



## Environmental Product Declaration

in accordance with ISO 14025 and EN 15804



### Paneltec New Zealand Induracore

Company Address: 10 Mako Street, Dargaville, 0372, New Zealand  
Issue Date: 27 September 2024  
Valid to: 22 November 2028  
Document Version: 1.0



**Environment Product Declaration Details**

<b>EPD Scope</b>	Cradle to Gate with Options (A1-A3, C D)
<b>EPD Type</b>	Product Specific EPD
<b>EPD Number</b>	PNZ:IG01:2024:EP
<b>Issue Date</b>	27 September 2024
<b>Valid Until</b>	22 November 2028

**CEN standard EN 15804 serves as the core PCR**

Compliant with EN 15804:2012+A2:2019

Independent external verification of the declaration and data, according to ISO 14025:2010

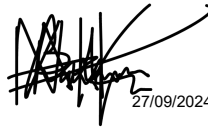
 Internal

 External

<b>Third Party Verifier</b>
<b>Internal EPD Reviewed by</b>



Direszni Naiker, Gaia Conscious Consulting


 27/09/2024

Nana Bortsie-Aryee, Global GreenTag International Pty Ltd

The EPD is property of declared manufacturer. Different program EPDs may not be comparable as e.g. Australian transport is often more than elsewhere. Comparability is further dependent on the product category rules used and the source of the data. EPDs of construction products may not be comparable if they do not comply with EN15804. Further explanatory information is found at [globalgreentag.com](http://globalgreentag.com) or contact: [epd@globalgreentag.com](mailto:epd@globalgreentag.com).

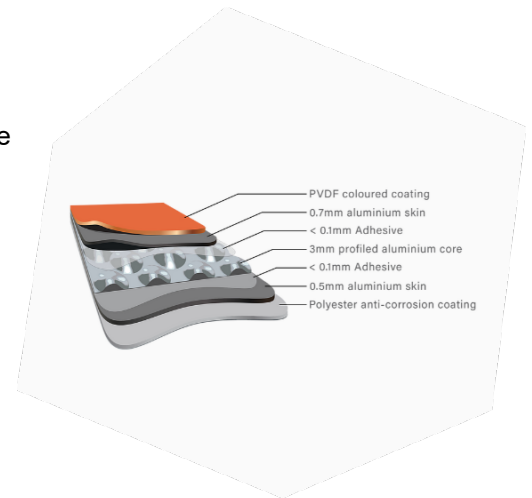
This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with EN 15804:2012+A2 2019 for business to business communication and currency as per Section 7.1 Table 2.

<b>EPD Program Operator</b>	<b>EPD Producer</b>	<b>Declaration Owner</b>
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**Product Information**

<b>Product Name</b>	Induracore G2	
<b>Description</b>	Deemed non-combustible bonded aluminium panel, facade products for all types of buildings	
<b>PCR</b>	CEN standard EN 15804 serves as the core PCR	
<b>Declared Unit/ Functional Unit</b>	The function unit is 1 m <sup>2</sup> of Induracore G2 with an average weight of 4.2kg/m <sup>2</sup> from cradle to Gate with options, modules A1-A3, C1-C4 and module D	
<b>Manufacturer Warranty</b>	15 years	
<b>Manufacturing Site</b>	Dubai Industrial City, Dubai, UAE. Huashi Town, Jiangyin, Jiangsu, China	
<b>Site Representation &amp; Geography</b>	Australasia	
<b>Cut-off criteria &amp; Data quality</b>	Complies with EN 15804+A2:2019	
<b>Standards</b>	This product complies with ISO 14044: 2006 EM: LCA: Requirement & guideline for data review: LCI; LCIA, Interpretation results: Include additional quality testing as required by PCR.	
<b>Product Specifications</b>	<b>Test</b>	<b>Result</b>
	<b>AS/NZS 4284</b>	The test sample complied with test conditions of E2/VM1.
	<b>AAMA2605-17 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels</b>	Pass
	<b>BS8414-2</b>	Passed the BR135 standard
	<b>CodeMark NZ Building Code Conformity</b>	Compliant (see certificate for limitations)
	<b>EN 13501-1:2007 + A1:2009 o</b>	Available on request
	See <a href="https://paneltec.co.nz/project/induracore-g2/">https://paneltec.co.nz/project/induracore-g2/</a> for more information.	
<b>Restricted Substance List</b>	N/A	
<b>Functional &amp; Technical Performance</b>	Industrial, commercial and residential building in/exterior	
<b>Range and variability</b>	Significant differences of average LCIA results are declared	



**Primary Data**

Data was collected in accordance with EN ISO 14044:2006, 4.3.2, from primary sources including factory audits, suppliers and their publications on corporate locations, logistics, technology, market share, management system, standards and commitment to improved environmental performance.

**Substances of Very High Concern**

Contains no substances in the “Candidate List of Substances of Very High Concern for authorisation” registration with the European Chemicals Agency

