

38/71 Eagle Street Brisbane City QLD, 4000 Australia

Global GreenTag
International EPD Program



Environmental Product Declaration

In accordance with EN15804+A2 & ISO 14025

HVG FACADES PTY LTD

Nucleo

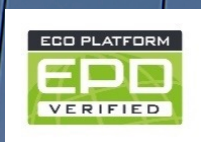
Company Address: 29 Henderson St, Turrella,
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1. General Information

Product Category Rules (PCR)	CEN standard EN 15804+A2 2019 serves as core Product Category Rules (PCR) Product Category Wall and Ceiling Linings Sub-PCR WCL:2023			
Verification Statement	Independent verification of the declaration and data, according to ISO 14025:2010 ☐ Internal ☒ External Independent external verification of the declaration and data, mandatory for business-to-consumer communication according to ISO 14025:2010			
	Signature	Name	Details	Logo
Third Party Verifier		Gaurav Das	Independent LCA Consultant	
LCA and EPD Producer		ERKE Sustainability Consultancy	Kısıklı Mah. Hanımseti Sok. No:5 Üsküdar/İstanbul/Türkiye info@erkeconsultancy.com www.erkeconsultancy.com	
Program Operator		Nana Bortsie-Aryee	Global GreenTag International Pty Ltd, Level 38, 71 Eagle Street, Brisbane 4000 Australia epd@globalgreentag.com www.globalgreentag.com	
EPD Owner		HVG FACADES PTY LTD	HVG Facades 29 Henderson St, Turrella, NSW 2205 info@hvgfacades.com.au hvgfacades.com.au/	
Communication	This EPD can be used for business-to-consumer (B2C) and business-to-business (B2B) communication.			
Comparability	Construction product EPDs may not be comparable if not EN15804 compliant. Different program EPDs may not be comparable. Comparability is further dependent on the product category rules and data source used.			
Reliability	LCIA results are relative expressions that do not predict impacts on category endpoints, exceeding of thresholds, safety margins or risks. The manufacturer has the sole ownership, liability, and responsibility for the EPD. The EPD Verifier and EPD Operator does not bear any liability.			
Geographical Area	The product is produced in Henan, China. It is sold to different marketplace in the world.			
Life Cycle Assessment (LCA)-method Cut-off Classification	Complies with EN 15804+A2:2019			
Characterisation Factors Version	EF Reference Package 3.1			
Electricity mix	Consumption mix			

2. Product Information – Product Specific EPD



Figure 1 Product Image

EPD Data Type	This EPD is based on product specific information.	
Product Name	Nucleo	
Product Description	Nucleo® is made with two external layers of aluminium sheeting and a profiled aluminium core bonded together to create a lightweight and ultra-flat panel. Intended use: Nucleo® panels offer excellent UV stability and colour retention.	
Product Site	Henan, China	
Description of Manufacturing Processes	It mainly includes ten steps: Aluminum coil inspection and set-up, Dry-film adhesive application, Heat Lamination, Cooling, Application of Protective film, Coil trimming, Surface cleaning, Cut to length to sheet sizes, Place layers of sheet onto steel pallets, Attach side walls and tide grades.	
Product Performance and Standard Compliance	Standard	Result
	AS 1530.1	Deemed non-combustible
	AS1530.3	Pass
	AS3837	Pass
	ISO14001 and ISO9001	available
	Updated technical information can be found on the hvgfacades.com.au	
Candidate List of Substances of Very High Concern for Authorisation	Product does not contain substances on the “Candidate List of Substances of Very High Concern for authorisation” (2).	
Materials	Material	Function
	Aluminium sheet	Structure
	PVDF coating	Coating
	Polyester Primer	Coating
	Adhesive Film	Adhesive
	Protective Film	Protective
	Steel pallet	Packaging
	Sulfate wrapper	Packaging
	Timber sheet	Packaging
	Packaging plastic	Packaging

