



INTRODUCING SKARN ASSOCIATES

SKARN
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Founded in 2016, Skarn Associates is a specialised UK-based mining sector information provider developing new subscription data products which address environmental, social and governance (ESG) issues. Skarn has developed a unique methodology for quantifying mining industry environmental impacts, including greenhouse gas (GHG) emissions and water consumption, on a forward-looking basis. Our products allow clients to independently evaluate mining company ESG performance.

Skarn's senior team were previously key players in leading mining sector information businesses Wood Mackenzie, CRU, S&P Global and Thompson Reuters Refinitiv; we are specialists in commercialising mining sector technical and economic data.

Sophie Chung
*Director,
Industry Analysis*

Since the first products were launched in September 2020 the business has grown rapidly. Some of the largest global mining companies, including Anglo American, BHP, Glencore, Rio Tinto, Vale, First Quantum and Teck, plus major financial institutions including Barclays and Standard Chartered use our GHG Intensity Curves.

In November 2021 we will be launching our Gold Mines Water Benchmarking analysis, marking our entry into a new ESG subject area.

Skarn's mission is to create high quality, independent, forward-looking mining sector ESG analysis. Skarn has developed unique methodologies and datasets, on an asset-by-asset basis.

Martin Haller
*Aluminium
Consultant*

OUR APPROACH TO ESG RESEARCH

Forecasting & reconciling ESG impacts

- Asset-by-asset, forward-looking ESG models, based on mine production schedule
- Requires thorough understanding of technical drivers; balancing energy inputs to emissions
- e.g. fuel inputs ↔ consumption rates/tonne ore ↔ fuel carbon intensity ↔ CO₂e

Data consistency

- Consistent approach to presenting corporate asset ownership
- Standardised metrics – e.g. production reporting basis – concentrate at mine gate vs refined metal at refinery
- Critical scrutiny of company reported data, CDP etc
- Intelligent, flexible and transparent treatment of system boundaries

Value-add research

- Carbon intensity and abatement curves; flexing functionality
- Benchmarking – energy, water, land/rehab costs, ecosystem impact, social indicators
- Capital and operating cost implications; connecting ESG to mine economics
- Longer term - Life Cycle Analysis, Scope 3 Emissions, implications for commodity markets

ESG PRODUCT ROADMAP

Cu

Ni

Fe

Coal

Au

Co

Al

Ag



GHG INTENSITY CURVES

Available now

- Aluminium-alumina-bauxite
- Copper (Mines & Smelters)
- Gold
- Nickel
- Iron ore
- Metallurgical Coal
- Zinc (Mines & Smelters)
- Cobalt
- Lead
- Silver



H₂O BENCHMARKING

Launching Q4 2021

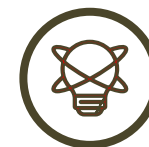
- Unique asset-level approach to balancing water withdrawal, consumption and discharge.
- Groundbreaking application of intensity curves to water.
- Overlaying climate, water stress, watershed, hydrology and precipitation data.



CORPORATE ANALYSIS

Launching Q4 2021

- Quarterly Review – company targets
- Data tool – ESG metrics including emissions, water, safety & others
- Reconciliation of reported vs. equity basis



THEMATIC RESEARCH

Regular Analytical Reports

- Skarn Mining ESG Bulletin: a monthly round-up of mining-ESG news, plus feature articles
- Periodic whitepapers and thematic reports
- Monthly roundtable webinars