**Manufacturing Process**

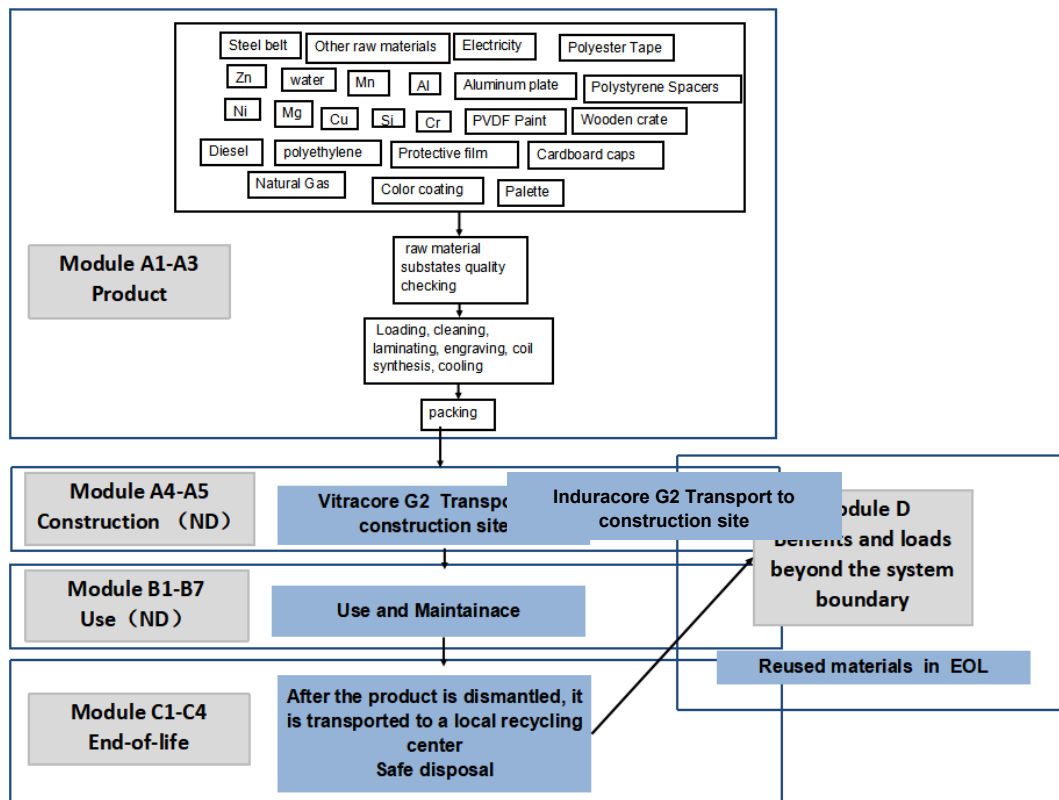


Figure 1. Induracore G2 Products Cradle to Gate System Boundary

## Base Material Origin and Detail

**Table 1** Lists key components and additives by function, type, key operation, source and amount.

**Table 1 Base Material**

Product	Component	Material	Source	% mass
<b>Induracore G2 manufactured in United Arab Emirates (UAE)</b>	Aluminium mill coils	Aluminium	Bahrain	>95%
	Adhesive film	Ethylene Vinyl Acetate (EVA)	India	<1%
	Protective film	Polyethylene Film	UAE	<1%
<b>Induracore G2 manufactured in Jiangsu, China</b>	Aluminium skin with coating	Aluminium plate strip	China	80-90%
	Adhesive film	Ethylene Vinyl Acetate (EVA)	USA	<1%
	Protective film	Polyethylene	China	<1%
	Aluminium mill coils	Aluminium	China	10-20%

## Mass Balance

According to Table 2, products produced in the UAE and Jiangsu in China are mass-balanced.

**Table 2 The mass balance of the 1 m<sup>2</sup> Induracore G2**

<b>Induracore G2 manufactured in United Arab Emirates (UAE)</b>		
	Name	Weight (kg)
<b>Inputs</b>	Aluminium coils	4.15
	Adhesive film	0.03
	Protective film	0.01
<b>Outputs</b>	Induracore G2	4.2
<b>Induracore G2 manufactured in Jiangsu, China</b>		
	Name	Weight (kg)
<b>Inputs</b>	Aluminium mill coils	0.81
	Aluminium skin with coating	3.36
	Protective film	0.00899
	Adhesive film	0.02
<b>Outputs</b>	Induracore G2	4.2
	Castoff	0.06

## Greenhouse Gas Emissions and Fossil Fuel Inputs

**Table 3 Greenhouse Gas Emissions and Fossil Fuel Inputs for 1 m<sup>2</sup> Induracore G2**

Fossil Fuel	Usage	Emission factors			Emission factor sources
		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	
Induracore G2 manufactured in United Arab Emirates (UAE)					
Diesel	0.00408L	2.73 CO <sub>2</sub> kg/L	1.44E-04 CH <sub>4</sub> kg/L	1.44E-04 N <sub>2</sub> Okg/L	IPCC
Induracore G2 manufactured in Jiangsu, China					
Diesel	0.07L	2.73 CO <sub>2</sub> kg/L	1.44E-04 CH <sub>4</sub> kg/L	1.44E-04 N <sub>2</sub> Okg/L	IPCC
Natural Gas	2.33m <sup>3</sup>	2.09 CO <sub>2</sub> kg/M <sup>3</sup>	3.73E-05 CH <sub>4</sub> kg/M <sup>3</sup>	3.73E-06 N <sub>2</sub> Okg/M <sup>3</sup>	IPCC

## Program Description

<b>EPD Scope</b>	Cradle to gate with options (A1 to A3, C1-C4 and D) as defined by EN 15804+A2 and depicted in Figure 1
<b>System Boundary</b>	The system boundary with nature included processing material and energy system inputs, manufacture and transport to factory gate plus waste arising.
<b>Reference Service Life</b>	20 years <sup>1</sup>
<b>Comparability</b>	EPD of construction products may not be comparable if they do not comply with EN 15804

<sup>1</sup> The reference service life was determined by the manufacturer's extended warranty.

