Declaration Owner
All Weather Insulated Panels
sales@awipanels.com
Contact Number: +1 (707) 359 2280
https://www.awipanels.com/products/

Product
Insulated Metal Roof Deck Panels (Wall, Roof, Roof Decks):
OneDek®RD1

Functional Unit
The functional unit is 100 m^2 of building coverage area over a 75-year building service life.

EPD Number and Period of Validity
SCS-EPD-08587
EPD Valid January 17, 2023 through January 16, 2028
Version: April 21, 2023

Product Category Rule
PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 3.2. UL Environment. Sept. 2018

PCR Guidance for Building-Related Products and Services Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels, UL 10010–5. October 23, 2018.

Program Operator
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
+1.510.452.8000 | www.SCSglobalServices.com

Declaration Owner:	All Weather Insulated Panels
Address:	929 Aldridge Rd, Vacaville, CA 95688, USA
Declaration Number:	SCS-EPD-08587
Declaration Validity Period:	EPD Valid January 17, 2023 through January 16, 2028
Version:	April 21, 2023
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Kovvali Manasa Rao, WAP Sustainability
LCA Software and LCI database:	GaBi - Version 10.6.1.35, Service pack 2022.1
Product RSL:	30 years
Markets of Applicability:	North America
EPD Type:	Product Specific
EPD Scope:	Cradle-to-Grave
LCIA Method and Version:	TRACI 2.1, CML 2001-Jan 2016, IPCC AR6
Independent critical review of the LCA and data, according to ISO 14044, ISO 21930 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Beth Cassese, SCS Global Services
Part A Product Category Rule:	PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 3.2. UL Environment. December. 2018
Part A PCR Review conducted by:	Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig
Part B Product Category Rule:	PCR Guidance for Building-Related Products and Services Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels, UL 10010–5. October 23, 2018
Part B PCR Review conducted by:	Thomas Gloria (Chair), Industrial Ecology Consultants; Lindita Bushi, PhD; Bob Zebcik, PE
Independent verification of the declaration and data, according to ISO 14025, ISO 21930 and the PCR	☐ internal ☒ external
EPD Verifier:	Beth Cassese, SCS Global Services
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and ISO 21930.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

1. About All Weather Insulated Panels

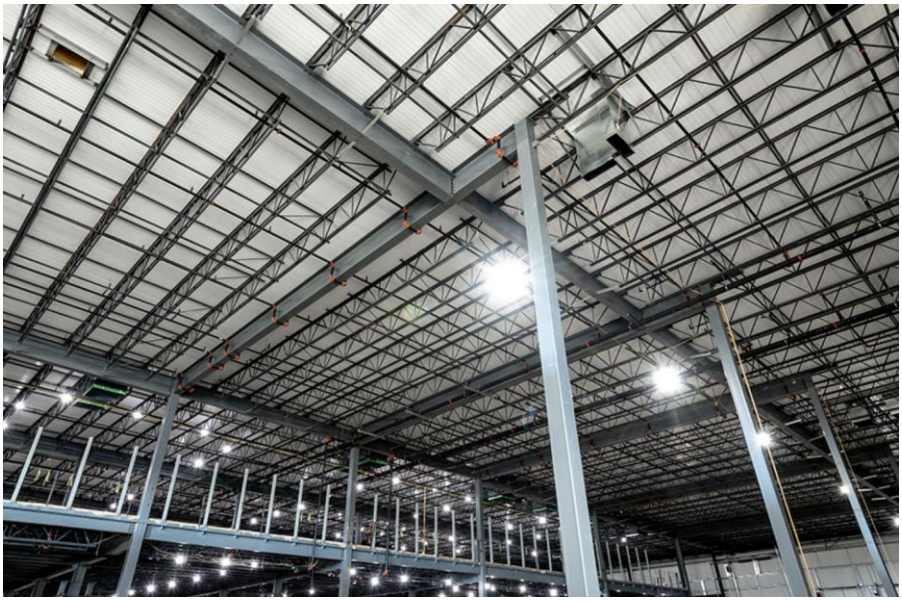
All Weather Insulated Panels (AWIP) is an innovator in the design, construction, and advancement of foam composite insulated metal panels. The company is strategically positioned to meet the growing energy, environmental and economic challenges facing the North American building industry with state-of-the-art continuous line manufacturing facilities in Vacaville, California, Little Rock, Arkansas and East Stroudsburg, Pennsylvania. AWIP's sustainability efforts include a commitment to responsible use of materials and the use of renewable energy to manufacture products.

2. Product

2.1 Product Description

Insulated metal panels are comprised of a rigid foam core sandwiched between two metal sheets and cut to shape and size as requested by the customer. Interior and exterior insulated metal panels offer an efficient alternative to field assembled roofing systems. In the factory, steel substrates and polyisocyanurate foam are combined to create lightweight, strong and energy efficient roof panels. A variety of solutions are available to meet the requirements of almost any building. They are also available in numerous colors and applied finishes.

OneDek® Insulated Roof Deck System includes two components to complete the roof: an insulated roof deck panel and a PVC or TPO membrane. This EPD covers the insulated roof deck panel portion of the two-component system.



2.2 Application

AWIP's Insulated Metal Roof Deck Panels are used in a variety of applications including architectural, commercial, industrial, institutional, and cold storage applications due to the excellent thermal efficiency, ease of installation and overall structural integrity for wall applications.

2.3 Technical Data

The following technical data is relevant for the declared as-delivered product. Additional performance test results are also disclosed, as applicable. All Weather Insulated Panels' products have been extensively tested under a variety of North American standards.

Table 1: *Technical Data*

Property	Test Results	Units
Length	2.44 – 21.9	m
Width	0.91-1.02	m
Thickness	50.8-203	mm
Density	32-40	kg/m^3
Tensile Strength (Adhesion)	0.083	MPa
Modulus of Elasticity (Steel)	200,000	MPa
U-value of assembly including interruptions to insulation	0.40-0.10	[W/m2*K] (@ 24 degC mean)
R value of typical materials where continuous	2.47-10.03	[m2*K/W] (@ 24 degC mean)
Water vapor permeance	This term/calculation is not relevant to IMPs as steel is not permeable.	Metric perms
Airborne sound reduction	Panels typically not used for sound reduction	dB
Sound absorption coefficient	Panels typically not used for sound reduction	%

2.4 Delivery Status

AWIP supplies Insulated Metal Roof Deck Panels in a variety of sizes and configurations customized to customer requirements.

