

Carbon Measurement Standards and Decarbonisation in the Aluminium Sector

World Trade Organization

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Director – Scenarios and Forecasts

Responsibilities at IAI: I'm responsible for IAI's material flow analysis, including the Alucycle visualisation and developing scenarios and forecasts for the industry. I also manage work related to aluminium recycling and greenhouse gas modelling.

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Agenda

- About the International Aluminium Institute (IAI)
- Industry Guidelines for Carbon Footprint Calculations
- Data Collection & Publication
- IAI Greenhouse Gas Pathways



International Aluminium Institute



Global association for aluminium metal producers

- Bauxite, alumina and aluminium
- Producers from all regions
- 50+ years



Data, Joint Projects, Guidelines, etc

- Industry material flow model
- Sustainability
- Promotion



GHG Emissions Reductions

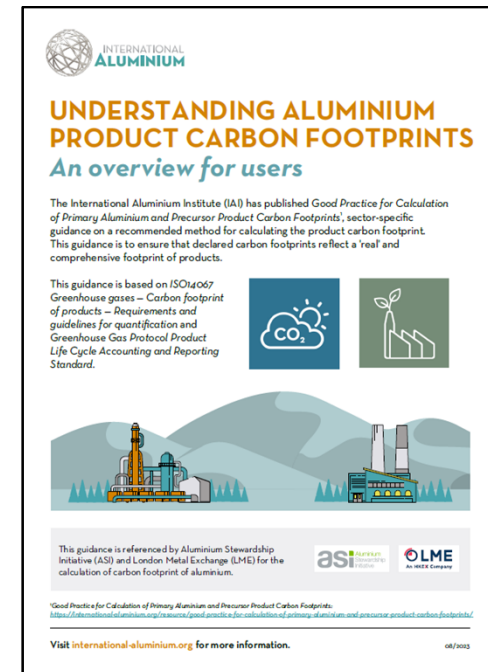
- GHG Pathways
- Carbon Footprint Guidance – Primary metal and upstream
- Transparency Guidelines – Secondary metal

Don't do:

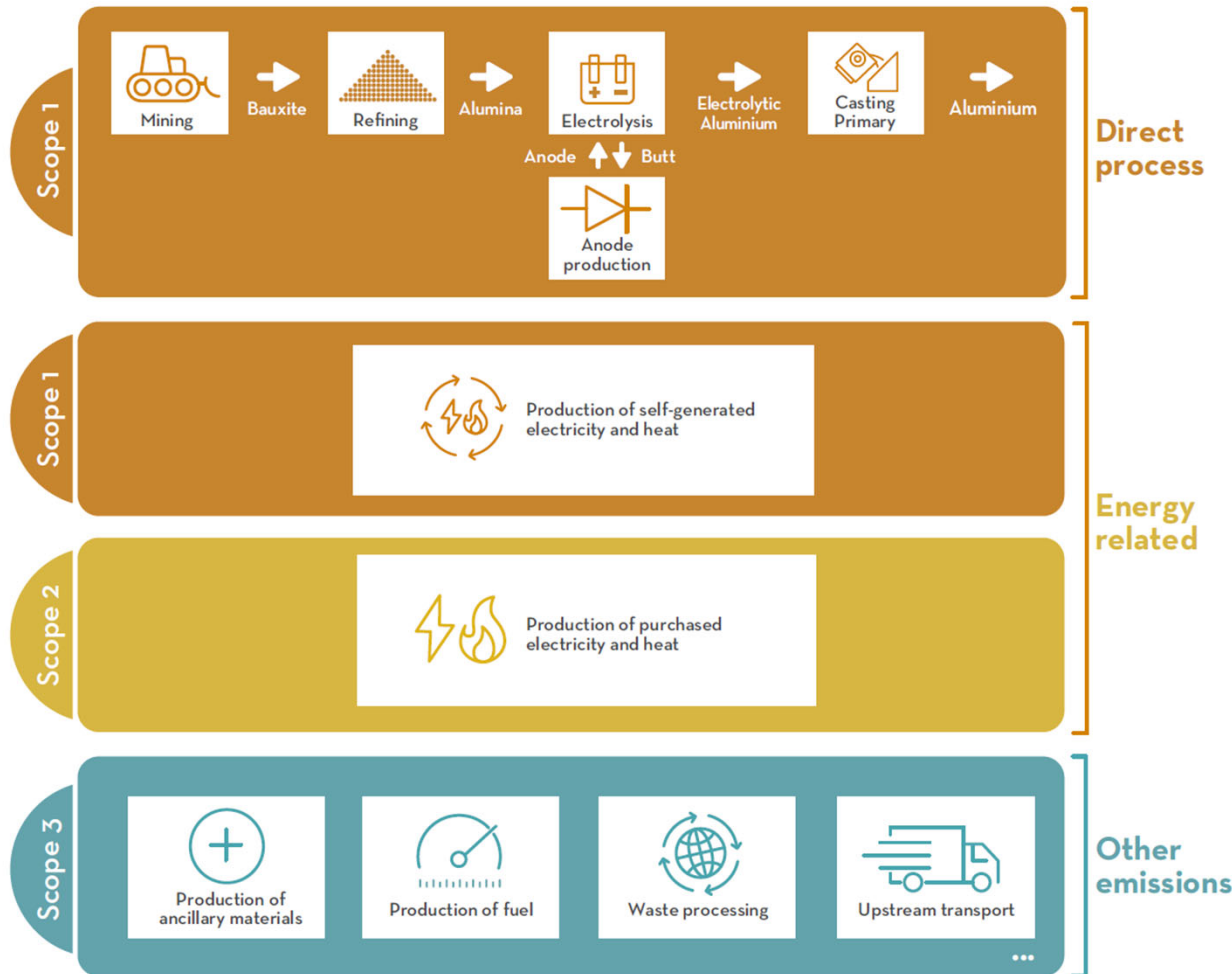
- Thresholds
- Criteria
- Green Al definition
- Low-carbon Al definition
- Audit
- Verification
- Commercially competitive issue between producers, including trade

