Environmental Product Declaration

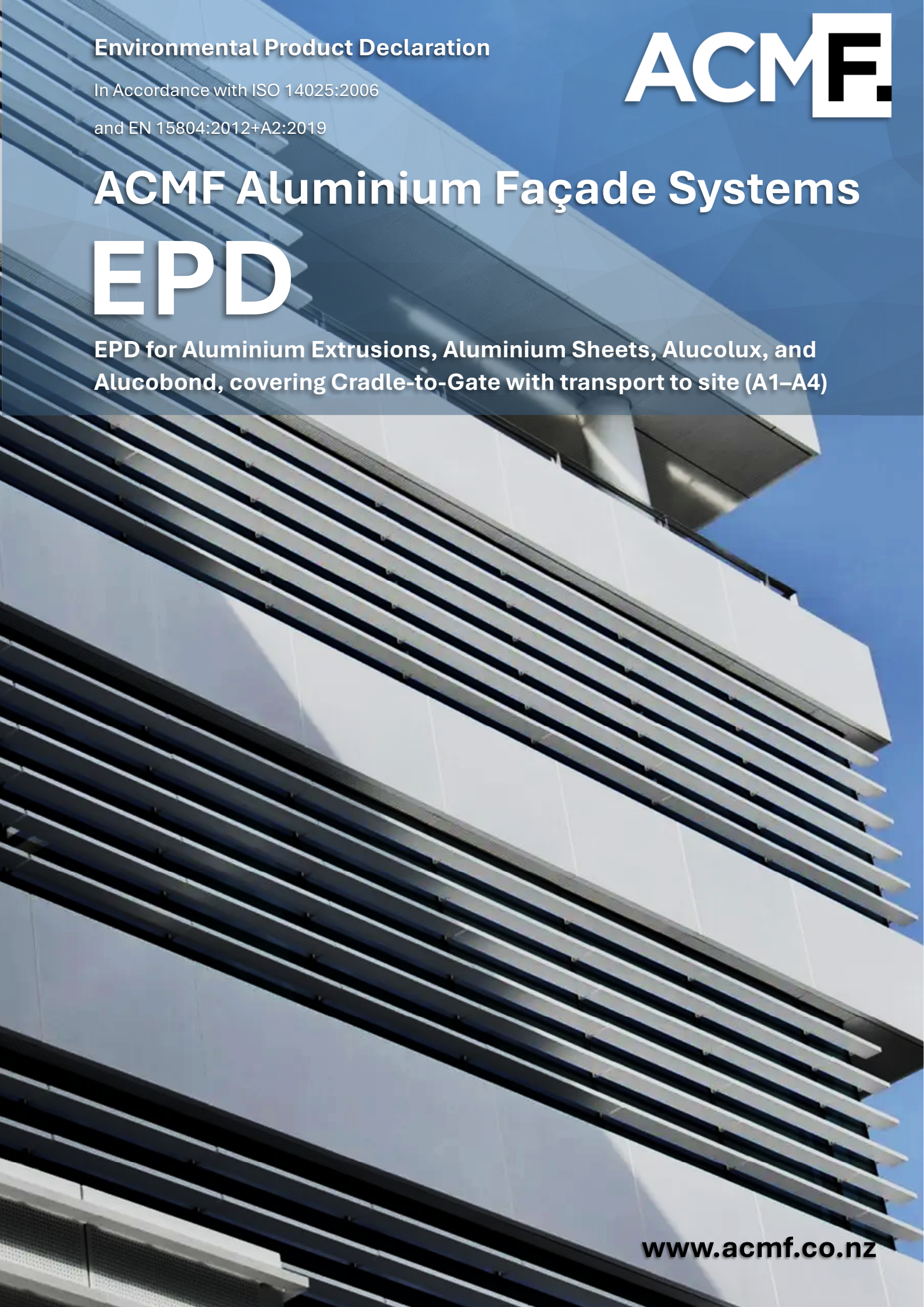
In Accordance with ISO 14025:2006

and EN 15804:2012+A2:2019

ACMF Aluminium Façade Systems

EPD

EPD for Aluminium Extrusions, Aluminium Sheets, Alucolux, and Alucobond, covering Cradle-to-Gate with transport to site (A1–A4)



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1 General Information

Programme Operator
EPD Australasia Limited
www.epd-australasia.com

EPD Number
Pending assignment upon verification

Publication Date
To be confirmed following verification

Validity
EPDs are valid for five years from publication date. This document is a **proxy EPD submission**; validity dates will be confirmed once verified and registered.

Geographical Scope
New Zealand, with primary supply chain inputs from China and local processing in Auckland.

Manufacturer / EPD Owner
ACM Fabricators Ltd. (ACMF)
Auckland, New Zealand
Website: www.acmf.co.nz

General Information

ACMF is a New Zealand-based specialist in architectural façade solutions, designing, manufacturing and installing products that perform in some of the harshest local environments. Our product range includes aluminium balustrades, louvres, flashings, fire-rated joinery, aluminium composite panel (ACP) cladding systems and various others.

All products are engineered and fabricated to meet or exceed the requirements of the New Zealand Building Code, ensuring durability, safety, and long-term performance. With a focus on innovation and sustainability, ACMF works with architects, builders, and developers to deliver façade systems that combine compliance, aesthetics, and resilience.