Roof deck panel configurations have a range as follows:
− Thickness: from 2 inches to 6 inches
− Width: from 36 inches to 40 inches
− Length: from 8 feet to 50 feet, depending on product

Joint configurations: The panel's overlapping joint is self-aligning and allows for easy sealant application at the panel joinery.

Facings: Material:
Galvanized steel
Gauge ranges:
22, 24- and 26-gauge steel

2.5 Material Composition

Table 2: *Material Composition*

Material	Amount - 2" thick panel, 26 / 26 ga (kg/ 100 m²)	Percentage of Total Mass	Amount - 6" thick panel, 22 / 22 ga (kg/ 100 m²)	Percentage of Total Mass
Insulated Metal Roof Deck Panel				
Galvanized steel	879	81%	1,372	70 %
Polyisocyanurate foam	205	19 %	576	30 %
Coating	3.38	<1 %	3.38	<1 %
Total	**1,087**	**100%**	**1,951**	**100%**
Packaging				
Wood	33.0	90.5 %	33.0	90.5 %
Polystyrene	3.5	9.5 %	3.5	9.5 %
Plastic film	0.007	<1 %	0.007	<1 %
Foam	0.004	<1 %	0.004	<1 %
Total Packaging	**36.5**	**100%**	**36.5**	**100%**

Note: Products under study do not contain any regulated hazardous substances or dangerous substances per definitions of the same in North America.

2.6 Manufacturing

The manufacturing process begins with the mining/ processing of raw materials, which is a mixture composed mostly of steel, polyisocyanurate and some coating. In the continuous process method of producing insulated metal panels (see Figure 1), metal facers (here referred to as external and internal steel sheets) are continuously formed. Simultaneously, at another point on the continuous line, the foam mixture is injected into the panel assembly. The foam then expands and fills the cavity between the metal skins as they enter a platen conveyor. The panels are then trimmed and embossed, following which the top and bottom edge details are profiled. The panels then go through a curing process and are then cut to standard or customized lengths. The panels are then cooled, stacked, and packaged for shipping.

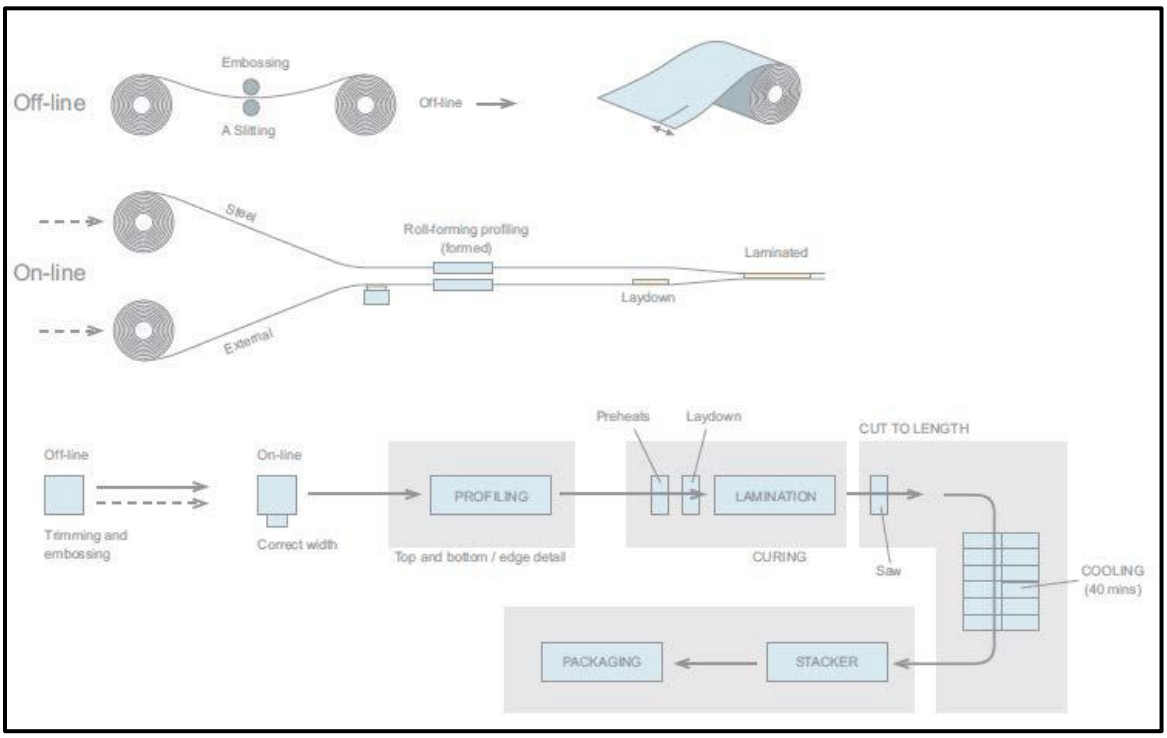


Figure 1: *Schematic of continuous manufacturing process for insulated metal panels*

2.7 Transportation

The product is delivered to the customer via truck depending on the location of the end-user. Transport to the installation site was calculated based on sales records per product and an average shipping distance based on manufacturing location, as provided by AWIP.

2.8 Product Installation

The installation instructions require the use of white butyl caulk and some steel trim, clips and fasteners for recommended installation. From the installation instructions, it is understood that there is a forklift and panel cutting equipment that is used during installation as well. However, due to limited data availability on the amount of resources (here, electricity and diesel) used for these operations, quantities recommended by the PCR (Part B) have been used.

2.9 Packaging

Once the panels are manufactured, foam sheets are layered between insulated metal panels before the panels are bundled and stacked on wooden pallets. The pallets are then buffered with foam and wrapped in plastic film to prevent damage during transportation.

2.10 Use Conditions

The panels are cleaned once a year for roof applications with 500 ml of 1% (v/v) sodium lauryl sulfate solution. Cleaning frequency and material amount recommendations are taken from Part B of the PCR. More information is provided in the tables below.