3. LCA Description and Rules

EPD Type	Cradle-to-gate with modules C1-C4 and module D
System Boundary	The declared unit is production of 1m ² Nucleo Premium Bonded Aluminium Core Panel. The painted weight of the product is 4.482 kg/m ² , the thickness is 4 mm.
Functional/Declared Unit	The declared unit is production of 1m ² Nucleo Premium Bonded Aluminium Core Panel. The painted weight of the product is 4.482 kg/m ² , the thickness is 4 mm.
Reference Service Life (RSL)	According to the producer, reference service life is not available.
Key Assumptions	See section 4
Application of Cut-Off Criteria	According to PCR, the definition of cut-off criteria allows some data from the inventory to be disregarded when such data is considered irrelevant for the purposes of the study and would only represent an unnecessary burden in collecting data, without significantly altering the end result. Except for the exclusions listed in the PCR, no other specific cut-off criteria is applied. In this study, all inputs and outputs were included.
Allocations	Where possible, allocation has been avoided. Electricity, water use and waste streams of the factory has been allocated based on volumes of production outputs. All data modelled through The Evah Database were modelled using physical allocation, based on reaction stoichiometry by energetic or mass fraction. All data modelled through the Ecoinvent database follow the inherent allocation criteria of each dataset.
Excluded processes	• Production and disposal of the infrastructure and capital equipment (buildings, machines, transport media, roads, etc.) during Nucleo manufacturing, installation, and maintenance; • All phases of the use stage are excluded since there are no emissions during the use of the product; • Product losses due to abnormal damage such as natural disasters or fire accidents. These losses would mostly be accidental; • Handling operations at the distribution center and retail outlet are excluded due to small contribution and negligible impact. • Research and development activities; • Long-term emissions.
Allocations	Allocation of input: the allocation of raw material input is avoided in this study, only the energy consumption for A3 is allocated based on the product's mass. Allocation of waste: In this study, during the final stage of production, the side metals are trimmed and collected to another location. Recycling of waste material is under external stakeholder responsibilities.
Data Collection Period	Year 2024
Applied Software	SimaPro 9.5.0.0
Applied Background Database	Ecoinvent 3.9.1
Data Quality Assessment	See Figure 4 Data quality requirement and assessment
Applied Energy Datasets	Electricity, medium voltage {CN-CCG} market for electricity, medium voltage Cut-off, U from Ecoinvent 3.9.1
Applied Electricity Mix Carbon Footprint	[0.916 kg CO ₂ e/kWh.]

Figure 2: Modules Included

Information	Construction Works Life Cycle Information																Supplementary Information
Stages	Product			Construction Process		Use							End-of-Life				Benefits & Loads Beyond the System Boundary
Module Codes	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module Names	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water use	Deconstruction and Demolition	Transport	Waste Processing	Disposal	Reuse Recovery and Potential
Modules Declared	✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	✓	✓	✓	✓	✓
Data	Based on Primary Information			Scenario													Scenario
	✓ = Module Included , ND = Module Not declared																

