



**INTRODUCING SKARN ASSOCIATES**

**SKARN**  
**ASSOCIATES**

# SKARN ASSOCIATES

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.

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.

**Sophie Chung**  
*Director,  
Industry Analysis*

**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 ↔ CO<sub>2</sub>e

## 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



## GHG INTENSITY CURVES

### Available now

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

### Upcoming

- PGMs
- Forecast future years



## H<sub>2</sub>O 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.

### Upcoming

- Gold Mines H<sub>2</sub>O Benchmarking launch (November);  
Copper Mines - January



## CORPORATE ANALYSIS

### Launching Q4 2021

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

### Upcoming

- Forecast ESG metrics for future years

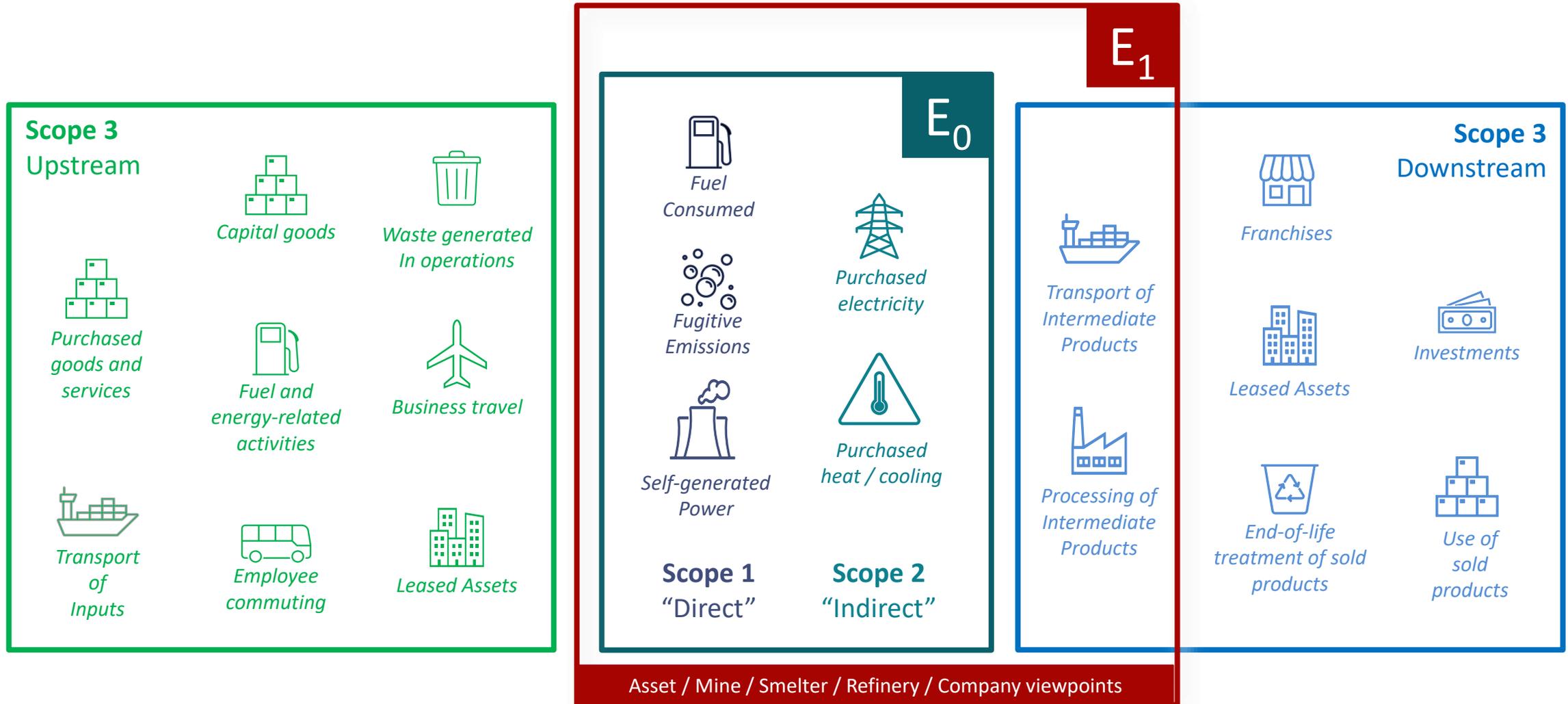


## THEMATIC RESEARCH

### 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

# SKARN'S E<sub>0</sub> & E<sub>1</sub> INTENSITY METRICS vs SCOPES 1-3

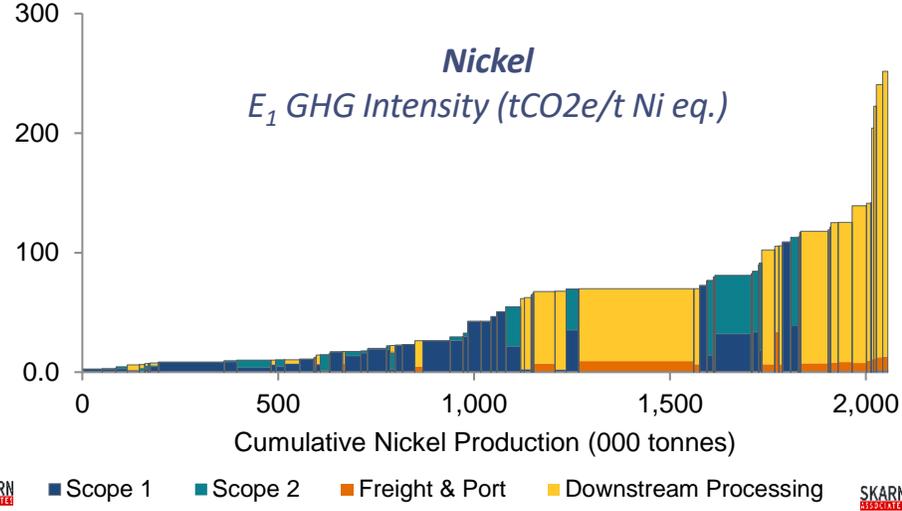
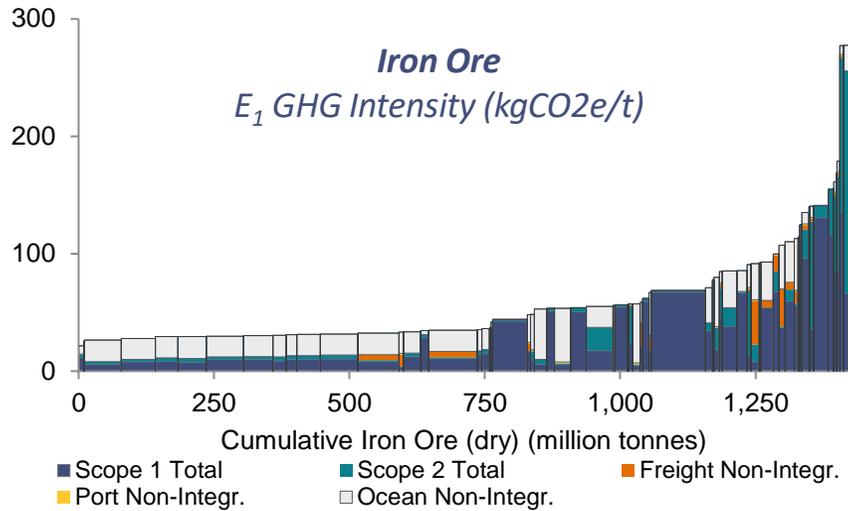


