ICMM Mining with Principles

The Global Mining Dataset

Understanding the global distribution of mining and metals facilities

September 2025

Introduction 01

As the world grapples with urgent challenges – from climate change and biodiversity loss to the imperative of a just energy transition – the demand for critical minerals is surging. Mining's role in supplying these essential resources, powering global development, and enabling a sustainable future is undeniable.

Synopsis

- Building an accurate picture of the global mining and metals industry is vital for data-driven discussion, ultimately informing public and policy debate.
- The Global Mining Dataset is a first step towards this goal. It includes over 15,000 mining and metals facilities spread across 151 countries, producing 47 commodities.
- The Global Mining Dataset represents the most comprehensive single list of mines, smelters, refineries, and processing plants currently available, and we have made as much as possible publicly accessible in a public version of the Dataset (8,508 mining and metals facilities).
- This is a foundational first report of a planned series that aims to support further research and enhance our collective understanding of the mining and metals industry.

Yet, despite this indispensable contribution, a significant gap persists: the lack of comprehensive, reliable, and standardised industry-wide data.

This dearth of quality information has, for too long, hindered the ability of policymakers, investors, civil society, and even industry itself, to draw fully informed opinions, craft effective regulations, and truly understand both the impact and contribution of the mining sector.

Without robust data, dialogue risks becoming anecdotal, policy formulation can lack precision or lead to unintended outcomes, and the industry's commitment to responsible practices might not be improved upon where needed or, conversely, not fully appreciated.

Recognising this critical need, ICMM is embarking on a multi-year data-gathering initiative to fundamentally transform the information landscape surrounding the mining industry. Existing global data about the mining and metals sector is either incomplete, inconsistent, commodity- or region-specific, or locked behind paywalls.

Moving beyond fragmented reports to establish a credible source of information that captures mining's multifaceted contributions and impacts is not a task we can – or want to – undertake alone. We are committed to working with partners to build robust, transparent datasets that can inform policy, support a clearer public understanding, and elevate the conversation around mining's role in society.

Our first step in this data-gathering initiative has been to answer three basic but foundational questions that will help us to build out other datasets in the future:

How many mining and metal or mined material processing facilities are there in the world, where are they located, and what do they produce?

With support from Accenture, Global Energy Monitor[1,2], and Skarn Associates[3], and with access to public[4,5], and proprietary sources[6], we've assembled a preliminary, global, facility-level dataset which we call the Global Mining Dataset.

The Dataset will need refinement and further curation over time. However, we hope that as a starting point it sparks curiosity, encourages scrutiny, and inspires others to collaborate with us towards building a data-driven picture of the mining and metals sector and its evolving role in sustainable development.

This initiative is about more than just data collection: it's about building a shared understanding, fostering evidence-based dialogue, and ultimately, shaping a mining industry that not only provides the materials essential for global progress but does so responsibly and with demonstrable positive impact. We invite all interested stakeholders to join us on this vital journey.

Insights from the Global Mining Dataset

02

The Global Mining Dataset identifies 15,188 mining and/or processing facilities, producing 47 different primary commodities. Each is identified with approximate geocoordinates and facility name(s).

While the number of facilities contained in the Dataset is likely an underestimate of the total number of such facilities globally, it represents the most comprehensive single list of mines, smelters, refineries and processing plants currently available and will be an invaluable foundation for building out our collective understanding of the sector.

Over time the Dataset will be developed to improve its accuracy, coverage and our confidence in it, and we welcome and encourage partnership with others on this journey. The Dataset focuses on the large-scale mining and metals sector at this stage, because small-scale and artisanal mining operations are largely absent from the source datasets used.

About the Global Mining Dataset

This report draws on ICMM's complete Global Mining Dataset of 15,188 mines and processing facilities, which combines both publicly available data and proprietary information. Alongside this report we have released a public Global Mining Dataset containing information for 8,508 mines and processing facilities. The public Global Mining Dataset excludes 6,680 facilities that exist in the complete Global Mining Dataset due to S&P's licensing restrictions. For access to the proprietary data that was unable to be shared in the public Global Mining Dataset, please refer to the S&P Capital IQ Platform.

