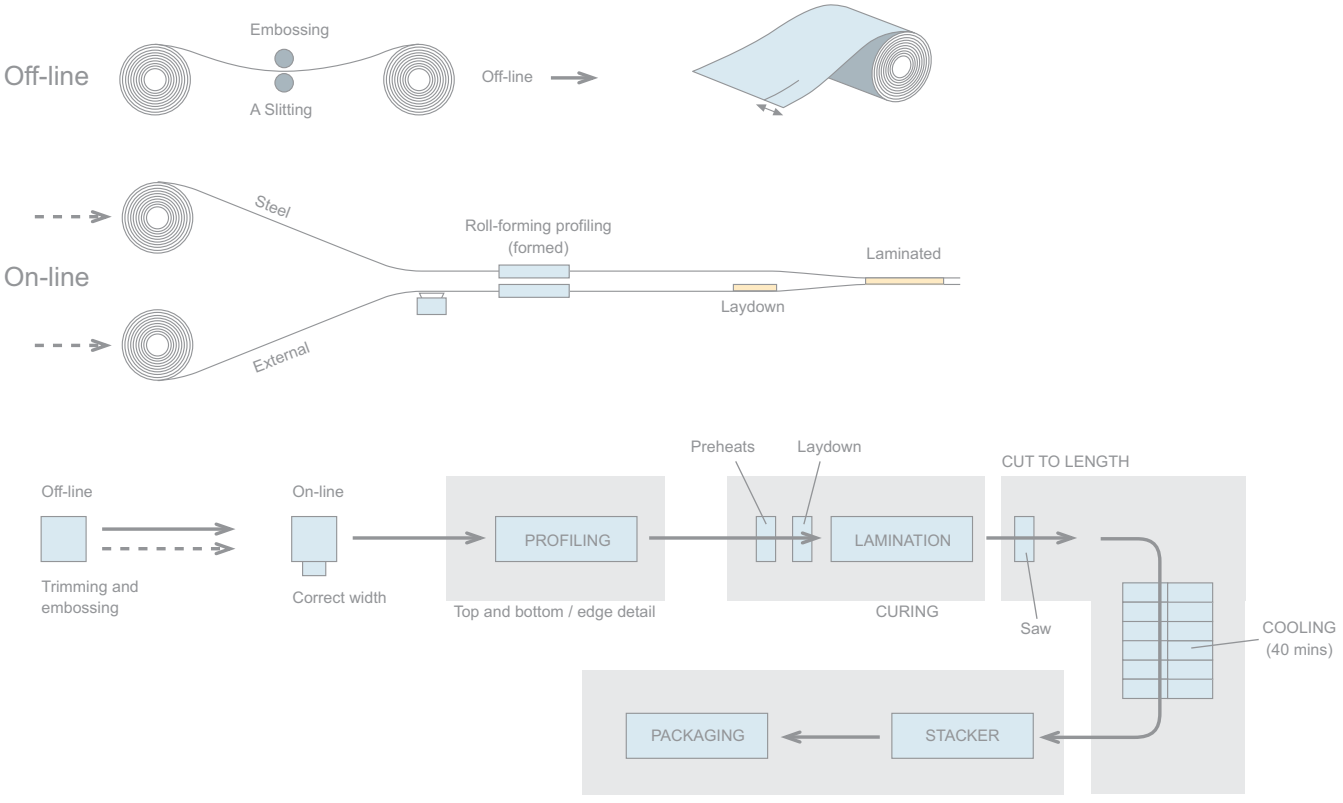
The system boundaries studied as part of this LCA include extraction of primary materials, raw materials manufacture, panel manufacture, installation via crane, product installation & maintenance, and end-of-life as shown in the aforementioned main production process.

Period under construction

Primary data collected from Kingspan for their operational activities related to the two insulation products are representative for the year 2008 (reference year).

Manufacturing process

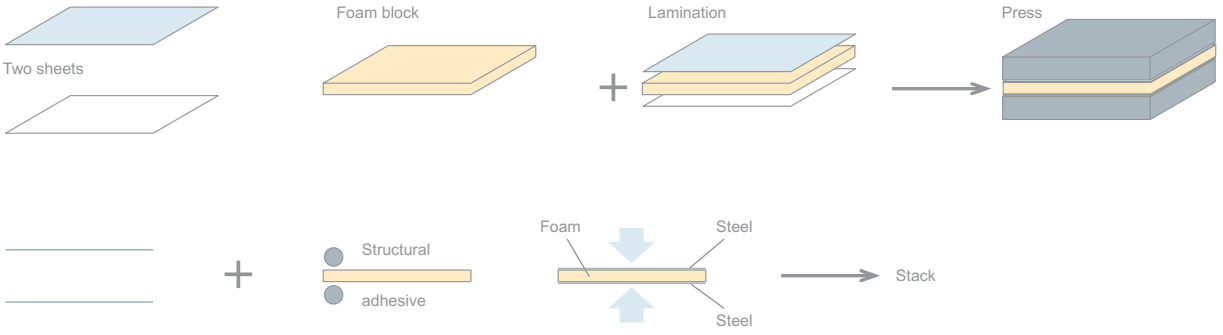
Insulated Metal Panels – Continuous Production Line (CPL).