<b>Product Stages Included</b>	<p>A1 Raw material supply</p> <ul style="list-style-type: none"> <li>• Raw material acquisition, extraction, refining and processing</li> <li>• Secondary material acquisition and processing</li> <li>• Reuse of scrap product or material from a previous product system</li> <li>• Electricity generated from all sources with extraction, refining &amp; transport</li> <li>• Secondary fuel energy and recovery processes</li> </ul> <p>A2 Transport internal and to the factory gate</p> <p>A3 Manufacture of product co-products and packaging plus</p> <ul style="list-style-type: none"> <li>• Production of inputs and ancillary material</li> <li>• System flows leaving at end-of-waste boundary allocated as coproducts</li> </ul> <p>C1 Deconstruction demolition</p> <p>C2, transport to waste processing</p> <p>C3, waste processing for reuse, recovery and/or recycling</p> <p>C4, disposal</p> <p>D, reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.</p>
<b>Cut Off Criteria</b>	<p>In this study, the “Vinyl Sealer Tape 0 PVC” and “PET Packer” used in the production process were ignored because it accounted for less than 1%, and the rest of the raw materials and energy consumption were taken into account. The sum of the neglected processes over their entire life cycle does not exceed 5% of energy use and quality. The manufacturer provides transport expenditure data for all relevant material flows. Excluding machines and facilities required in the production process.</p>
<b>Stages Excluded</b>	<p>A4-5, B1-7</p>
<b>Data Collection Year</b>	<p>2021</p>
<b>Background Data</b>	<p>Table 4、 Table 5</p>
<b>Allocations Method</b>	<p>According to ISO 14044/44, allocation is needed in several situations for LCA. One of those is recycling of end-of-life materials. Therefore, a reasonable recycling method is needed to calculate the environmental benefits of the reprocessed materials at EoL stage. This study will quote “Allocation 50/50 method”.</p> <p>Allocation 50/50 is the most common recycling methods, which has been discussed and accepted by PEF guide It “allocates the impacts and benefits due to recycling equally between the producer using recycled material and the producer producing a recycled product” [Product Environmental Footprint (PEF) Guide,2013].</p>

**Scenario Modelling Assumption**

Stage C - end of life: it is assumed that the product is disposed of by landfilling which require no waste processing, emissions data from the landfill process comes from the Ecoinvent database and transport distance of product to landfill site is 100km.

Stage D – benefits and loads beyond the system boundary: includes reuse, recovery and/or recycling, and transport to recycling operations. We assume aluminium recycle content and transport distance to recycle site is 100km. and scrap aluminium replaces primary aluminium.

**Product Average**

Table 8

**Background Data**

**Table 4.** Data sources for the Induracore G2 (UAE)

Component	Material Description	Material Dataset	Data Source	Publication Date
<b>Induracore G2 Product Component</b>				
<b>Aluminium Mill Coils</b>	Aluminium	Aluminium strip - aluminium strip (cast & rolled) (China)	CLCD- 0.8	2013
<b>Adhesive Film</b>	Polyethylene Film <sup>2</sup>	Packaging film, low density polyethylene-packaging film production, low density polyethylene (RER)	Ecoinvent 3.1	2014
<b>Protective Film</b>	Polyethylene	Fleece production, polyethylene	Ecoinvent 3.8	2021
<b>Packing</b>				
<b>Palette</b>	Polyethylene	Fleece production, polyethylene	Ecoinvent 3.8	2021
<b>Paper Wrapping</b>	Plastic Wrapping	Extrusion, plastic film	Ecoinvent 3.8	2021
<b>Transportation</b>				
Transport- Aluminum coils/ Protective film	Diesel Truck	Transport, freight train, diesel	Ecoinvent 3.8	2021
Ship Transport- Adhesive Film	Container Shipping	Transport, freight, sea, transoceanic ship-market for transport, freight, sea, transoceanic ship(Global)	Ecoinvent 3.1	2014
<b>Energy</b>				

<sup>2</sup> Polyethylene was used to model Ethylene Vinyl Acetate (EVA) due to historic data provided. Results remain within the tolerances stated in EN15804.



<b>Grid Electricity</b>	Electricity production, natural gas, 10MW	Electricity production, oil	Ecoinvent 3.8	2021
<b>Diesel</b>	Diesel Oil	Market group for diesel	Ecoinvent 3.8	2021
<b>Water</b>	Tap Water	Tap water production, underground water with disinfection	Ecoinvent 3.8	2021
<b>Waste treatment</b>				
<b>Packaging waste</b>	Landfill	Treatment of inert waste, sanitary landfill	Ecoinvent 3.8	2021
<b>Sewage</b>	Dispose	Market for wastewater, average	Ecoinvent 3.8	2021

**Table 5.** Data sources for the Induracore G2 (Jiangsu,China)

Component	Material Description	Material Dataset	Data Source	Publication Date
<b>Induracore G2 Product Component</b>				
<b>Aluminium Mill Coils /Aluminium Skin With Coating</b>	Aluminium	Aluminium strip - aluminium strip (cast & rolled) (China)	CLCD- 0.8	2013
<b>Protective Film</b>	Polyethylene	Fleece production, polyethylene	Ecoinvent 3.8	2021
<b>Adhesive Film</b>	Polyethylene <sup>3</sup>	Fleece production, polyethylene	Ecoinvent 3.8	2021
<b>Packing</b>				
<b>Palette</b>	Polyethylene	Fleece production, polyethylene	Ecoinvent 3.8	2021
<b>Paper Wrapping</b>	Plastic Wrapping	Extrusion, plastic film	Ecoinvent 3.8	2021
<b>Cardboard Tube Core/Cardboard Caps</b>	Cardboard	Corrugated Board (t n.g.), Industry LCA - Represents Specific Technology/Industry-wide/Market Average (for Process Industry Database and Technology Research), China, 2020, From cradle to gate (from resource extraction to product delivery)	CLCD- 0.9	2020
<b>Paper Masking &amp; Sealing Tape/ Paper Roll Labels</b>	PET	Polyethylene terephthalate, granulate, amorphous, recycled to generic market for amorphous PET granulate	Ecoinvent 3.8	2021
<b>Polyester Tape</b>	Polyester	Market for fibre, polyester	Ecoinvent 3.8	2022
<b>Steel Strapping</b>	Steel	Hot Rolled Strip (t Unclassified), Industry LCA - Represents Specific Technology/Industry-	CLCD- 0.9	2020

<sup>3</sup> Polyethylene was used to model Ethylene Vinyl Acetate (EVA) due to historic data provided. Results remain within the tolerances stated in EN15804.