Figure 3: System Process Flow Chart

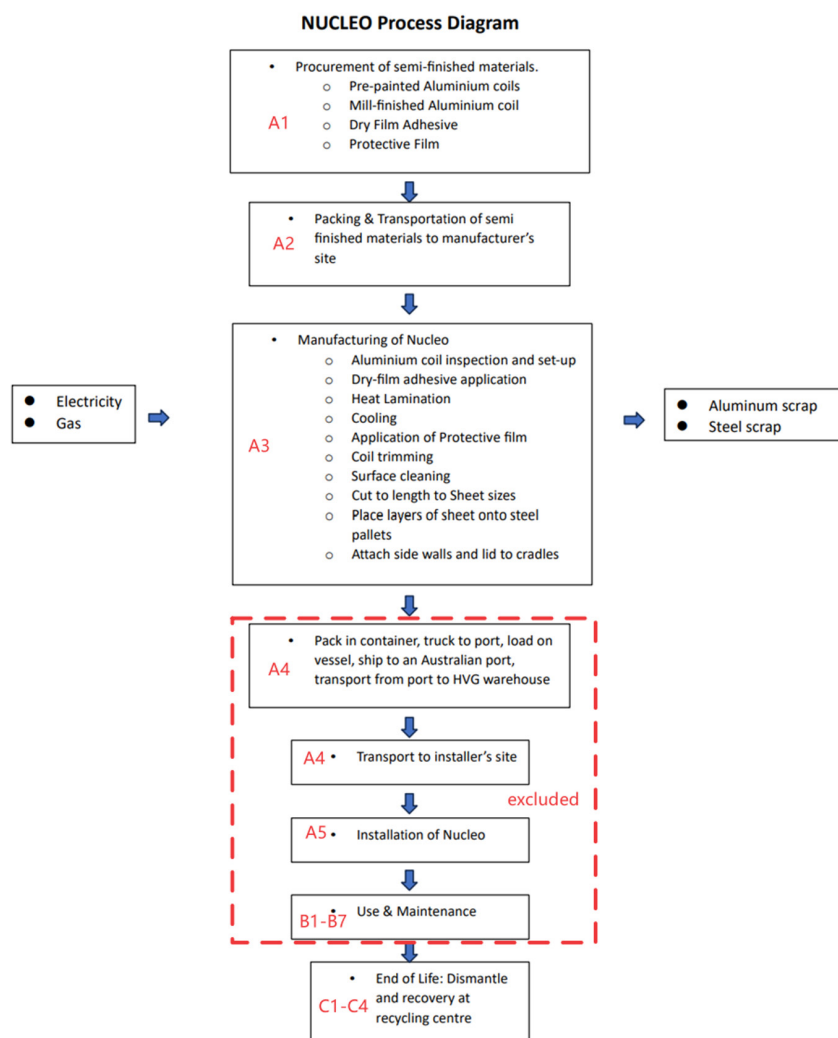


Figure 4: Data quality requirement and assessment

Statement: EPD does not declare any misleading or exaggerated claims with respect to data quality. The EPD specifies which table from EN 15804+A2, Annex E has been used to assess the data quality of relevant data.

Quality requirement	Specific requirement	Data quality applied in this LCA	Result Met/not met
Time-related coverage (age of data and the minimum length of time over which data should be collected)	Generic datasets should be within ten years	Ecoinvent 3.9.1, <10 years	Met
	Newly collected LCI data were current or up to 5 years old and based on a 1-year average	2024.1-2024.12 production inventory	Met
Geographical coverage (the geographical area from which data for unit processes should be collected to satisfy the goal of the study)	Geographic coverage shall reflect the operational reality of the different life cycle stages	All raw material data was collected from the manufacturer in China; Production data was collected and provided by HVG Facades.	Met
		Distribution, Use, and EoL are based on their respective geographical regions. The specific applied scenarios are supplied by HVG Facades, which is deemed to be representative.	Met
		Transportation and energy use data referring to Ecoinvent data with geographical coverage corresponding to the location.	Met
Technology Coverage	Specific technology or technology mix	For the most part, data are 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.	Met
Precision	Measure of the variability of the data values for each data expressed	Data collected for operations were typically averaged for one or more years over multiple operations, which is expected to reduce the variability of results.	Met

Quality requirement	Specific requirement	Data quality applied in this LCA	Result Met/not met
Completeness	95% percentage of flow is measured or estimated	All of the unit processes within the scope of the life cycle were included, with less than a 1% cut-off	Met
Representativeness	Qualitative assessment of the degree to which the data set reflects the actual population of interest, i.e., geographical coverage, period, and technology coverage	See geographical coverage, period, and technology coverage requirement above. These requirements are met.	Met
Consistency	Qualitative assessment of Whether the study methodology is applied uniformly to the various components of the analysis	The study methodology is applied uniformly to the different parts of the analysis.	Met
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 documents.	Met
Sources of the data	The foreground data should be from the primary producer	Data representing energy use at Chinese 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, Ecoinvent v3.9.1 are used.	Met
Uncertainty of the information	Data, models, and assumptions should be verified	All the primary data and assumptions were confirmed with HVG Facades, and models were built following ISO 14040/44 and PCR requirements.	Met

4. Scenarios and Additional Technical Information

The results have been calculated based on the below information.