Foam is applied as a liquid or froth between the sheets of metal. It undergoes a chemical reaction causing it to rise and bond to the metal skins, filling the interior cavity, creating a solid monolithic panel that maintains a consistent thermal value and resists moisture, insect and rodent infiltration.

CPL Unit Processes	Description
Forming and Trimming	Steel coil is embossed, formed, and trimmed to size
Preheat and Curing Oven	Foam is mixed in line between two coil layers, then cured
Cutting and Cooling	Cured panels are cut to length and cooled
Packaging	Panels are stacked and packaged

Insulated Metal Panels – Laminated (i.e., discontinuous production line).



IMPs can also be manufactured by a laminating process. In this method, pre-cured foam board stock is adhered to preformed metal facers with structural adhesives and placed under pressure in a platen press.

Laminated Unit Processes	Description
Forming and Trimming	Steel coil is embossed, formed, and trimmed to size
Foamstock Production and Shaping	Preblended foam is shaped and cut to size
Lamination	Formed coil and shaped foamstock are laminated
Packaging	Panels are stacked and packaged

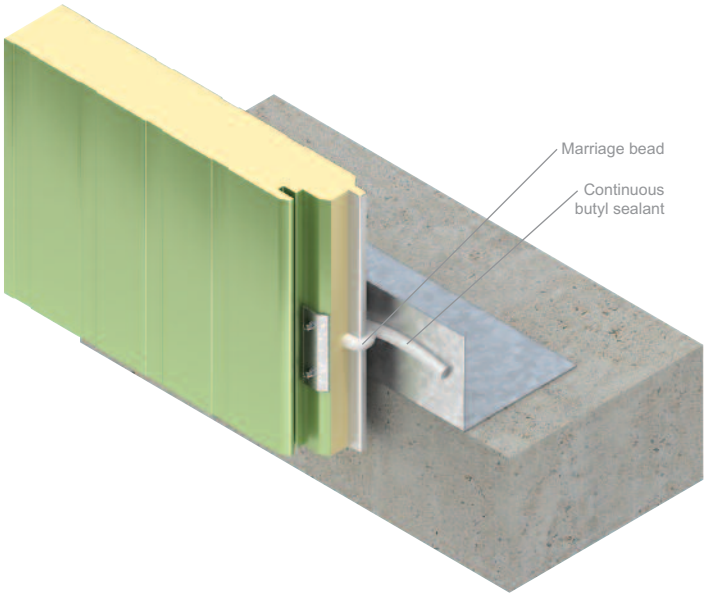
With both types of IMPs a factory controlled, uniform foam thickness provides consistent insulation performance; all IMPs can be produced in a variety of styles and sizes depending on application.

Installation

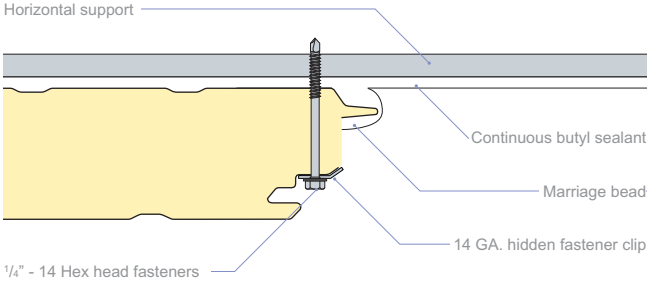
The installed Kingspan IMP is a system that also requires butyl sealant and fasteners. The butyl sealant and fasteners are included in the LCA. It is installed as a system over structural support systems such as wall framing, which are excluded from this EPD.

Auxiliary materials for installation are included but the entire wall or roof system is not modeled. After installation of the panel, other materials such as flashing, trim, molding, clips, and framed openings can be installed onto or attached to the IMP. Figure 2 and Figure 3, on the following pages, depict installation guidelines. The diagrams show that butyl sealant and fasteners are necessary to correctly install the panels – they have therefore been included in the LCA.

