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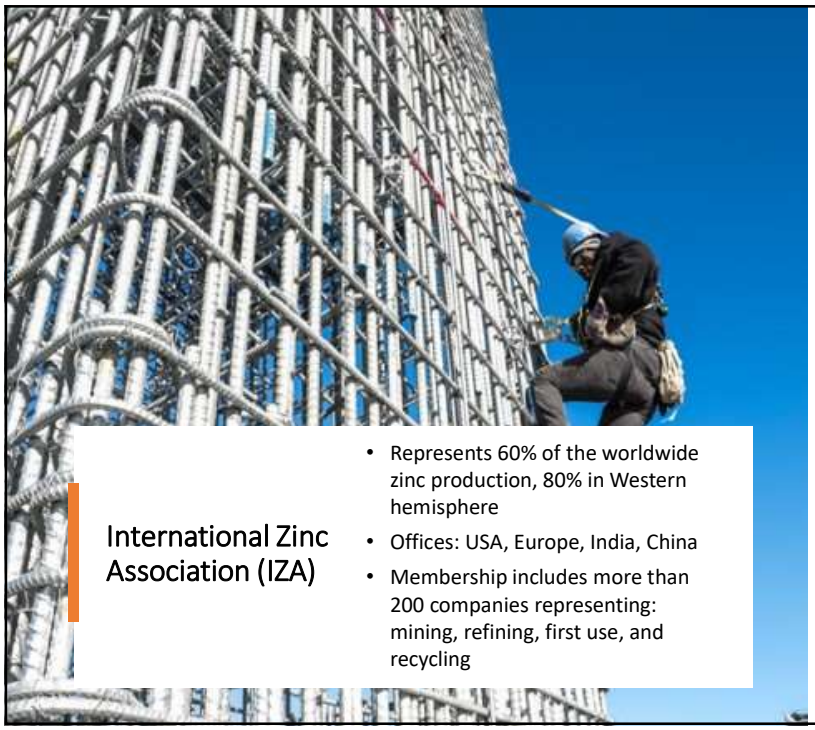
Zinc Circularity, Carbon Footprint, and Decarbonization

ILZSG Spring Meetings
24 April 2024, Lisbon, Portugal

Sabina
IZA Associate Director Sustainable Development

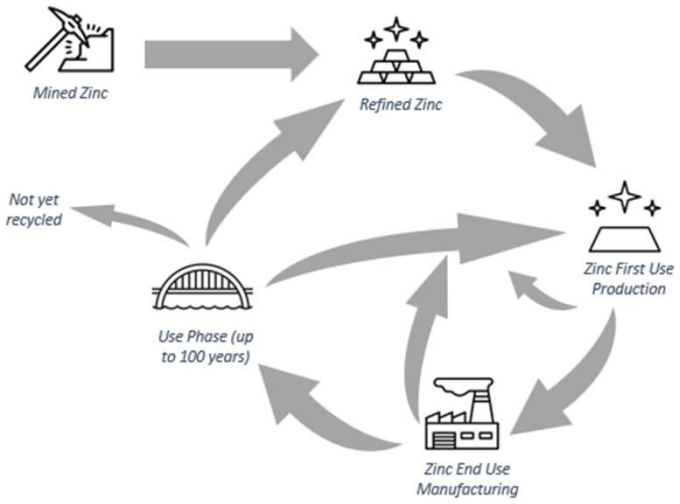


International Zinc Association (IZA)

- Represents 60% of the worldwide zinc production, 80% in Western hemisphere
- Offices: USA, Europe, India, China
- Membership includes more than 200 companies representing: mining, refining, first use, and recycling

Content

1. **Zinc Circularity**
2. Carbon footprint
3. Decarbonization Roadmap
4. Summary



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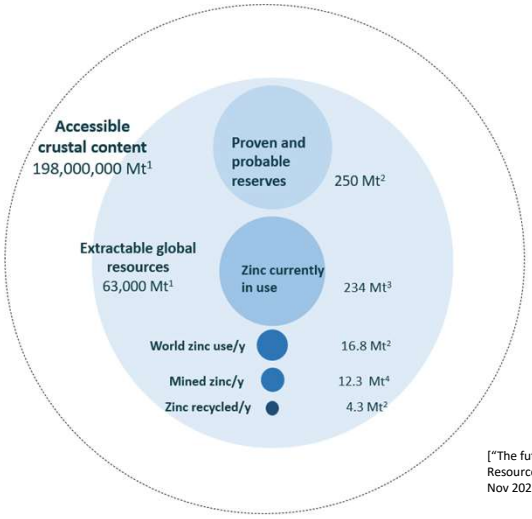
Zinc is Long-Term Available



Geological inventory + future demand scenarios:

- At global level, zinc is long-term available from mined and recycled sources.
- Both sources will be needed to satisfy demands.
- Focus shifts to regional and national criticality assessments.