# SKARN'S PROPRIETARY METRICS: GHG EMISSIONS



# 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:

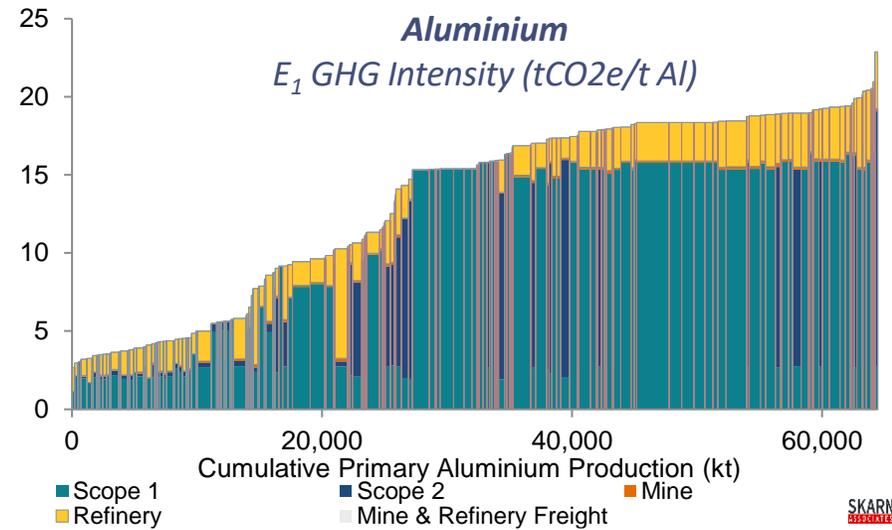
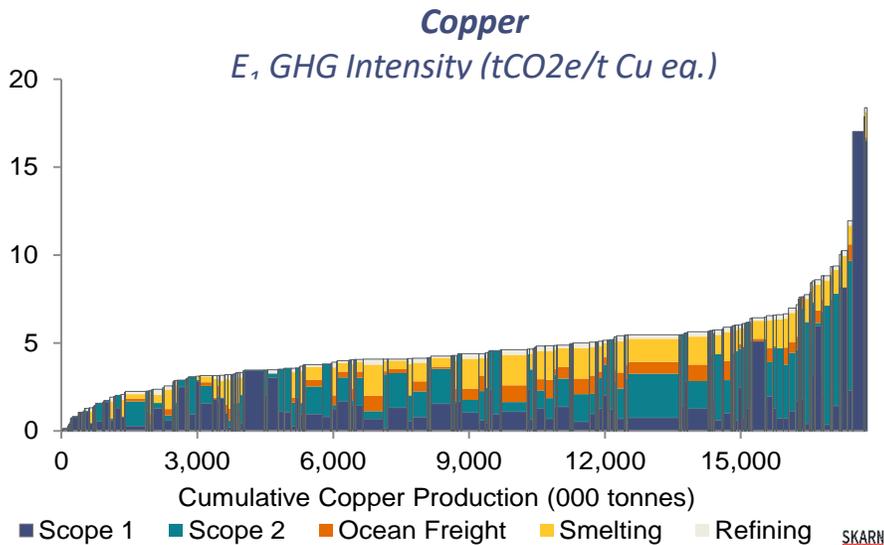
- Mining activities (Scope 1 & 2\*)
- Ore processing (Scope 1 & 2\*)
- Fugitive emissions (Scope 1 & 2\*)
- Transport (Scope 3\*)
- Downstream processing (Scope 3\*)

### Emissions by:

- Asset
- Company
- Country

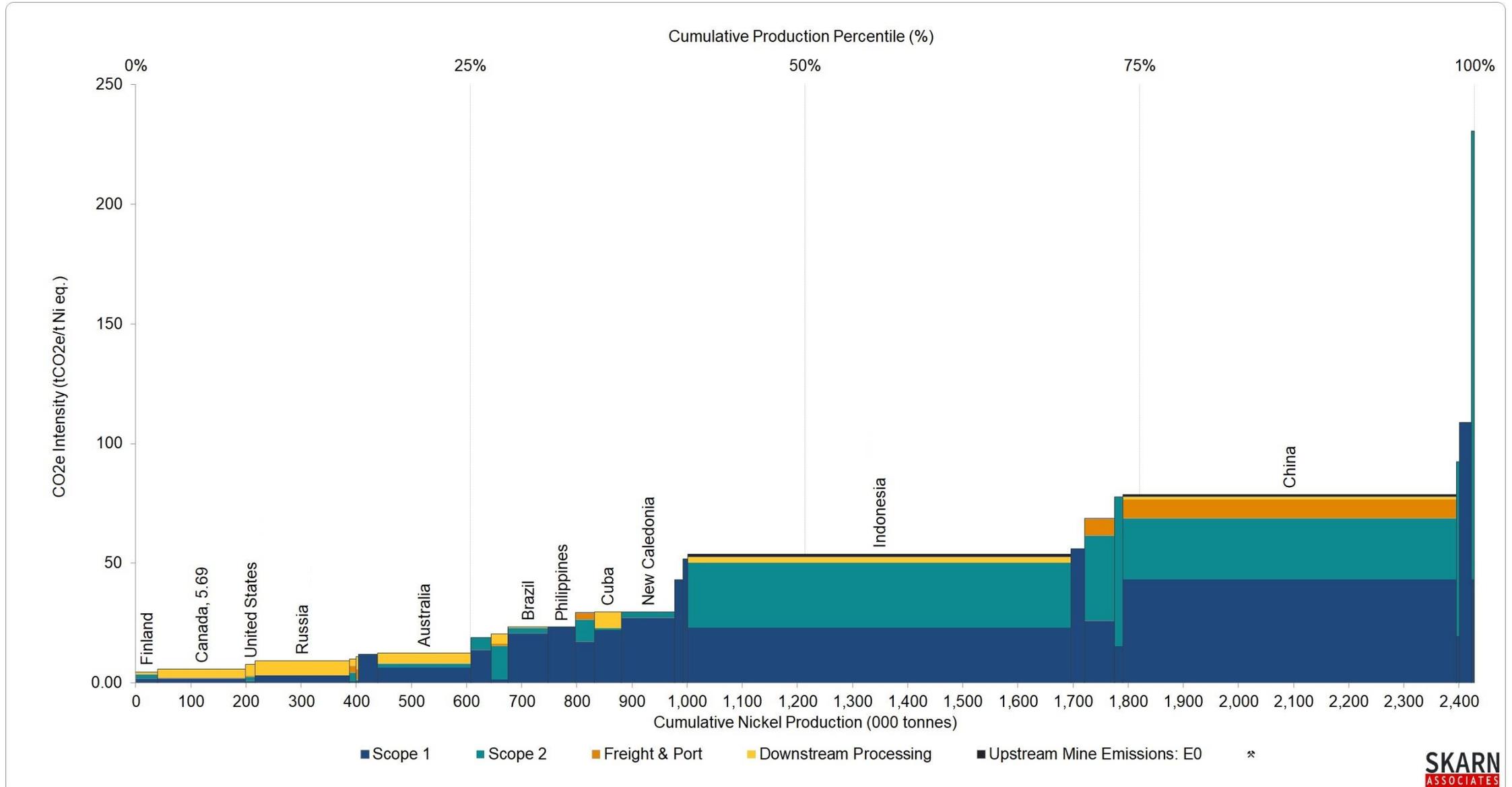
### Commodity coverage:

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

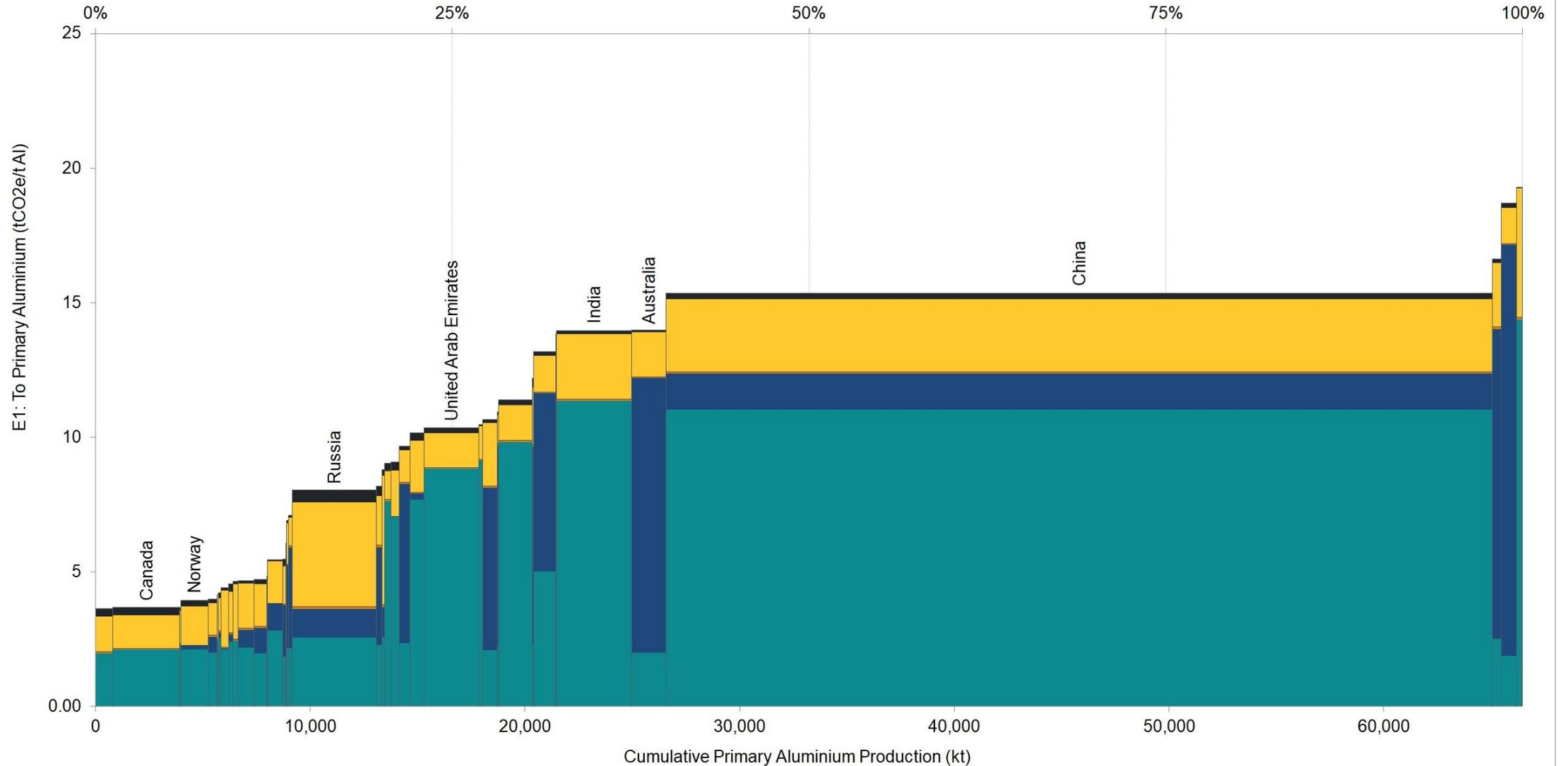


\*As defined by the [GHG Protocol Corporate Accounting and Reporting Standard](#)