			wide/Market Average (for Process Industry Database and Technical Research), China, 2020, From Cradle to Gate (From Resource Extraction to Product Delivery)		
<b>Wooden Crate</b>	Wood		Spruce wood-Spruce wood (Germany)	ELCD3.0	2012
<b>Polystyrene Spacers</b>	Polystyrene		Polystyrene production, expandable	Ecoinvent 3.8	2021
<b>Transportation</b>					
<b>Road Transport-Protective Film/Aluminium Skin With Coating/Adhesive Film/Aluminium Mill Coils</b>	Diesel Truck		Heavy Diesel Trucking (10t) (t*km Heavy Goods Vehicle), Industry LCA - Represents Specific Technology/Industry-wide/Market Average (for Process Industry Database and Technology Research), China, 2020, From cradle to gate (from resource extraction to product delivery)	CLCD- 0.9	2020
<b>Energy</b>					
<b>Grid Electricity-</b>	Grid Electricity-Product		National average grid electricity	CLCD-0.9	2021
<b>Diesel</b>	Diesel Oil		Diesel (market average)	CLCD-0.9	2021
<b>Natural Gas</b>	Natural Gas		Natural Gas (National Average) (M3 Unclassified), Industry LCA - Represents Specific Technology/Industry-wide / Market Average (for Process Industry Database and Technology Research), China, 2020, Cradle to Gate (From Resource Extraction to Product Delivery)	CLCD- 0.9	2020
<b>Water</b>	Tap Water		Tap Water (t Not Classified), Industry LCA - Represents Specific Technology/Industry-wide/Market Average (for Process Industry Database and Technology Research), China, 2020, From Cradle to Gate (From Resource Extraction to Product Delivery)	CLCD- 0.9	2020
<b>Waste Treatment</b>					
<b>Packaging Waste</b>	Landfill		Treatment of inert waste, sanitary landfill	Ecoinvent 3.8	2021
<b>Hazardous Waste</b>	Incineration		Treatment of hazardous waste, hazardous waste incineration	Ecoinvent 3.8	2021
<b>Sewage</b>	Dispose		Market for wastewater, average	Ecoinvent 3.8	2021

## Data Quality Assessment

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

**Table 6.** Data quality assessment for the Induracore G2 product system

Data Quality Parameter	Data Quality Discussion
<p><b>Time-Related Coverage:</b></p> <p>Age of data and the minimum length of time over which data is collected</p>	<p>The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 3 years old (typically 2020 and 2021). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annualized production for 2021.</p>
<p><b>Geographical Coverage:</b></p> <p>Geographical area from which data for unit processes is collected to satisfy the goal of the study</p>	<p>The data used in the analysis provides the best representation of the current data. Electricity consumption for product manufacturing was modeled using representative data from Saudi Arabia and China. The surrogate data used in the assessment is representative of business globally or in other parts of the world. Data representing operations in the rest of the world is considered similar enough to actual processes. Data representing product disposition is based on regional statistics.</p>
<p><b>Technology Coverage:</b></p> <p>Specific technology or technology mix</p>	<p>For the most part, data is representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.</p>
<p><b>Precision:</b></p> <p>Measure of the variability of the data values for each data expressed</p>	<p>Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.</p>
<p><b>Completeness:</b></p> <p>Percentage of flow that is measured or estimated</p>	<p>The LCA model included all known mass and energy flows for production of the electrical cables and accessories products. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.</p>
<p><b>Representativeness:</b></p> <p>Qualitative assessment of the degree to which the data set reflects the true population of interest</p>	<p>Data used in the assessment represent typical or average processes as currently reported from multiple data sources, and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.</p>
<p><b>Consistency:</b></p> <p>Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis</p>	<p>The consistency of the assessment is considered to be high. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current practices in Australia</p>

**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

Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.

**Sources of the Data:**

Description of all primary and secondary data sources

Data representing energy use at the China and United Arab Emirates (UAE) Factories represent an annual average and are considered of high quality due to the length of time over which these data are collected. For secondary LCI datasets, CLCD 0.8 and 0.9, Ecoinvent v3.8 and v3.1 ,ELCD v3.0 LCI data are used.

**Uncertainty of the**

**Information:**

Uncertainty related to data, models, and assumptions

Uncertainty related to materials in the Induracore G2 and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years).

**LCA Scenarios and Additional Technical Information**

**EoL stage (C1 - C4, D)**

The disposal stage includes demolition of the products (C1); transport of the Induracore G2 to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product degrades in a landfill (C4). For the Induracore G2 , no emissions are generated during demolition (C1) while no waste processing (C3) is required for underground deposit. After demolition, non-recyclable waste is disposed of in landfills(C4), and the landfill process is connected to the Ecoinvent database.

Transportation of waste materials at end-of-life (C2) assumes a 100 km average distance to disposal. Aluminium materials in the product are assumed at end-of-life.

The data for waste transportation of per t\*km are obtained from Ecoinvent 3.8. The functional unit was defined as diesel trucks completing 1t\*km on the suburbs highway with 7.5~16 ton load capacity .

Data from the landfill comes from Ecoinvent 3.8. It represents the treatment of waste, including foundation sealing, leachate collection systems, leachate wastewater treatment plants.

**Table 7.** EoL parameters for Induracore G2, per 1 m<sup>2</sup>

Processes	Unit	Induracore G2 (UAE)	Induracore G2 (Jiangsu, Chin)
<b>Collection Process</b>	kg: collected separately	4.2	4.2
<b>Recovery System</b>	kg :for recycling	4.116	4.116
<b>Safe Disposal</b>	kg: for final disposal	0.84	0.84
<b>Transportation</b>	km	100	100

### Product Average

The environmental impact category indicators are also reported based on the EFv3.1 characterization factors according to EN15804.