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Products Covered by this EPD
This Environmental Product Declaration (EPD) covers the following aluminium-based construction products manufactured and supplied by ACM Fabricators Ltd (ACMF):

Aluminium Extrusions: Structural and architectural profiles manufactured from 6063-T6 and 6061-T6 aluminium alloy, including louvres, fins, and framing elements.

Aluminium Sheet Metal Products: Flat and formed sheet components, typically 5005 and 5052 alloys, used for cladding, flashings, and fabricated assemblies.

Aluminium Composite Panels (ACP Panels): Factory-bonded aluminium composite sheets used in façade and cladding applications.

Declared Unit
1 kg of finished product, delivered to the ACMF factory gate (cradle-to-gate, A1–A3), with additional modelling for transport to ACMF (A2), transport to site (A4), and optional stages as defined in Section 3.

Reference Service Life (RSL)
Not declared (ND). This EPD does not cover use stage performance; durability depends on application, coating systems, and maintenance regimes.

CEN Standard EN 15804 / ISO 14025
This document has been prepared in alignment with:

EN 15804:2012 + A2:2019 – Sustainability of construction works – Environmental product declarations – Core rules for construction products

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

PCR (Product Category Rules)
PCR: Construction Products and Construction Services (EPD International, EN 15804 aligned).

Status of this Document
This is a **proxy EPD submission** prepared by ACMF based on available supplier data, internal calculations, and secondary databases. It has not yet been independently verified. Verification and registration with EPD Australasia are pending.

Intended Audience
Architects, engineers, contractors, developers, and other stakeholders in the building and construction sector seeking preliminary environmental information for ACMF aluminium products.

Comparability Disclaimer
EPDs of construction products may not be comparable if they do not comply with EN 15804. Results are only comparable when based on the same PCR, system boundaries, and datasets.

2 Product Information

2.1 Product Description

This EPD covers aluminium-based façade and cladding products manufactured and supplied by **ACM Fabricators Ltd (ACMF)** in Auckland, New Zealand.

The scope includes:

- **Aluminium Extrusions** – custom and proprietary extruded profiles manufactured from 6063-T6 and 6061-T6 alloy, used in balustrades, louvres, fins, framing, and other façade systems.
- **Aluminium Sheet Metal Products** – flat and formed sheet products, typically fabricated from 5005 and 5052 alloy aluminium, used for cladding panels, flashings, and fabricated assemblies.
- **Alucolux Solid Aluminium Panels** – coil-coated solid aluminium panels, typically 3 mm thick, used for large-format façade and soffit cladding.
- **Alucobond Aluminium Composite Panels (ACP)** – composite cladding panels consisting of two 0.5 mm aluminium skins bonded to a 3 mm mineral or polyethylene core (total thickness 4 mm).

2.2 Application and Use

These products are primarily used as façade and cladding elements in commercial, residential, and institutional buildings, as well as for soffits, signage, and architectural finishes.

2.3 Technical Data

- Aluminium Extrusions:
  - Alloy: 6063-T6 and 6061-T6
  - Density: ~2.70 g/cm^3
  - Surface finish: Powder coated (Dulux Duratec) or anodised
  - Typical use: framing, balustrades, fins, louvres

- Aluminium Sheet Products:
  - Alloys: 5005-H34 and 5052-H32
  - Typical thickness: 1.2mm to 3 mm
  - Surface finish: Powder coated or anodised
  - Typical use: flashings, fabricated panels, cladding features
- Alucolux Solid Aluminium Panels:
  - Solid aluminium sheet, coil-coated
  - Thickness: 3 mm
  - Density: ~2.70 g/cm^3
  - Typical use: façade cladding, soffits, curved or flat architectural panels
- Alucobond Aluminium Composite Panels (ACP):
  - Two aluminium skins (0.5 mm each) bonded to a 3 mm core
  - Total thickness: 4 mm
  - Core: fire-retardant mineral-filled (FR) on project specification
  - Surface finish: coil-coated aluminium
  - Density: ~1.5–1.8 g/cm^3 (panel level)
  - Typical use: façade cladding, soffits, curved or flat architectural panels, signage

2.4 Standards and Regulations Applied

- **AS/NZS 1734** – Aluminium and aluminium alloys – Flat sheet, coiled sheet and plate
- **AS/NZS 1866** – Aluminium and aluminium alloys – Extruded rod, bar, solid and hollow shapes
- **AS/NZS 4284** – Testing of building façades
- **AS/NZS 1170** – Structural design actions
- **NZ Building Code (NZBC)** – relevant clauses for durability, fire performance, and structural loading

2.5 Manufacturing Location

All products are fabricated and assembled at **ACM Fabricators Ltd (ACMF)** in Auckland, New Zealand.

- **Aluminium extrusions** are sourced from an ISO-certified supplier in China. All extrusion suppliers hold ISO 9001 (quality management), ISO 14001 (environmental management), ISO 45001 (occupational health and safety) and IATF 16949:2016 certifications.

(Extrusion Supplier details are withheld for commercial confidentiality but will be disclosed confidentially to verifiers and programme operators.)

- **Aluminium sheet products** are supplied through **INEX Metals Ltd (NZ)**, sourced from Chinese mills.
- **Alucolux solid aluminium panels** and **Alucobond ACP panels** are imported directly from China / India manufacturers.
- **Powder coating** is performed locally by certified applicators using **Dulux Duratec** powders.
- **Sealants**: Sika polyurethane (PU) and silane modified polymer (SMP) façade sealants supplied locally and imported from Switzerland
- Fixings and fasteners are sourced from ANZOR Stainless Steel (NZ), sources from Taiwan Mills.