Base Condition



Framed Opening Condition



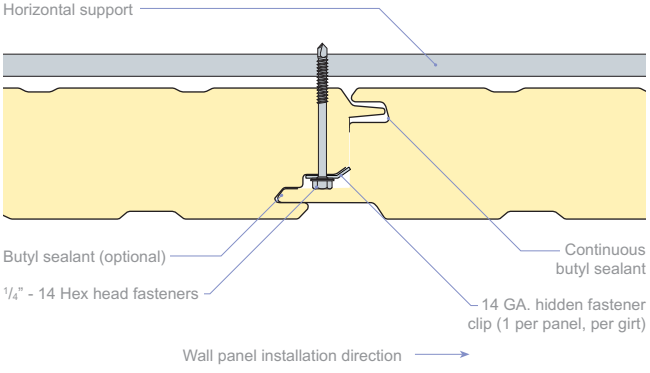


Figure 2: Example IMP wall installation guidelines

Panel Connection at Joint

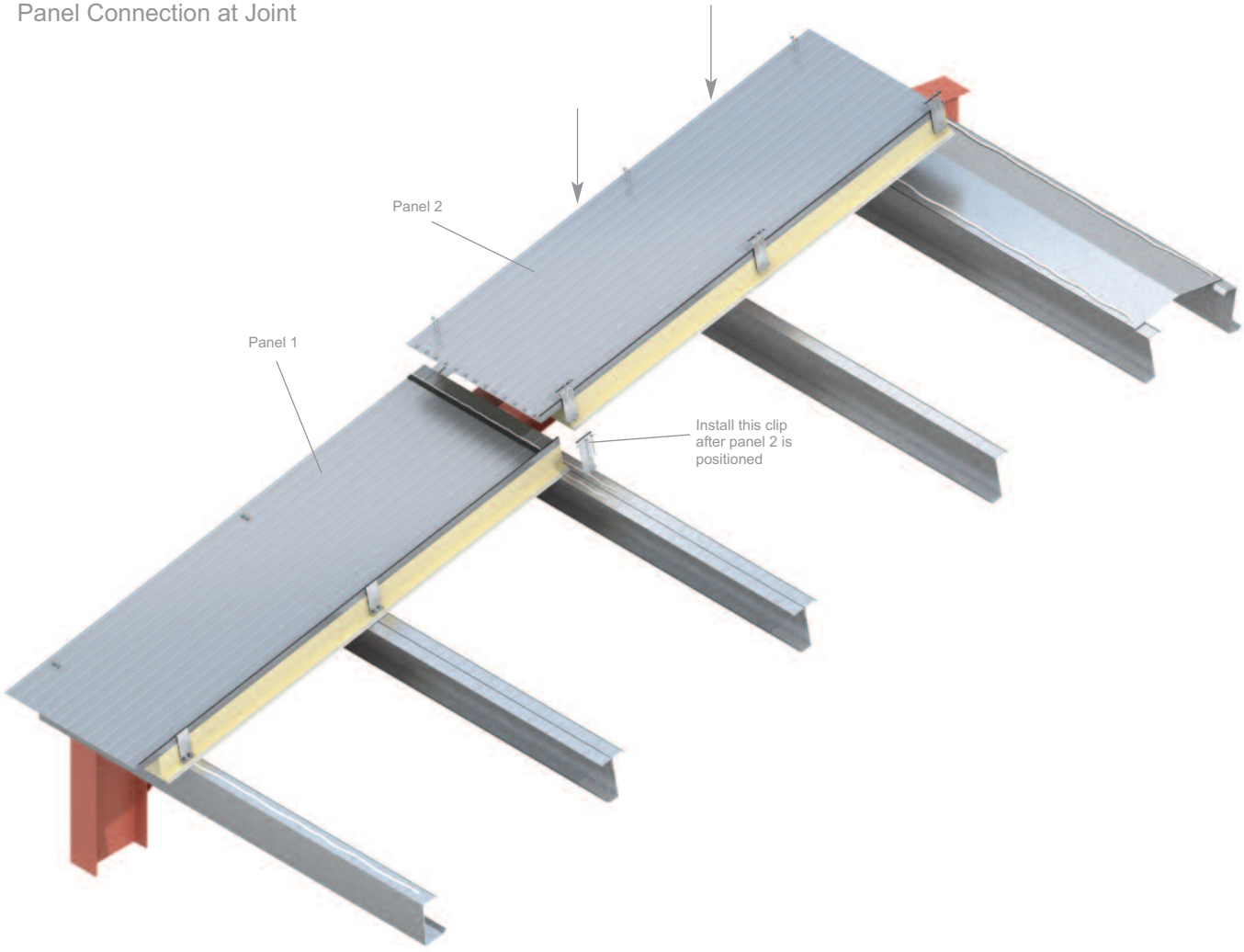


Figure 3 - Example IMP roof installation guide

Transport

Transportation emissions and fuels throughout all life cycle phases are included. All transport is assumed to be by truck, with an average distance of 100 miles.

Disposal / Reuse / Recycling

Although the LCA assumes that Kingspan insulated metal panels go to the landfill at end of life, it is possible to recycle 100% of the steel and insulating material.

Steel scrap is generated during manufacturing related to off-quality, the roll-forming of coil, and cutting the finished panels to length. This steel is considered a valuable co-product, and was addressed in the LCA with system expansion. To be consistent with the Worldsteel dataset for Steel Coil, the scrap steel was given a credit based on the "Value of Scrap" model as described in a study of recycling methodologies (Avery & Coleman, Sept 2009). This model is included upstream in the production of Steel Coil and is consistent throughout the study.

Cut-off rules

The following cut-off criteria were used to ensure that all relevant environmental impacts were represented in the study:

- Mass – If a flow is less than 1% of the cumulative mass of all the inputs and outputs of the LCI model, it may be excluded, provided its environmental relevance is not a concern.
- Energy – If a flow is less than 1% of the cumulative energy of all the inputs and outputs of the LCI model, it may be excluded, provided its environmental relevance is not a concern.
- Environmental relevance – If a flow meets the above criteria for exclusion, yet is thought to potentially have a significant environmental impact, it is evaluated with proxies identified by chemical and material experts within PE. If the proxy for an excluded material has a significant contribution to the overall LCIA, more information is collected and evaluated in the system.