**Table 8.** LCA impact indicators

Core environmental impact indicators		
Impact category	Indicator	Unit
Climate change – fossil	GWP-fossil	kg CO2 eq
Climate change – biogenic	GWP-biogenic	kg CO2 eq
Climate change - land use and land use change	GWP-luluc	kg CO2 eq
Climate change – total	GWP-total	kg CO2 eq
Ozone Depletion	ODP	kg CFC 11 eq.
Acidification	AP	mol H+ eq.
Depletion of abiotic resources -fossil fuels	ADP-fossil	MJ, net calorific value
Eutrophication aquatic freshwater	EP-freshwater	kg P eq.
Eutrophication aquatic marine	EP-marine	kg N eq.
Eutrophication terrestrial	EP-terrestrial	mol N eq
Photochemical ozone formation	POCP	kg NMVOC eq.
Water use <sup>4</sup>	WDP	m3 world eq

<sup>4</sup> The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Core environmental impact indicators		
Impact category	Indicator	Unit
Additional environmental impact indicators		
Impact category	Indicator	Unit
Particulate Matter emissions	PM	Disease incidence
Ionizing radiation, human health	IRP	kBq U235 eq
Eco-toxicity (freshwater)	ETP-fw	CTUe
Human toxicity, cancer effects	HTP-c	CTUh
Human toxicity, non-cancer effects	HTP-nc	CTUh
Land use related impacts/ Soil quality	SQP	dimensionless

Results of the Life Cycle Assessment are presented below.

**Table 9.** Cradle to Gate LCA results for 1m<sup>2</sup> Induracore G2

Core environmental impact indicators-1						
Product/LCIA Impact	GWP- total	GWP- Fossil	GWP- Biogenic	GWP- Land use	ODP	AP
Induracore G2 (UAE)	7.41E+01	6.93E+01	7.89E-01	0.00E+00	9.11E-07	5.05E-01
Induracore G2 (Jiangsu,China)	8.54E+01	8.05E+01	5.85E-01	0.00E+00	8.55E-07	5.38E-01
Core environmental impact indicators-2						
Product/LCIA Impact	EP Fresh water	EP terrestrial	EP- marine	POCP	ADP fossil	ADP- mineral and metal
Induracore G2 (UAE)	1.35E-03	8.82E-01	7.93E-02	2.44E-01	8.55E+02	2.91E-05
Induracore G2 (Jiangsu,China)	9.91E-04	9.44E-01	8.46E-02	2.59E-01	1.10E+03	1.08E-05
Additional environmental impact indicators						
Product/LCIA Impact	PM	IRP	ET freshwater	HT cancer	HT-non cancer	SQP
Induracore G2 (UAE)	ND	1.28E+00	3.93E+01	-3.50E-06	-6.80E-04	ND
Induracore G2 (Jiangsu,China)	ND	1.38E+00	1.27E+04	-2.97E-06	-6.33E-04	ND

### Information Modules

The LCA and EPD declare results for mandatory A1-A3,C1-C4 and D information modules as shown in Figure 2. Optional modules and stages A4-A5,B1-B7 are excluded and are marked Not Declared (ND). ND does not indicate zero inventory or impact results.

	Product			Construction		Use stage of building fabric and operation							End of life stage				Resource recovery stage
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Modules	✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	✓	✓	✓	✓	✓
Modelling	Actual			Scenarios													Optional

ND = Module not declared ✓ = included

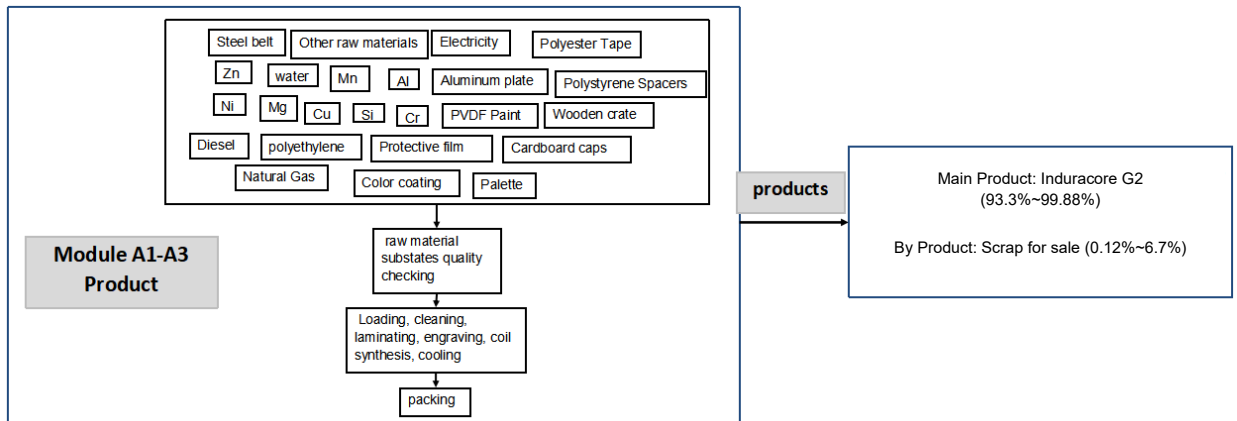
### Figure 2 Phases and Stages Cradle to Gate

The description of life cycle stage A-D are as follows:

- A1 Extraction and processing of raw materials for the Induracore G2 products components.
- A2 Transport of component materials to the manufacturing facilities
- A3 Manufacturing of Induracore G2 products and packaging
- A4 Transport of product (including packaging) to the building site (ND)
- A5 Install the product (ND)
- B1 Use of the Induracore G2 products in a building setting (ND)
- B2 Maintenance of the usage phase (ND)
- B3-B5 Repairing, replacing and refurbishing during the use phase (ND)
- B6 Energy use during the use phase (ND)
- B7 Water use during the use phase (ND)
- C1 Demolition of the products is accomplished using hand tools with no associated emissions and negligible impacts
- C2 Transport of Induracore G2 products to local recycling centre at end-of-life
- C3 The products is disposed of by using hand tools manually strip the metal material from it which require no waste processing
- C4 Disposal of Induracore G2 products for underground deposit
- D Recyclable metal from C3

**Material Flow Diagram**

In the process of producing Induracore G2, some waste (such as: plastic waste, metal waste) will be generated, these scraps will be sold as by-products after processing, and the production of 4.2kg Induracore G2 will produce 0.00504kg~0.03kg by-products, so the environmental impact is distributed according to the weight of the main by-products, main products: 93.3%~99.88%, by-products: 0.12%~6.7%.