2.6 Reference Service Life (RSL)

No specific RSL is declared in this EPD. Aluminium products typically achieve **50+ years service life** in façade applications, depending on coating type, installation quality, and maintenance.

2.7 Packaging

Products are packaged for transport using:

- Polyethylene (PE) film wrapping
- Timber pallets
- PET strapping

Quantitative packaging ratios are modelled in Inventory Section 5.2.

3 LCA Information

3.1 Declared Unit

The declared unit is:

1 kg of finished aluminium product (extrusion, sheet, or ACP panel), delivered to the factory gate (A1–A3).

Additional stages are modelled as follows:

- **A2:** Transport from supplier to ACMF (China truck leg + sea freight + NZ domestic transport to ACMF).
- **A3:** Fabrication at ACMF, including electricity, LPG, diesel (factory/yard), powder coating (material and curing), ancillary materials (sealant, fixings), and packaging.
- **A4:** Transport of finished products from ACMF to construction sites (company trucks, fuel-based allocation).
- Other life cycle stages (B–C–D): Not declared in this EPD.

3.2 System Boundaries

The system boundary follows **cradle-to-gate with options**, in line with EN 15804:2012 + A2:2019.

3.2.1 A1 (Raw material supply):

- Primary aluminium production (extrusions and sheets from China)
- ACP panel production (Alucobond FR, Alucolux solid panels, imported finished products)
- Ancillary materials: stainless steel fasteners (NZ), sealants (Sika), powder coating (Dulux Duratec)
- Packaging materials (PE film, PET strapping, timber pallets)

3.2.2 A2 (Transport to manufacturer):

- Truck transport from extrusion/sheet plant to port of export (China)
- Sea freight from China to Port of Auckland
- Truck transport from Port of Auckland or INEX warehouse to ACMF

3.2.3 A3 (Manufacturing at ACMF):

- Fabrication processes (cutting, forming, assembly)
- Powder coating by local applicators (Duratec range, including overspray and gas curing energy)
- Electricity and LPG for factory operations
- Diesel for internal yard operations (excluding delivery to site)
- Packaging for dispatch

3.2.4 A4 (Transport to construction site):

- Company truck diesel fuel consumption for delivery of finished products to construction sites
- Allocation based on annual diesel consumption and delivered tonnage

3.2.5 A5, B1–B7, C1–C4, D

- Not declared.

3.3 Cut-Off Rules

Processes contributing less than **1% of total mass or energy flow** were excluded if data was unavailable and if they were expected to have negligible influence on the results. The total neglected input flows do not exceed **5% of impacts for any environmental indicator**.

3.4 Allocation Rules

- Multi-product processes (e.g., energy consumption shared across extrusion, sheet, and ACP) were allocated based on **annual production mass**.
- Powder coating overspray was modelled at **80% transfer efficiency**, with additional powder consumption included accordingly.
- Truck diesel fuel was allocated between A3 (coating shuttle) and A4 (site delivery). Based on operational experience, a 40% / 60% split was applied for powder-coated products. ACP products were excluded as they are supplied pre-finished.
- No allocation of recycling credits has been applied in this proxy EPD (Module D not declared).

3.5 Data Quality

3.5.1 Primary data:

- ACMF factory energy use (electricity, LPG, diesel)
- Annual production mass per product stream (extrusions, sheet, ACP)
- Packaging usage (PE, PET, timber)
- Powder coating volumes and curing energy demand

3.5.2 Secondary data:

- Aluminium extrusion and sheet production: modelled using ecoinvent/GaBi proxy datasets combined with supplier-specific EPDs and technical datasheets from ISO-certified Chinese extrusion suppliers and New Zealand distributors (INEX Metals).
- ACP panels (Alucobond FR, Alucolux): supplier technical data and proxy LCA values
- Powder coating: Dulux Duratec EPD (proxy values used in draft)
- Sealants: Sika product LCIs
- Fasteners: ANZOR stainless steel data

Data is representative of the 2024–2025 reporting period.

3.6 Period Under Review

Data collection covers the period **August 2024 – September 2025**, representing a full year of ACMF's operations.

3.7 Comparability

According to EN 15804, EPDs of construction products may not be comparable if they do not comply with EN 15804 and/or are not based on the same Product Category Rules (PCR).

4 System Boundary Description

4.1 System Boundary Overview

This EPD follows a **cradle-to-gate with options** approach, in line with EN 15804:2012 + A2:2019. The included modules are:

- **A1:** Raw material supply
- **A2:** Transport to manufacturer
- **A3:** Manufacturing and finishing at ACMF
- **A4:** Transport of finished products to construction site

Other life cycle modules (A5, B1–B7, C1–C4, D) are **not declared (ND)** in this EPD.

