

SPECIFIERS' GUIDE TO IAI'S CARBON FOOTPRINT METHODOLOGY

The International Aluminium Institute (IAI) has published *Carbon Footprint Methodology*¹, sector-specific guidance on a recommended method for calculating the product carbon footprint. This guidance is to ensure that declared carbon footprints reflect a 'real' and comprehensive footprint of products.

This guidance is based on:

- *ISO14067 Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification*
- *Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard*



This guidance is referenced by Aluminium Stewardship Initiative (ASI) and London Metal Exchange (LME) for the calculation of carbon footprint of aluminium.



¹IAI's Carbon Footprint Methodology: <https://international-aluminium.org/resource/carbon-footprint-methodology/>

CRADLE-TO-GATE SCOPE

The IAI specifies a cradle-to-gate approach, which assesses a product's carbon footprint from raw material extraction until it leaves the factory. Its 'Lego block' approach includes both direct and indirect emissions for the production process and inputs. Using primary aluminium ingot as an example, its cradle-to-gate carbon footprint is illustrated in Figure 1, covering Scope 1, Scope 2 and Scope 3 upstream of corporate greenhouse gas emissions (GHG) accounting².

IAI CRADLE-TO-GATE GUIDANCE

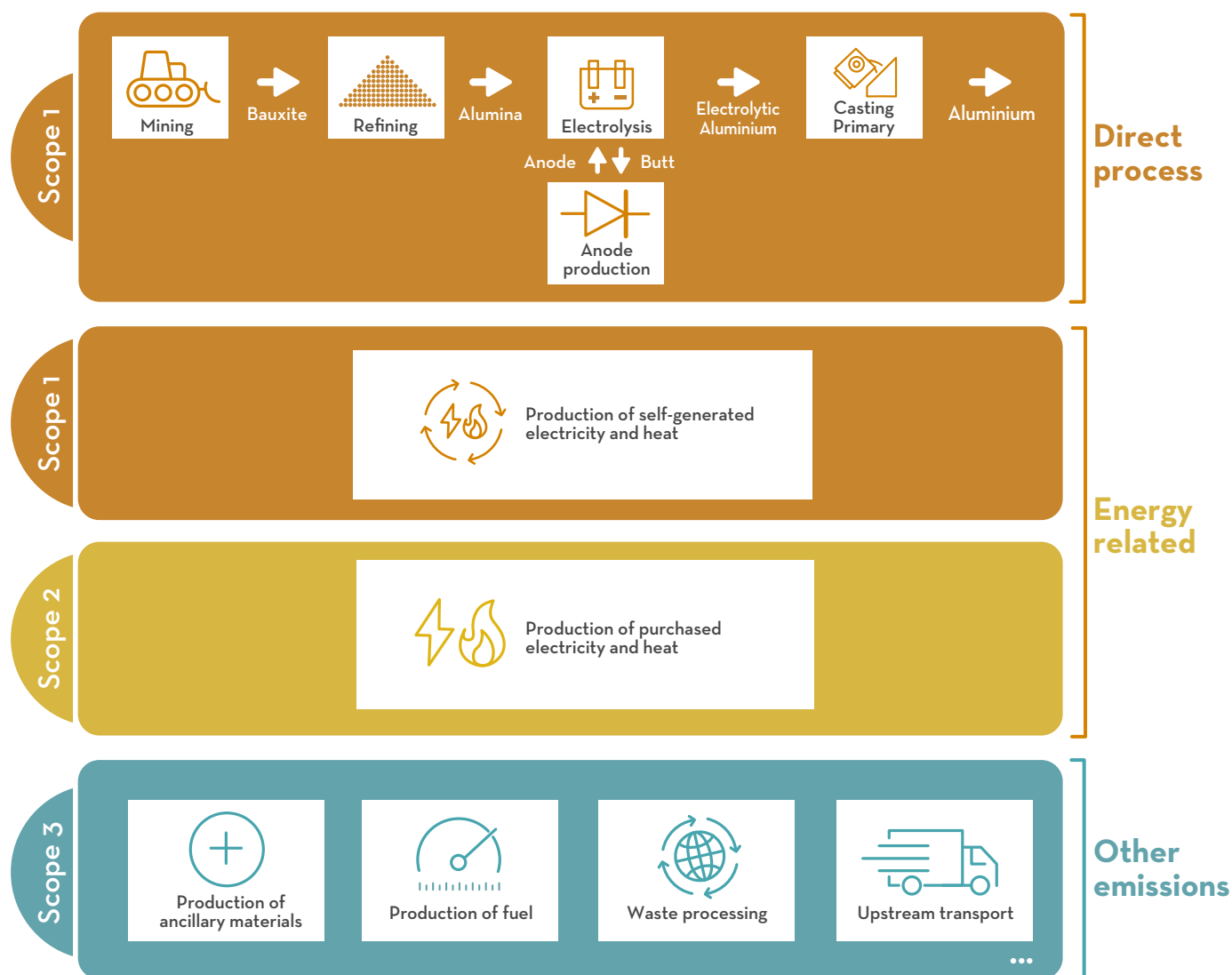


Figure 1. An example of an integrated production value chain, i.e. the direct operations at mine, refinery, smelter, casthouse and power plant of a company. For a company without integrated value chain, each block contained in Figure 1 remains essential in product carbon footprint calculation. However, each will be allocated into different scopes by following 'The GHG Protocol Corporate Accounting and Reporting Standard'.

²Broadly equivalent corporate accounting scopes are provided in Figure 1. It is important to note that product carbon footprints may not align precisely with corporate scopes.

COMPONENTS OF PRIMARY ALUMINIUM CARBON FOOTPRINT

The total carbon footprint of a product is made up of the GHG emissions from corresponding unit processes, as shown in Figure 1. The IAI 2019 LCI survey provides a good reference for the GHG emission intensity of each unit process (see Figure 2).