# NICKEL E<sub>1</sub> GHG INTENSITY CURVE BY COUNTRY



# ALUMINUM E<sub>1</sub> GHG INTENSITY CURVE BY COUNTRY



■ Scope 1

■ Scope 2

■ Mine

■ Refinery

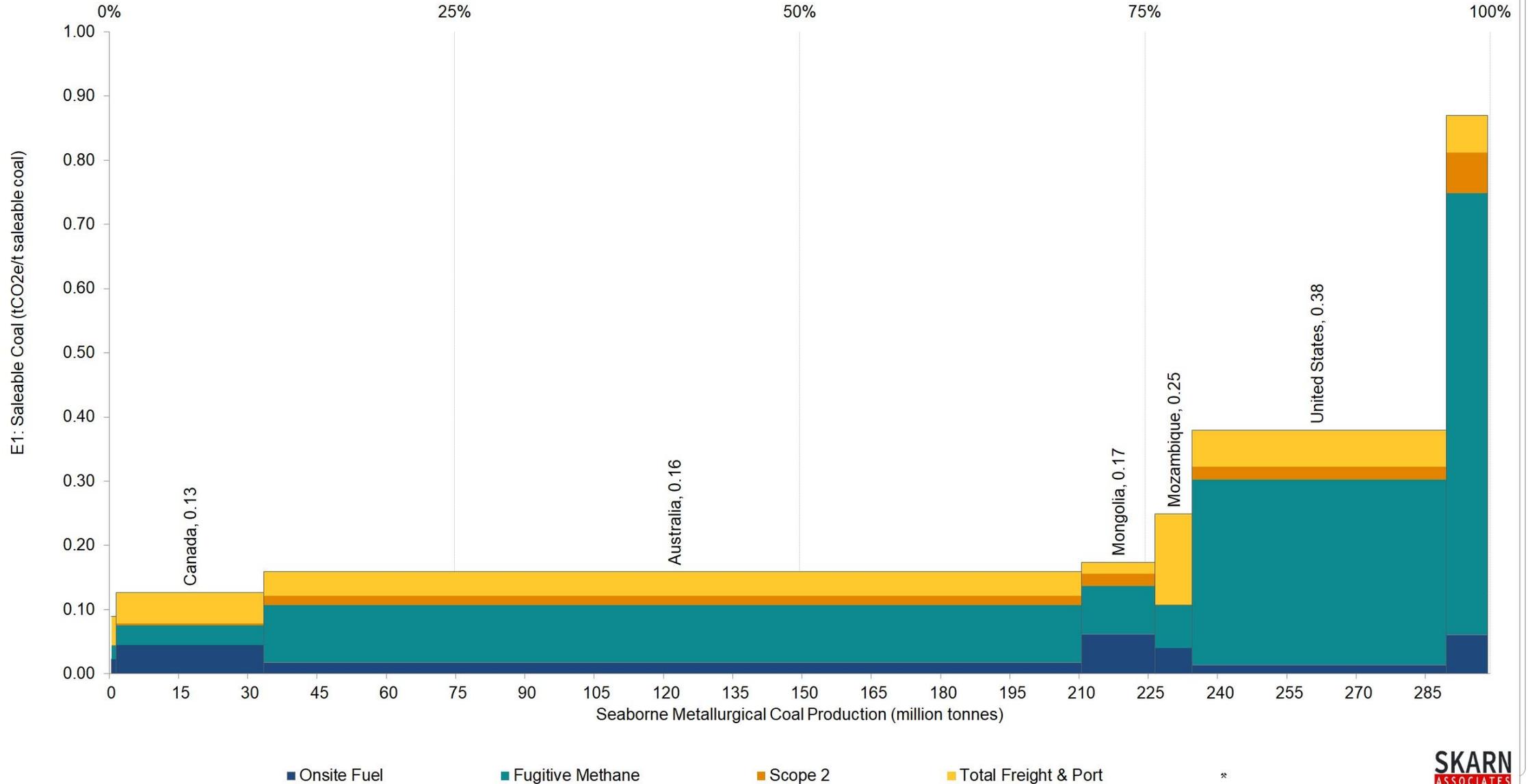
■ Mine & Refinery Freight