Upcoming

- PGMs
- Forecast future years

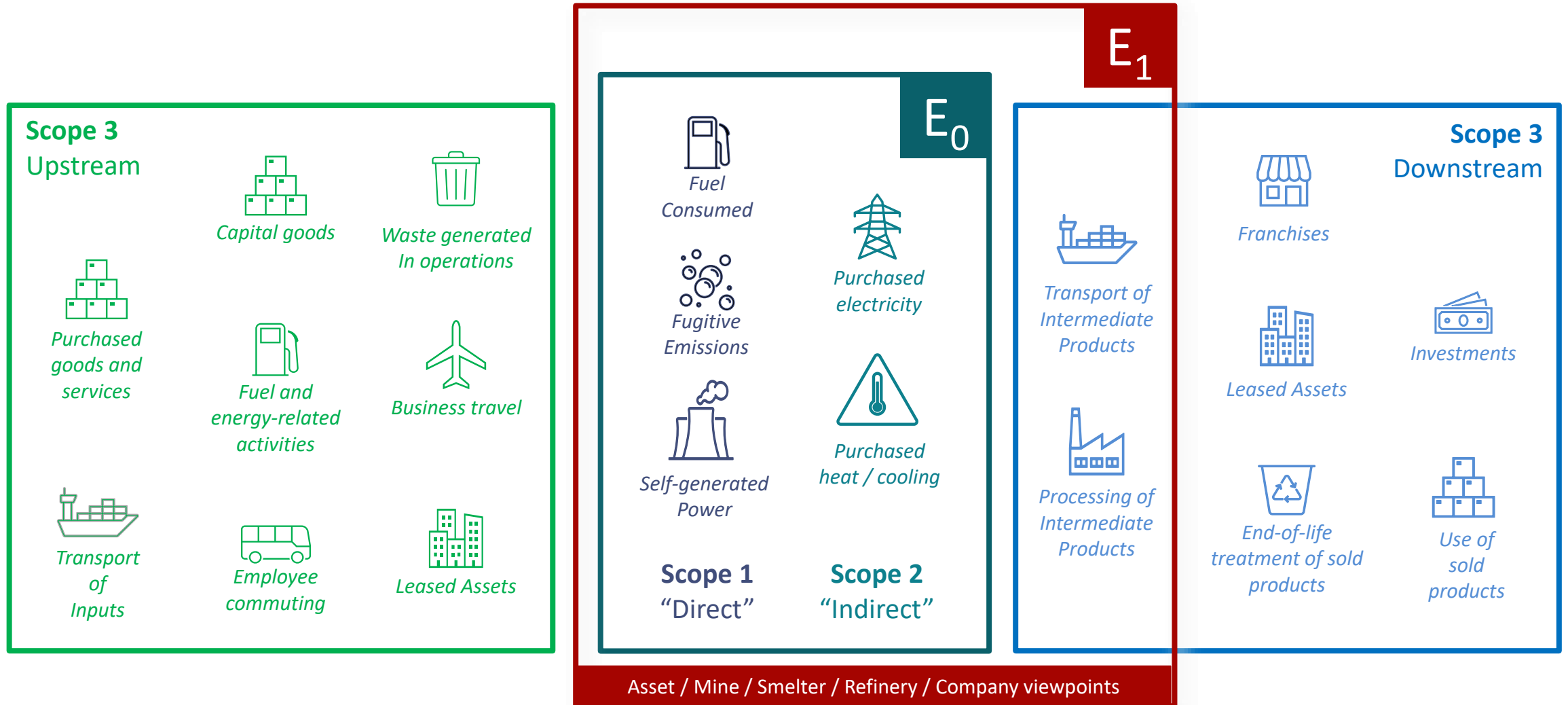
Upcoming

- Gold Mines H₂O Benchmarking launch (November);
Copper Mines - January

Upcoming

- Forecast ESG metrics for future years

SKARN'S E₀ & E₁ INTENSITY METRICS vs SCOPES 1-3

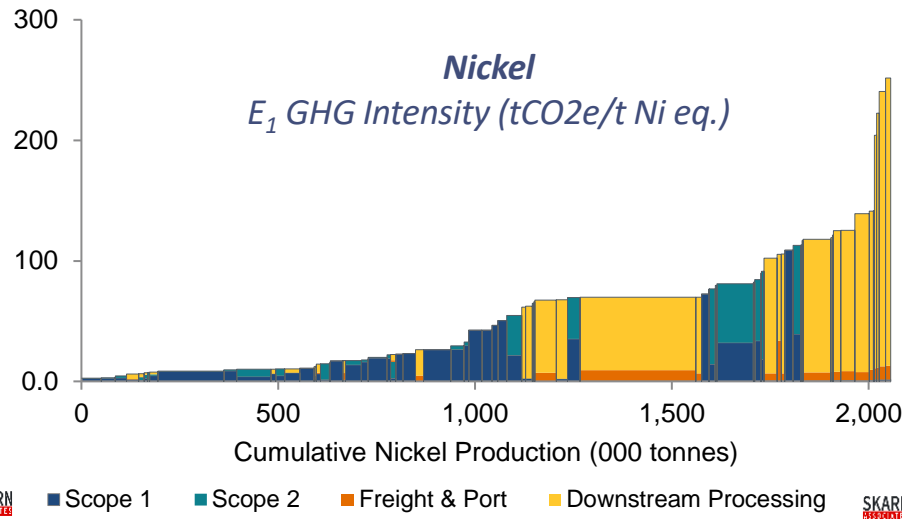
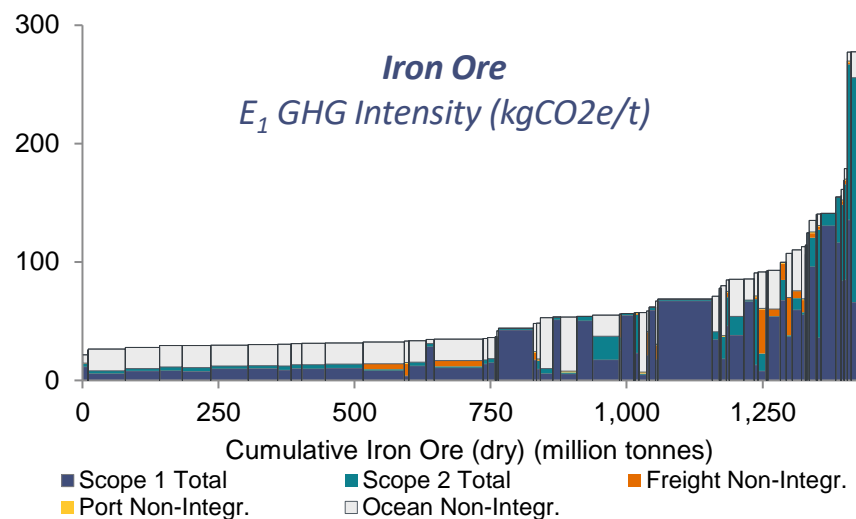