1. Global Energy Monitor (2025), *Global Coal Plant Tracker*, https://globalenergymonitor.org/projects/global-coal-plant-tracker/
2. Global Energy Monitor (2024), *Global Iron Ore Mines Tracker*, https://globalenergymonitor.org/projects/global-iron-ore-mines-tracker/
3. Skarn Associates (2025), *Skarn Associates Mining & Metals Industry Database*, https://www.skarnassociates.com/
4. Jasansky, S., Lieber, M., Giljum, S. et al. (2023), 'An open database on global coal and metal mine production', *Sci Data*, 10, 52, https://doi.org/10.1038/s41597-023-01965-y
5. Hudson-Edwards, Karen; Owen, John; Kemp, Deanna et al. (2023), 'Water and Planetary Health Analytics (WAPHA) global metal mines database [Dataset]', *Dryad*, https://doi.org/10.5061/dryad.j3tx95xmg
6. S&P Global Market Intelligence (2025), *S&P Capital IQ metals and mining database*, https://www.spglobal.com/marketintelligence/en/campaigns/metals-mining

Insight 1: The mining and metals industry is global, but its footprint is unevenly distributed

— The Dataset includes 12,876 mines, 1,980 sites that process metals or mined raw materials, and 332 co-located facilities.

— Mining and processing facilities (see pop out box to the right) are present in over 151 countries, which means that at least 75 per cent of national economies have at least some connection to large-scale mining or the processing of metals or mined materials.

— Despite a widespread global distribution of mining and processing activities, three countries (China, the USA, and Australia) account for approximately 45% of all facilities in the Dataset.

Defining facility types

— *Processing facilities* include both metallurgical and mined raw material processing facilities.

— *Metallurgical processing facilities* refers to smelters, refineries, and steel plants.

— *Mined raw material processing facilities* refers to plants for crushing, grinding, washing or flotation of mined raw materials.

— *Co-located facilities* refers to where a mine is located with one or more metallurgical or processing facilities.

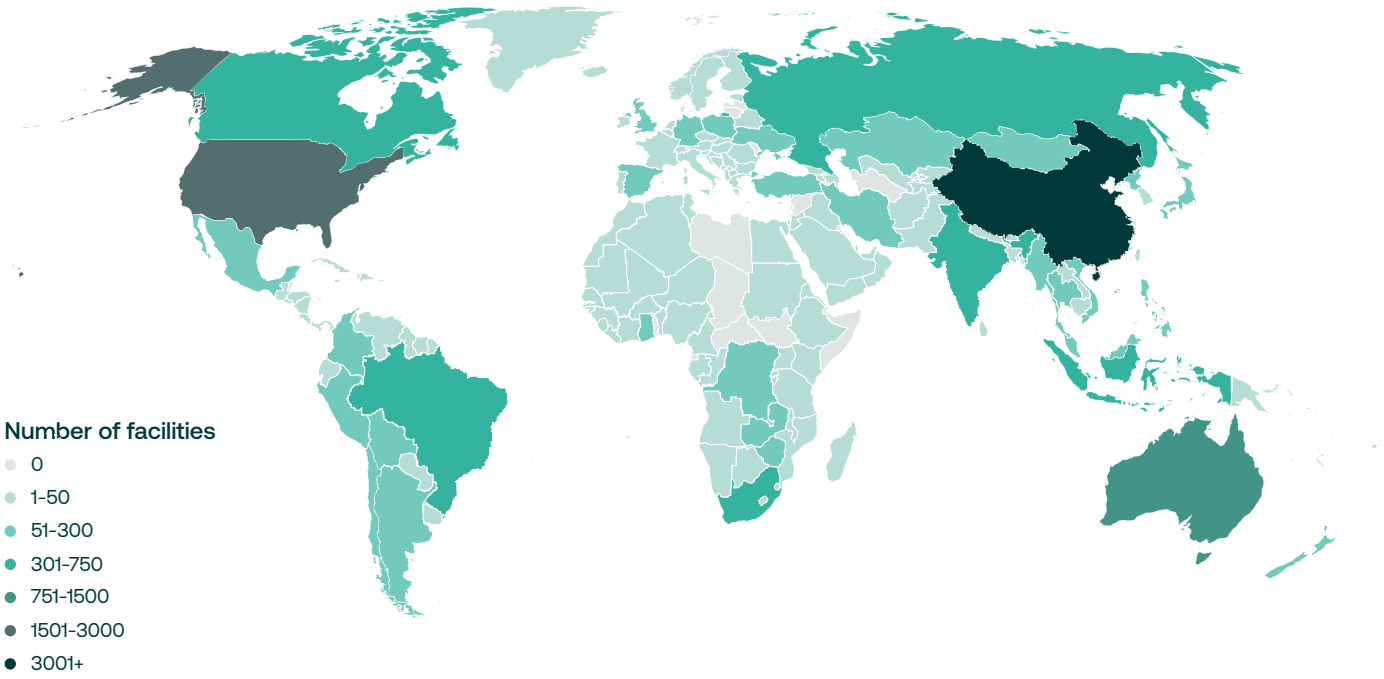

Figure 1: Global distribution of large-scale mining and processing facilities

Insight 2: Coal, gold, copper, and iron ore are the most represented primary commodities by number of mines

— Approximately 80 per cent of the mines in the Dataset produce one of four commodities as their primary output.