4.2 Module Descriptions

4.2.1 A1 – Raw Material Supply

- Aluminium billets and extrusions (6063-T6 alloy, imported from China)
- Aluminium sheets (5005, 5052 alloys, sourced via INEX Metals Ltd from China)
- ACP panels:
    - Alucolux (solid aluminium, 3 mm)
    - Alucobond FR (4 mm ACP: 0.5 mm skins + 3 mm fire-retardant mineral core)
- Ancillary materials:
    - Stainless steel fasteners (ANZOR)
    - Sealants (Sika)
    - Powder coating materials (Dulux Duratec)
- Packaging materials: polyethylene (PE) film, PET strapping, timber pallets

4.2.2 A2 – Transport to Manufacturer

- Truck transport from aluminium producers to port of export (China)
- Sea freight from China to Port of Auckland
- Truck transport from Port of Auckland or INEX warehouse to ACMF factory (Auckland, NZ)

4.2.3 A3 – Manufacturing at ACMF

- Fabrication processes: cutting, forming, assembly
- Powder coating: including overspray and curing energy
- Energy consumption: electricity (NZ grid), LPG, diesel (yard operations, coater shuttle)
- Ancillary inputs (sealant use, fasteners, packaging for dispatch)

4.2.4 A4 – Transport to Site

- Transport of finished products from ACMF factory to construction sites
- Modelled using ACMF's truck diesel consumption allocated across annual delivered mass

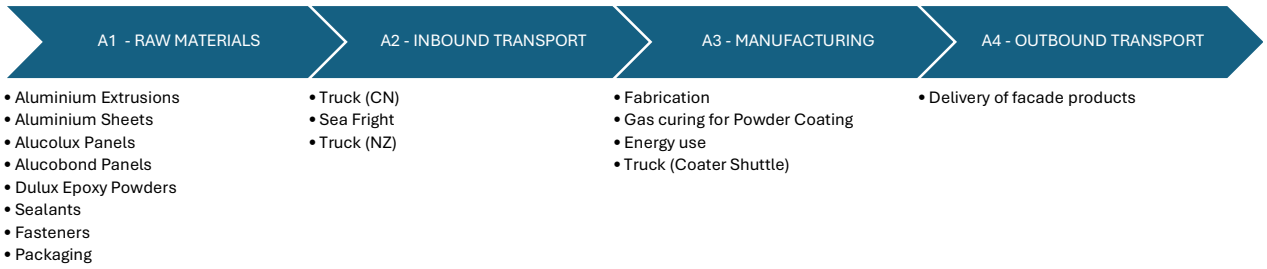

Figure 1: Summary of included life cycle modules (A1–A4) and key processes

4.2.5 Not Declared (ND)

- A5 (Installation at site): not included
- B1–B7 (Use stage): not included
- C1–C4 (End of life): not included
- D (Benefits beyond system boundary): not included