IAI Product Carbon Footprint Guideline

- A **single method** for primary aluminium, alumina and bauxite – Al producers can report consistent, comparable, and transparent.
- Cradle-to-gate – scope 1, 2 and 3 (upstream)
- Referenced by Aluminium Stewardship Initiative (ASI) and London Metal Exchange (LME), Rocky Mountain Institute (RMI)
- <https://international-aluminium.org/resource/good-practice-for-calculation-of-primary-aluminium-and-precursor-product-carbon-footprints/>



IAI Product Carbon Footprint Guidelines



Applicable to a given mass of primary aluminium and precursor products (Bauxite, Alumina, Anodes, Electrolytic Aluminium):

- Direct emissions from process, inclusive of emissions from fuel combustion
 - [Scope 1](#)
- Emissions related to energy production
 - [Scope 1](#) for self-generated energy
 - [Scope 2](#) for purchased energy
 - Plus, [Scope 3 Category 3](#) fuel and energy-related activities (not included in Scope 1 and 2)
- Others
 - Scope 3, Category 1 (purchased goods), 4 (upstream transportation and distribution) and (5 – waste generated in operation)

Scope terminology – GHG Protocol Corporate Standard

IAI Product Carbon Footprint - Cradle-to-Gate - Checklist

Product Carbon Footprint - Cradle-to-Gate			Broadly equivalent corporate accounting "scope"	
Product	Emission Category	Emission source	Primary aluminium smelter	Alumina Refinery
Aluminium Hydroxide	Direct Process	Anode/Paste Production - self produced	1	1
		Anode/Paste Production - purchased	3	1
		Emissions from Anode/Paste consumption	1	1
		Perfluorocarbon emissions	1	1
		Stationary combustion in <u>casthouse</u>	1	3 (cat 3)
		Stationary combustion in auxiliary, <u>emergency</u> or pollution control equipment	1	2 & 3 (cat 3)
		combustion of fossil fuels for stationary and mobile equipment,	1	1 & 3 (cat 3)
	Energy Production	Fuel	3 (cat 3)	3 (cat 1)
		Electricity, steam, heat - purchased	2 & 3 (cat 3)	3 (cat 2)
		Electricity, steam, heat - self generated	1 & 3 (cat 3)	3 (cat 4)
	Others	Purchased goods and services	3 (cat 1)	3 (cat 5)
		Capital goods	3 (cat 2)	3 (cat 7)
		Upstream transportation and distribution of aluminium oxide	3 (cat 4)	3 (cat 8)
		Waste Generated in operations	3 (cat 5)	
		Employee commuting	3 (cat 7)	
		Upstream leased assets	3 (cat 8)	