Module	Scenario and Additional Technical Information
A1-A3	In A3, during the final stage of production, the side metals are trimmed and collected to another location. Recycling of waste material is under external stakeholder responsibilities.
C1	Diesel in construction machines with a value of 0.043 MJ/kg.
C2	A distance of 50 km is assumed to transport the construction waste to the disposal site. The type of transport is modelled by ecoinvent dataset "Transport, freight, lorry 7.5-16 metric ton, EURO5 {RoW} market for transport, freight, lorry 7.5-16 metric ton, EURO5 I Cut-off, U."
C3	Waste processing of materials flows intended for reuse, recycling and energy recovery are included in C3, ecoinvent dataset "Aluminium scrap, post-consumer, prepared for melting {RoW} treatment of aluminium scrap, post-consumer, by collecting, sorting, cleaning, pressing I Cut-off, U" is used for modelling.
C4	After waste processing, 95% of the waste aluminium sheet are sent to recycling centre, 5% of the aluminium waste are sent for landfill, the other waste such as coating are sent to landfill centre.
D	The benefit of aluminium recycling calculated according to Circular Footprint Formula in Product Environmental Footprint Category Rules

5. LCA Results – Definitions and Disclaimers

All results have been calculated and displayed as per EN15804. Units Methods and abbreviations are defined below. Results are reported in scientific notation.

Figure 5: Core Indicators

Impact Category	Indicator	Acronym	Unit
Climate change – total	Global Warming Potential total	GWP-total	kg CO ₂ eq.
Climate change - fossil	Global Warming Potential fossil fuels	GWP-fossil	kg CO ₂ eq.
Climate change - biogenic	Global Warming Potential biogenic	GWP-biogenic	kg CO ₂ eq.
Climate change - land use and land use change	Global Warming Potential land use and land use change	GWP-luluc	kg CO ₂ eq.
Ozone Depletion	Depletion potential of the stratospheric ozone layer	ODP	kg CFC 11 eq.
Acidification	Acidification potential, Accumulated Exceedance	AP	mol H ⁺ eq.
Eutrophication aquatic freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment	EP-freshwater	kg PO ₄ eq.
Eutrophication aquatic marine	Eutrophication potential, fraction of nutrients reaching freshwater end compartment	EP-marine	kg N eq.
Eutrophication terrestrial	Eutrophication potential, Accumulated Exceedance	EP-terrestrial	mol N eq.
Photochemical ozone formation	Formation potential of tropospheric ozone	POCP	kg NMVOC eq.
Depletion of abiotic resources – minerals and metals ²	Abiotic depletion potential for non-fossil resources	ADP-minerals&metals	kg Sb eq.
Depletion of abiotic resources - fossil fuels ²	Abiotic depletion potential for fossil resources	ADP-fossil	MJ, net calorific value
Water use ²	Water (user) deprivation potential, deprivation-weighted water consumption	WDP	m ³ world eq. deprived

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Figure 6: Additional Indicators

Impact category	Indicator	Acronym	Unit
Particulate matter emissions	Potential incidence of disease due to PM emissions	PM	Disease incidence
Ionising radiation, human health ¹	Potential Human exposure efficiency relative to U235	IRP	kBq U235 eq.
Ecotoxicity (freshwater) ²	Potential Comparative Toxic Unit for ecosystems	ETP-fw	CTUe
Human toxicity, cancer effects ²	Potential Comparative Toxic Unit for humans	HTP-c	CTUh
Human toxicity, non- cancer effects ²	Potential Comparative Toxic Unit for humans	HTP-nc	CTUh
Land use related impacts / soil quality ²	Potential Soil quality index	SQP	dimensionless