4.3 System Boundary Diagram

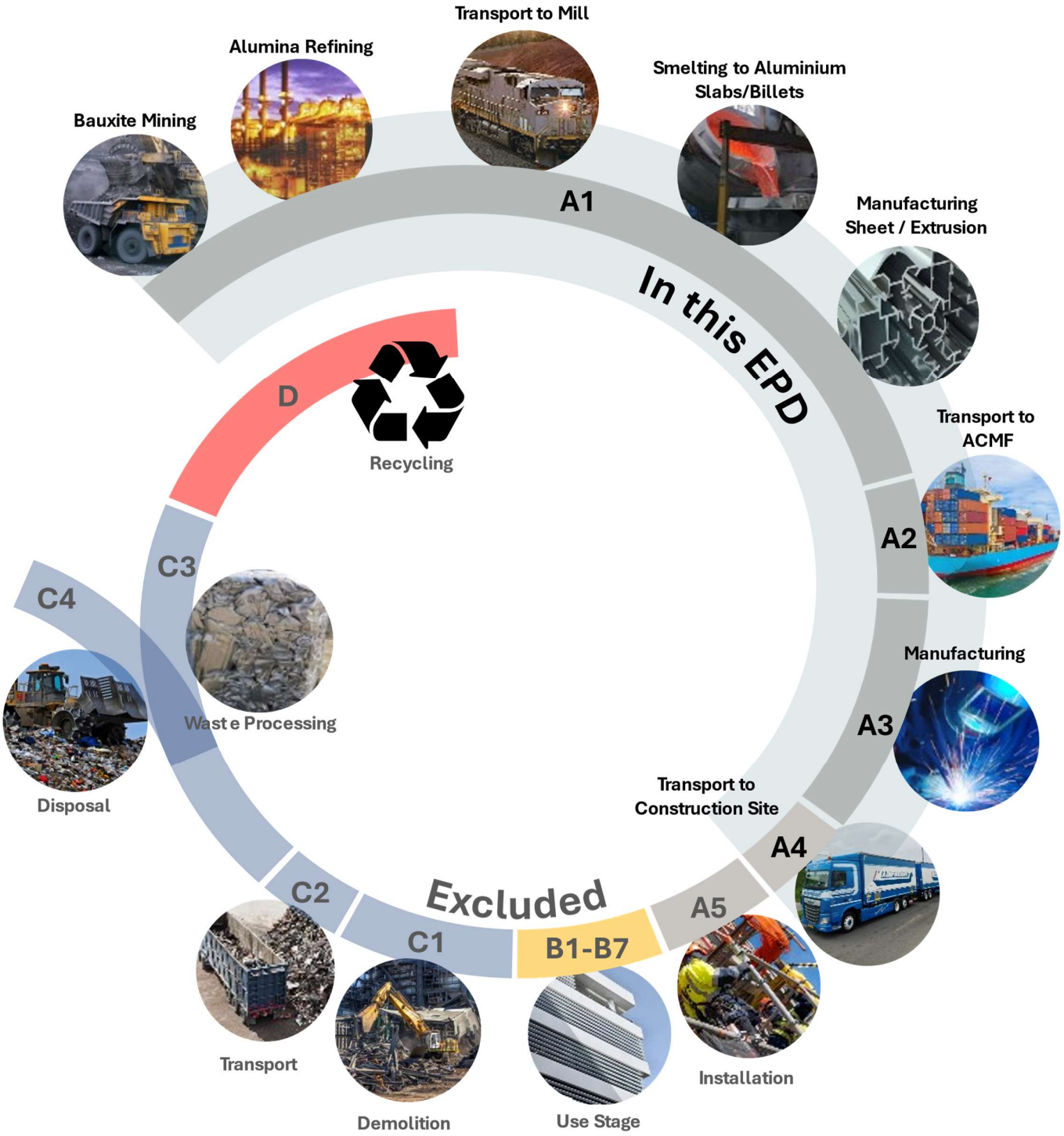

Figure 2: System boundary illustration for this EPD, showing the life cycle stages A1–A4 covered in this study, as well as excluded stages (B1–B7, C1–C4, D).

5 Inventory Data

5.1 Declared unit and reference flow

- **Declared unit:** 1 kg of finished product (Extrusion / Sheet / Alucolux / Alucobond FR) at ACMF factory gate.
- **Reference flow:** Per-kg inventory values below (mass, energy, transport, packaging).

- **Temporal coverage:** 2024 (12-month rolling data).
- **Geography:** New Zealand (manufacturing) with international supply chains (primarily China).
- **Waste:** Aluminium fabrication scrap (15% of input mass, recycled off-site)

5.2 Material inputs & Packaging — A1 (per 1 kg product)

Table 1: Material inputs & Packaging data (A1)

Flow	Unit	Extrusions	Sheet	Alucolux 3mm	Alucobond FR 4mm	Notes
Aluminium extrusion	kg/kg	0.8837	0.0000	0.0000	0.0000	Mass of extrusions per declared unit
Aluminium sheet	kg/kg	0.0000	0.8978	0.0000	0.0000	Mass of sheet per declared unit
ACP - Alucolux	kg/kg	0.0000	0.0000	0.9140	0.0000	Mass of Alucolux per declared unit
ACP - Alucobond	kg/kg	0.0000	0.0000	0.0000	0.9145	Mass of Alucobond per declared unit
Stainless steel fasteners	kg/kg	0.0430	0.0437	0.0445	0.0445	Mass of fixings per declared unit
Sealant	kg/kg	0.0000	0.0035	0.0228	0.0222	Mass of sealant per declared unit
Dulux Epoxy Powder	kg/kg	0.0552	0.0366	0.0000	0.0000	Mass of Powder Coating per declared unit
PE film packaging	kg/kg	0.0022	0.0022	0.0023	0.0023	From packaging ratios
Timber pallet packaging	kg/kg	0.0159	0.0162	0.0165	0.0165	From packaging ratios
PET strapping packaging	kg/kg	0.0000	0.0000	0.0000	0.0000	From packaging ratios

5.3 Inbound transport — A2 (per 1 kg product)

Table 2: Inbound Transport data (A2)

Flow	Unit	Extrusions	Sheet	Alucolux 3mm	Alucobond FR 4mm	Notes
Truck transport	tkm/kg	0.0418	0.1279	0.0527	0.0276	Truck tonne-km per kg product
Sea freight	tkm/kg	1.5875	4.8618	2.0033	1.0474	Sea tonne-km per kg product

5.4 Energy and auxiliaries — A3 (per 1 kg product)

Table 3: Energy and Auxiliaries (A3)

Flow	Unit	Extrusions	Sheet	Alucolux 3mm	Alucobond FR 4mm	Notes
Gas Curing for PC	kWh/kg	0.1545	0.1025	0.0000	0.0000	Gas Curing per declared unit
Electricity	kWh/kg	0.3682	0.3741	0.3808	0.3811	Electricity allocation per kg product
LPG	kWh/kg	0.1182	0.1201	0.1223	0.1223	LPG allocation per kg product
Diesel - Coater Shuttle	kWh/kg	1.2744	1.2684	0.0000	0.0000	Diesel allocation per kg product

5.5 Outbound transport — A4 (per 1 kg product)

Table 4: Outbound transport data (A4)

Flow	Unit	Extrusions	Sheet	Alucolux 3mm	Alucobond FR 4mm	Notes
Diesel - Site Delivery	kWh/kg	1.2778	1.2982	1.3216	1.3224	Diesel allocation per kg product

5.6 Ancillary assumptions (document here)

- Powder coating transfer efficiency (TE): 80 %
    - Overspray included at 25 % extra powder consumption.
- Curing energy basis:
    - 2.8 kWh/m^2 (gas curing ovens, LPG equivalent)
    - Panel surface assumed: 1.2 m^2/kg (for extrusions converted to surface equivalent)
    - ≈ 3.4 kWh/kg product coated
- Electricity market data:
    - New Zealand grid mix (2024 average, MfE factor ~0.097 kg CO_2e/kWh)

- NZECS not applied (purchased from grid, no renewable certificates claimed).

- Diesel scope:
  - A3: included for coater shuttel (company trucks)
  - A4: included for site delivery (company trucks)
  - Commuting excluded (staff travel not part of LCA).

Diesel use has been split between A3 (coater shuttle) and A4 (site delivery) at a ratio of 40% / 60%. This allocation applies only to powder-coated products (extrusions and aluminium sheet). ACP panels are not coated and therefore have no shuttle diesel allocation.