["The future availability of zinc", Rostek, Pirard, Loibl, Resources, Conservation & Recycling Advances, Vol. 19, Nov 2023 (link)]

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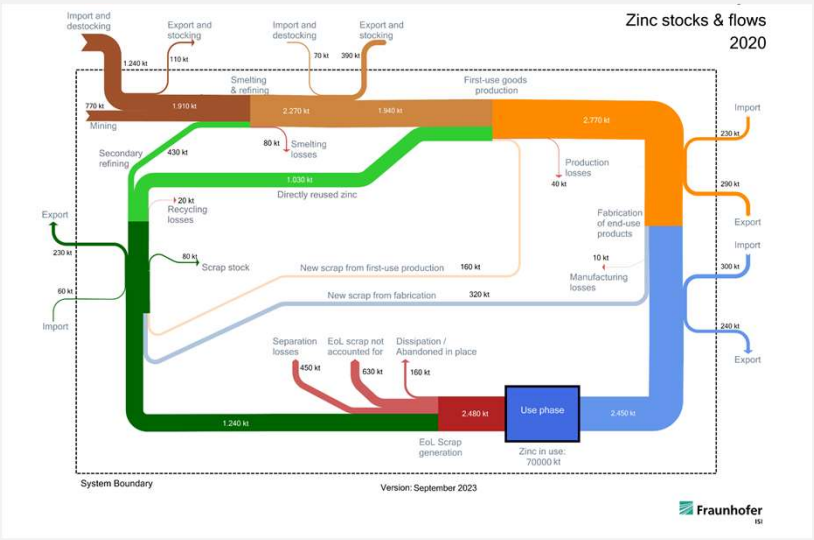
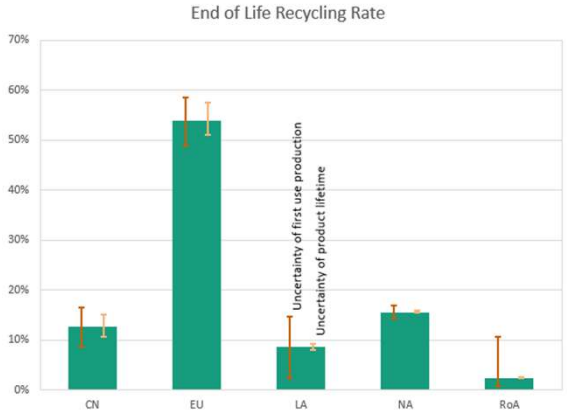


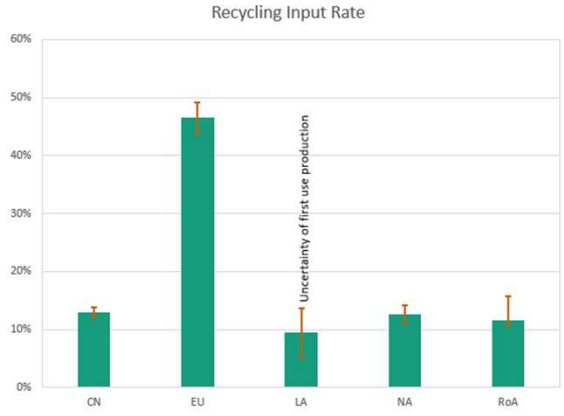
Example: Zinc Circularity in Europe

- Saturated market
- End-of-life Recycling Rate: ca. 50%
- Recycling Input Rate: ca. 50%
- Impact opportunities: collection and sorting

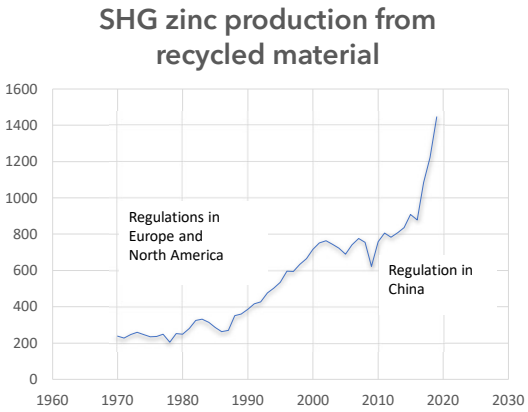
Regional Zinc Recycling Rates

2020





Disruptive Developments impacting Zinc Circularity



Zinc recycling from steel mill (EAF) dust (hazardous waste) increases with regulations being enforced