Table 3: *Items Included in Life Cycle Stages B1-B7*

Included	Excluded
Energy, materials, and water related to the usage of the product, including product operation, cleaning, and maintenance.	Production of multi-use cleaning, repair, installation, and maintenance tools
Energy, materials, and water related to the upkeep of the product, including product repair, refurbishment, and replacement.	
Production, transport, and waste processing and disposal of the new product after replacement to meet the required functional unit	

2.12 Reference Service Life

The Reference Service Life (RSL) of the Insulated Metal Roof Deck Panels is taken to be 30 years. Therefore, 2 replacements after the first installation are needed over the estimate service life of a building (75 years). More information is provided in Table 6: Reference Service Life

2.13 Re-Use Phase

Insulated panels are typically not re-used after their service life.

2.14 Disposal

All waste has been classified and modeled according to regional-specific legislation as required in Section 2.8.6 in Part A: Life Cycle Assessment Calculation rules and Report Requirements from UL Environment.

However, AWIP has designed their Insulated Metal Roof Deck Panels for disassembly and the metal panel can be separated from the insulation core. After separation, the metal panels can be recycled through locally available metal recycling facilities and the insulation core can be reused as stand-alone insulation.

3. LCA: Calculation Rules

3.1 Functional Unit

The functional unit used in the study, as specified in the PCR, is coverage of 100 m^2 of panel surface over 75 years. The reference flow of the product system, which is the mass of 100 m^2 of insulated metal panel is 1,087 kg for the lightest configuration (2" thick panel, 26 / 26 ga) and 1,951 kg for the heaviest configuration (6" thick panel, 22 / 22 ga).

3.2 System Boundary

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The diagram below is a representation of the most significant contributions to the life cycle of the insulated metal panel (IMP) products.

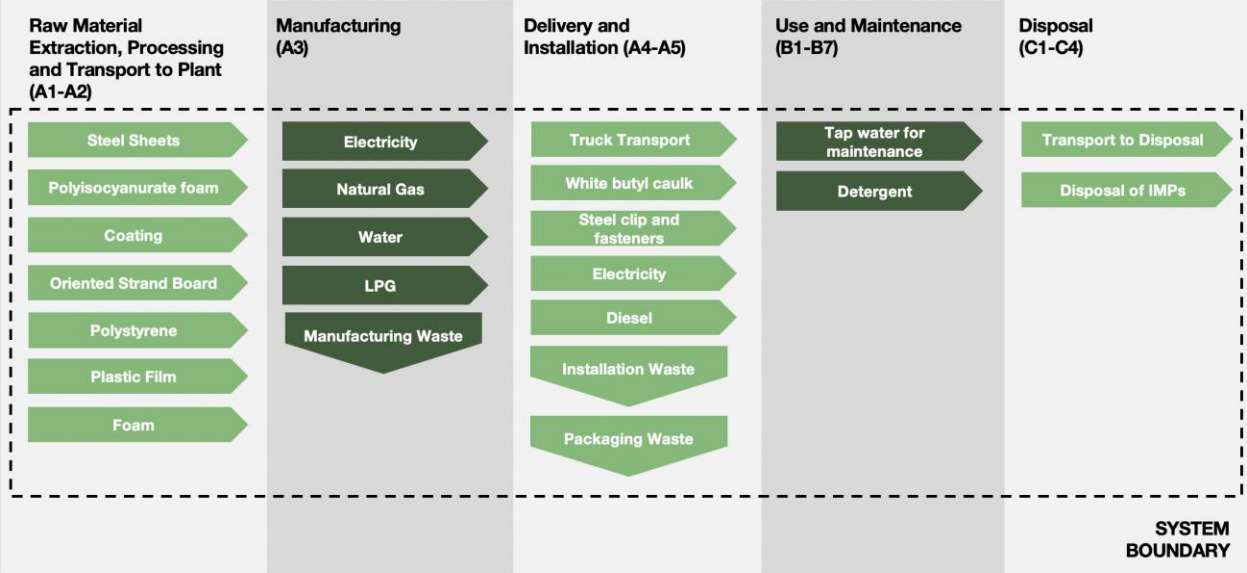


Figure 2: *System Boundary*

3.3 Units

All results are presented using SI units using three significant figures, as per PCR guidance.

3.4 Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals including all utility usage and production information. For the study, the usage information was divided by the production to create an energy and water use per square meter, then extrapolated to 100 square meters. Another assumption is that the installation tools are used enough times that the per square meter impacts are negligible.

It should also be noted that LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The PCR allows for the results for several inventory flows related to construction products to be reported as "other parameters". These are aggregated inventory flows and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.5 Cut-off criteria

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit. No known flows are deliberately excluded from this LCA.

3.6 Background Data

Primary data were provided by AWIP for the Vacaville, California and Little Rock, Arkansas facilities and from their suppliers of component materials for the metal panel products. The sources of secondary LCI data are GaBi - Version 10.6.1.35, Service pack 2022.1.