SKARN'S PROPRIETARY METRICS: GHG EMISSIONS



UNIQUE ASSET LEVEL ANALYSIS

Skarn's GHG Intensity Curves quantify emissions along the supply chain at the asset, company and country level.



Emissions to first-saleable product:

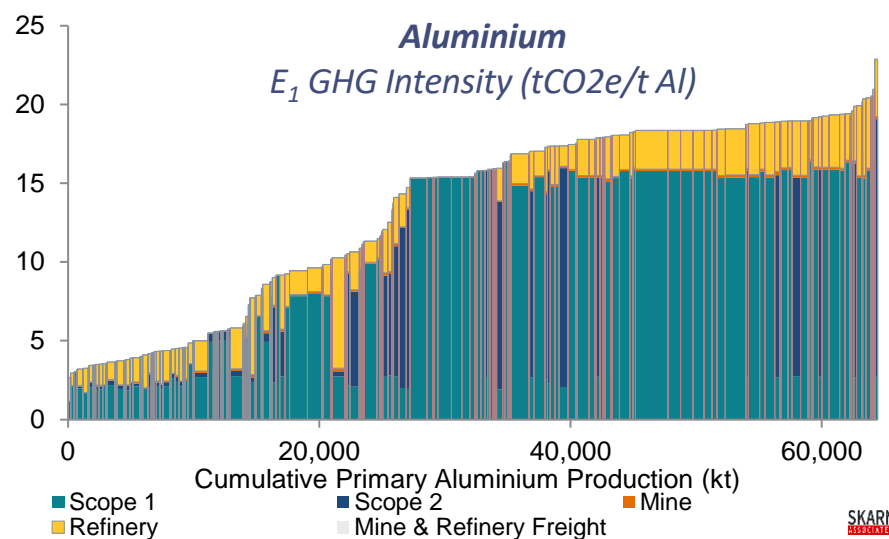
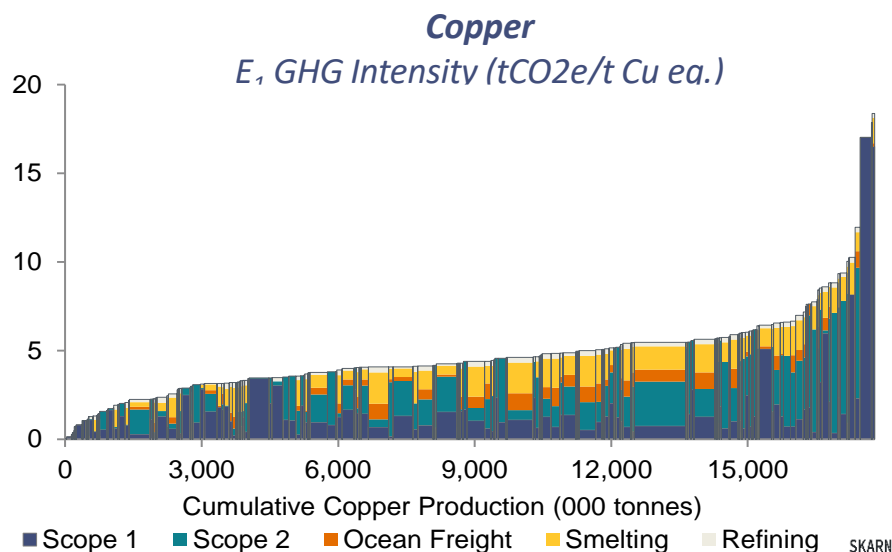
- Mining activities (Scope 1 & 2*)
- Ore processing (Scope 1 & 2*)
- Fugitive emissions (Scope 1 & 2*)
- Transport (Scope 3*)
- Downstream processing (Scope 3*)

Emissions by:

- Asset
- Company
- Country

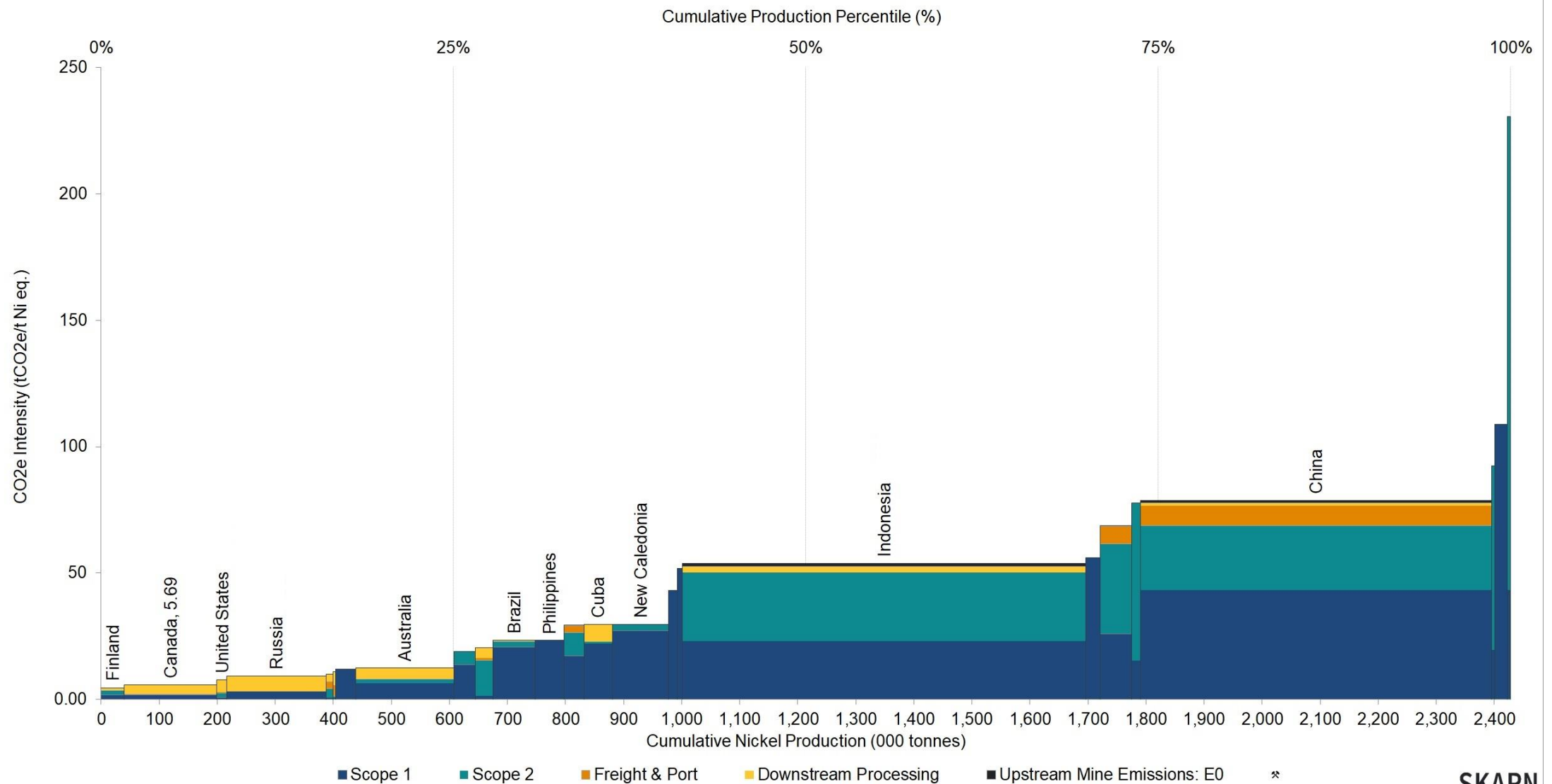
Commodity coverage:

- Aluminium, Alumina, Bauxite
- Copper – mines, smelters & refineries
- Gold
- Nickel
- Iron Ore
- Metallurgical coal
- Zinc – mines & smelters
- Silver
- Lead
- Cobalt