■

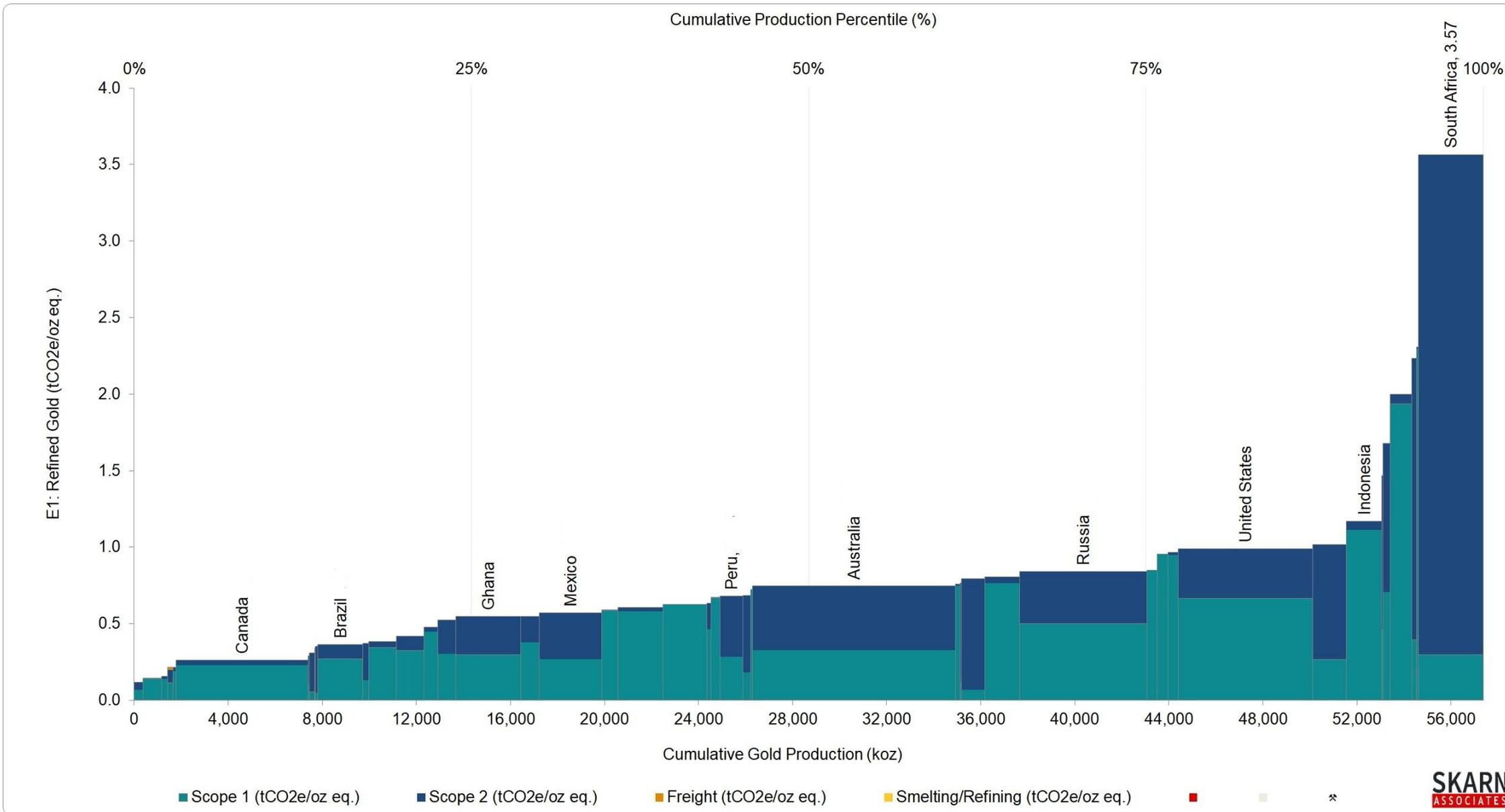
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# METALLURGICAL COAL E<sub>1</sub> GHG INTENSITY CURVE BY COUNTRY

Cumulative Production Percentile (%)