Unit process		Surveyed range (Unit: tCO ₂ e/t product)
	Mining	0.004 – 0.05
	Refining	0.6 – 2.4
	Anode production	0.9 – 3.8
	Electrolysis	1.9 – 23.6
	Casting (primary)	0.03 – 0.7

Figure 2. The GHG emission intensity from unit processes

According to the IAI, most of the cradle-to-gate carbon footprints for primary aluminium will fall in the range 4.5–22 tCO₂e/t primary aluminium. This range includes the following sources of emissions. Associated indicative ranges are shown in Figure 3.

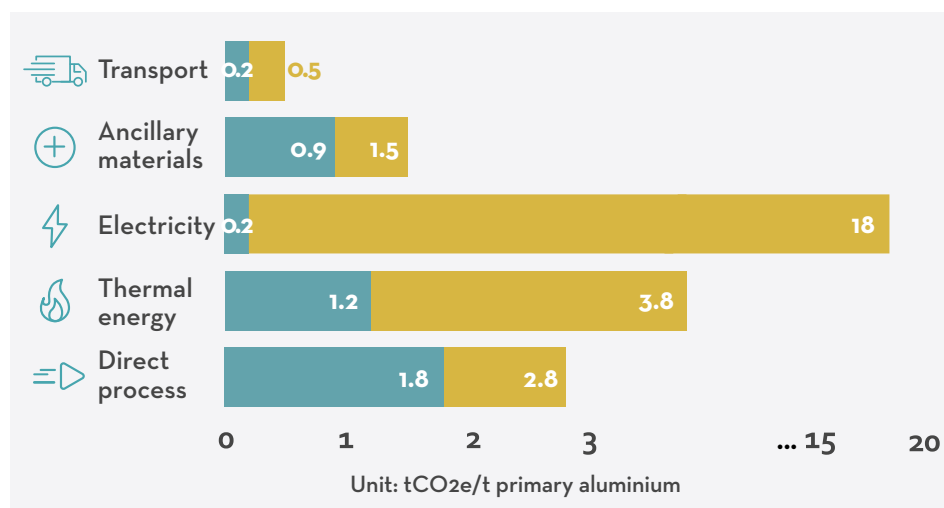


Figure 3. Typical range of emissions from various sources

On the IAI website³, you can view data on GHG emissions intensity for primary aluminium and GHG emissions for the aluminium sector.

As can be seen in Figure 3, the major source of variability is for electricity-related emissions. For indicative purposes, the typical range of cradle-to-gate carbon footprint of primary aluminium is shown in Figure 4.

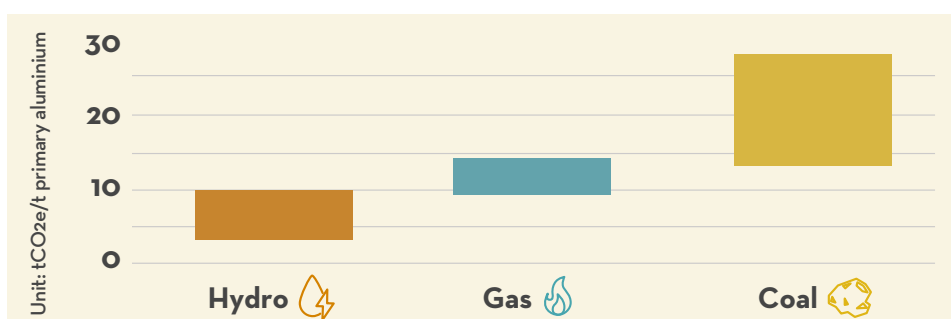


Figure 4. Indicative cradle-to-gate carbon footprint of primary aluminium from different electricity sources

³<https://international-aluminium.org/statistics/greenhouse-gas-emissions-intensity-primary-aluminium/>
<https://international-aluminium.org/statistics/greenhouse-gas-emissions-aluminium-sector/>

OTHER APPROACHES

At present (2023), a carbon footprint of 4 t CO₂e/t primary aluminium or less is considered the lowest achievable at commercial scale based on the best available performance for each unit process, and using carefully selected supply chains.

Inconsistent declarations

Some carbon footprints publicly declared may be inconsistent with IAI's Good Practice Guidance. Differences that warrant attention may include:

- Omitting emissions outside the facilities directly owned, i.e. disclose Scope 1 only.
- Overlooking emissions generated upstream of aluminium smelting.
- Inadequate accounting for Scope 3 emissions.



The IAI has also published material to assist suppliers in the estimation of Scope 3 emissions.⁴

Scrap

The footprint of metal may include aluminium scrap (pre-consumer and/or post-consumer) in the casting phase.

The IAI has additionally released transparency guidelines for recycled aluminium⁵. These guidelines detail that the LCA methodology used to account for aluminium scrap share is disclosed, as well as the share of pre-consumer scrap and post-consumer scrap.

Implementation by users of aluminium

When assessing the carbon footprint of aluminium supplies, it is recommended that data be requested in accordance with the IAI's Carbon Footprint Methodology.

It is also possible for a carbon footprint to be audited against this Guidance. **Within Annex C of the Guidance, useful check-lists** are provided for a few products. If comparisons are being made to other materials, the footprint of those materials should also be assessed under the same scope, i.e. cradle-to-gate as recommended by IAI guidance.

⁴IAI Scope 3 Calculation Tool & Guidance: <https://international-aluminium.org/resource/iai-scope3-calcuation-tool-and-guidance/>

⁵Guidelines on Transparency - Aluminium Scrap: <https://international-aluminium.org/resource/guidelines-on-transparency-aluminium-scrap/>