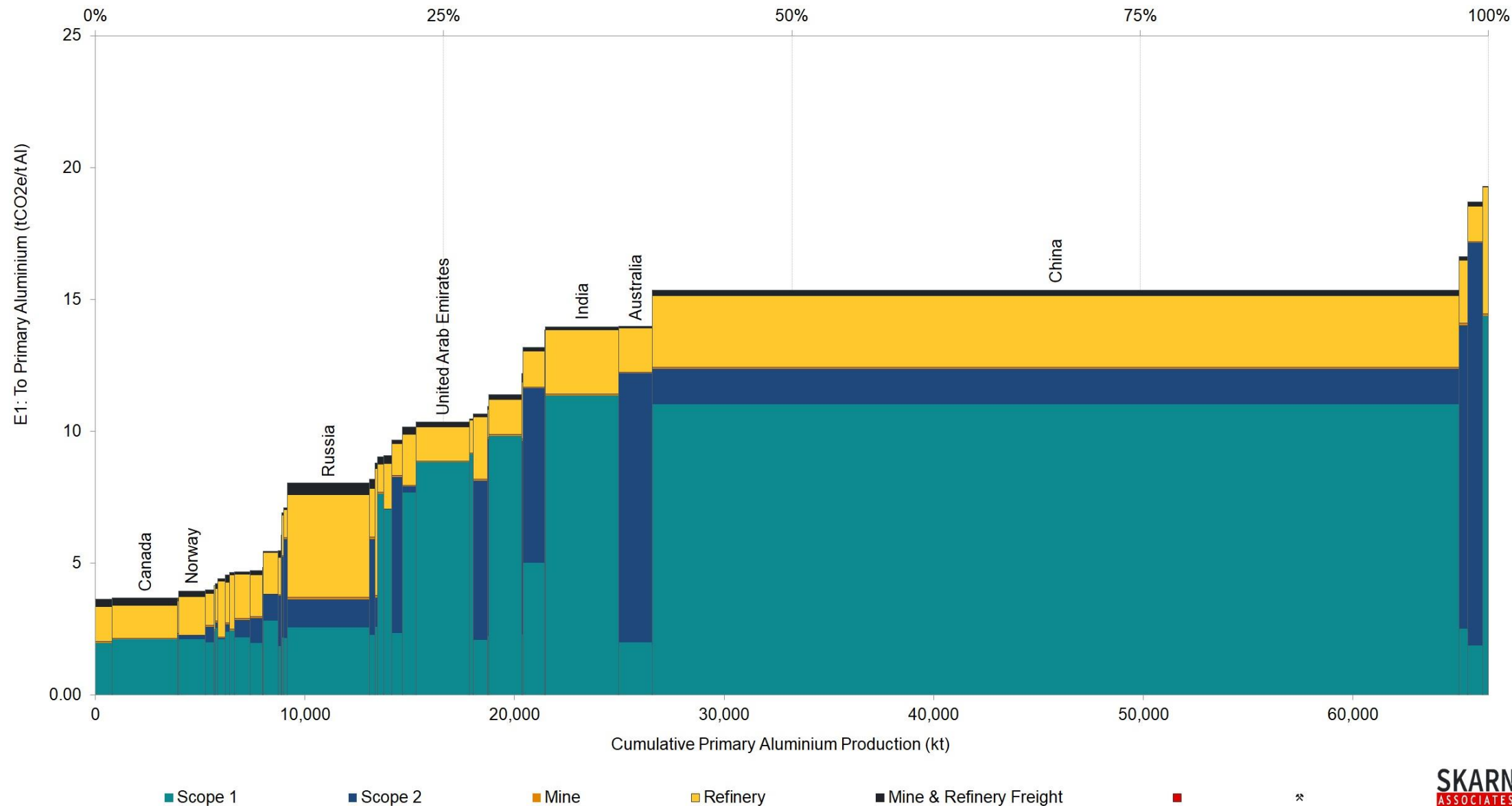


*As defined by the [GHG Protocol Corporate Accounting and Reporting Standard](#)