IAI GHG Data Collection and Publishing

Period		Electricity – Indirect	Perfluorocarbon (PFC) – Direct	Process (CO ₂) – Direct	Ancillary Materials – Indirect	Thermal Energy – Direct/Indirect	Transport – Indirect	Total – Cradle to Gate
2021	tonnes of CO ₂ e per tonne of primary aluminium							
	Mining	0.01			<<0.01	0.04		0.04
	Refining	0.4			0.4	1.6	0.2	2.7
	Anode Production	0.04		0.1	0.7	0.1		0.9
	Electrolysis	10.3	0.8	1.5	0.1		0.2	12.9
	Casting	0.04			<<0.01	0.1		0.1
	Primary Aluminium	10.7	0.8	1.7	1.2	1.8	0.4	16.6

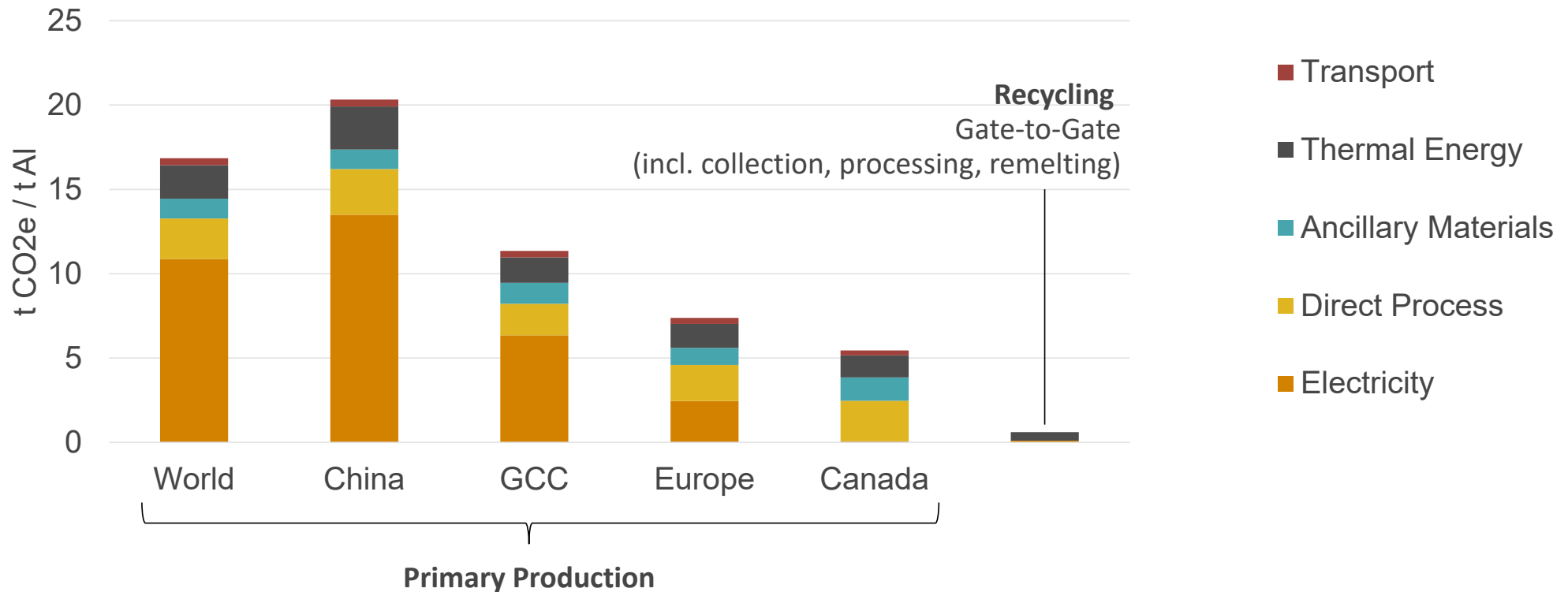
Data Collection

Annual

Every 2 years

Every 5 years

2019 Regional Cradle-to-Gate Scenarios



IAI LCI Report (IAI, 2022)