- Changing regulatory environment
- Demand shifts
- Technological shifts

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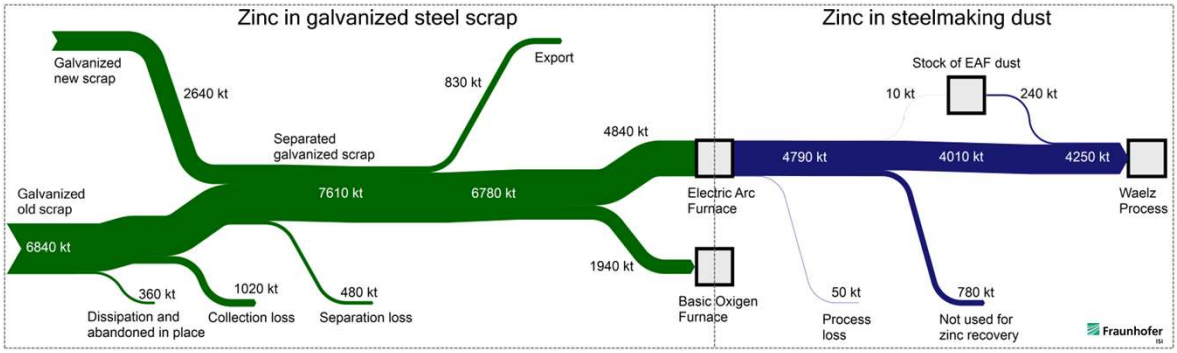
Example: Zinc Circularity in Europe

- Zinc losses in galvanized steel recycling can be minimized by improved collection and sorting, targeted scrap management, regulations



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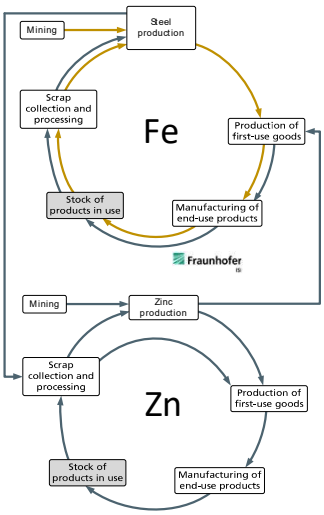
Poly-Metal Flow Analysis

- Steel-zinc cycle (galvanized steel)
- Copper-zinc cycle (brass)
- Aluminium-zinc alloys (die casting alloys)

Challenge: Recycling processes for anthropogenic ores are optimized for more valuable elements.



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Take Aways Zinc Circularity

Zinc is long-term available

- Mined and recycled sources both are needed

Zinc is circular, challenges and impact opportunities remain:

- Data availability and quality
- Disruptive changes
- Poly-metal effects

Impact opportunities

- Collection, sorting, innovation
- Impact opportunities vary between regions

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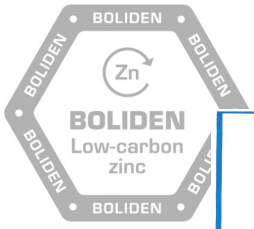
Content

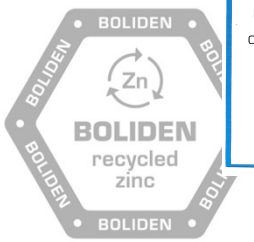
- Zinc Circularity
- **Carbon footprint**
- Decarbonization Roadmap
- Summary

2024 Key Performance Indicators

Classic	New
· Price	· Carbon footprint
· Price	· Recycled content
· Price	· Sourced responsibly
· Quality	

Talk of the Town …





CERTIFICATE
Low Carbon Zinc

February 14, 2022

This certificate is awarded to

ZINKPOWER

For purchasing 7 700 MT of Low Carbon Zinc to be delivered during the period February 2022 until December 2022 (Sales Agreement Zn22-002). The Low Carbon Zinc has a verified CO_2 footprint of less than 1 MT CO_2 equiv[illegible] zinc calculated according to the general principles of ISO 14064-3 (Greenhouse Gases – Part 3: Specification with Guidance for the Val Verification of Greenhouse Gas Assertions)