- Sheet origin:
  - Imported from China (A2 includes Chinese truck transport + sea freight ~9,500 km + NZ truck ~250 km)
  - No domestic aluminium sheet production included.
- ACP variants in scope:
  - Alucolux (solid aluminium, 3 mm, coil-coated)
  - Alucobond FR (4 mm, 0.5/3/0.5, mineral-filled core only)
  - No PE cores included (excluded as combustible, not used by ACMF).

5.7 Data sources and representativeness

- Primary data: ACMF metered electricity/LPG/diesel, coating volumes & curing energy, packaging weights, annual production per product.
- Secondary data / proxies: Aluminium (extrusions/sheet) datasets, Alucobond FR & Alucolux supplier data, Dulux Duratec powder EPD, Sika sealant models, SS316 average.
- Cut-off: < 5 % of mass/energy; no single flow > 1 % omitted.

6 Environmental Indicators (Results)

Declared unit: 1 kg finished product
Indicators: EN 15804 (A2:2019) — GWP, AP, EP, POCP, ADPf, ADPe, ODP, PERT, PENRT
System boundary: Cradle-to-gate with options (current totals reflect A1–A3 plus A2 as modelled in the inventory; A4 reported separately)

6.1 A1 to A3 - Aluminium Extrusions (per 1 kg product)

Table 5: A1 to A3 Indicators for Aluminium Extrusions

Indicator	Unit	Extrusions (per kg)
GWP	**kg CO2e**	9.454
AP	**kg SO2e**	1.971E-02
EP	**kg PO4e**	2.097E-03
POCP	**kg C2H4e**	5.401E-04
ADPf	**MJ**	136.035
ADPe	**kg Sb eq**	7.398E-04
ODP	**kg CFC-11 eq**	4.921E-07
PERT	**MJ**	14.217
PENRT	**MJ**	135.791

6.2 A1 to A3 - Aluminium Sheet (per 1 kg product)

Table 6: A1 to A3 Indicators for Aluminium Sheets

Indicator	Unit	Alu Sheet (per kg)
GWP	**kg CO2e**	10.431
AP	**kg SO2e**	2.448E-02
EP	**kg PO4e**	2.635E-03
POCP	**kg C2H4e**	6.386E-04
ADPf	**MJ**	155.838
ADPe	**kg Sb eq**	9.331E-04
ODP	**kg CFC-11 eq**	6.217E-07
PERT	**MJ**	17.143
PENRT	**MJ**	155.663

6.3 A1 to A3 - 3mm Alucolux (per 1 kg product)

Table 7: A1 to A3 Indicators for 3mm Solid Alucolux

Indicator	Unit	Alucolux (per kg)
GWP	**kg CO2e**	10.326
AP	**kg SO2e**	2.413E-02
EP	**kg PO4e**	2.504E-03
POCP	**kg C2H4e**	6.044E-04
ADPf	**MJ**	157.167
ADPe	**kg Sb eq**	9.560E-04
ODP	**kg CFC-11 eq**	6.020E-07
PERT	**MJ**	18.120
PENRT	**MJ**	156.215

6.4 A1 to A3 – 4mm Alucobond FR (per 1 kg product)

Table 8: A1 to A3 Indicators for 4mm Alucobond FR

Indicator	Unit	Alucobond (per kg)
GWP	**kg CO2e**	3.111
AP	**kg SO2e**	3.922E-03
EP	**kg PO4e**	4.915E-04
POCP	**kg C2H4e**	2.338E-04
ADPf	**MJ**	54.459
ADPe	**kg Sb eq**	3.916E-05
ODP	**kg CFC-11 eq**	9.740E-08
PERT	**MJ**	2.287
PENRT	**MJ**	52.867

6.5 A4 - Diesel per 1 kg product (Delivery of Façade Products)

Table 9: A4 Indicators for Delivery of Facade Products

Product	Diesel (kWh/kg)	GWP (kg CO2e)	AP (kg SO2e)	EP (kg PO4e)	POCP (kg C2H4e)	ADPf (MJ)	ADPe (kg Sb eq)	ODP (kg CFC-11 eq)	PERT (MJ)	PENRT (MJ)
Extrusions	**1.27781**	0.3361	5.878E-04	8.689E-05	7.284E-05	4.6001	1.406E-07	1.406E-09	0.0141	4.5873
Alu Sheet	**1.29821**	0.3414	5.972E-04	8.828E-05	7.400E-05	4.6736	1.428E-07	1.428E-09	0.0143	4.6606
Alucolux	**1.32162**	0.3476	6.079E-04	8.987E-05	7.533E-05	4.7578	1.454E-07	1.454E-09	0.0145	4.7446
Alucobond	**1.32239**	0.3478	6.083E-04	8.992E-05	7.538E-05	4.7606	1.455E-07	1.455E-09	0.0145	4.7474

7 Additional Environmental Information

7.1 Recyclability and End-of-Life

- Aluminium Extrusions & Sheet Products:
  - 100% recyclable at end-of-life.
  - Recycling of aluminium requires only ~5% of the energy compared to primary production.
  - Fabrication scrap generated during ACMF processing (approx. 15% of aluminium input mass) is segregated and sent for closed-loop recycling into the aluminium market.
- Alucolux (Solid Aluminium Panels):
  - Fully recyclable as aluminium scrap after service life.
  - Coatings are removed or treated during smelting with minimal impact on recyclability.
- Alucobond FR (ACP Panels):
  - Panels consist of two aluminium skins bonded to a fire-retardant mineral-filled core.
  - Aluminium skins can be mechanically separated and recycled.
  - The mineral core is typically disposed of as inert landfill, though emerging recycling technologies may provide future recovery options.