Table 4: *Background Data*

Component	Material Description	Material Dataset	Data Source	Publication Date
Product				
Primary Components				
Internal and External Sheet	Steel Sheets	Steel hot dip galvanised	worldsteel	2014
Foam	Polyisocyanurate foam	Polyisocyanurate (PIR high-density foam)	Sphera	2021
Auxiliary Components				
Coating	Chemical intermediate	Naphtha at refinery	Sphera	2018
Coating	Chemical intermediate	Cyclohexanone	Sphera	2021
Coating	Chemical intermediate	Propylene glycol (via PO-hydrogenation)	Sphera	2021
Coating	Chemical intermediate	Diethylene glycol by product ethylene glycol from ethene and oxygen via EO	Sphera	2021
Coating	Chemical intermediate	Aniline (phenyl amine, amino benzene)	Sphera	2021
Coating	Chemical intermediate	Toluene (from pyrolysis gasoline)	Sphera	2021
Coating	Chemical intermediate	Butanol (n-butanol) from propylene with rhodium catalyst	Sphera	2021
Coating	Chemical intermediate	Butanediol mix	Sphera	2021
Coating	Chemical intermediate	Cumene (isopropylbenzene) (C9H12)	Sphera	2021
Coating	Chemical intermediate	Ethylene glycol (from ethene and oxygen via EO)	Sphera	2021
Coating	Chemical intermediate	Titanium dioxide pigment (sulphate process)	Sphera	2021
Packaging				
Spacer	Wood	Oriented strandboard (OSB)	CORRIM	2020
Stretch wrap	Plastic film	Polyethylene film (LDPE/PE-LD)	Sphera	2021
Spacer	Foam	EU-28: Expanded Polystyrene (EPS) Foam (25 kg/m3, EN15804 A1-A3) Sphera	Sphera	2021
Electricity/Heat				
Electricity	Sub-region electricity	Electricity grid mix – SRMV	Sphera	2019
Electricity	Sub-region electricity	Electricity grid mix – CAMX	Sphera	2018
Electricity	Onsite solar electricity	Electricity from photovoltaic	Sphera	2021
Thermal Energy	Thermal energy from fuel oil	Thermal energy from light fuel oil (LFO)	Sphera	2018
Thermal Energy	Thermal energy from LPG	Thermal energy from LPG	Sphera	2018
Thermal Energy	Thermal energy from natural gas	Thermal energy from natural gas	Sphera	2018
Water	Process water	Process water from ground water	Sphera	2021
Transportation				
Transport of Raw Materials	Truck	Truck - Trailer, basic enclosed / 45,000 lb payload - 8b	Sphera	2021
Transport of Raw Materials	Truck	Truck-trailer, Euro 0 - 6 mix, 34 - 40t gross weight / 27t payload capacity	Sphera	2021
Transport of Raw Materials	Train	Rail transport cargo - Diesel, average train, gross tonne weight 1,000t / 726t payload capacity	Sphera	2021
Transport of Raw Materials	Ship	Container ship, 5,000 to 200,000 dwt payload capacity, ocean going	Sphera	2021
Transport of Raw Materials	Fuel	Diesel mix at filling station	Sphera	2019
Transport of Raw Materials	Fuel	Heavy fuel oil at refinery (2.5wt.% S)	Sphera	2018

3.7 Data Quality

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	Primary data were provided by AWIP associates and represent calendar year 2020. Using 2020 data meets the PCR requirement that manufacturer specific data be within the last 5 years. Time coverage of this data is considered good. Data necessary to model cradle-to-gate unit processes was sourced from thinkstep LCI datasets. Time coverage of the GaBi datasets varies from approximately 2011 to present. All datasets rely on at least one 1-year average data. Overall time coverage of the datasets is considered good and meets the requirement of the PCR that all data be updated within a 10-year period. The specific time coverage of secondary datasets can be referenced in the dataset references table in the LCA report.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The geographical scope of the manufacturing portion of the life cycle is Vacaville, California and Little Rock, Arkansas. This LCA uses country specific energy datasets that take into account US eGrid specific energy and transportation mixes. Overall, the geographic coverage of primary data is considered good.
Technology Coverage: Specific technology or technology mix	Primary data provided by AWIP are specific to the technology that the company uses in manufacturing their product. It is site specific and considered of good quality. It is worth noting that the energy and water used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering was not available to extract process only energy and water use from the total energy use. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes was sourced from thinkstep LCI datasets. Technological coverage of the datasets is considered good relative to the actual supply chain. While improved life cycle data from suppliers would improve technological coverage, the use of lower quality generic datasets does meet the goal of this EPD.
Precision: Measure of the variability of the data values for each data expressed	Process-specific data and secondary data for all upstream processes have been averaged over a year, thus reducing the variability in terms of the precision of the data.
Completeness: Percentage of flow that is measured or estimated	Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit. No known flows are deliberately excluded from this EPD.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data collected for the process are considered typical or representative for the region and temporal scope. This is an average and process are not considered site-specific. Determining the actual process at each site would require us to go to upstream in the supply chain all the way to resource extraction. Improvements can be made through the modification of datasets to incorporate more regional specificity, both in terms of energy and technology. However, the data was considered appropriate in relation to the goal, scope and budget of the project.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data of similar quality and age are taken from the GaBi database. All life cycle stages were evaluated with equal importance.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	This LCA is reproducible by other LCA practitioners. All the data, assumption, estimates and value choices have been clearly stated in the EPD and background LCA report.
Sources of the Data: Description of all primary and secondary data sources	Primary data was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production process. When primary data did not exist, secondary data for raw material production was used from the GaBi database.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to the product raw materials and packaging is low. Since actual primary data for each of the manufacturing steps were not available, representative datasets were used. The datasets chosen have been verified by the provider (thinkstep – provider of GaBi software and database) and are as close as possible to the regional and temporal scope of this project.

3.7 Period under review

This EPD is based on data for 2020.

3.9 Allocation

General principles of allocation were based on ISO 14040/44. There are no products other than insulated metal panels that are produced as part of the manufacturing processes studied in the LCA. Since there are no co-products, no allocation based on co-products is required. To derive a per unit value for manufacturing inputs such as electricity, natural gas and water, allocation based on total production in square meters (allocation by area) was adopted. Discussions with AWIP staff divulged this was a more representative way than via mass to allocate the manufacturing inputs based on the manufacturing processes used and the types of products created. As a default, secondary GaBi datasets use a physical mass basis for allocation. Impacts from transportation were allocated based on the mass of material and distance transported.

Throughout the study recycled materials were accounted for via the cut-off method. Under this method, impacts and benefits associated with the previous life of a raw material from recycled stock are excluded from the system boundary. Additionally, impacts and benefits associated with secondary functions of materials at end of life are also excluded (i.e. production into a third life or energy generation from the incineration plant). The study does include the impacts associated with reprocessing and preparation of recycled materials that are part of the bill of materials of the products under study.

In consideration of the wide range of configurations available based on polyisocyanurate foam thickness and combinations of internal and external steel facing gauges, results are presented for the lightest (2" thick panel, 26 / 26 ga) and heaviest weight (6" thick panel, 22 / 22 ga) configurations. In this way, the range of results covers the wide range of product configurations.

3.10 Comparability

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.
Comparison of the environmental performance of insulated metal panels using EPD information shall be based on the product's use and impacts at the construction works level, and therefore EPDs may not be used for comparability purposes when not considering the construction works energy use phase as instructed under this PCR. Full conformance with the PCR for insulated metal panels allows EPD comparability only when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category Part B PCR, and use equivalent scenarios with respect to construction works. However, variation and deviations are possible.