Sven Hjelmstedt
Director Sales

Daniel Peltonen
President Boliden

Teck

Teck Resources Limited
TSX: TECK.A, TECK.B
NYSE: TECK
www.teck.com

News Release

For Immediate Release
23-21-TR

Date: March 29, 2023

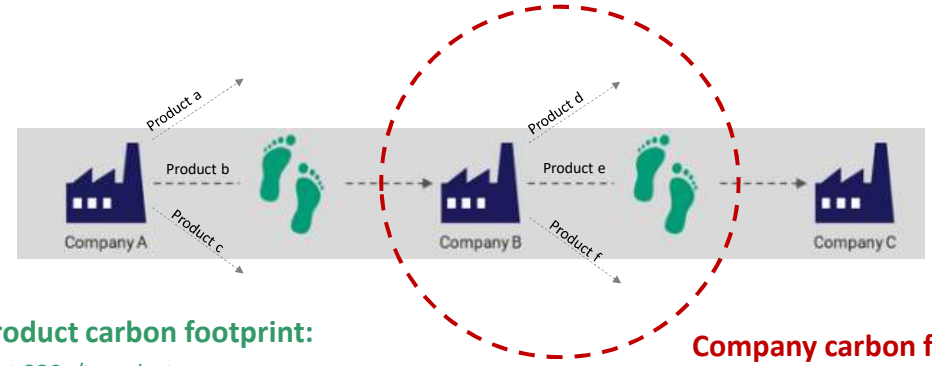
Teck Trail Operations Announce Low-Carbon Refined Zinc

Vancouver, B.C. – Teck Resources Limited (TSX: TECK.A and TECK.B, NYSE: TECK) ("Teck") announced today a new report outlining the extremely low carbon footprint of the Special High Grade (SHG) refined zinc from its Trail Operations in British Columbia, Canada. The report, which was

Credibility through Harmonization, Transparency, Certification

- Clear definitions and guidance
- Alignment between up- and downstream users' standards
- Audits and certification

Types of Carbon Footprint



Product carbon footprint:

- t CO2e/t product
- Needed by downstream companies for their CF reporting and in product design
- Based on LCA standards (ISI 14044, 14067, and GHG Protocol Products Standard

Company carbon footprint:

- t CO2e per company per year
- Used by banks and in sustainability reporting
- Based on GHG Protocol Corporate Standards Scope 1,2,3

CF: Carbon Footprint LCA: Life Cycle Assessment

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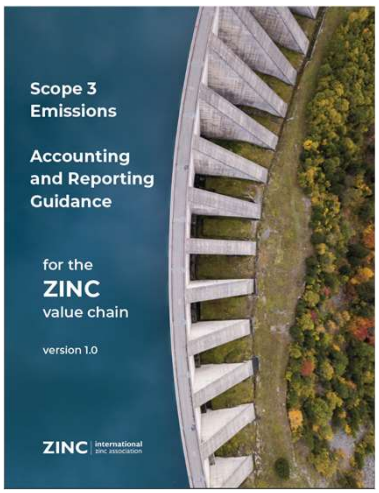

Download: https://www.zinc.org/climate_change/

Zinc Company Carbon Footprint

- Scope 3 Guidance in line with GHG Protocol Corporate Standard
- Based on ICMM Scope 3 Guidance for the mining and metals industry
- Launched in Oct 2023

➢ **Increasingly used by companies**

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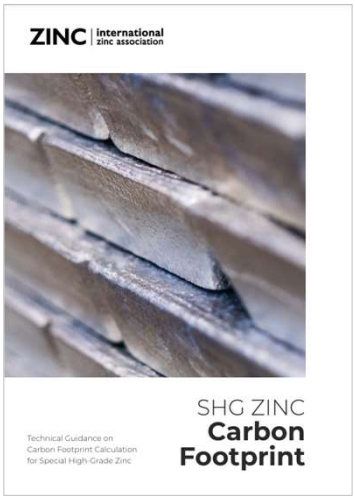


Download: https://www.zinc.org/climate_change/

Zinc Product Carbon Footprint

- Guidance in line with GHG Protocol Products Standard and ISO 14044 and 14067
- Launched in 2023; version 2.0 in peer review process