7.2 Waste Categories and Output Flows (A1–A3)

- Metal scrap: ~15% of aluminium input becomes fabrication offcuts. All collected scrap is recycled into the aluminium value chain.
- Hazardous waste: negligible, limited to powder coating overspray that cannot be reclaimed.
- Non-hazardous waste:
  - Timber pallets (reused multiple times; damaged pallets recycled or disposed).
  - PET strapping and PE film (disposed as general waste; recyclable where facilities exist).
- Packaging waste: modelled in A3.

7.3 Packaging and Circularity

- Products are packaged using polyethylene (PE) film, PET strapping, and timber pallets.
- Timber pallets are reused internally or returned to suppliers where possible.
- Plastic packaging is technically recyclable, though collection depends on contractor facilities.

7.4 Indoor Environment and Health

- Powder-coated aluminium products (Dulux Duratec) comply with low-VOC requirements and do not release harmful emissions in service.
- Sealants (Sika) are low-VOC and compliant with international green building rating schemes (LEED, BREEAM, Green Star).
- No asbestos, formaldehyde, or substances of very high concern (SVHCs) are present in ACMF products.

7.5 Durability and Service Life

- Aluminium products typically achieve 50+ years service life in façade applications, subject to appropriate coating and maintenance.
- Powder coatings (Dulux Duratec) are warranted for up to 25 years colour retention and 20 years gloss retention depending on exposure zone.
- Alucobond FR and Alucolux panels are designed for long-term façade performance (>30 years).

7.6 Environmental Management at ACMF

- ACMF operates a Quality and Environmental Management System aligned with ISO 9001 and ISO 14001 principles.
- Annual tracking of electricity, LPG, and diesel consumption supports ongoing efficiency improvements.

- Waste segregation and recycling programmes are in place for aluminium scrap, packaging, and pallets.

8 Interpretation of Results

8.1 Aluminium Extrusions

- A1 (Raw material) dominates across all indicators, contributing 92–99% of impacts.
- A2 (Transport) is minimal (<1% for most categories, slightly higher for EP at 2.2%).
- A3 (Manufacturing) adds around 1% across indicators, linked to electricity and coating.
- A4 (Site delivery) is visible for GWP (6.7%) and especially POCP (15%), reflecting diesel combustion.

Table 10: Life Cycle Inventory Data – Aluminium Extrusions (per 1 kg declared unit)

Extrusions	% GWP (kg CO2e)	% AP (kg SO2e)	% EP (kg PO4e)	% POCP (kg C2H4e)	% ADPf (MJ)	% ADPe (kg Sb eq)	% ODP (kg CFC-11 eq)	% PERT (MJ)	% PENRT (MJ)	Average
A1	**92.12%**	93.92%	89.18%	82.25%	94.30%	**99.55%**	**93.76%**	97.28%	94.32%	92.96%
A2	**0.20%**	0.79%	2.22%	1.36%	0.50%	**0.23%**	**3.39%**	0.24%	0.50%	1.05%
A3	**1.00%**	0.82%	1.70%	1.38%	0.85%	**0.07%**	**1.02%**	1.49%	0.82%	1.02%
A4	**6.69%**	4.47%	6.90%	15.00%	4.36%	**0.16%**	**1.83%**	0.99%	4.36%	4.97%

Conclusion: Aluminium extrusions are highly material-intensive, with impacts concentrated in A1, but delivery fuel (A4) is an important secondary hotspot for photochemical smog.

8.2 Aluminium Sheet

- A1 remains dominant (88–94% across most indicators).
- A2 shows slightly higher shares than extrusions, especially for EP (5.5%) and ODP (8.2%).
- A3 is low (≤1.4%).
- A4 accounts for ~6% of GWP, 13% of POCP, and 3–6% across other categories.

Table 11: Life Cycle Inventory Data – Aluminium Sheets (per 1 kg declared unit)

Alu Sheet	% GWP (kg CO2e)	% AP (kg SO2e)	% EP (kg PO4e)	% POCP (kg C2H4e)	% ADPf (MJ)	% ADPe (kg Sb eq)	% ODP (kg CFC-11 eq)	% PERT (MJ)	% PENRT (MJ)	Average
A1	**92.53%**	93.73%	87.62%	82.18%	94.09%	**99.28%**	**89.56%**	97.35%	94.11%	92.27%
A2	**0.55%**	1.96%	5.45%	3.59%	1.33%	**0.55%**	**8.21%**	0.60%	1.33%	2.62%
A3	**0.81%**	0.66%	1.36%	1.17%	0.72%	**0.05%**	**0.78%**	1.22%	0.70%	0.83%
A4	**6.11%**	3.65%	5.57%	13.05%	3.86%	**0.12%**	**1.45%**	0.82%	3.86%	4.28%

Conclusion: Aluminium sheet has a very similar profile to extrusions, but with slightly greater A2 and A4 shares due to heavier transport and packaging intensity.

8.3 Alucolux 3 mm (Solid Panel)

- A1 dominates even more strongly (96% GWP; >95% for most indicators).
- A2 and A3 remain small contributors (<3%).
- A4 is slightly lower than extrusions and sheet, at 3–11%, but contributes meaningfully to POCP (11%).