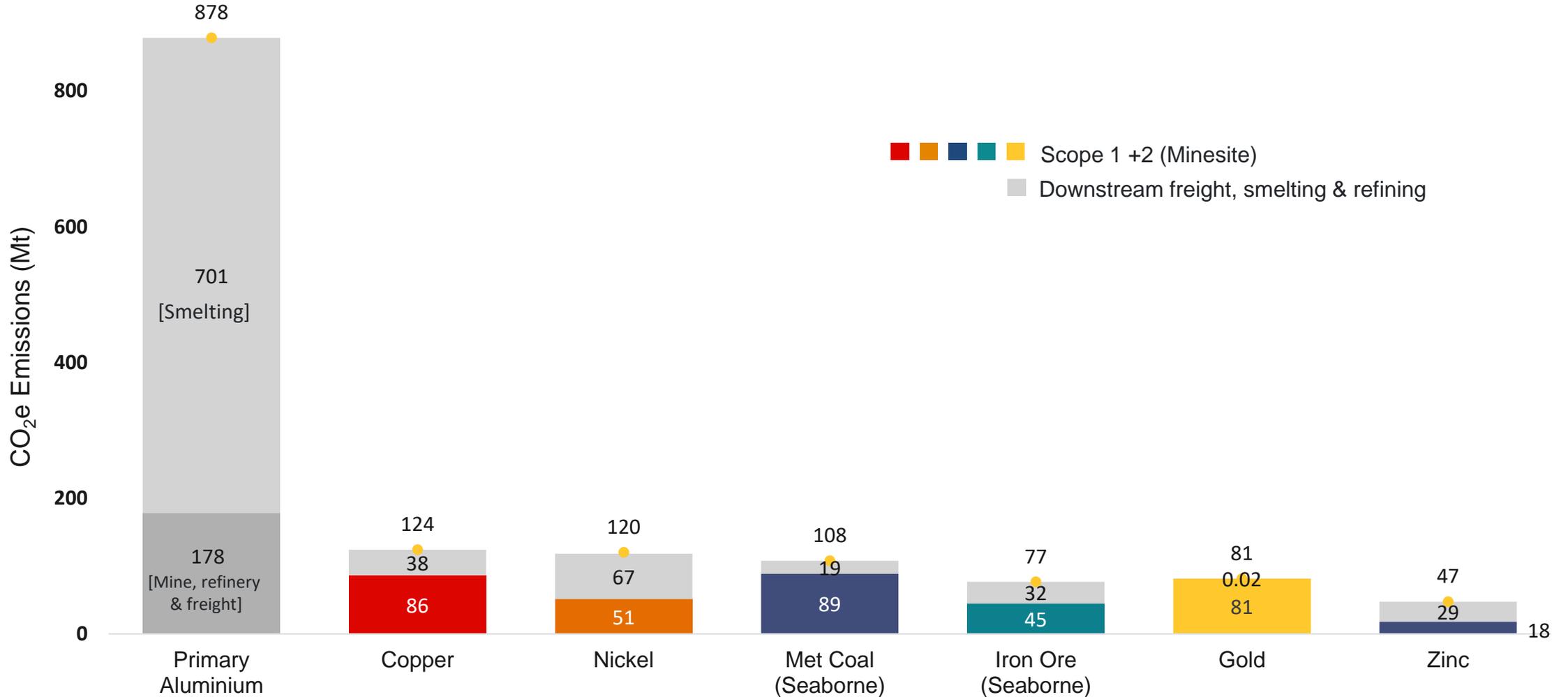


# GOLD E1 GHG INTENSITY CURVE BY COUNTRY



# CROSS-COMMODITY COVERAGE

Annual CO<sub>2</sub>e Emissions by commodity, to first saleable product (E<sub>1</sub>)