The sum of the neglected material flows shall not exceed 2 % of mass or energy.

Assumptions and estimations

The product mix presented is representative for the product range of the plant. For the life cycle assessment, each product type has been modeled separately and then an average value has been established.

The geographical coverage for this study is as follows:

- 2-inch Laminated Panels (R-15) – manufactured in Columbus, OH;
- 3-inch CPL Panels (R-24) – manufactured in Modesto, CA & Deland, FL;
- Packaging systems and installation materials production – manufactured in United States;
- Use of metal insulated panels – used around the United States; and
- Disposal / reuse / recycling disposition (panels and packaging waste) – disposed in the United States.

Allocation

Steel scrap generated during manufacturing was considered a valuable co-product, and was addressed with system expansion. To be consistent with the Worldsteel dataset for Steel Coil, the scrap steel was given a credit based on the "Value of Scrap" model as described in a study of recycling methodologies (Avery & Coleman, Sept 2009). This model is included upstream in the production of Steel Coil and is consistent throughout the study.

The environmental "Value of Scrap" is applied within the product life cycle as shown in the simplified diagram of Figure 4. In this example, the steel contains 10% scrap. Therefore, the cradle to gate production of 1 kg of steel receives the environmental burdens associated with combining 0.90 kg of primary steel with 0.10 kg of scrap steel. Upon disposal / reuse / recycling, 0.90 kg of scrap steel is produced, and therefore 0.90 kg worth of "Value of Scrap" is received. The "Value of Scrap" (per kg) awarded as credit during disposal / reuse / recycling is the mathematical inverse of that which adds burden to material production. In this example, the 0.90kg of scrap mathematically cancels the 0.10kg of scrap used during the initial manufacture, and provides a net 0.80 kg worth of the "Value of Scrap" credit plus 0.90 kg of primary steel production. Throughout this report, however, we separate the "Value of Scrap" used during product manufacture from that potentially available at disposal / reuse / recycling. This is done for two reasons: for transparency in modeling, and in recognition of the uncertainty around disposal / reuse / recycling treatment.

The "Value of Scrap" is calculated as the difference between producing a given amount of material by primary production and the same amount of material through secondary production means. Mathematically, this is represented as follows:

LCI for 1 kg of steel including disposal / reuse / recycling = $X_{PR}(1-R_C)+XRE(R_C) – Y(R_R- R_C)(X_{PR}-X_{RE})$

Where:

The "Value of Scrap" = $Y(X_{PR}-X_{RE})$

X_{PR} = LCI for primary steel production

X_{RE} = LCI for secondary steel production

R_R = Recovery Rate at disposal / reuse / recycling

R_C = Recycled content in steel object

Y = Metallic Yield

A simplified example, assuming no material losses during production, manufacturing or use.

Figure 4: "Value of Scrap" as applied in a Life Cycle

Allocation was used in creation of upstream datasets in the GaBi database, such as refinery products. Documentation for upstream data can be provided upon request or at http://documentation.gabi-software.com/.

Data quality

Description of data

Although it is difficult to conduct a comprehensive data quality and reliability check on the data reported from several production sites, consistency and internal quality checks for mass and energy balance results were conducted.

Background Data

Data from the GaBi 4 database, the Worldsteel LCIs, the NREL USLCI, and the Polyisocyanurate Insulation Manufacturers Association (PIMA) LCI were used.

Life Cycle Assessment results and analysis

A life cycle assessment, complying with ISO 14040 / 14044, describing the declared product and based on plausible, transparent and credible data, is presented. Model assumptions with a relevant influence on the declared results are clearly stated below. The aggregated values of the life cycle inventory analysis and the categories of the life cycle impact assessment below are clearly scaled to the functional or declared unit.

Material and energy resources

Primary energy consumption

	100 square feet	Unit / 100ft²	Total Life Cycle	1. Raw Materials	2. Transport	3. Mfg Emiss & Scrap credits	4. Purchased Energy	5. Installation & Maintenance	6. End of Life
CPL	Primary Energy from NonRenewable Resources	MJ	1.45E +04	1.38E +04	1.29E +02	-4.59E +02	8.37E +02	1.18E +02	8.36E +01
CPL	Primary Energy from Renewable Resources	MJ	5.14E +02	2.94E +02	1.87E -01	2.68E +01	1.87E +02	2.45E +00	4.21E +00
CPL	Energies from Secondary Fuels	MJ	0.00E +00	0.00E +00	0.00E +00	0.00E +00	0.00E +00	0.00E +00	0.00E +00
Laminated	Primary Energy from NonRenewable Resources	MJ	1.63E +04	1.33E +04	1.26E +02	-8.94E +01	2.83E +03	4.35E +01	7.65E +01
Laminated	Primary Energy from Renewable Resources	MJ	3.21E +02	2.84E +02	1.82E -01	5.46E +00	2.56E +01	1.13E +00	4.17E +00
Laminated	Energies from Secondary Fuels	MJ	0.00E +00	0.00E +00	0.00E +00	0.00E +00	0.00E +00	0.00E +00	0.00E +00