China: Mining (M) China / Refining (R) China / Anode (A), Electrolysis (E), Casing (C) China

GCC: M Oceania / R Oceania / A, E, C GCC

Europe: M Africa / R Europe / A, E, C Europe

Canada: M South America / R South America / A, E, C Canada

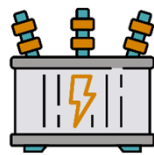
IAI Greenhouse Gas Pathways to 2050

- Data driven approach
- Establish the sector baseline
- Consider the different positions

- Industry data & input
- Top-down scenario analysis – IEA
- Identify variety of pathways

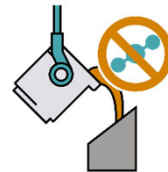
2018:
1.1 billion
tonnes of
CO₂e

700 million



Electricity

300 million



Process & Thermal

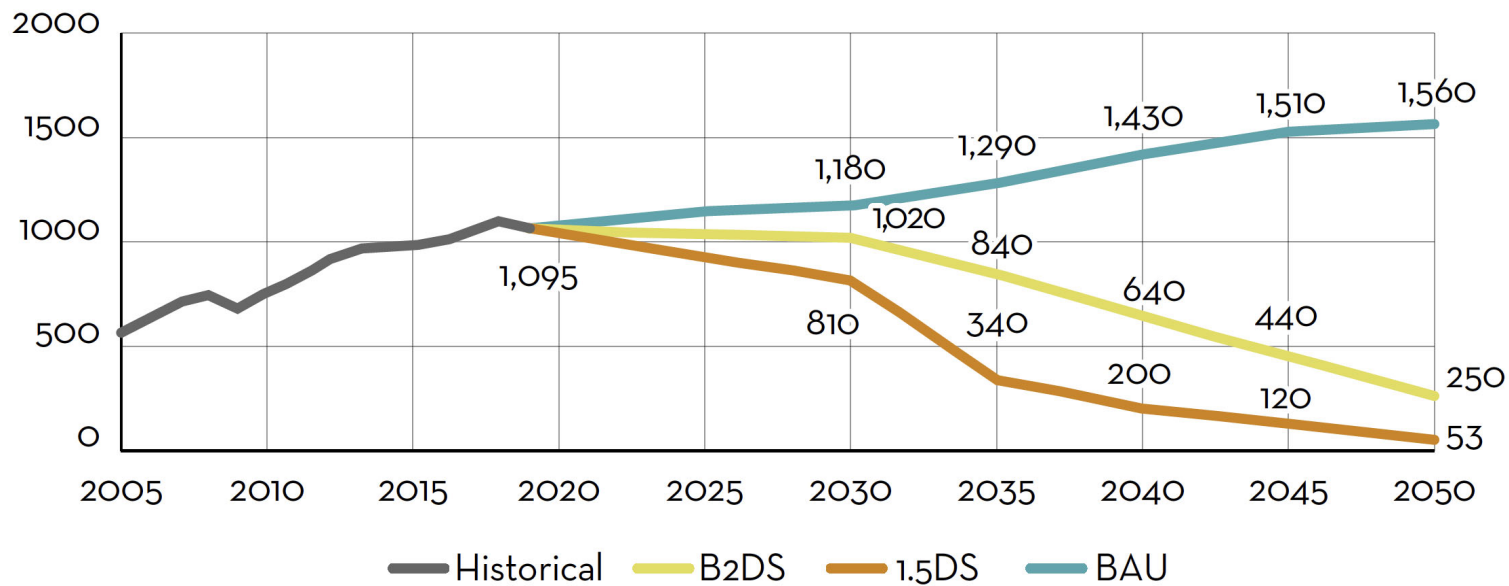
<100 million



Ancillary & Transport

IAI Emissions Scenarios

Aluminium Sector (million tonnes CO₂e)