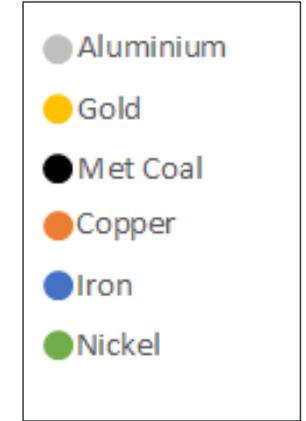
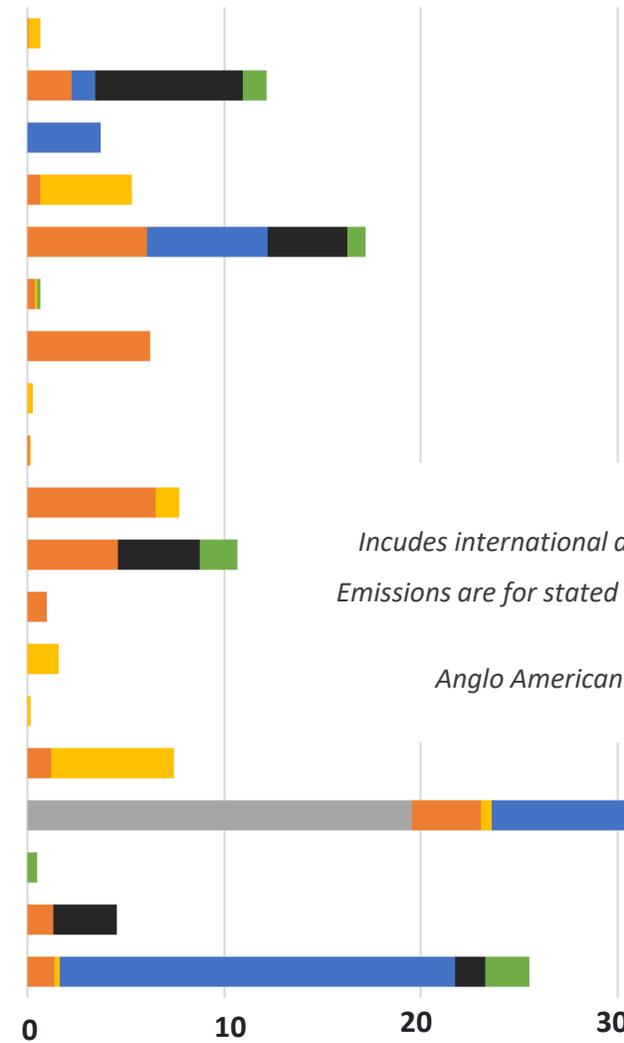
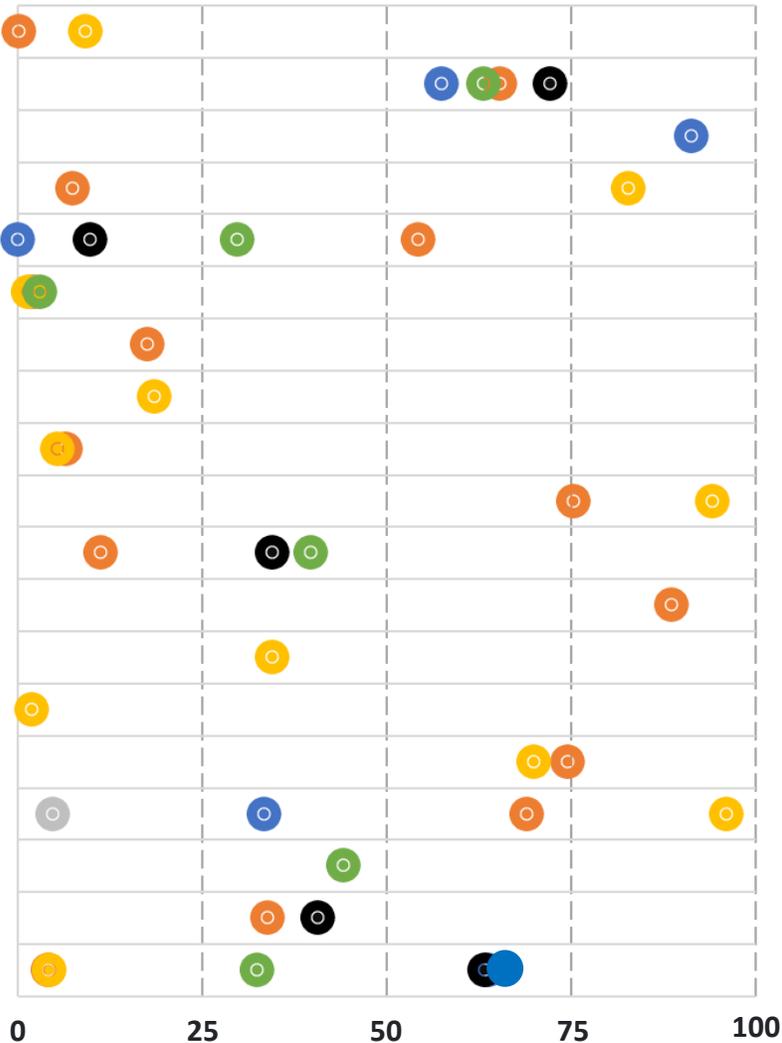


# MAJOR COMPANIES – E<sub>1</sub> GHG EMISSIONS BY COMMODITY

Percentile position: E<sub>1</sub> CO<sub>2</sub>e Emissions Intensity/Unit Production

E<sub>1</sub> CO<sub>2</sub>e Emissions (Mt CO<sub>2</sub>e)

- Agnico Eagle
- Anglo American
- ArcelorMittal
- Barrick Gold
- BHP Group
- Boliden
- CODELCO
- Detour Gold
- Dundee PM
- Freeport
- Glencore
- Hudbay Minerals
- Kinross Gold
- Kirkland Lake
- Newmont
- Rio Tinto
- Sherritt
- Teck
- Vale



*Notes: based on equity ownership.  
Includes international assets (i.e. not restricted to Canada)  
Emissions are for stated commodities only, i.e. exclude oil & gas, thermal coal etc.  
Anglo American excludes Kumba, which is reported separately.*

Source: Skarn Associates

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