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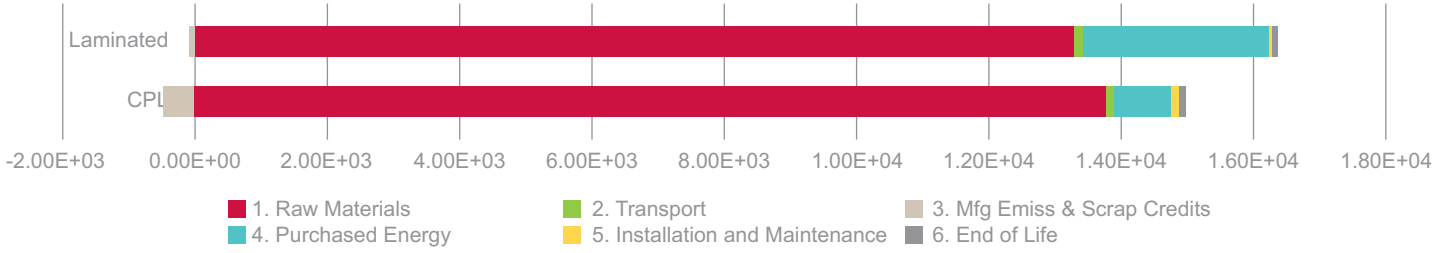
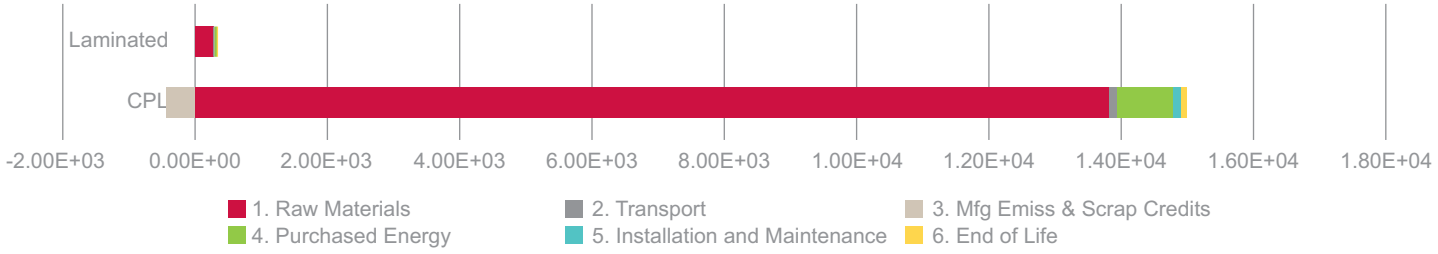
Insulated Metal Roof and Wall Panel Systems

According to ISO 14025

Primary Energy Demand – Non-renewable (MJ/100ft²)

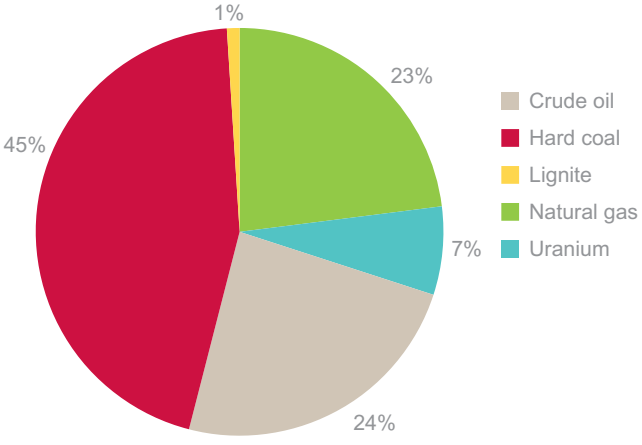


Primary Energy Demand – Renewable (MJ/100ft²)

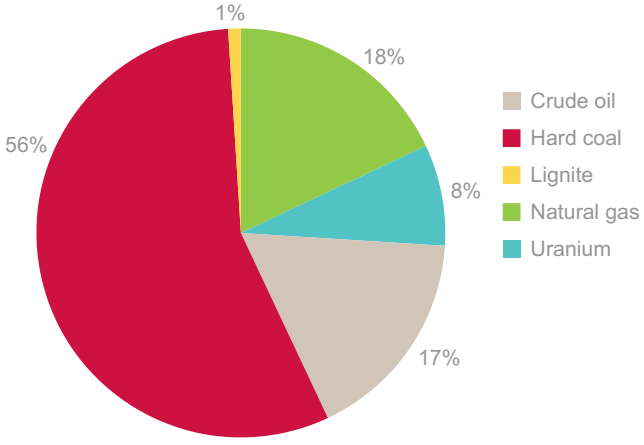


Primary energy of non-renewable resources (MJ), subdivided into (%)