**Figure 3 Material Flow Diagram**



**Induracore G2**
**Cradle to Gate + Options Inventory**
**Table 10 Inventory Resource Use Results/1 m<sup>2</sup> Induracore G2 (UAE) <sup>5</sup>**

Stages		Product			End of life stage				Resource recovery stage
		A1	A2	A3	C1	C2	C3	C4	D
Module Code <sup>6s</sup>	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling
GWP-fossil	kg CO2 eq	9.06E+01	1.59E-01	1.09E-02	0.00E+00	2.23E-01	1.31E-01	0.00E+00	-2.18E+01
GWP-biogenic	kg CO2 eq	3.05E-01	4.50E-03	1.72E-05	0.00E+00	5.69E-03	4.89E-01	0.00E+00	-1.55E-02
GWP-luluc	kg CO2 eq	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-total	kg CO2 eq	9.50E+01	1.63E-01	1.09E-02	0.00E+00	2.28E-01	5.35E-01	0.00E+00	-2.18E+01
ODP	kg CFC 11 eq.	1.07E-06	1.29E-08	1.05E-10	0.00E+00	4.71E-08	2.67E-09	0.00E+00	-2.18E-07
AP	mol H+ eq.	5.36E-01	1.66E-03	2.91E-06	0.00E+00	1.44E-03	1.07E-04	0.00E+00	-3.45E-02
ADP-fossil	MJ, net calorific value	1.12E+03	2.47E+00	8.81E-03	0.00E+00	3.67E+00	2.22E-01	0.00E+00	-2.75E+02
EP-freshwater	kg P eq.	1.40E-03	2.15E-05	9.96E-08	0.00E+00	2.31E-05	1.02E-05	0.00E+00	-1.00E-04
EP-marine	kg N eq.	8.57E-02	7.22E-04	1.00E-06	0.00E+00	5.20E-04	1.49E-03	0.00E+00	-9.17E-03
EP-terrestrial	mol N eq	9.49E-01	7.88E-03	1.09E-05	0.00E+00	5.68E-03	3.25E-04	0.00E+00	-8.11E-02
POCP	kg NMVOC eq.	2.60E-01	2.10E-03	3.09E-06	0.00E+00	1.55E-03	2.70E-04	0.00E+00	-1.99E-02
ADP-minerals&metals	kg Sb eq.	3.16E-05	6.82E-07	1.12E-09	0.00E+00	1.35E-06	5.14E-08	0.00E+00	-4.61E-06
ADP- fossil	kg Sb eq.	ND	ND	ND	ND	ND	ND	ND	ND
WDP	m3 world eq	3.57E+02	1.04E+01	2.70E-02	0.00E+00	9.28E+00	7.76E+00	0.00E+00	-7.76E+00

<sup>5</sup> Results are reported in scientific notation where 1.00E+01 is 10 and 1.00E-01 is 0.1

<sup>6</sup> See 'Table 5 LCA impact indicators' for full module names

**Induracore G2**
**Table 11 Inventory Resource Use Results/1 m<sup>2</sup> Induracore G2 (Jiangsu,China) <sup>7</sup>**

Stages		Product			End of life stage				Resource recovery stage
		A1	A2	A3	C1	C2	C3	C4	D3
Module Codes <sup>8</sup>	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Recycling
<b>GWP-fossil</b>	<b>kg CO2 eq</b>	9.63E+01	5.70E-01	5.07E+00	0.00E+00	2.23E-01	1.31E-01	0.00E+00	-2.18E+01
<b>GWP-biogenic</b>	<b>kg CO2 eq</b>	1.05E-01	1.07E-03	8.73E-05	0.00E+00	5.69E-03	4.89E-01	0.00E+00	-1.56E-02
<b>GWP-luluc</b>	<b>kg CO2 eq</b>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>GWP-total</b>	<b>kg CO2 eq</b>	1.01E+02	5.71E-01	5.07E+00	0.00E+00	2.28E-01	5.35E-01	0.00E+00	-2.18E+01
<b>ODP</b>	<b>kg CFC 11 eq.</b>	1.02E-06	2.49E-11	6.87E-10	0.00E+00	4.71E-08	2.67E-09	0.00E+00	-2.18E-07
<b>AP</b>	<b>mol H+ eq.</b>	5.68E-01	3.42E-03	1.29E-05	0.00E+00	1.44E-03	1.07E-04	0.00E+00	-3.46E-02
<b>ADP-fossil</b>	<b>MJ, net calorific value</b>	1.36E+03	1.20E+01	4.16E-02	0.00E+00	3.67E+00	2.22E-01	0.00E+00	-2.76E+02
<b>EP-freshwater</b>	<b>kg P eq.</b>	1.06E-03	3.15E-08	1.62E-06	0.00E+00	2.31E-05	1.02E-05	0.00E+00	-1.01E-04
<b>EP-marine</b>	<b>kg N eq.</b>	9.01E-02	1.67E-03	8.37E-06	0.00E+00	5.20E-04	1.49E-03	0.00E+00	-9.18E-03
<b>EP-terrestrial</b>	<b>mol N eq</b>	1.00E+00	1.82E-02	3.75E-05	0.00E+00	5.68E-03	3.25E-04	0.00E+00	-8.12E-02
<b>POCP</b>	<b>kg NMVOC eq.</b>	2.72E-01	4.50E-03	9.17E-04	0.00E+00	1.55E-03	2.70E-04	0.00E+00	-1.99E-02
<b>ADP-minerals&amp;metals</b>	<b>kg Sb eq.</b>	1.40E-05	1.33E-09	1.18E-08	0.00E+00	1.35E-06	5.14E-08	0.00E+00	-4.61E-06
<b>ADP- fossil</b>	<b>kg Sb eq.</b>	ND	ND	ND	ND	ND	ND	ND	ND
<b>WDP</b>	<b>m3 world eq</b>	2.10E+02	4.40E-03	2.32E-01	0.00E+00	9.28E+00	7.76E+00	0.00E+00	-7.77E+00

Note Additional Environment Indicators are not declared in this EPD.