➢ **Approved by LME$_{passport}$**

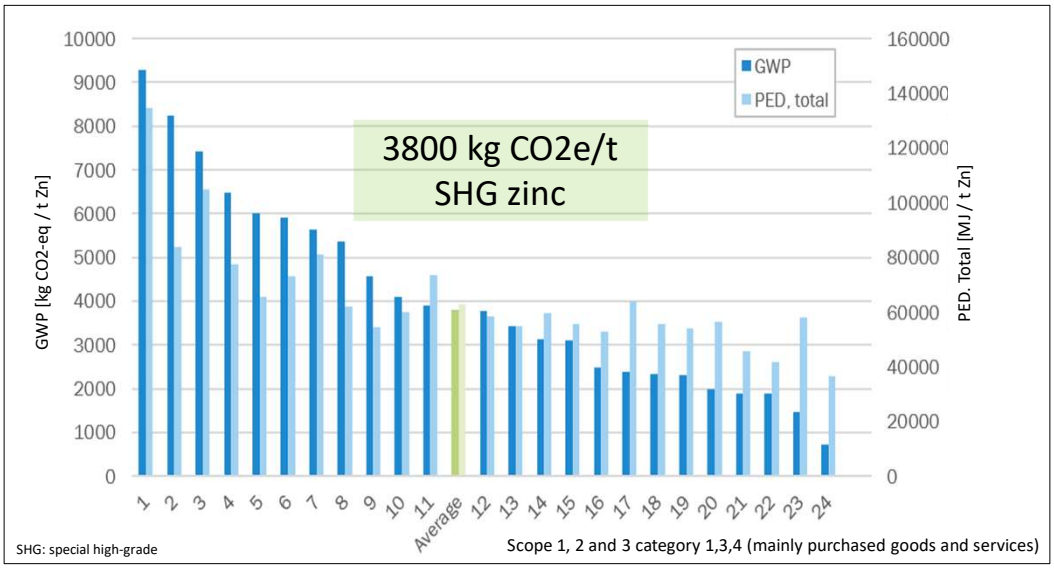
Download: https://www.zinc.org/life-cycle-assessment/

Specific Versus Average Carbon Footprint

- Averages are used as default and in early design stages.
- High quality average data in relevant data bases ensure market access.

➢ **IZA provides global or regional averages based on anonymized industry data.**

Average Product Carbon Footprint for SHG Zinc



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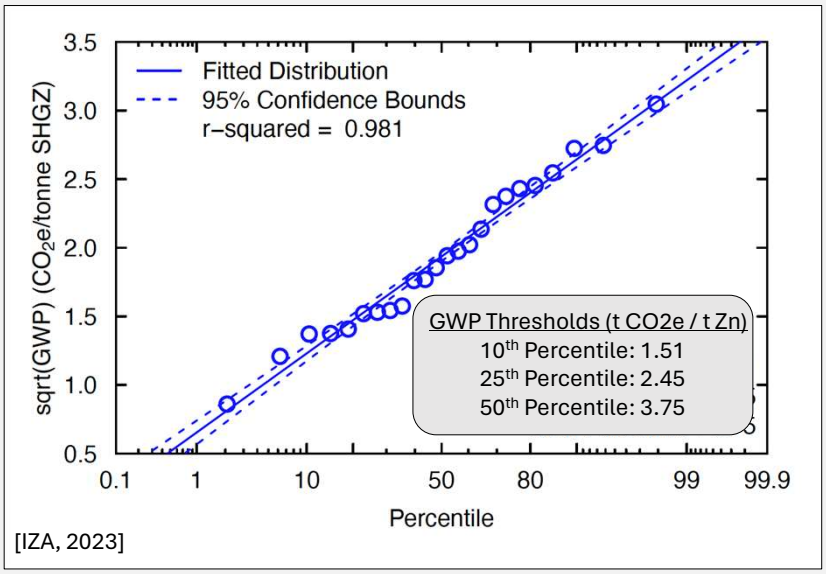

[IZA, 2023]

What is "Low Carbon Zinc?"

1. Global Warming Potential for smelters taken from LCA
2. All data used (no separation)
   - RLE vs. ISF
   - Crude oxide use
   - Regions
3. Data transformed for linearized model
4. Percentiles reported for market comparisons
5. Regular updates managed by IZA

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Take Aways Zinc Carbon Footprint

Different CFs for different purposes

- Product CF
- Company CF

IZA guidance for harmonization and transparency

- Scope 3 reporting
- Product CF
- Average CFs

There is no definition for "low carbon zinc"

- Companies can claim to be below the global average.