— Coal mines make up the largest share of the Dataset, comprising 42 per cent of all mines. Gold follows at 17 per cent, then copper (12 per cent), and iron ore (9 per cent).

— While the number of mines does not necessarily reflect production volumes, they nevertheless provide regional insights: Asia has the largest number of mines producing copper, iron ore, and coal, and North and Central America host the largest number of gold mines.

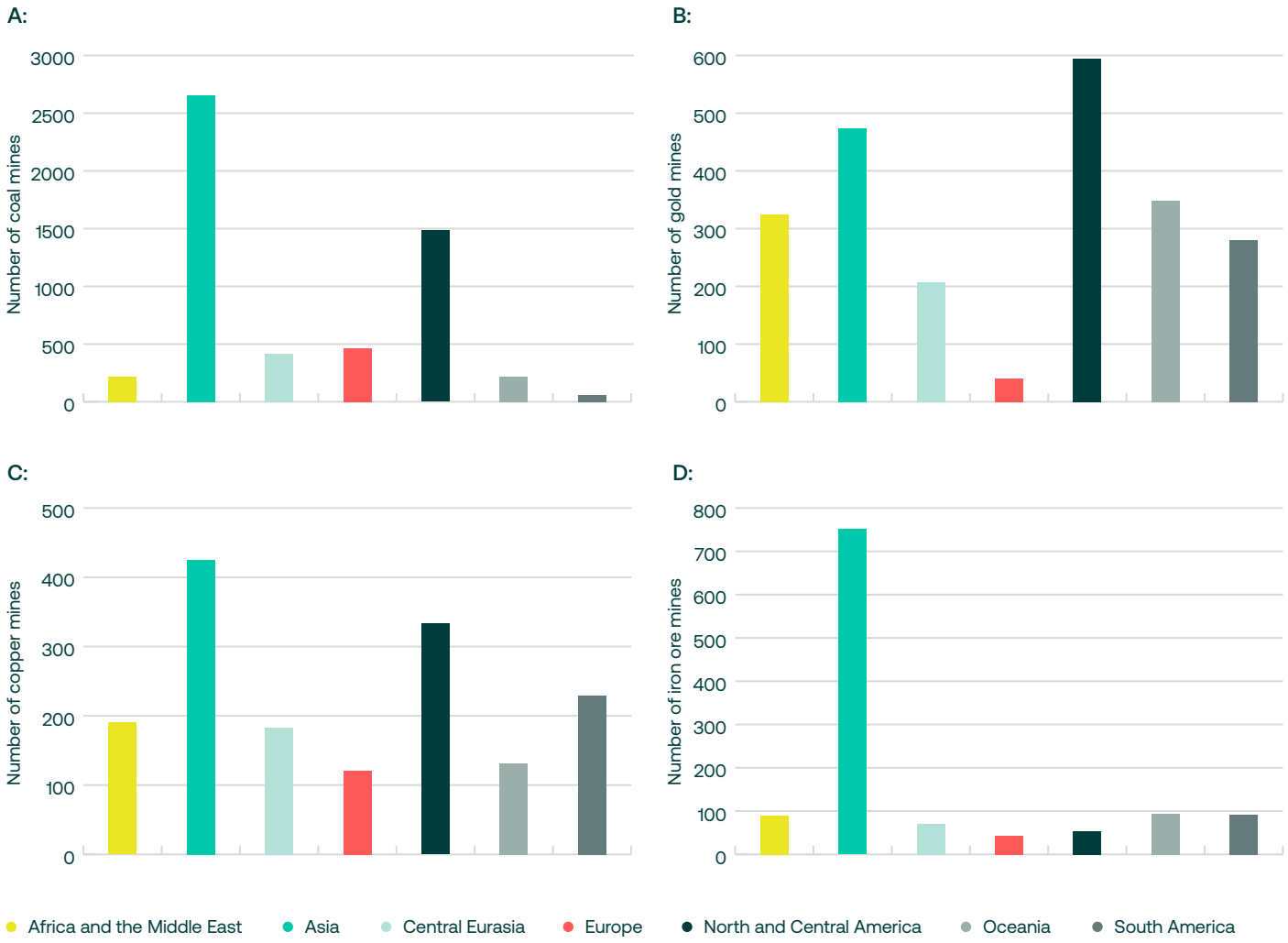

Figure 2: Regional distribution of mines producing the four most represented commodities in our Dataset
A: coal (5,509 mines); B: gold (2,269 mines); C: copper (1,612 mines); D: iron ore (1,194 mines).
Note the varying scale of the y-axis

Confidence in our data

— The 15,188 mining and processing facilities in the Dataset are derived from a range of public and proprietary sources. To support transparency and usability, we have assigned a confidence level to each facility based on how many independent sources it appears in.