<sup>7</sup> Results are reported in scientific notation where 1.00E+01 is 10 and 1.00E-01 is 0.1

<sup>8</sup> See 'Table 5 LCA impact indicators' for full module names

**Induracore G2**
**Table 12 Resource Use Results/1 m2 Induracore G2 (UAE)**

		Product			End of life stage				Resource recovery stage
		A1	A2	A3	C1	C2	C3	C4	D
Module Codes	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling
Net Fresh Water Use	m <sup>3</sup>	0.00E+00	0.00E+00	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Renewable Fuel	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Renewable Material	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Renewable Not Feedstock	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Renewable Total	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Non-renewable Fuel	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	1.44E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Non-renewable Material	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Non-renewable Energy Not Feedstock	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Non-renewable Total	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hazardous Waste Disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous Waste Disposed	kg	0.00E+00	0.00E+00	3.50E-03	0.00E+00	0.00E+00	8.40E-01	0.00E+00	0.00E+00
Radioactive Waste Disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Components For Reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material For Recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.12E+00
Material For Energy Recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported Energy Electrical	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported Energy Thermal	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Induracore G2**
**Table 13 Resource Use Results/1 m2 Induracore G2 (Jiangsu,China)**

		Product			End of life stage				Resource recovery stage
		A1	A2	A3	C1	C2	C3	C4	D
Module Codes	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling
Net Fresh Water Use	m <sup>3</sup>	0.00E+00	0.00E+00	3.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Renewable Fuel	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Renewable Material	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Renewable Not Feedstock	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Renewable Total	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Non-renewable Fuel	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	2.56E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Non-renewable Material	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Non-renewable Energy Not Feedstock	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	8.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Primary Energy Non-renewable Total	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	8.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Hazardous Waste Disposed	kg	0.00E+00	0.00E+00	1.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous Waste Disposed	kg	0.00E+00	0.00E+00	6.00E-02	0.00E+00	0.00E+00	8.40E-01	0.00E+00	0.00E+00
Radioactive Waste Disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Components For Reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material For Recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.12E+00
Material For Energy Recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported Energy Electrical	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported Energy Thermal	MJ <sub>ncv</sub>	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### Interpretation

For given figures, the contribution of manufacturing stage to the LCIA results of all the Induracore G2 products are highest except for GWP-Biogenic. This is because the production process needs a lot of materials and energy. For the AP and EP, they have much to do with waste disposal in the waste stage.

In the EoL phase, the environmental impact is caused by the landfill.

In Module D, 98% of the scrap can be recycled, thus offsetting a significant environmental impact.