Table 12: Life Cycle Inventory Data – Alucolux 3mm (per 1 kg declared unit)

Alucolux	% GWP (kg CO2e)	% AP (kg SO2e)	% EP (kg PO4e)	% POCP (kg C2H4e)	% ADPf (MJ)	% ADPe (kg Sb eq)	% ODP (kg CFC-11 eq)	% PERT (MJ)	% PENRT (MJ)	Average
A1	**95.91%**	96.07%	92.79%	86.17%	95.85%	**99.72%**	**95.53%**	98.57%	95.86%	95.16%
A2	**0.23%**	0.82%	2.36%	1.55%	0.54%	**0.22%**	**3.49%**	0.24%	0.55%	1.11%
A3	**0.61%**	0.65%	1.39%	1.19%	0.66%	**0.05%**	**0.73%**	1.12%	0.64%	0.78%
A4	**3.26%**	2.46%	3.46%	11.08%	2.94%	**0.02%**	**0.24%**	0.08%	2.95%	2.94%

Conclusion: Alucolux's environmental profile is very similar to aluminium sheet, but with higher concentration in A1 due to solid aluminium content, making upstream aluminium sourcing the clear hotspot.

8.4 Alucobond FR 4 mm (ACP)

- A1 is still dominant but lower relative share than solid aluminium: 73–88% depending on indicator.
- A2 contributions increase, especially EP (5.5%) and ODP (11%), reflecting more complex logistics.
- A3 is higher than other products (6% EP; 9% PERT) due to multi-material processing.
- A4 plays a much larger role here, contributing 10% GWP, 13% AP, and up to 24% POCP.

Table 13: Life Cycle Inventory Data – Alucobond FR (per 1 kg declared unit)

Alucolux	% GWP (kg CO2e)	% AP (kg SO2e)	% EP (kg PO4e)	% POCP (kg C2H4e)	% ADPf (MJ)	% ADPe (kg Sb eq)	% ODP (kg CFC-11 eq)	% PERT (MJ)	% PENRT (MJ)	Average
A1	**95.91%**	96.07%	92.79%	86.17%	95.85%	**99.72%**	**95.53%**	98.57%	95.86%	95.16%
A2	**0.23%**	0.82%	2.36%	1.55%	0.54%	**0.22%**	**3.49%**	0.24%	0.55%	1.11%
A3	**0.61%**	0.65%	1.39%	1.19%	0.66%	**0.05%**	**0.73%**	1.12%	0.64%	0.78%
A4	**3.26%**	2.46%	3.46%	11.08%	2.94%	**0.02%**	**0.24%**	0.08%	2.95%	2.94%

Conclusion: ACP has a more distributed impact profile — while A1 is still largest, A3 and A4 are proportionally more important than for solid aluminium products. This reflects the composite nature and logistics of ACP, with site delivery emerging as a major contributor to smog formation (POCP).

8.5 Overall Findings

- Across all products, A1 is the hotspot (>85% of impacts in most categories), confirming that aluminium production is the key driver.
- A2 (inbound transport) is consistently minor, but more relevant for ACP due to higher complexity.
- A3 is modest for extrusions, sheet, and Alucolux, but more significant for ACP.
- A4 (site delivery) consistently contributes 6–10% GWP and is particularly high for POCP (up to 24%), making it the main secondary hotspot.
- Recycling of fabrication scrap (≈15% of input mass) ensures significant recovery of aluminium, mitigating some upstream burdens though not directly credited here.

9 References

9.1 Standards and Core Methodology

- **EN 15804:2012+A2:2019** — Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- **ISO 14025:2006** — Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
- **ISO 14040:2006** — Environmental management – Life cycle assessment – Principles and framework.
- **ISO 14044:2006** — Environmental management – Life cycle assessment – Requirements and guidelines.

9.2 Product Category Rules (PCRs)

- PCR: *Construction products and services* (aligned with EN 15804 and the EPD Australasia Programme requirements).

Life Cycle Inventory (LCI) Datasets

- ecoinvent v3.9.1 (2022) — background data for aluminium, electricity, fuel, and transport processes.
- GaBi Professional Database (2022) — supplementary data for packaging, sealants, and logistics processes.

Supplier and Industry Data

- Dulux Powder & Industrial Coatings — Technical datasheets and Duratec product information (including coating warranty and durability performance).
- Sika (sealants) — Environmental and technical datasheets for façade sealant products.
- Anzor Fasteners — Material datasheets for stainless steel fasteners (Grade 316).
- Inex Metals Ltd. — Material specifications for aluminium sheet products (5005/5052 alloys).
- 3A Composites — Alucobond FR technical datasheets (fire-retardant ACP panels).
- Alucolux — Solid aluminium cladding panel datasheets (3 mm coil-coated aluminium).

Software Tools

- Microsoft Excel — customised LCA inventory and calculation model (developed for ACMF EPD).

- OpenLCA 1.11 — LCA modelling software (cross-checking inventory flows and impact characterisation).

10 Verification and Certification

Independent Verification of the Declaration and Data, according to ISO 14025 / EN 15804:

- Independent third-party verification: *Pending*
- Verification type: To be confirmed (external expected)

Name of Verifier

- To be appointed. This EPD has been prepared by ACMF Ltd using proxy datasets and supplier information, and will undergo independent third-party verification prior to formal registration.

Accreditation / Programme Operator

- Intended programme operator: EPD Australasia Limited (*www.epd-australasia.com*).

EPD Registration Number

- To be assigned upon approval by the programme operator.

Date of Issue / Validity

- Draft prepared: [09, 2025]
- Final validity: 5 years from official registration