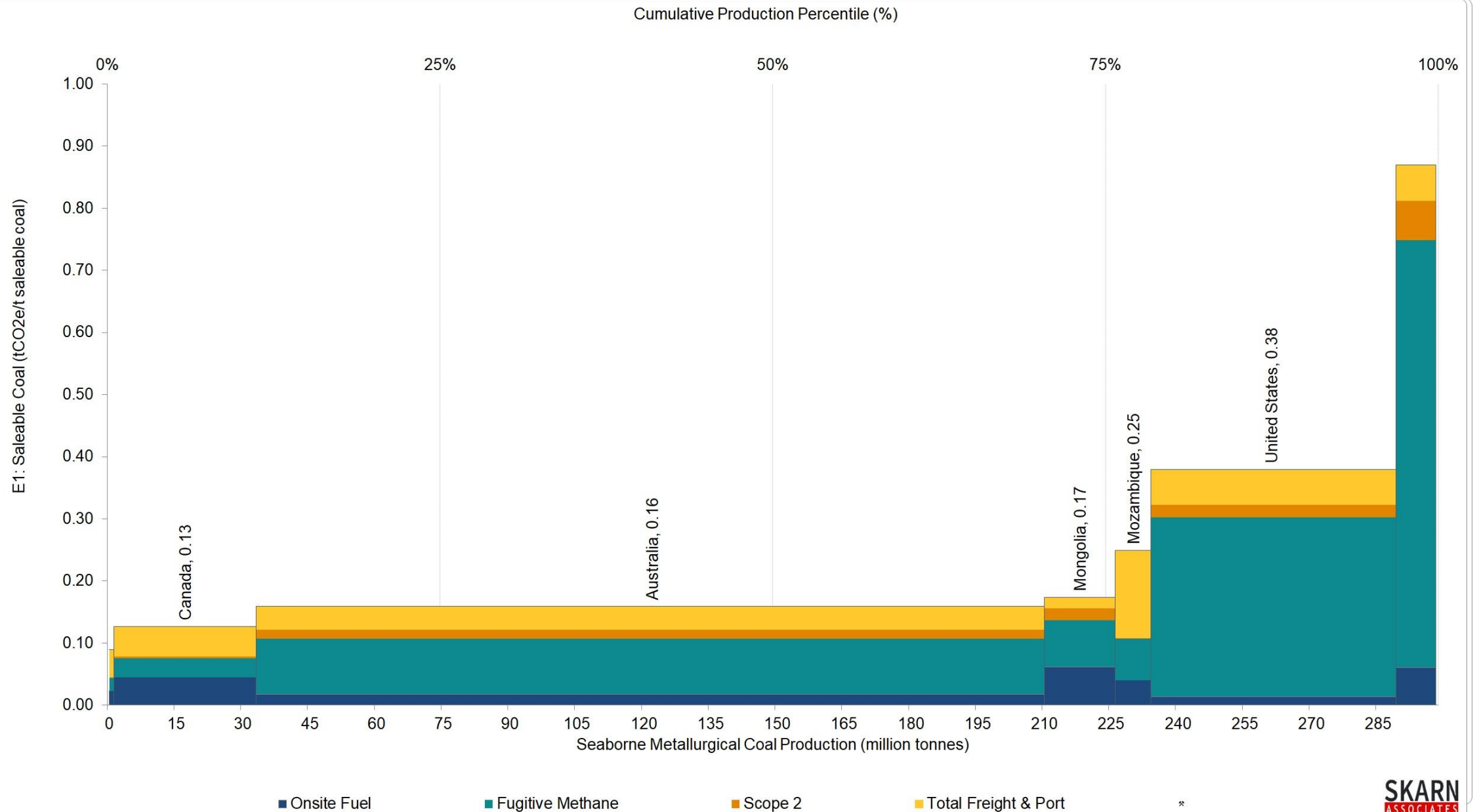
NICKEL E₁ GHG INTENSITY CURVE BY COUNTRY