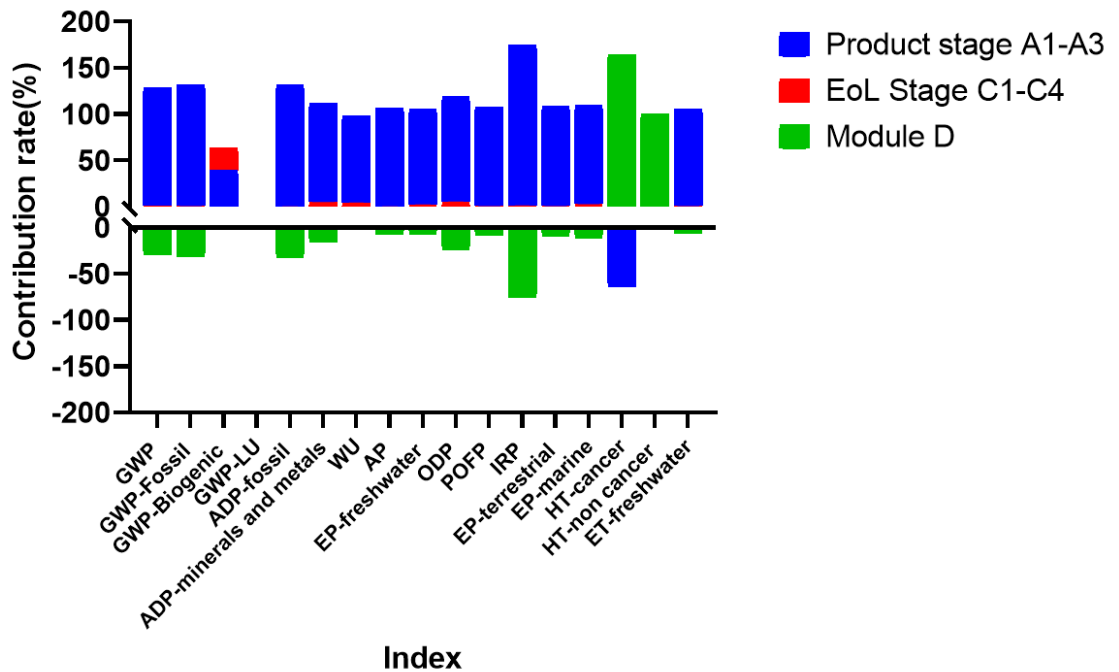


Fig 3. Induracore G2 (UAE) product each stage contribution to LCA results

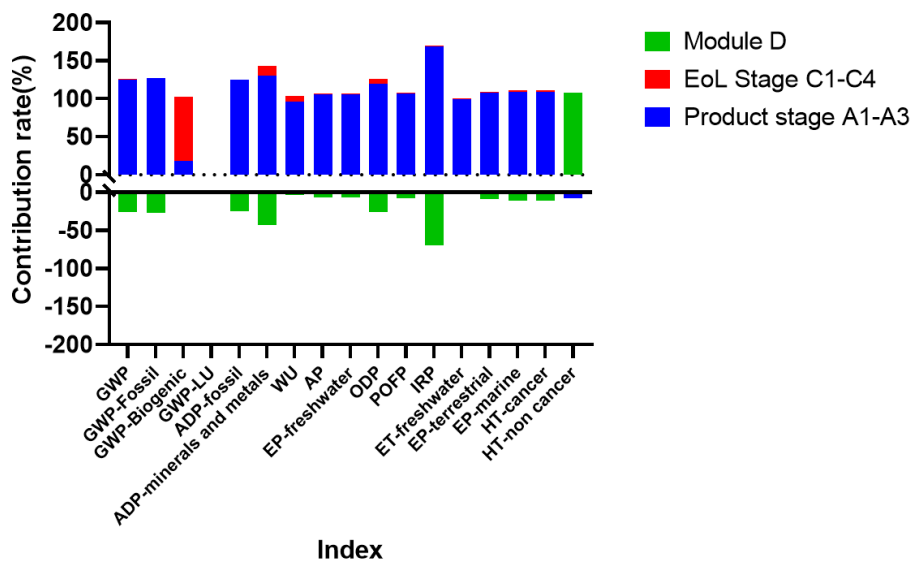


Fig 4. Induracore G2 (Jiangsu, China) product each stage contribution to LCA results

## Sensitivity Analysis

From calculation results, it is seen that most of the environmental impact is caused by Module A1-A3. It can be seen from the result table that the use of raw aluminium coil, aluminium skin, aluminium panel increases the environmental impact of module A1-A3, because the production of aluminium will cause more environmental impact. Therefore, in the process of producing aluminium coils, using more recycled aluminium will reduce environmental emissions.

Aluminium coil, aluminium skin with coating linked to the CLCD database of aluminium plate produced with 100% primary aluminium.

The sensitivity analysis was carried out to understand the environmental impact of the aluminium strip produced from 20% recycled aluminium in the production of Induracore G2, so the aluminium strip produced by 100% primary aluminium connected by aluminium coil, aluminium skin, aluminium plate was replaced with aluminium strip produced by 80% primary aluminium.

According to the results, it can be seen that the HT- cancer and HT-non cancer indicators have the greatest impact.

**Table 12. Sensitivity analysis table**

Product/ LCIA Impact	Core environmental impact indicators								
	GWP-total	GWP-Fossil	GWP-Biogenic	GWP-Land use	ODP	AP	EP-Fresh water	EP-terrestrial	EP-marine
1. Induracore G2(UAE) (Results without recycled aluminium)	7.41E+01	6.93E+01	7.89E-01	0.00E+00	9.11E-07	5.05E-01	1.35E-03	8.82E-01	7.93E-02
2. Induracore G2(UAE) (Results with recycled aluminium)	5.80E+01	5.73E+01	8.33E-01	0.00E+00	4.16E-07	5.17E-02	5.95E-04	1.28E-01	1.52E-02
Percentage of change	-21.70%	-17.34%	5.66%	0.00%	-54.34%	-89.76%	-56.04%	-85.43%	-80.83%
3 Induracore G2 (Jiangsu, China) (Results without recycled aluminium)	8.54E+01	8.05E+01	5.85E-01	0.00E+00	8.55E-07	5.38E-01	9.91E-04	9.44E-01	8.46E-02
4 Induracore G2 (Jiangsu, China) (Results with recycled aluminium)	7.14E+01	7.00E+01	6.24E-01	0.00E+00	4.26E-07	1.45E-01	3.34E-04	2.91E-01	2.91E-02
Percentage of change	-16.32%	-12.95%	6.62%	0.00%	-50.16%	-35.59%	-66.29%	-69.20%	-79.33%
124.7%	124.7%	124.7%	124.7%	124.7%	124.7%	124.7%	124.7%	124.7%	124.7%

Product/LCIA Impact	Core environmental impact indicators					Additional environmental impact indicators				
	POCP	ADP-fossil	ADP-mineral and metal	WU	PM	IRP	ET-freshwater	HT-cancer	HT-non cancer	SQP
1 Induracore G2(UAE) (Results without recycled aluminium)	2.44E-01	8.55E+02	2.91E-05	3.77E+02	ND	1.28E+00	3.93E+01	-3.50E-06	-6.80E-04	ND
2 Induracore G2(UAE) (Results with recycled aluminium)	3.54E-02	4.03E+02	2.62E-05	2.04E+02	ND	1.14E+00	3.08E+00	6.07E-06	7.12E-04	ND
Percentage of change	-85.50%	-52.92%	-10.03%	-45.94%	ND	-11.07%	-92.15%	273.20%	204.70%	ND
3 Induracore G2 (Jiangsu, China) (Results without recycled aluminium)	2.59E-01	1.10E+03	1.08E-05	2.20E+02	ND	1.38E+00	1.27E+04	-2.97E-06	-6.33E-04	ND
4 Induracore G2 (Jiangsu, China) (Results with recycled aluminium)	7.83E-02	7.10E+02	8.29E-06	6.98E+01	ND	1.26E+00	2.62E+03	5.33E-06	5.74E-04	ND
Percentage of change	-69.82%	-35.59%	-23.41%	-68.24%	ND	-8.87%	-79.33%	279.39%	190.68%	ND

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