4. LCA: Scenarios and Additional Technical Information

Delivery and Installation stage (A4 - A5)

Table 5: *Transport to building site (A4) – per 100 m²*

Name	Roof Deck Panel	Unit
Fuel type	Diesel	-
Liters of fuel	39	l/100km
Vehicle type	Truck - Heavy Heavy-duty Diesel Truck / 53,333 lb payload - 8b	-
Transport distance (Average)	1,148.3	km
Capacity utilization	78	%
Weight of products transported	1,084 -1,948	kg/100 m²
Volume of products transported	5.08 - 15.24	m³/100 m²
Capacity utilization volume factor	1	-

Table 6: *Reference Service Life*

Name	Insulated metal roof deck panel	Unit
RSL	30	years
Declared product properties and finishes, etc.	See Technical Data	-
Design application	Installation per recommendation by manufacturer	-
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Accepted industry standard	-
Use conditions	Normal building operating conditions	-

Table 7: *Installation into the building (A5) – per 100 m²*

Name	Quantity	Unit
White butyl caulk	15.3	kg/100 m²
Steel trims and fasteners	3.57	kg/100 m²
Electricity	2	kWh/100 m²
Diesel	3.15	kg/100 m²
Waste materials at the construction site before waste processing, generated by product installation	90.7 - 134	kg/100 m²
Product loss per functional unit, to landfill	54.4 – 97.6	kg/100 m²
Packaging waste, OSB	33	kg/100 m²
Packaging waste, plastic film, polystyrene, stretch wrap	3.48	kg/100 m²
Biogenic carbon contained in packaging	52.5	kg CO_2
Direct emissions to ambient air, soil and water	0	kg
VOC emissions	N/A	µg/m³

Use stage (B1)

There are no inputs needed to use the product.

Maintenance stage (B2)

Table 8: *Maintenance per 100 m^2 (B2)*

Name	Truck	Unit
Maintenance process information	Use phase parameters as recommended by the UL PCR Part B	
Cleaning	30, 75	Cycles/ RSL and Cycles/ ESL
Detergent	0.0025	kg/ 100 m^2/ cleaning cycle
Net freshwater consumption specified by water source and fate	0.25 tap water, evaporated	kg/ 100 m^2/ cleaning cycle
Further assumptions for scenario development	500 ml of 1% (v/v) sodium lauryl sulfate solution, once per year	

Repair/Replacement/Refurbishment stage (B3 - B5)

N/A. Insulated Metal Panels typically do not require repair, replacement, or refurbishment during the service life of the building.

Table 9: *Repair (B3)*

Name	Value	Units
Repair process information	n/a	-
Inspection process information	n/a	-
Repair cycle	n/a	Cycles / RSL
Repair cycle	n/a	Cycles / ESL
Net freshwater consumption	n/a	m^3
Ancillary materials	n/a	kg
Energy input	n/a	kWh
Waste materials from repair	n/a	kg
Direct emissions to ambient air, soil, and water	n/a	kg
Further assumptions for scenario development	n/a	-

Table 10: *Replacement (B4)*

Name	Value	Units
Reference Service Life	30	Years
Replacement cycle	1.5	(ESL/RSL) – 1
Energy input – Electricity	2	kWh / replacement
Energy input – Diesel	3.15	kg / replacement
Net fresh water consumption	0	m^3
Ancillary materials - White butyl caulk	15.3	kg / replacement
Ancillary materials - Steel trims and fasteners	3.57	kg / replacement
Replacement of worn parts, specify parts/materials	0	kg
Direct emissions to ambient air, soil, and water	0	kg
Further assumptions for scenario development	n/a	-
Waste generated after each replacement	1178 - 2085	kg / replacement

Table 11: *Refurbishment (B5)*

Name	Value	Units
Refurbishment process description	n/a	-
Replacement cycle	n/a	Cycles / RSL
Replacement cycle	n/a	Cycles / ESL
Energy input	n/a	kWh
Net fresh water consumption	n/a	m^3
Material input for refurbishment	n/a	kg
Waste materials	n/a	kg
Direct emissions to ambient air, soil, and water	n/a	kg
Further assumptions for scenario development	n/a	-

Building operation stage (B6 – B7)

N/A.

Table 12: *Operational energy use (B6) and Operational water use*

Name	Value	Units
Net fresh water consumption	n/a	m^3
Ancillary materials	n/a	kg
Energy input	n/a	kWh
Power output of equipment	n/a	kW
Characteristic performance	n/a	-
Direct emissions to ambient air, soil, and water	n/a	kg
Further assumptions for scenario development	n/a	-

Disposal stage (C1 - C4)

Table 13: *Disposal per 100 m^2 (C1-C4)*

Name		2" thick panel, 26 / 26 ga	6" thick panel, 22 / 22 ga	Unit
Assumptions for scenario development		Product is landfilled at end of life		
Collection process	Collected separately	0	0	kg
	Collected with mixed construction waste	1,084	1,948	kg
Recovery	Reuse	0	0	kg
	Recycling	0	0	kg
	Landfill	1,084	1,948	kg
	Incineration	0	0	kg
	Incineration with energy recovery	0	0	kg
	Energy conversion efficiency rate	84-94	84-94	%
Disposal	Product or material for final deposition	1,084	1,948	kg

5. LCA: Results

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

5.1 Results for 100 m^2 of OneDeck RD1 2'' thick insulated metal roof deck panels with 26 ga facings on both sides (lightest configuration)

CML Life Cycle Impact Assessment (LCIA) results for OneDeck RD1 2'' thick metal roof deck panel with 26 ga facings on both sides (lightest product) over 75 years. All values are rounded to three significant digits. Results reported in MJ are calculated using higher heating value.