— Confidence levels vary by commodity, reflecting differing quality and consistency of underlying data. For example, we have a greater degree of confidence in our data on coal than on gold (see Figure 3). Some source datasets had already undergone rigorous quality control before we received them, while others contained a prevalence of legacy sites, duplicates and artefacts that required manual curation.

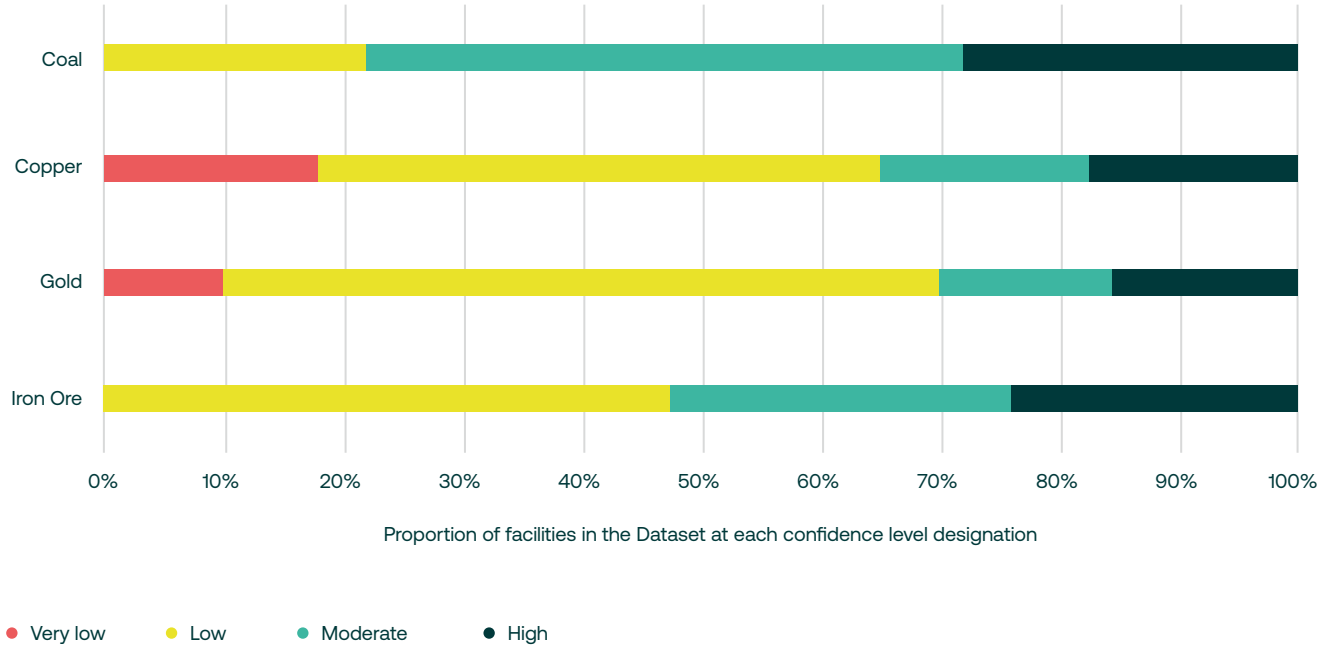

Figure 3: Confidence levels in our data

Insight 3: At the regional level, metal mining occurs in different locations than metal refining, smelting and steelmaking

— The distribution of metallurgical facilities such as smelters, refineries and steel plants broadly matches the distribution of metal mines; but within countries and regions, there are notable differences in the locations of metal mining operations and the metallurgical facilities for purifying and refining these metals.

— The difference in distribution between mining and metallurgical activities is visible in several regions. In North America, metal mining facilities are concentrated in the west, while metallurgical facilities are more prevalent towards the east. Similarly in Japan, metallurgical facilities are more common in the south of the country, with mining in the north.

— At a regional level, Europe has a greater density of metallurgical facilities than mines, likely reflective of Europe's strong manufacturing sector supporting the automotive, aerospace and electronics industries, combined with the historic depletion of the continent's easily accessible high-grade ore deposits.

— Globally, China is recorded as having the largest number of metallurgical facilities in the Dataset (426), followed by the USA (120), India (87) and then Brazil (65).