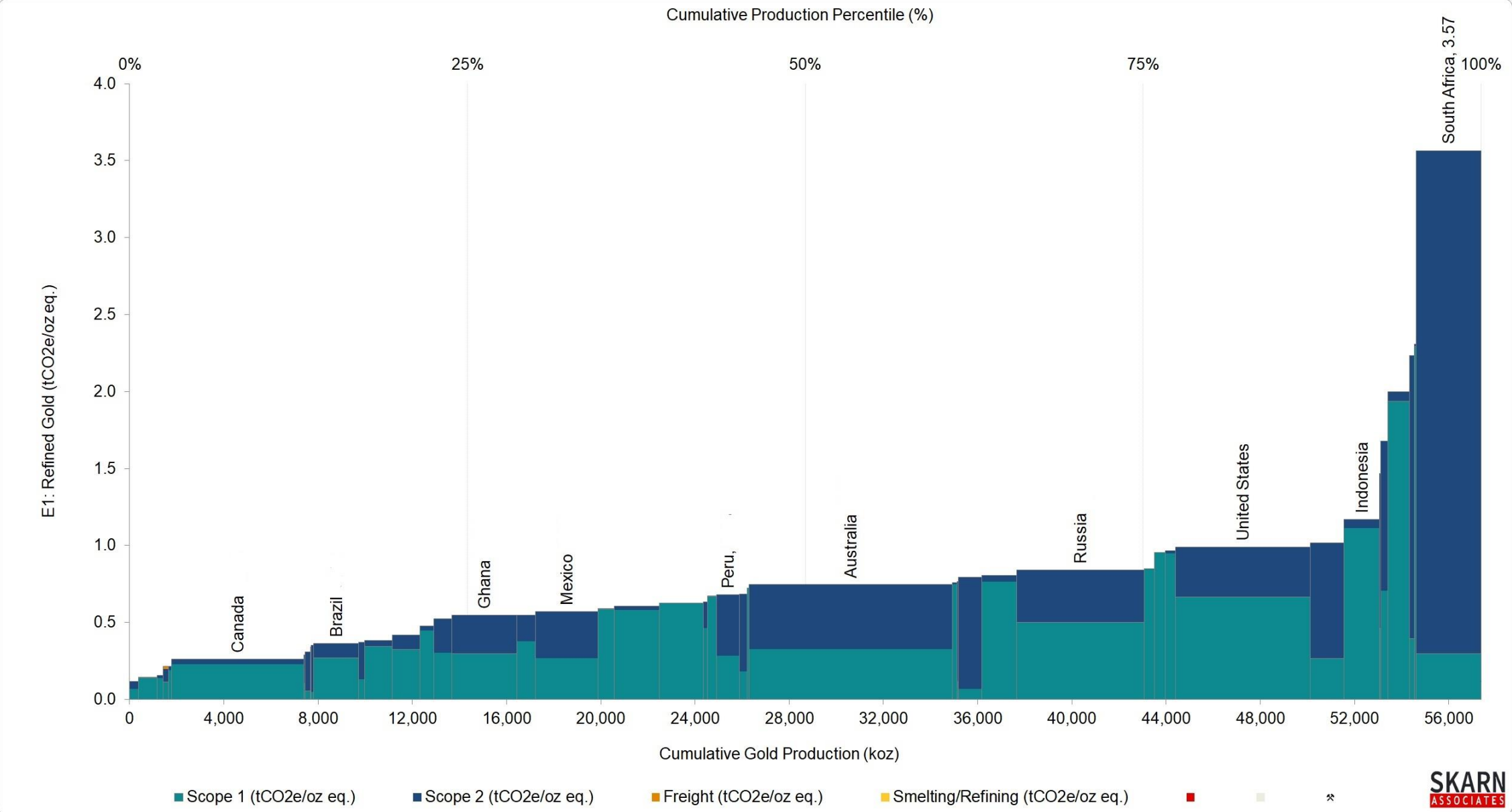
ALUMINUM E₁ GHG INTENSITY CURVE BY COUNTRY