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Potential	kg CO_2 eq.	2.74E+03	8.49E+01	2.23E+02	0.00E+00	1.33E+01	0.00E+00	4.64E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E+00	0.00E+00	4.64E+01	MND
Acidification Potential of Land and Water	kg SO_2 eq.	1.71E+01	3.07E-01	1.07E+00	0.00E+00	1.57E-02	0.00E+00	2.81E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-02	0.00E+00	1.85E-01	MND
Eutrophication Potential	kg PO_4^{3-} eq.	1.90E+00	8.16E-02	2.00E-01	0.00E+00	2.54E-03	0.00E+00	3.31E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-03	0.00E+00	2.29E-02	MND
Depletion Potential of the Stratospheric Ozone Layer	kg CFC-11 eq.	4.33E-07	9.10E-12	2.20E-08	0.00E+00	1.19E-11	0.00E+00	6.83E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-13	0.00E+00	8.66E-11	MND
Formation Potential of Tropospheric Ozone	kg C_2H_4 eq.	1.28E+00	-1.21E-01	9.99E-02	0.00E+00	6.65E-03	0.00E+00	1.88E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-5.36E-03	0.00E+00	1.71E-03	MND
Abiotic Depletion Potential for Non-Fossil Resources (Elements)	kg Sb eq.	8.70E-03	2.73E-05	4.45E-04	0.00E+00	7.51E-06	0.00E+00	1.38E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-06	0.00E+00	1.26E-05	MND
Abiotic Depletion Potential for Fossil Resources (Fossil Fuels)	MJ eq.	3.93E+04	9.97E+02	2.73E+03	0.00E+00	1.59E+02	0.00E+00	6.54E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E+01	0.00E+00	5.41E+02	MND

MND = Module not declared

TRACI Life Cycle Impact Assessment (LCIA) results for OneDeck RD1 2'' thick metal roof deck panel with 26 ga facings on both sides (lightest product) over 75 years. All values are rounded to three significant digits.

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
IPCC AR6 GWP	kg CO_2 eq	2.76E+03	8.55E+01	2.29E+02	0.00E+00	1.36E+01	0.00E+00	4.69E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E+00	0.00E+00	4.69E+01	MND
Global Warming (GWP, 100 year)	kg CO_2 eq.	2.74E+03	8.49E+01	2.23E+02	0.00E+00	1.33E+01	0.00E+00	4.64E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E+00	0.00E+00	4.64E+01	MND
Acidification	kg SO_2 eq.	1.85E+01	4.24E-01	1.36E+00	0.00E+00	1.84E-02	0.00E+00	3.07E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-02	0.00E+00	2.02E-01	MND
Eutrophication	kg N eq.	8.48E-01	3.71E-02	1.17E-01	0.00E+00	1.60E-03	0.00E+00	1.52E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-03	0.00E+00	1.12E-02	MND
Ozone Depletion	kg CFC-11 eq.	4.21E-07	1.61E-13	2.14E-08	0.00E+00	2.07E-13	0.00E+00	6.64E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-15	0.00E+00	1.49E-12	MND
Smog	kg O_3 eq.	3.42E+02	9.80E+00	2.37E+01	0.00E+00	4.33E-01	0.00E+00	5.69E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-01	0.00E+00	3.55E+00	MND

MND = Module not declared

Resource use and waste flows for OneDeck RD1 2" thick metal roof deck panel with 26 ga facings on both sides (lightest product) over 75 years. All values are rounded to three significant digits. Results reported in MJ are calculated using higher heating value.

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ eq.	4.20 E+03	4.65 E+01	2.43 E+02	0.00 E+00	9.15 E+00	0.00 E+00	6.84 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.87 E+00	0.00 E+00	6.63 E+01	MND
Use of renewable primary energy resources used as raw materials	MJ eq.	4.70 E+02	0.00 E+00	2.35 E+01	0.00 E+00	0.00 E+00	0.00 E+00	7.40 E+02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ eq.	3.56 E+04	1.20 E+03	2.63 E+03	0.00 E+00	3.43 E+02	0.00 E+00	6.03 E+04	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.81 E+01	0.00 E+00	7.07 E+02	MND
Use of non-renewable primary energy resources used as raw materials	MJ eq.	7.61 E+03	0.00 E+00	3.80 E+02	0.00 E+00	0.00 E+00	0.00 E+00	1.20 E+04	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of secondary materials	kg	8.29 E+02	0.00 E+00	4.14 E+01	0.00 E+00	0.00 E+00	0.00 E+00	1.31 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of renewable secondary fuels	MJ eq.	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of non-renewable secondary fuels	MJ eq.	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Recovered Energy	MJ eq.	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Fresh Water Use	m^3	8.17 E+02	1.67 E-01	4.10 E+01	0.00 E+00	4.86 E-01	0.00 E+00	1.29 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	6.72 E-03	0.00 E+00	1.01 E-01	MND
Hazardous waste	kg	7.48 E-01	4.97 E-09	3.90 E-02	0.00 E+00	1.82 E-08	0.00 E+00	1.18 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.00 E-10	0.00 E+00	2.65 E-08	MND
Non-hazardous waste	kg	6.71 E+01	1.03 E-01	8.27 E+01	0.00 E+00	2.45 E-01	0.00 E+00	1.88 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	4.13 E-03	0.00 E+00	1.11 E+03	MND
High-level Radioactive waste	kg	5.13 E-04	3.93 E-06	3.26 E-05	0.00 E+00	4.68 E-06	0.00 E+00	8.36 E-04	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.58 E-07	0.00 E+00	7.07 E-06	MND
Intermediate and low-level Radioactive waste	kg	5.52 E-01	3.31 E-03	3.34 E-02	0.00 E+00	3.91 E-03	0.00 E+00	8.93 E-01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.33 E-04	0.00 E+00	6.20 E-03	MND
Components for re-use	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Materials for recycling	kg	7.14 E+01	0.00 E+00	4.09 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.13 E+02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Materials for energy recovery	kg	0.00 E+00	0.00 E+00	5.91 E-01	0.00 E+00	0.00 E+00	0.00 E+00	8.86 E-01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Exported energy	MJ eq.	0.00 E+00	0.00 E+00	2.08 E+01	0.00 E+00	0.00 E+00	0.00 E+00	3.13 E+01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND

MND = Module not declared
INA = Indicator not assessed

Carbon emissions and uptake for OneDeck RD1 2" thick metal roof deck panel with 26 ga facings on both sides (lightest product) over 75 years. All values are rounded to three significant digits.