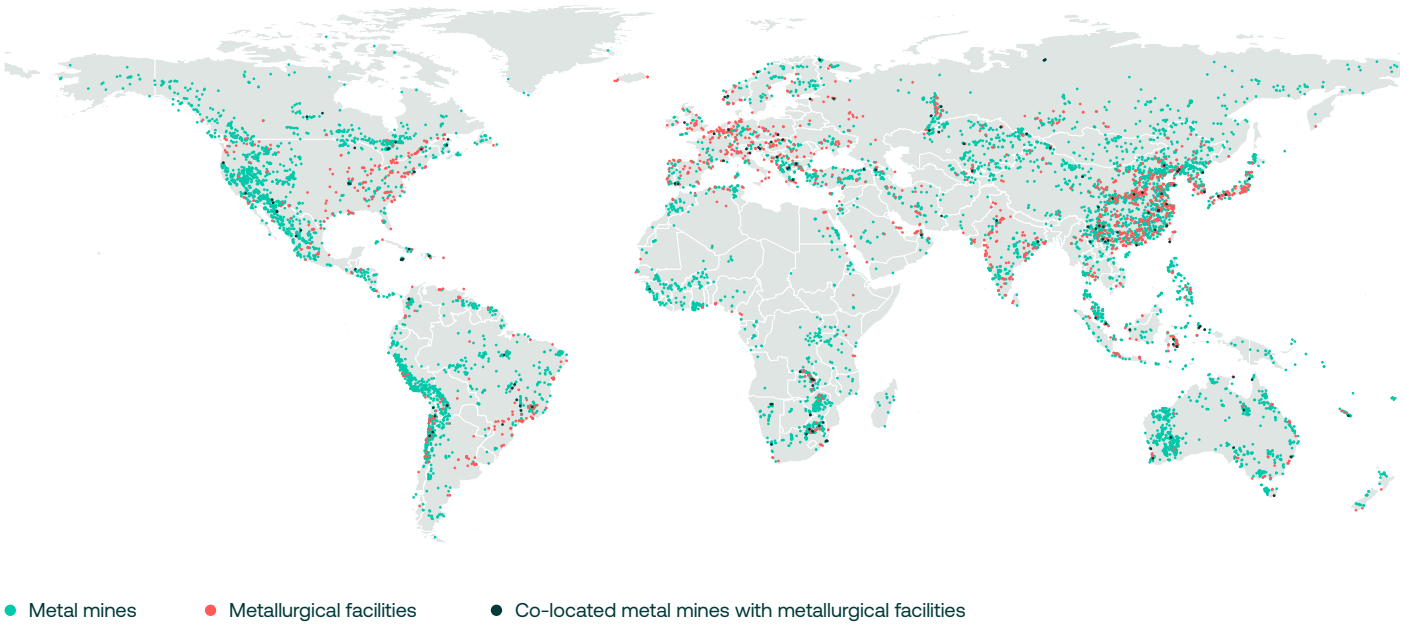

Figure 4: Global distribution of metal mines, metallurgical facilities, and co-located metal mines with metallurgical facilities

Commodity-specific mapping
Figure 5 provides a commodity-specific example of the extraction–processing distribution, focussing on copper. Access to commodity-level data supports more credible analysis of processing pathways – essential for informed public discourse and sound policy decisions.