Non-renewable Energy by Source – CPL

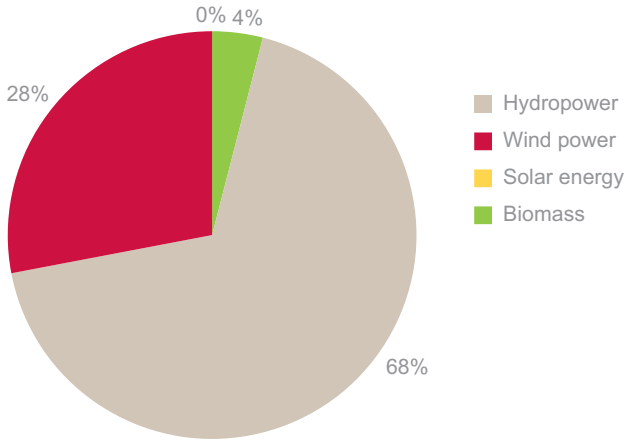


Non-renewable Energy by Source – Laminated

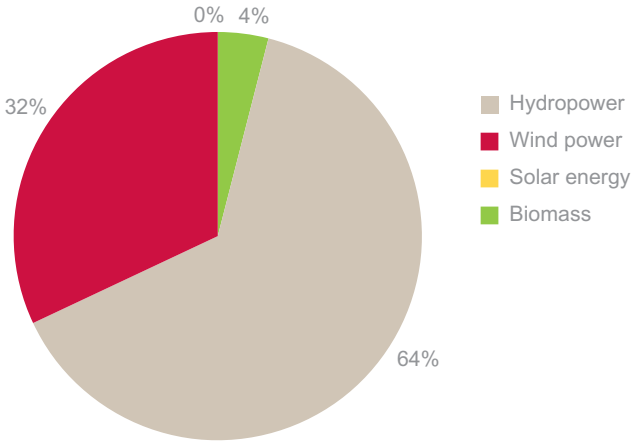


Primary energy of renewable resources (MJ), subdivided into (%)

Renewable Energy by Source – CPL



Renewable Energy by Source – Laminated



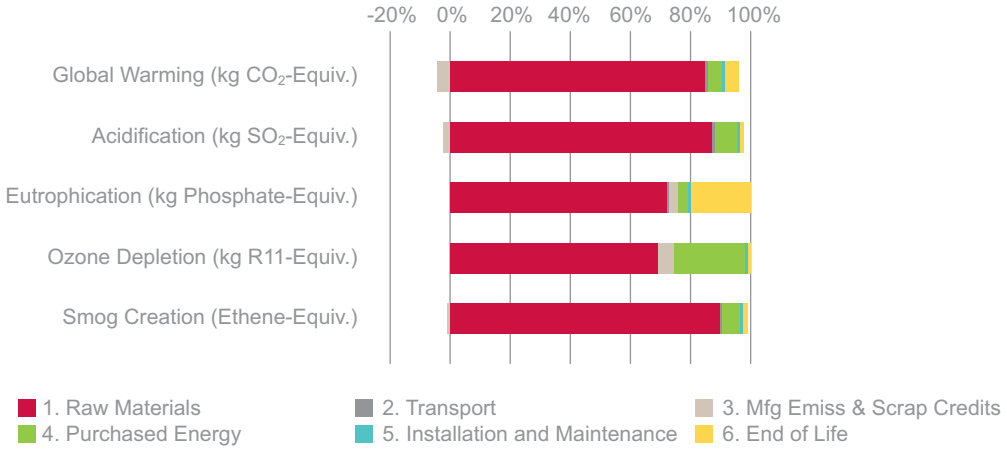
Non-renewable material resources, Water utilization, and Wastes			
	Unit / 100ft²	**CPL**	**Laminated**
Non-renewable resources	kg	2137.292	1456.492
Water	m^3	6.016	3.754
Wastes			
Secondary Material (steel scrap)	kg	39.090	3.630
Consumer waste	kg	18.269	0.318
Hazardous waste	kg	3.421	1.107
Radioactive waste	kg	0.346	0.271
Stockpile goods	kg	2083.288	1400.222

Life cycle impact assessment (LCIA)

