



Greenhouse Gas Emissions from **World Zinc Mining**

A mine-by-mine analysis

Metalytics Pty Limited and **minecost.com**
have joined forces
to produce the first comprehensive analysis of
energy consumption and **CO₂ emissions**
of global primary zinc production

Greenhouse Gas Emissions from World Zinc Mining

Carbon Emissions are Now of Critical Strategic Importance

This timely analysis, unavailable elsewhere, combines the ten-year mine modelling experience of minecost.com with the analytical expertise and detailed industry knowledge of [Metalytics](http://Metalytics.com). It examines the pattern and range of energy consumption and greenhouse gas emissions at every step in the zinc production chain from mining to production of finished primary metal.

The 378 page report presents 149 tables and 82 coloured charts that list and graphically illustrate:

- mining and full onsite energy consumption and GHG emissions
- zinc's share of mining and site energy consumption and GHG emissions
- zinc's share of energy consumption and GHG emissions (on- and off-site) through to finished metal production per tonne of contained zinc in ore (allocated both on a mass basis and according to value)
- unit cash cost of production of refined zinc (with carbon penalties at various levels).

Clients buying this report also receive a powerful MS Excel-based spreadsheet model that can generate the data tables as well as energy, emission and cost curves displaying individual mine-by-mine data and weighted averages by company and producer country, under various forecast scenarios.

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Australia

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Brazil

Canada

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India

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Kazakhstan

Korean Republic

Mexico

Namibia

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Russian Federation

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- GHG intensities of zinc production vs other metals
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Appendices

The Report Appendices give detailed results for the years 2007 and 2012 set out as follows:

Tables Only

- Mine Production – Details
- Zinc Mine Operations – Energy Inputs per tonne Ore
- Zinc Mine Downstream Activities

Charts with Tables

Each chart is accompanied by two tables, one ranked in ascending order of the results (i.e. in the same order as each producer appears on the chart) and the other sorted alphabetically by mine within country, by company or by country as appropriate.

Mine Operations Results

This section compares the energy consumptions and CO₂-equivalent emissions of the activities that produce "mine output" (i.e. zinc in concentrates).

These include excavation and ore extraction and transport, disposal of waste rock, and ore crushing and concentration, but not the downstream transport and metallurgical activities required to produce slab zinc from concentrates.

Zinc Mine Operations –

- Final Energy per unit Ore
- CO₂-e Emissions per unit Ore
- Final Energy per unit Ore: by Mining Company
- CO₂-e Emissions per unit Ore: by Mining Company
- Final Energy per unit Ore: by Country of Mining
- CO₂-e Emissions per unit Ore: by Country of Mining
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Mine
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Mining Company
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Country of Mining
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- CO₂-e Emissions (allocated by metal value) per unit Zinc: by Mining Company
- CO₂-e Emissions (allocated by metal value) per unit Zinc: by Country of Mining

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All Onsite Activities & Transport Results

In this section we take a broader “whole-of-site” perspective, including the energy consumptions and CO₂-equivalent emissions of integrated smelting and refining activities that take place at the same location as mining operations, and adding the transport necessary to deliver site products to market or to a smelter/refinery.

All Onsite Activities & Transport –

- Final Energy per unit Ore
- CO₂-e Emissions per unit Ore
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Mine
- Final Energy per unit Ore: by Mining Company
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Mining Company
- Final Energy per unit Ore: by Country of Mining
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Country of Mining

Finished Zinc Results

For full like-with-like comparisons, this section compares the final energy consumptions and CO₂-equivalent emissions associated with entire production chains from mining ore to the refining of marketable-quality zinc metal, on a mine-by-mine basis, along with totals and weighted averages by company and country of mining. Offsite activities such as concentrate transport, metallurgical processing at dedicated or representative smelters and refineries are all included in the analysis.

Finished Zinc Production –

- Final Energy per unit Ore: by Mine
- CO₂-e Emissions per unit Ore: by Mine
- Final Energy per unit Ore: by Mining Company
- CO₂-e Emissions per unit Ore: by Mining Company
- Final Energy per unit Ore: by Country of Mining
- CO₂-e Emissions per unit Ore: by Country of Mining
- Final Energy (allocated by metal mass) per unit Zinc: by Mine
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Mine
- CO₂-e Emissions (allocated by metal value) per unit Zinc: by Mine
- Final Energy (allocated by metal mass) per unit Zinc: by Mining Company
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Mining Company
- CO₂-e Emissions (allocated by metal value) per unit Zinc: by Mining Company
- Final Energy (allocated by metal mass) per unit Zinc: by Country of Mining
- CO₂-e Emissions (allocated by metal mass) per unit Zinc: by Country of Mining
- CO₂-e Emissions (allocated by metal value) per unit Zinc: by Country of Mining

Production Costs

Cost curves and data tables illustrate the impact that would have resulted from the application of a universal penalty of US\$50/tonne CO₂-equivalent on all emissions associated with evaluated Zinc production in 2007.

Zinc Cash Costs of Production –

- by Mine
- by Mining Company
- by Country of Mining
- by Mine (Carbon Tax \$50/t CO₂-e)
- (Carbon Tax \$50/t CO₂-e) by Mining Company
- (Carbon Tax \$50/t CO₂-e) by Country of Mining

Mines included in the analysis

Australia

Broken Hill
Cannington
Century
Endeavour (Elura)
Golden Grove
McArthur River
Mt Garnet
Mt Isa Lead-Zinc
Rosebery

Bolivia

San Cristobal

Canada

Brunswick
Duck Pond
Flin Flon
Kidd Creek
La Ronde
Langlois
Myra Falls
Scotia
Snow Lake

Chile

El Toqui

Finland

Pyhäsalmi

Honduras

El Mochito

India

Rajpura Dariba
Rampura Agucha
Zawar Mines

Ireland

Galmoy
Lisheen
Tara

Kazakhstan

Eastern Region
Karanganda

Mexico

Bismark
Charcas
Francisco Madero
Fresnillo
La Cienega
Naica
Sabinas
San Martin
St Barbara
Tizapa

Morocco

Tighza

Namibia

Rosh Pinah
Skorpion

Peru

Antamina
Atacocha
Cerro de Pasco
Cerro Lindo
Colquijirca
El Porvenir
Huanzala
Huaron
Iscaycruz
Quiruvilca
Raura
San Vicente
Uchucchacua
Yauli

Portugal

Neves Corvo

South Africa

Black Mountain

Sweden

Boliden
Garpenberg
Zinkgruvan

Turkey

Çayeli

USA

Balmat
Doe Run
Greens Creek
Lucky Friday
Montana Tunnels
Pend Oreille
Red Dog
Sweetwater

The Report comes with interactive spreadsheet models.

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