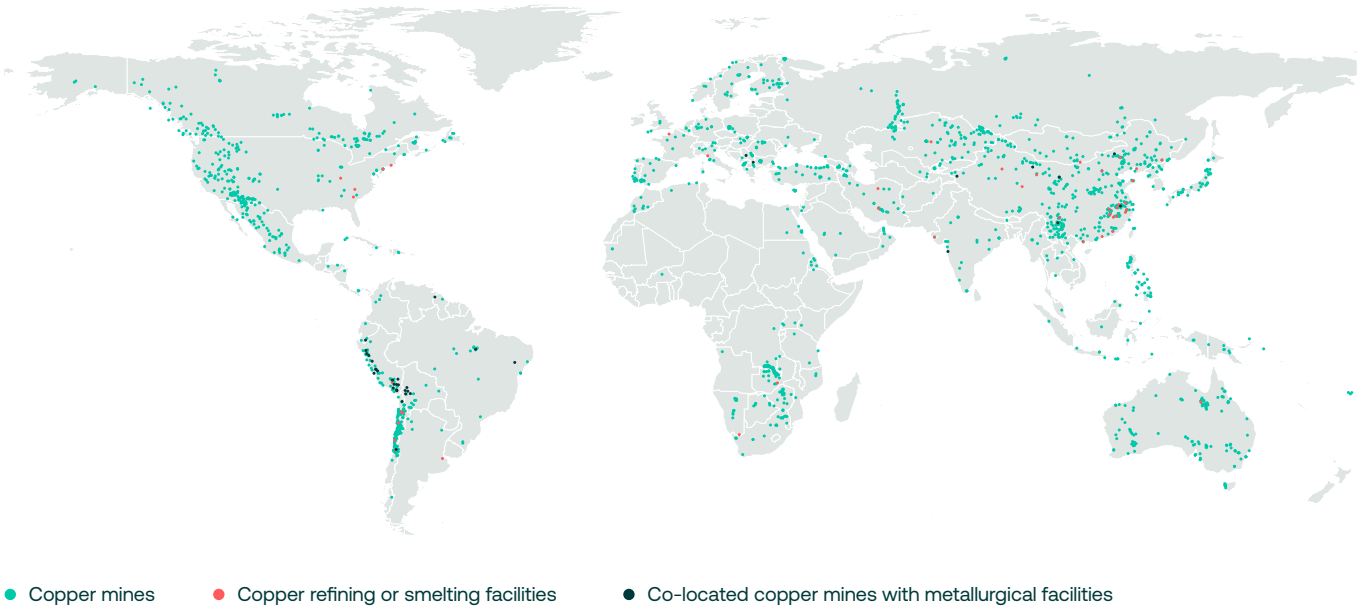

Figure 5: Global distribution of copper mines, copper refining or smelting facilities, and co-located copper mines with metallurgical facilities

Implications and Limitations of the Global Mining Dataset 03

The UN has identified misinformation and disinformation as global vulnerabilities that pose serious risks for which the international community is deeply underprepared. Data gaps are key obstacles to overcoming these challenges and to engaging in evidence-based narratives.[7] The mining and metals sector is not immune to data gaps or the impacts of mis- and dis-information.

The Global Mining Dataset is ICMM's first step in closing critical industry-wide data gaps relating to mining and metals, essential to provide credible foundations for evidence-based dialogue. Bringing together a range of public and proprietary sources, the Dataset provides a credible platform on which future data-gathering efforts on the global mining and metal sector can build.

Capturing the current landscape of large-scale mining operations, the Dataset reveals a sector that is inherently global, yet highly concentrated in key regions and commodities. The dominance of coal, gold, copper, and iron ore operations reflects both market demand and geological realities. The uneven geographic distribution of facility types also reflects geologic,

7. United Nations (2024), *Global Risk Report*, New York, https://unglobalriskreport.org/UNHQ-GlobalRiskReport-WEB-FIN.pdf

economic and political considerations, with mines located where minerals are to be found, where the enabling environment for investment is also a factor. Smelters and refineries are often located close to ports, or manufacturing industries supplying end-user markets.

At this stage, the Dataset focuses on large-scale mining and metals operations, because small-scale and artisanal mining operations are largely missing from the source datasets we used. This limitation was not intentional but is significant. We recognise that any dataset that does not capture small-scale and artisanal mining is incomplete, particularly for commodities such as gold and cobalt. This imbalance presents both a challenge and an imperative: the Dataset makes visible not just what we know about mining and metals' global footprint, but also what remains systematically under-documented.

Consistent with our focus on major mining and metal production, this version of the Dataset excludes quarries (by removing facilities identified as primarily producing gravel, sand, aggregate, or dolomite). We also excluded exploration sites, a deliberate choice to only include mining facilities that have moved beyond the exploration and feasibility phases in the Dataset. Additionally, any historical mine sites where visible evidence of large-scale operations – such as pits, tailings storage facilities, or infrastructure – is no longer apparent in geospatial imagery have been removed. This ensures our focus remains on the present-day mining and metals industry, helping to prevent the Dataset from being overinflated by legacy, historical features such as old mine shafts.

Our Dataset is the most comprehensive publicly available compilation of mining and metals facilities globally. However, it is not a static, final dataset – it is a starting point. We welcome partnership with others to close country or commodity-level gaps in our data and to curate, refine, validate and add to the data in this Dataset.

For more detailed information on our methodology, data processing and a list of countries for which we do not currently have any data, please see our Methodology Appendix.

Looking forward 04

The Global Mining Dataset is the start of an exciting initiative ICMM is leading to transform the information landscape surrounding the mining and metals industry. Data gaps already hinder evidence-based conversations and policy formulation. As mineral demand patterns evolve, the importance of closing data gaps that could obscure a shared understanding of existing and emerging supply chains will become increasingly important.