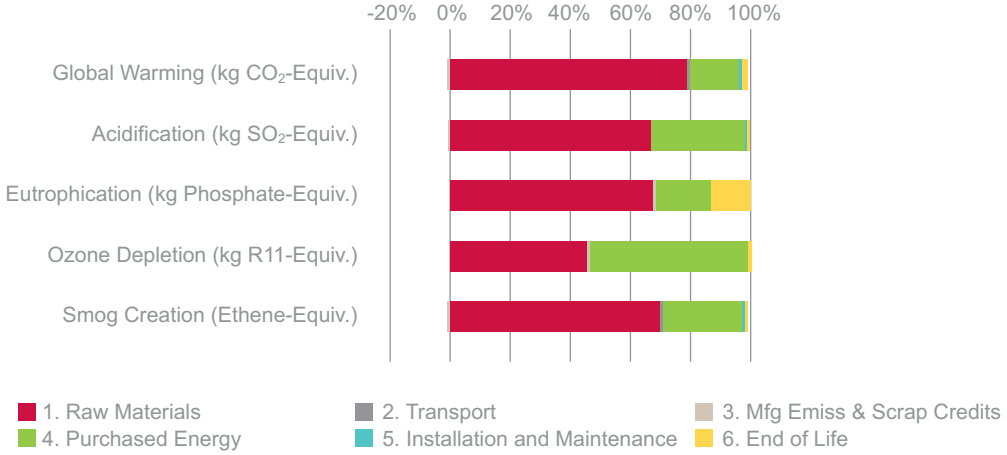
Impact Assessment

		Global Warming (kg CO_2-Equiv.)	Acidification (kg SO_2-Equiv.)	Eutrophic-ation (kg Phosphate -Equiv.)	Ozone Depletion (kg R11 -Equiv.)	Smog Creation (kg Ethene -Equiv.)
CPL	Total	9.25E+02	1.69E+02	1.70E-01	3.05E-05	1.75E-03
CPL	1. Raw Materials	8.60E+02	1.56E+02	1.23E-01	2.10E-05	1.59E-03
CPL	2. Transport	9.10E+00	5.84E-01	4.49E-04	2.04E-08	9.29E-06
CPL	3. Mfg Emiss & Scrap Credits	-4.40E+01	-4.79E+00	4.55E-03	1.67E-06	-1.43E-05
CPL	4. Purchased Energy	5.01E+01	1.40E+01	5.80E-03	7.56E-06	1.06E-04
CPL	5. Installation & Maintenance	8.95E+00	1.39E+00	1.05E-03	1.12E-07	1.67E-05
CPL	6. End of Life	4.09E+01	2.10E+00	3.48E-02	1.76E-07	4.03E-05
Laminated	Total	1.17E+03	2.51E+02	1.83E-01	4.23E-05	2.30E-03
Laminated	1. Raw Materials	9.39E+02	1.69E+02	1.24E-01	1.94E-05	1.63E-03
Laminated	2. Transport	8.88E+00	5.64E-01	4.29E-04	1.99E-08	8.91E-06
Laminated	3. Mfg Emiss & Scrap Credits	-9.48E+00	-9.00E-01	9.57E-04	3.33E-07	-9.69E-06
Laminated	4. Purchased Energy	1.97E+02	8.04E+01	3.36E-02	2.24E-05	6.30E-04
Laminated	5. Installation & Maintenance	3.81E+00	5.61E-01	4.05E-04	3.69E-08	7.44E-06
Laminated	6. End of Life	2.92E+01	1.97E+00	2.41E-02	1.43E-07	3.63E-05

LCIA Results – CPL (per 100 ft² normalized to 100%)



LCIA Results – Laminated (per 100 ft² normalized to 100%)



Interpretation of results

As indicated in the results above, raw materials clearly dominate the Cradle-to-Gate impacts. Manufacturing processes and energy, Transportation, Installation, and EOL all have small effects on the life cycle burdens.

Within the Raw Materials category, the main contributors are the materials with the greatest mass. Steel, MDI, and Polyol make up the largest percentage by mass compared to other foam additives and packaging. These three materials represent 95%, 86%, and 91% of the finished packaged product mass for Columbus, Deland, and Modesto respectively. Background data for the foam materials are relevant to the LCIA results, but no proxies were used and the LCIs were taken from industry average studies.

Plywood and Steel scrap provide impact credits which are represented as negative burden values in the results presented herein. The outbound packaging shipped with the finished product includes a considerable amount of plywood. Trees sequestered carbon dioxide upstream in the manufacture of plywood, represented by a negative CO_2 emission. The plywood could eventually be burned in an incinerator, balancing this CO_2 uptake. However, most plywood and waste in the US is sent to Landfill so an average PE landfill model is chosen for the plywood's EOL.

Approximately 50% of biomass in landfill actually decays. The remainder is sequestered in the landfill for 100 years or more. The standard landfill emissions were compared to the emissions of this fractional decay and were found to be very similar. Therefore, an industry average land-fill dataset for Commercial Waste was chosen to represent the EOL of plywood. The CO_2 up-take shown in the Outbound Packaging grouping does not balance the CO_2 emissions at EOL because of the partial sequestration of biomass in landfills. The second material for which a credit is being applied is valuable steel scrap sent to recyclers, causing negative burden values. The dataset chosen for this is the "Global Value of Scrap" data set. Both this dataset as well as the Hot Dipped Galvanized Coil data set were developed in the Worldsteel LCI project. Note that this credit is only applied to the steel scrap generated during manufacture. Kingspan has no documentation of steel from panels being recycled at disposal / reuse / recycling, so no recycling credit can be given.

Additional environmental benefits

To evaluate additional environmental benefits, an independent simulation analysis was performed by a third party (Architectural Energy Corporation) to evaluate the energy efficiency impact of improving typical buildings with insulated metal panel wall and roof systems, and the additional steps necessary to achieve net-zero energy buildings.