METALLURGICAL COAL E₁ GHG INTENSITY CURVE BY COUNTRY

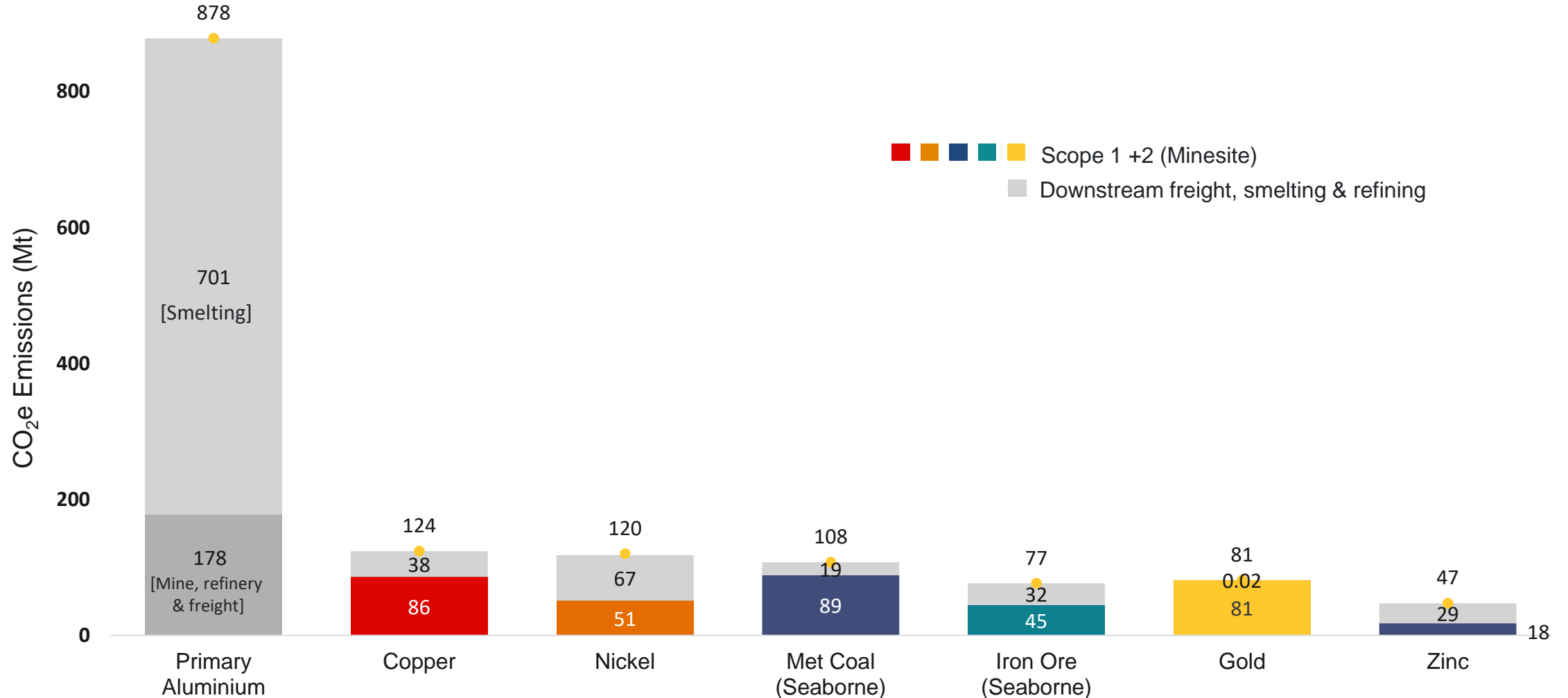


GOLD E1 GHG INTENSITY CURVE BY COUNTRY

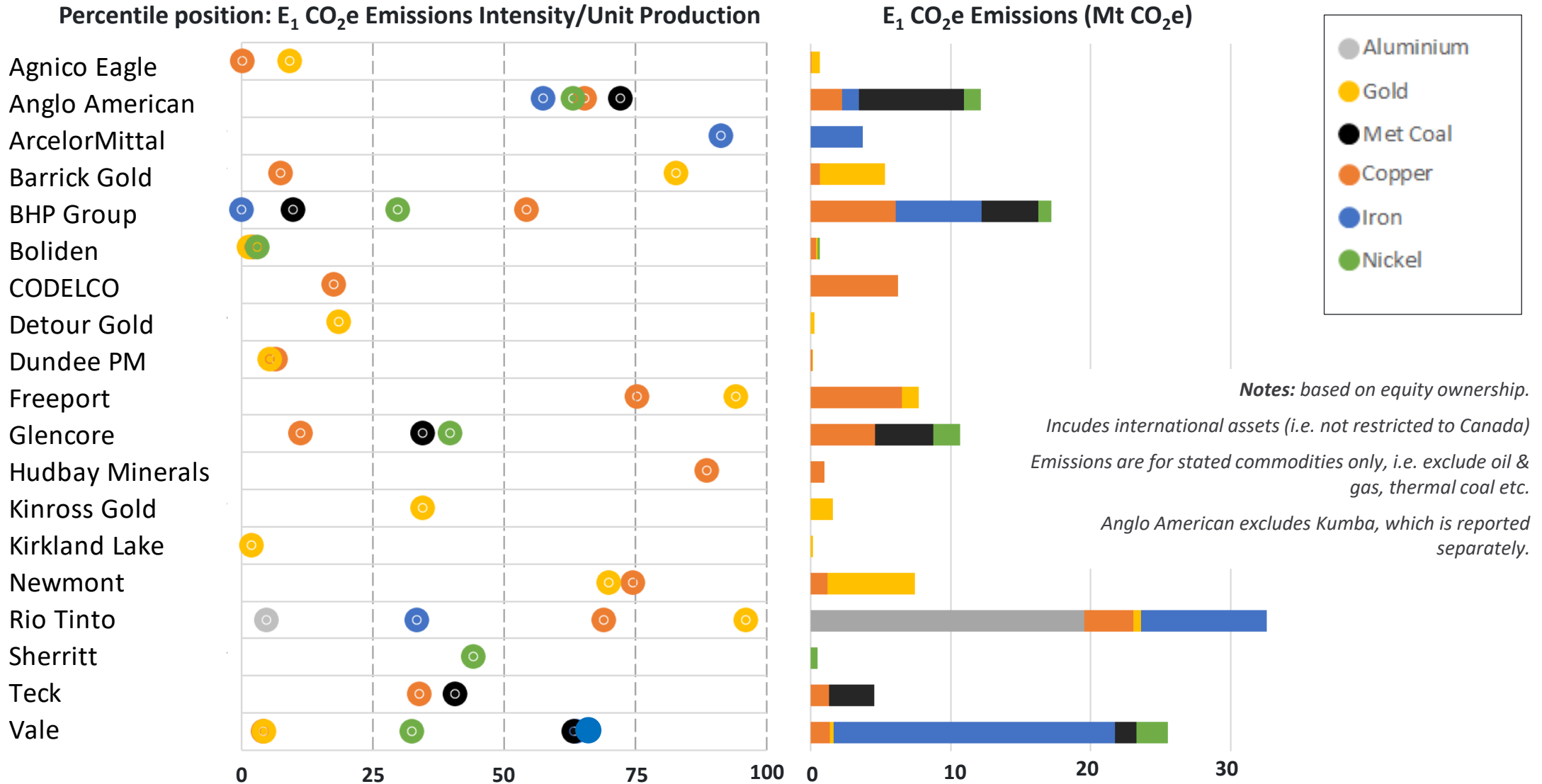


CROSS-COMMODITY COVERAGE

Annual CO₂e Emissions by commodity, to first saleable product (E₁)



MAJOR COMPANIES — E₁ GHG EMISSIONS BY COMMODITY



Source: Skarn Associates

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