CF: Carbon Footprint, IZA: International Zinc Association LCA: Life cycle Assessment

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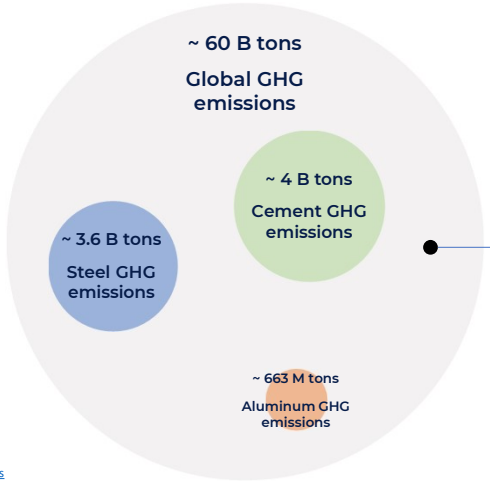
Baseline Carbon Footprint



~ 59 M tons
Zinc GHG emissions

Global zinc industry (2020)

Sources:
1. Global GHG emissions
2. Steel GHG emissions
3. Aluminum GHG emissions
4. Sweden's GHG emissions

GHG: Greenhouse Gas, such as CO_2 and methane

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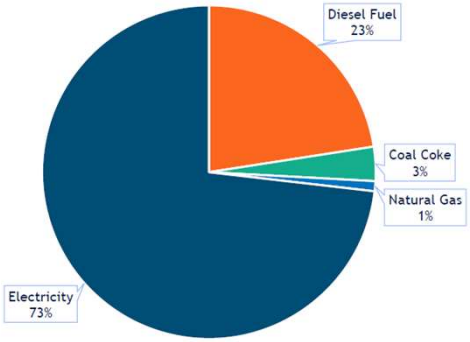
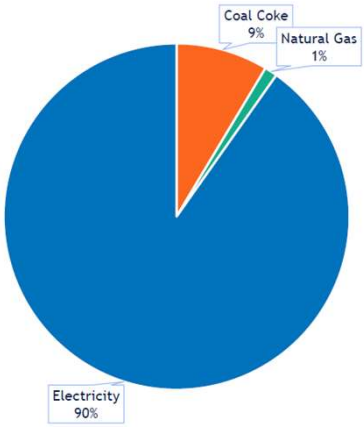
GHG Emissions by Source

Zinc mining 2019, Scope 1 and 2



Zinc smelting 2019, Scope 1 and 2



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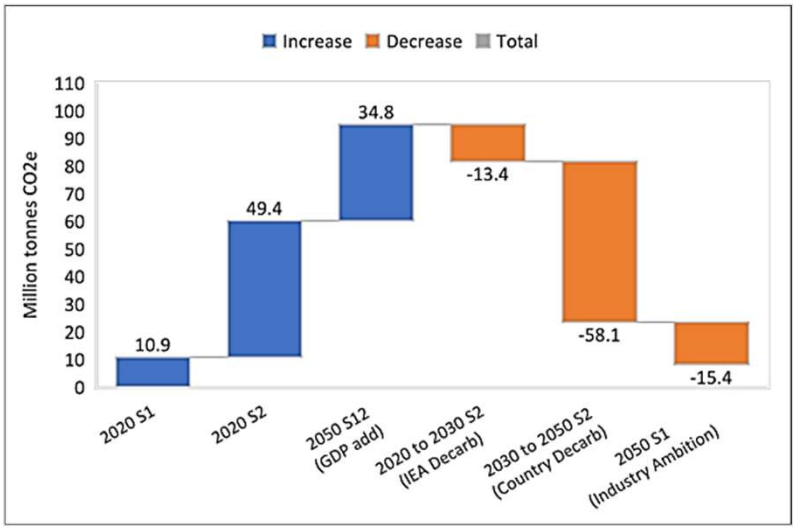
Global Carbon Footprint Context

- Idealized 2050 roadmap
- Scope 1 & 2
- Next Step: increase granularity and identify impact opportunities at regional, country, and site level



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Summary

- Zinc is long-time available from mined and recycled sources.
  - It is a critical or strategical raw material in many jurisdictions.
- The zinc sector focuses on products and sites with low carbon footprints.
  - IZA provides guidance on calculation and reporting to ensure harmonization, transparency, and credibility.
- The Zinc sector is reducing its carbon footprint.
  - IZA supports member companies with the Decarbonization Roadmap.

Thank you for your attention

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