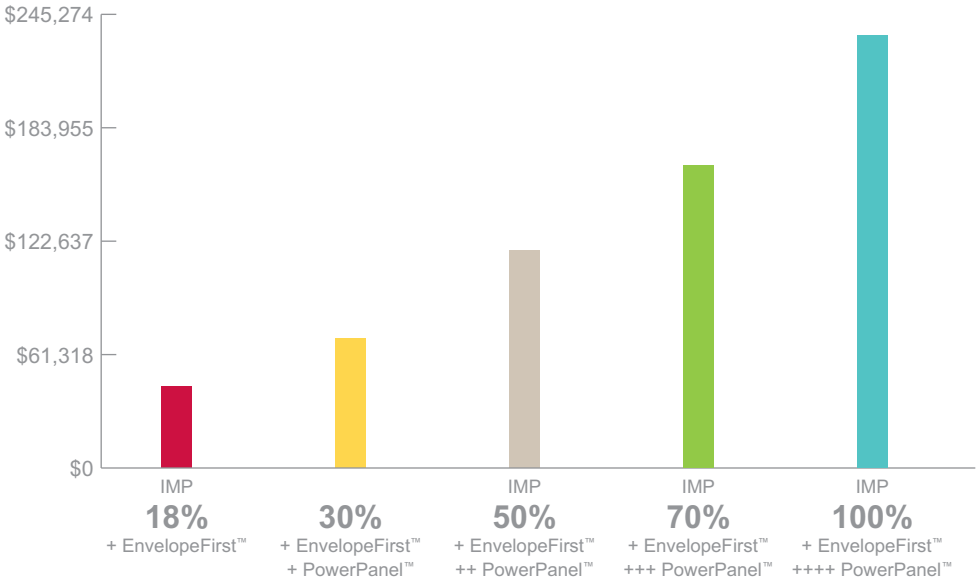
Three baseline buildings compliant with ASHRAE Standard 90.1-2004 and 90.1-2007 (school, office, and warehouse) were simulated in four locations. Each building's envelope was then improved with the insulated metal panel wall and roof systems.

Kingspan Insulated Panels North America
Insulated Metal Roof and Wall Panel Systems

According to ISO 14025

Path to NetZero™

Annual energy cost savings based on 110,348 ft² School in Minneapolis using 3" Kingspan insulated metal wall panels, 4" Kingspan insulated metal roof panels in comparison with Split Face block construction and baseline building method at ASHRAE 90.1 2004 standard.



This study is available at www.kingspanpanels.us and was independently reviewed. One of the review comments was to include Return On Investment (ROI) as related to "first costs" at a minimum of 25 year use life. As a result www.pathtonetzero.com and the related App were developed as tools to help design teams understand the importance of thermal performance to optimize a building's envelope. For full details on energy cost savings and ROI, download the free App.

Kingspan
Path to NetZero™

Available on the App Store

Download for Android

Other relevant information

Useful life of a Kingspan Insulated Panel

Wall and roof panels by Kingspan Insulated Panels are available with warranties of up to 20 years. Note that the panels must be replaced 3 times to achieve a 60 year coverage, per the PCR. To model this, all non-use phase impacts have been scaled up to cover the manufacturing, installation & removal, and disposal / reuse / recycling three times.

There are many documented examples of insulated metal panels in use for over 30 years that are still performing per the original specifications and show little or no signs of wear and tear. Depending on local environmental conditions, projected service life could be as long as 50-60 years.

Health and safety

Kingspan North America has policies and systems in place to meet or exceed OSHA standards, address safety concerns and track accidents. Kingspan meets all Federal, State and Local requirements for health and safety.

Delivered product configurations

Panels are custom built to order and are delivered to site within the following parameters:

Insulated Metal Wall Panels – Continuous Production (CPL)	
Panel Thickness	2” 2-1/2” 3” 4” 5” 6”
Panel Width	24” 30” 36” 42” (standard)
Lengths	8’-0” to 52’-0”
Joint Configuration	Double tongue and groove interlocking rainscreen joint
Panel Facings – Material	Zincalume® / Galvalume® or G-90, non-directionally stucco embossed steel
Orientation	Horizontal or Vertical

Insulated Metal Wall Panels – Laminated Production	
Panel Thickness	2” 2-1/2” 3”
Panel Width	24”, 30” and 36” standard (special widths 8” min. to 46” max.)
Lengths	1’0” to 24’0” standard (30’0” maximum)
Joint Configuration	Double tongue and groove interlocking rainscreen joint
Panel Facings – Gauges	22/24 gauge steel, .040”/.040” aluminum
Orientation	Horizontal or Vertical

Insulated Metal Roof Panels – Continuous Production (CPL)	
Panel Thickness	2” 3” 4” 5” 6”
Panel Width	42”
Lengths	8’-0” to 52’-0”
Joint Configuration	Standing Seam, 2” high (nominal)
Panel Facings – Material	Galvalume® or Zincalume® pre-painted steel
Panel Facings – Gauges	Exterior 24 minimum, 22 available Interior 26, 24 or 22

References

(2006). ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

(2006). ISO 14040 : Environmental management - Life cycle assessment – Principles and framework.

(2006). ISO 14044 : Environmental management - Life cycle assessment – Requirements and guidelines.

Avery, C., & Coleman, C. (Sept 2009). Life Cycle Assessment Methodologies for Quantifying the Benefits of Steel Reuse and Recycling.