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Figure 7: Resource Use, Waste and Output Flow Parameters

Parameter	Acronym	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ, net calorific value
Use of renewable primary energy resources used as raw materials	PERM	MJ, net calorific value
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PERT	MJ, net calorific value
Use of non-renewable primary energy excluding non- renewable primary energy resources used as raw materials	PENRE	MJ, net calorific value
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ, net calorific value
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	PENRT	MJ, net calorific value
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ, net calorific value
Use of non-renewable secondary fuels	NRSF	MJ, net calorific value

Net use of fresh water	FW	m ³
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Components for re-use	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported thermal energy (ETE)	ETE	MJ
Exported electricity energy (EEE)	EEE	MJ

6. LCA Results

For more information about indicators see Section 7 Results Interpretation

Statement 1: the estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Figure 8: Core Indicator Results for 1m² Nucleo Premium Bonded Aluminium Core Panel

		Raw Material Transport Manufacturing	Raw Material Supply	Transport	Manufacturing	Deconstruction and Demolition	Transport	Waste Processing	Disposal	Reuse Recovery and Potential
Indicator Acronym	Unit	A1-A3	A1	A2	A3	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	8.51E+01	8.23E+01	5.57E-01	2.20E+00	1.92E-02	5.45E-02	1.42E+00	1.03E-02	-5.81E+01
GWP-biogenic	kg CO ₂ eq.	-2.95E-01	0.00E+00	0.00E+00	-2.95E-01	0.00E+00	0.00E+00	2.95E-01	0.00E+00	0.00E+00
GWP-luluc	kg CO ₂ eq.	2.37E-01	2.35E-01	2.86E-04	2.11E-03	2.16E-06	2.73E-05	1.44E-03	1.00E-05	-1.73E-01
GWP-total	kg CO ₂ eq.	8.50E+01	8.25E+01	5.58E-01	1.91E+00	1.92E-02	5.45E-02	1.72E+00	1.03E-02	-5.83E+01
ODP	kg CFC 11 eq.	9.41E-07	9.06E-07	9.48E-09	2.60E-08	3.05E-10	7.90E-10	9.80E-09	1.58E-10	-5.82E-07
AP	mol H ⁺ eq.	5.58E-01	5.47E-01	1.53E-03	9.90E-03	1.78E-04	1.88E-04	6.11E-03	6.83E-05	-3.93E-01
EP-freshwater	kg PO ₄ eq.	2.68E-02	2.60E-02	4.68E-05	8.05E-04	5.88E-07	4.38E-06	3.47E-04	2.57E-06	-1.82E-02
EP-marine	kg N eq.	9.23E-02	8.95E-02	4.02E-04	2.39E-03	8.23E-05	6.05E-05	1.15E-03	1.98E-05	-6.37E-02
EP-terrestrial	mol N eq.	9.58E-01	9.29E-01	4.16E-03	2.45E-02	8.94E-04	6.41E-04	1.25E-02	2.11E-04	-6.59E-01
POCP	kg NMVOC eq.	3.00E-01	2.88E-01	2.20E-03	9.24E-03	2.65E-04	2.47E-04	3.99E-03	7.11E-05	-2.04E-01
ADP-minerals&metals ²	kg Sb eq.	8.47E-05	7.46E-05	1.56E-06	8.60E-06	6.69E-09	1.71E-07	2.99E-05	1.93E-08	2.42E-04
ADP-fossil ²	MJ, net calorific value	8.25E+02	7.93E+02	8.42E+00	2.39E+01	2.51E-01	7.52E-01	9.53E+00	1.70E-01	-5.50E+02
WDP	m ³ world eq. deprived	1.11E+01	1.09E+01	4.28E-02	2.24E-01	5.40E-04	3.15E-03	1.43E-01	5.42E-03	-4.61E+00