Future data-gathering efforts will focus on understanding the impact of and contribution to society from these 15,188 facilities that comprise our best estimate for the global mining and metals sector at this stage. We invite regional and global partners from academia, consultancies, governments or commodity and national associations, to collaborate with us and further develop the Dataset. These collective efforts will seek to improve the accuracy, coverage and our confidence in the current data, build out future datasets and ultimately contribute robust, publicly available data that informs policy and public discourse relating to the mining and metals sector.

Acknowledgments

The development of this report and Global Mining Dataset would not have been possible without the input and support of the individuals below. ICMM gratefully acknowledges the following contributions:

External sources

The Global Mining Database draws upon the following datasets:

- The Water and Planetary Health Analytics (WAPHA) global metal mines database[8]
- The Global Energy Monitoring Global Coal Tracker[9]
- The Global Energy Monitoring Iron Ore Mines Tracker[10]
- An open database on global coal and metal mine production[11]
- S&P Capital IQ Pro[12]
- Skarn Associates Database[13]

We are incredibly grateful for these organisations' data, with a particular note of thanks to Skarn Associates and Global Energy Monitoring for their close collaboration and engagement. We are also grateful to the academic teams of Jasansky et al. (2023) and Hudson-Edwards et al. (2023) for their work to create publicly available datasets on global mining facilities.

External expertise

The development of the Global Mining Database was supported by Accenture, with technical assistance offered by Katie Clamp, Karly Wai and Dr Marc Plunkett, and strategic expertise offered by Gabriella Oken and Cameron Tandy. We are also grateful to Adam Skarshewski for data manipulation support.

ICMM team

Dr Emma Gagen provided principal oversight of the project, including the project's conceptual development, stakeholder engagement, and data verification. Dr Sally Innis led the development of the Global Mining Dataset. Will Wardle led the development of this report. Both tasks were supported by Jessica Hines. Support and input were also provided by Dr Diane Tang-Lee, Rohitesh Dhawan, Aidan Davy, Danielle Martin, Duncan Robertson, Jessica Nicholls, Owen Newton, Nic Benton, Kira Scharwey, and Marine Godard.

8. Hudson-Edwards, Karen; Owen, John; Kemp, Deanna et al. (2023), 'Water and Planetary Health Analytics (WAPHA) global metal mines database [Dataset]', *Dryad*, https://doi.org/10.5061/dryad.j3tx95xmg
9. Global Energy Monitor (2025), *Global Coal Plant Tracker*, https://globalenergymonitor.org/projects/global-coal-plant-tracker/
10. Global Energy Monitor (2024), *Global Iron Ore Mines Tracker*, https://globalenergymonitor.org/projects/global-iron-ore-mines-tracker/
11. Jasansky, S., Lieber, M., Giljum, S. et al. (2023), 'An open database on global coal and metal mine production', *Sci Data*, 10, 52, https://doi.org/10.1038/s41597-023-01965-y
12. S&P Global Market Intelligence (2025), *S&P Capital IQ metals and mining database*, https://www.spglobal.com/marketintelligence/en/campaigns/metals-mining
13. Skarn Associates (2025), *Skarn Associates Mining & Metals Industry Database*, https://www.skarnassociates.com/

Appendix: Methodology for the Global Mining Dataset

06

Global Mining Dataset – data collection and processing

A comprehensive list of mines, smelters, refineries, steel plants and processing plants worldwide was compiled from academic literature, commercial data providers, and international databases. The primary sources included:

- The Water and Planetary Health Analytics (WAPHA) Global Metal Mines Database, list of active sites (21,164 sites)
- Global Energy Monitoring (GEM) Global Coal Tracker (6,580 sites) & Iron Ore Mines Tracker (890 sites)
- Open database on global coal and metal mine production (2,296 sites)
- Skarn Associates Database (1,918 sites)
- S&P Capital IQ Pro (26,489 sites)

Datasets were selected for inclusion in the Global Mining Dataset based on several criteria, including data currency, global geographic coverage, and the availability of key metrics (i.e., mine name, geocoordinates, and commodities mined). Each source was systematically evaluated to identify technical, commodity-specific, or spatial limitations.

To further improve data coverage, additional providers were approached but declined to collaborate. S&P Capital IQ Pro imposed licensing restrictions, permitting the use of facility-level data only for internal validation while explicitly prohibiting its inclusion in public releases. Consequently, all S&P-derived site records were excluded from the publicly available dataset to adhere to these constraints, limiting the transparency of the final output.

Data cleaning and preprocessing

Prior to integration, each dataset underwent an initial cleaning process to:

- Remove invalid entries (e.g., missing geocoordinates).
- Eliminate duplicate facilities (e.g., a single mine listed multiple times within the same dataset).
- Filter out non-relevant sites (e.g., exploration projects and mine features misclassified as active mines).