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Biogenic carbon removal from packaging, BCRK	kg CO_2 eq.	5.75E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
Biogenic carbon emission from packaging, BCEK	kg CO_2 eq.	0.00E+00	0.00E+00	1.10E+01	0.00E+00	0.00E+00	0.00E+00	1.65E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

5.2 Results for 100 m^2 of OneDeck RD1 6'' thick insulated metal roof deck panels with 22 ga facings on both sides (heaviest configuration)

CML Life Cycle Impact Assessment (LCIA) results for OneDeck RD1 6" thick metal roof deck panel with 22 ga facings on both sides (heaviest product) over 75 years. All values are rounded to three significant digits. Results reported in MJ are calculated using higher heating value.

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Potential	kg CO_2 eq.	5.14E+03	1.50E+02	3.48E+02	0.00E+00	2.38E+01	0.00E+00	8.60E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E+00	0.00E+00	8.27E+01	MND
Acidification Potential of Land and Water	kg SO_2 eq.	2.82E+01	5.44E-01	1.65E+00	0.00E+00	2.80E-02	0.00E+00	4.61E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-02	0.00E+00	3.30E-01	MND
Eutrophication Potential	kg PO_4^{3-} eq.	3.23E+00	1.45E-01	2.70E-01	0.00E+00	4.53E-03	0.00E+00	5.53E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.84E-03	0.00E+00	4.08E-02	MND
Depletion Potential of the Stratospheric Ozone Layer	kg CFC-11 eq.	1.16E-06	1.61E-11	5.82E-08	0.00E+00	2.12E-11	0.00E+00	1.82E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.52E-13	0.00E+00	1.54E-10	MND
Formation Potential of Tropospheric Ozone	kg C_2H_4 eq.	2.11E+00	-2.13E-01	1.37E-01	0.00E+00	1.19E-02	0.00E+00	3.04E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-9.57E-03	0.00E+00	3.05E-03	MND
Abiotic Depletion Potential for Non-Fossil Resources (Elements)	kg Sb eq.	1.52E-02	4.84E-05	7.72E-04	0.00E+00	1.34E-05	0.00E+00	2.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-06	0.00E+00	2.25E-05	MND
Abiotic Depletion Potential for Fossil Resources (Fossil Fuels)	MJ eq.	8.04E+04	1.76E+03	4.84E+03	0.00E+00	2.83E+02	0.00E+00	1.32E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.14E+01	0.00E+00	9.66E+02	MND

MND = Module not declared

TRACI Life Cycle Impact Assessment (LCIA) results for OneDeck RD1 6" thick metal roof deck panel with 22 ga facings on both sides (heaviest product) over 75 years. All values are rounded to three significant digits.

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
IPCC AR6 GWP	kg CO_2 eq	2.76E+03	8.55E+01	2.29E+02	0.00E+00	2.42E+01	0.00E+00	4.69E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E+00	0.00E+00	4.69E+01	MND
Global Warming (GWP, 100 year)	kg CO_2 eq.	5.14E+03	1.50E+02	3.48E+02	0.00E+00	2.38E+01	0.00E+00	8.60E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E+00	0.00E+00	8.27E+01	MND
Acidification	kg SO_2 eq.	3.06E+01	7.51E-01	1.99E+00	0.00E+00	3.27E-02	0.00E+00	5.07E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-02	0.00E+00	3.60E-01	MND
Eutrophication	kg N eq.	1.52E+00	6.56E-02	1.53E-01	0.00E+00	2.85E-03	0.00E+00	2.64E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-03	0.00E+00	2.01E-02	MND
Ozone Depletion	kg CFC-11 eq.	1.14E-06	2.85E-13	5.74E-08	0.00E+00	3.69E-13	0.00E+00	1.80E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-14	0.00E+00	2.65E-12	MND
Smog	kg O_3 eq.	5.71E+02	1.74E+01	3.56E+01	0.00E+00	7.73E-01	0.00E+00	9.46E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00	6.33E+00	MND

MND = Module not declared

Resource use and waste flows for OneDeck RD1 6" thick metal woof deck panel with 22 ga facings on both sides (lightest product) over 75 years. All values are rounded to three significant digits. Results reported in MJ are calculated using higher heating value.

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ eq.	7.38 E+03	8.24 E+01	4.06 E+02	0.00 E+00	1.63E +01	0.00 E+00	1.20 E+04	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	3.33 E+00	0.00 E+00	1.18 E+02	MND
Use of renewable primary energy resources used as raw materials	MJ eq.	4.70 E+02	0.00 E+00	2.35 E+01	0.00 E+00	0.00 E+00	0.00 E+00	7.40 E+02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ eq.	7.99 E+04	2.12 E+03	4.91 E+03	0.00 E+00	6.12 E+02	0.00 E+00	1.32 E+05	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	8.57 E+01	0.00 E+00	1.26 E+03	MND
Use of non-renewable primary energy resources used as raw materials	MJ eq.	7.66 E+03	0.00 E+00	3.83 E+02	0.00 E+00	0.00 E+00	0.00 E+00	1.21 E+04	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of secondary materials	kg	1.29 E+03	0.00 E+00	6.47 E+01	0.00 E+00	0.00 E+00	0.00 E+00	2.04 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of renewable secondary fuels	MJ eq.	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Use of non-renewable secondary fuels	MJ eq.	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Recovered Energy	MJ eq.	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Fresh Water Use	m^3	1.28 E+03	2.96 E-01	6.42 E+01	0.00 E+00	8.67 E-01	0.00 E+00	2.02 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.20 E-02	0.00 E+00	1.81 E-01	MND
Hazardous waste	kg	1.17 E+00	8.81 E-09	6.01 E-02	0.00 E+00	3.25 E-08	0.00 E+00	1.85 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	3.56 E-10	0.00 E+00	4.73 E-08	MND
Non-hazardous waste	kg	1.26 E+02	1.82 E-01	1.29 E+02	0.00 E+00	4.38 E-01	0.00 E+00	3.34 E+03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	7.37 E-03	0.00 E+00	1.97 E+03	MND
High-level Radioactive waste	kg	1.15 E-03	6.96 E-06	6.49 E-05	0.00 E+00	8.34 E-06	0.00 E+00	1.85 E-03	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.82 E-07	0.00 E+00	1.26 E-05	MND
Intermediate and low-level Radioactive waste	kg	1.30 E+00	5.87 E-03	7.14 E-02	0.00 E+00	6.98 E-03	0.00 E+00	2.09 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	2.37 E-04	0.00 E+00	1.11 E-02	MND
Components for re-use	kg	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Materials for recycling	kg	1.11 E+02	0.00 E+00	6.09 E+00	0.00 E+00	0.00 E+00	0.00 E+00	1.76 E+02	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Materials for energy recovery	kg	0.00 E+00	0.00 E+00	5.91 E-01	0.00 E+00	0.00 E+00	0.00 E+00	8.86 E-01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND
Exported energy	MJ eq.	0.00 E+00	0.00 E+00	2.08 E+01	0.00 E+00	0.00 E+00	0.00 E+00	3.13 E+01	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	MND