BAU

B2DS

1.5DS

IAI GHG Pathways to 2050 (IAI, 2021)

Building On IAI Scenarios & Pathways

Pathway 1
**Electricity
decarbonization
potential**



Inform company GHG/climate change plans



Basis for emerging initiatives & methodologies



Collective understanding & action



Demonstrate the industry has a credible sector pathway

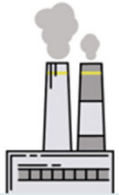


Shift to implementation – policy, finance, partnerships



Building on industry fact-base & engaging with key stakeholders

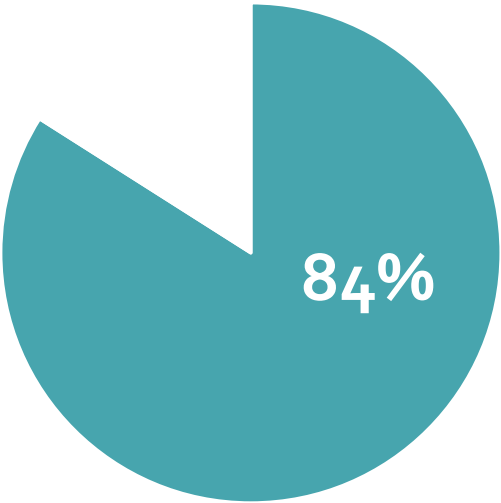
Pathway 2
**Direct
emissions
potential**



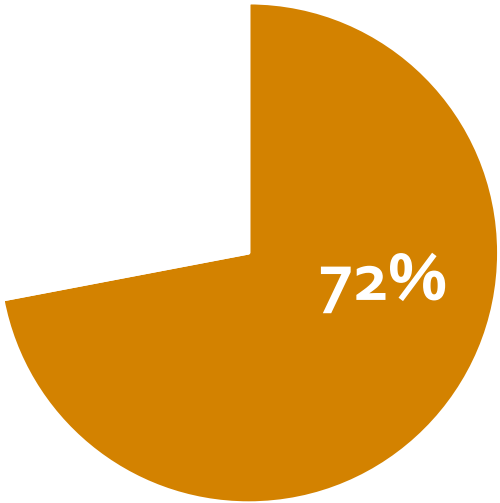
Pathway 3
**Recycling
& resource
efficiency
potential**