Figure 9: Additional Indicator Results for 1m² Nucleo Premium Bonded Aluminium Core Panel

			Raw Material Supply	Transport	Manufacturing	Deconstruction and Demolition	Transport	Waste Processing	Disposal	Reuse Recovery and Potential
Indicator Acronym	Unit	A1-A3	A1	A2	A3	C1	C2	C3	C4	D
PM	Disease incidence	7.02E-06	6.79E-06	5.50E-08	1.81E-07	4.95E-09	3.78E-09	1.04E-07	1.17E-09	-4.95E-06
IRP ¹	kBq U235 eq.	1.56E+00	1.51E+00	7.71E-03	5.05E-02	1.19E-04	6.50E-04	3.60E-02	5.39E-04	-8.52E-01
ETP-fw ²	CTUe	2.82E+02	2.68E+02	4.46E+00	9.56E+00	1.20E-01	4.31E-01	7.06E+00	1.73E+00	-1.04E+02
HTP-c ²	CTUh	1.16E-07	1.06E-07	2.47E-10	9.13E-09	5.87E-12	2.26E-11	8.81E-10	8.20E-12	-7.58E-08
HTP-nc ²	CTUh	1.55E-06	1.51E-06	6.10E-09	3.32E-08	4.08E-11	5.15E-10	3.60E-08	1.05E-10	-1.01E-06
SQP ²	dimensionless	2.64E+02	1.31E+02	8.52E+00	1.24E+02	1.69E-02	3.88E-01	9.39E+00	2.52E-01	-7.78E+01

Figure 10: Biogenic Carbon Content of 1m² Nucleo Premium Bonded Aluminium Core Panel

Biogenic carbon content	Unit (kg C/kg)
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	0.4576
NOTE 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂ .	

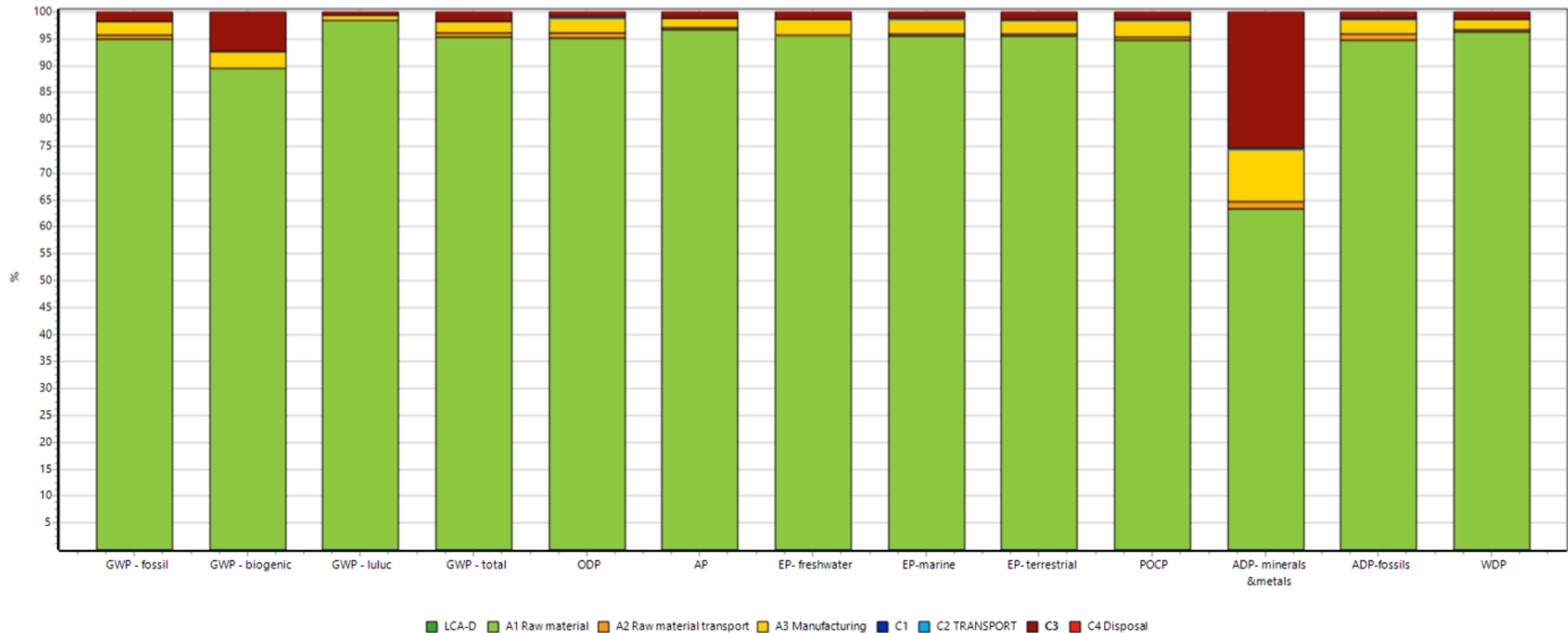
Figure 11: Resource Use, Waste and Output Flow for 1m² Nucleo Premium Bonded Aluminium Core Panel