The extent of cleaning varied by dataset, with some requiring more rigorous deduplication or error correction than others. Approximately 11,000 entries were removed during this initial preprocessing.

Dataset integration and deduplication

Following the initial cleaning, the five datasets were merged into a single Global Mining Dataset. A Python-based deduplication process was then applied to consolidate nearby facilities and standardise records. Key steps included:

Automated Merging of Nearby Sites:

- Mines within 2.5 km of each other were programmatically grouped into a single site using an automated spatial clustering algorithm (DBSCAN, ε=2.5km).
- Geocoordinates were averaged to produce a representative central location.
- All original mine names were preserved in a new column, ‘Group Names’, as a semicolon-delimited list.
- Commodities from all merged sites were combined into a unified, deduplicated list stored in ‘Group Commodities’.

Manual Review for Ambiguities:

- After automated merging, a manual review was conducted to identify mines with similar or identical names within a 15 km radius.
- Sites with matching or closely related names were merged under a single entry to further reduce duplication.

Quality assurance and validation

To ensure data accuracy, a Quality Assurance and Quality Control (QA/QC) process was applied involving both automated and manual validation:

Spatial Validation:

- Low confidence geocoordinates were cross-referenced using Google Earth to confirm the presence of mining facilities, processing plants, smelters or refineries at each location.
- Sites that could not be spatially validated (5,561 entries) were removed from the final database to ensure only verified facilities were included. Historic and legacy sites, such as abandoned mines or adits, were additionally removed during this process.

Commodity Verification:

— Primary and secondary commodities were verified using external resources, including online geologic databases (ie. MinDat, Porter GeoConsultancy, USGS).

Confidence assessment

Each site was assigned a confidence rating based on source verification:

— **High Confidence:** sites appearing across multiple primary datasets (Skarn Associates, S&P, Global Energy Monitor, WAPHA, and the Open database on global coal and metal mine production) or single-source entries originating from Skarn Associates (a very-high reliability provider).

— **Moderate Confidence:** Sites verified by either:

- 2-3 independent sources, or
- Single-source entries from high-reliability providers (Global Energy Monitor or the Open database on global coal and metal mine production).

— **Low Confidence:** A low confidence factor was applied for sites that were single-source entries originating from S&P.

— **Very Low Confidence:** single-source sites originating from the WAPHA database (due to higher validation issues during QA/QC).

The confidence rating is included as a dedicated column in the Dataset, allowing users to filter results based on data reliability.

Country-level groupings used to analyse the Dataset

Region	Countries Included
Africa and the Middle East	Algeria, Angola, Bahrain, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Egypt, Eritrea, Eswatini, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Iran, Iraq, Israel, Jordan, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Oman, Qatar, Republic of the Congo, Rwanda, Saudi Arabia, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Tunisia, Uganda, United Arab Emirates, Yemen, Zambia, Zimbabwe
Asia	Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Mongolia, Myanmar, Nepal, North Korea, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Vietnam
Central Eurasia	Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkey, Uzbekistan
Europe	Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Luxembourg, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom
North and Central America	Canada, Costa Rica, Cuba, Dominican Republic, El Salvador, Greenland, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Trinidad and Tobago, United States
Oceania	Australia, Fiji, New Caledonia, New Zealand, Papua New Guinea, Solomon Islands, Vanuatu
South America	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana, Paraguay, Peru, Suriname, Uruguay, Venezuela

A small subset of countries were not represented within source datasets and are therefore not present within the Dataset. These countries include: Antigua and Barbuda, the Bahamas, Barbados, Cabo Verde, Chad, Comoros, the Central African Republic, Denmark, Djibouti, Dominica, Equatorial Guinea, Gambia, Grenada, Haiti, Kiribati, Kuwait, Latvia, Lebanon, Liechtenstein, Libya, Lithuania, the Maldives, Malta, the Marshall Islands, Mauritius, Micronesia, Moldova, Monaco, Nauru, Brunei, Palau, Saint Kitts and Nevis, Saint Vincent and the Grenadines, San Marino, Sao Tome and Principe, Seychelles, Somalia, South Sudan, Syria, Timor-Leste, Togo, Tonga, and Turkmenistan.

ICMM stands for mining with principles.

We bring together a third of the global metals and mining industry, along with key partners to drive leadership, action and innovation for sustainable development, ultimately delivering a positive contribution to society.

Through collaboration, ICMM member companies set the standard for responsibly produced minerals and metals in a safe, just and sustainable world.

ICMM
53–64 Chancery Lane
London WC2A 1QS
United Kingdom

+44 [0]20 7467 5070
info@icmm.com

icmm.com

September 2025