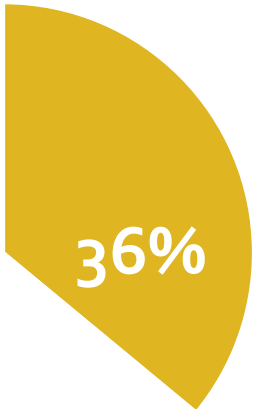
IAI Membership Decarbonisation Plans



Decarbonisation Plan



2050 Net-Zero Pathway



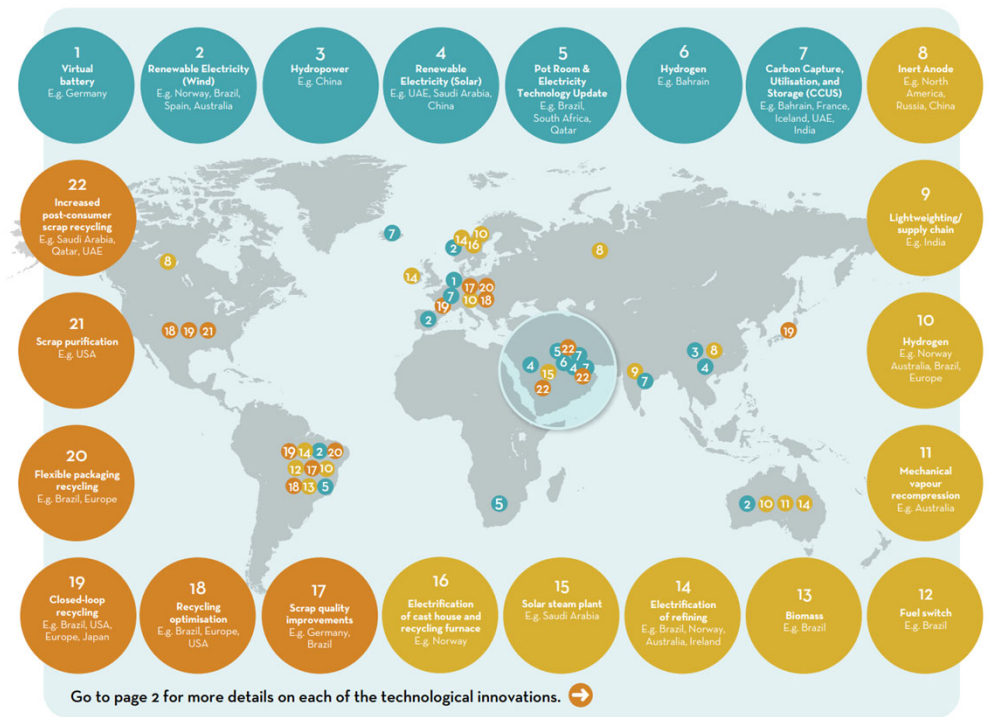
Endorsement of MPP Aluminium Transition Strategy

GHG Reduction Projects

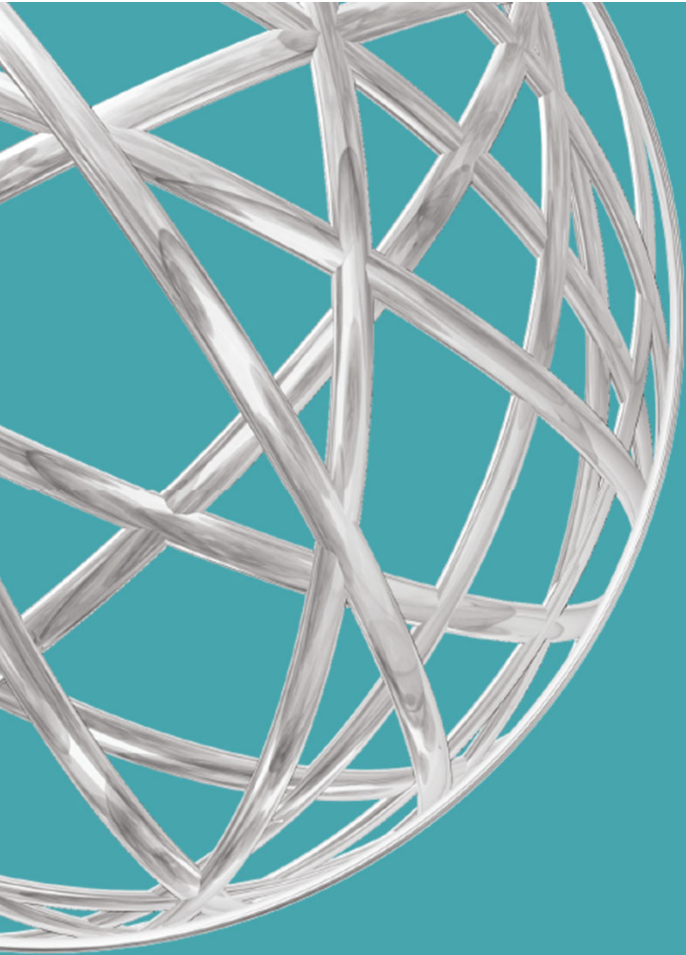
2020 -> 16 Project



2022/2023 -> 50 Projects



● Electricity decarbonisation
 ● Direct emissions
 ● Recycling



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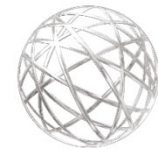
[linkedin.com/company/international-aluminium-institute/](https://www.linkedin.com/company/international-aluminium-institute/)



[@TheAluminiumStory](https://www.youtube.com/@TheAluminiumStory)

Thank you

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