		Raw Material Transport Manufacturing	Raw Material Supply	Transport	Manufacturing	Deconstruction and Demolition	Transport	Waste Processing	Disposal	Reuse Recovery and Potential
Resource Acronym	Unit	A1-A3	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ, net calorific value	9.18E+01	8.27E+01	1.07E-01	8.93E+00	1.43E-03	1.01E-02	1.03E+00	8.25E-03	-5.82E+01
PERM	MJ, net calorific value	2.77E+00	0.00E+00	0.00E+00	2.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ, net calorific value	9.45E+01	8.27E+01	1.07E-01	1.17E+01	1.43E-03	1.01E-02	1.03E+00	8.25E-03	-5.82E+01
PENRE	MJ, net calorific value	8.25E+02	7.93E+02	8.42E+00	2.35E+01	2.51E-01	7.52E-01	9.53E+00	1.70E-01	-5.50E+02
PENRM	MJ, net calorific value	3.28E-01	0.00E+00	0.00E+00	3.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	8.25E+02	7.93E+02	8.42E+00	2.39E+01	2.51E-01	7.52E-01	9.53E+00	1.70E-01	-5.50E+02
SM	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	0.00E+00
RSF	MJ, net calorific value	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
NRSF	MJ, net calorific value	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
FW	m ³	4.78E-01	4.68E-01	1.34E-03	9.01E-03	1.97E-05	1.00E-04	4.98E-03	1.45E-04	-2.60E-01
HWD	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	0.00E+00
NHWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.71E-01	0.00E+00
RWD	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	0.00E+00
CRU	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	0.00E+00
MFR	kg	1.61E-01	0.00E+00	0.00E+00	1.61E-01	0.00E+00	0.00E+00	3.91E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ per energy carrier	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
EEE	MJ per energy carrier	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

7. Interpretation

For the Nucleo product, it can be concluded that, Raw Material Product Stage is the dominant source of the environmental impacts among various life cycle stages. The production stage A1 accounts for 95.4% of the total life cycle GWP impacts as well as 95.1% of the total GWP-fossil impacts. The high impact intensity of the production stage indicates that the use of materials for the Nucleo product is relatively significant.

Figure 12: Life cycle impact contribution analysis



Method: EN 15804 + A2 (adapted for EPD) V1.00 / EF 3.1 normalization and weighting set / Characterisation
Analysing 1 p 'LCA-D';

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