MND = Module not declared | INA = Indicator not assessed

Carbon emissions and uptake for OneDeck RD1 6" thick metal woof deck panel with 22 ga facings on both sides (lightest product) over 75 years. All values are rounded to three significant digits.

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Biogenic carbon removal from packaging, BCRK	kg CO_2 eq.	5.75E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
Biogenic carbon emission from packaging, BCEK	kg CO_2 eq.	0.00E+00	0.00E+00	1.10E+01	0.00E+00	0.00E+00	0.00E+00	1.65E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

6. LCA: Interpretation

Overall, for AWIP's insulated metal roof deck panel products, Global Warming (GWP) and Abiotic Depletion of fossil fuels are the impact categories of most significance. Within these impact categories, the majority of impacts are aggregated in the A1-A3 and B4 phases of the life cycle of the product. A1-A3 includes raw material sourcing, transportation, and manufacturing, and B4 includes the impacts associated with necessary replacements. The next largest life cycle stage is A5 in terms of GWP which is installation at customer's job site.

For insulated metal panels, in the raw material sourcing and manufacturing stages, the largest contributors to the impacts are the raw materials, steel (40%) and foam (40%). As for manufacturing, electricity contributes about 1% of GWP impacts in A1-A3, while thermal energy from natural gas and LPG contributes 1-2% (averaged across both manufacturing facilities).

Shipping to customer contributes around 2% of total GWP impacts, while installation used contributes around 2.1% of GWP impacts. Finally, disposal of the product to landfill contributes 1.2% to total GWP impacts.

7. Additional Environmental Information

7.1 Environment and Health during Manufacture

AWIP has established Environmental, Health and Safety programs to ensure all federal, state, and local regulations are met or exceeded.

7.2 Environment and Health during Installation

In-site personnel shall follow the appropriate safety protocols as determined by the relevant governing bodies. All Weather Insulated Panels recommends the use of suction lifters during installation, to maximize safety and minimize undue manual handling. All personnel performing installation tasks should wear proper clothing and protective equipment at all times. There are no harmful substances or emissions from the installation of this product.

7.3 Extraordinary Effects

Fire

Fire testing and approvals for all products included in the study are listed below. For further fire testing results, please visit the resource library for specific products here https://www.awipanels.com/products/.

Test	Test Title	Results
FM 4880	Class 1 Fire Rating of Insulated Wall, Ceiling and Roof Panels	Passed: Class 1 Fire Rating of Building Panels or Interior Finish Material

Water
For water penetration testing results, please visit the resource library for specific products here https://www.awipanels.com/products/.

Mechanical Destruction

If the product is mechanically destroyed, it should be disposed of using standard procedures and replaced promptly.

7.4 Environmental Activities and Certifications

AWIP is deeply committed to operating a sustainable business that provides innovative and adaptable energy-efficient building solutions to help accelerate a zero-emissions future for our planet. This is embodied through AWIP's global sustainability program, Planet Passionate, which is an ambitious 10-year global sustainability program that aims to impact three big global issues:

- Climate Change
- Circularity
- Protection of our natural world

AWIP has already made significant strives to drive energy and carbon out of business operations and supply chain. This includes purchasing Renewable Energy Credits to cover the impacts of manufacturing the Insulated Metal Roof Deck Panels detailed in this report (RECs cover electricity and natural gas usage in 2020). It is all part of AWIP's larger goal of "Net zero carbon manufacturing by 2030".

To learn more about AWIP's sustainability programs please visit https://www.awipanels.com/sustainability/.

7.5 Further Information

For further information on the products detailed in this report, please visit: https://www.awipanels.com/product-categories/roof-decks/.

8. References

1. Bare, J., et al. TRACI – The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Journal of Industrial Ecology. Volume 6, no. 3-4 (2003). http://mitpress.mit.edu/jie
2. CML-IA Characterization Factors. Leiden University, Institute of Environmental Sciences. April 2013. http://cml.leiden.edu/software/data-cmlia.html
3. IPCC. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.
4. thinkstep. (2019). GaBi LCA Database Documentation. Retrieved from thinkstep AG: http://www.gabi-software.com/international/databases/gabi-databases/
5. thinkstep. (2019). GaBi ts: Software system and database for life cycle engineering. Stuttgart, Echterdingen, Germany.
6. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
7. ISO 14040: 2006 Environmental Management – Life cycle assessment – Principles and framework
8. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
9. ISO 21930: 2017 Sustainability in building construction – Environmental declaration of building products.
10. Life Cycle Assessment, LCA Report for Kingspan Group for Insulated Metal Panels. WAP Sustainability Consulting. July 2019.
11. Product Category Rules for Building-Related Products and Services. Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 3.2. UL Environment. Dec. 2018
12. Product Category Rules for Building-Related Products and Services. Part B: Insulated Metal Panels, Metal Composite Panels, and Metal Cladding: Roof and Wall Panels, UL 10010–5. October 23, 2018
13. Program Operator Manual. Type III Advanced Environmental Product Declaration Program. Version 11.0-. SCS Global Services. November 2021.

For more information please contact:

All Weather Insulated Panels
929 Aldridge Rd, Vacaville, CA 95688, USA
sales@awipanels.com
+1 (707) 359 2280

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Main +1.50.452.8000 | fax +1.510.452.8001