



**“MINING AND ECONOMY: CHALLENGES AND
RECOMMENDATIONS” FORUM**



Policy recommendations for downstream value chain development in the mining industry

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Presentation outline



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2. Policies
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5. Mongolian copper downstream market
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Heavy industry current state and development

Heavy industry current state and development



For the development of the downstream industry, several important conditions must be met, which can be more complicated for a developing country than development of the mining sector itself. These are:

- Availability of market demand for products
- Available infrastructure and logistics
- Human resource
- Raw materials
- Availability of financial resources
- Favorable policy framework etc.

The government has transitioned from being a passive player that only provides the policy environment for private investment to an active player that constructs infrastructure and industrial projects through government-owned resources rather than waiting for private companies to invest in these endeavors.



Policies

Policies



The Parliament of Mongolia approved the following laws and plans to strengthen the heavy industry policy and establish an integrated system of developmental policy, planning, and management.

- Law on Development Policy and Planning (On 26 Nov 2015)
- Mongolian Sustainable Development Vision 2030 (on 5 Feb 2016)- ineffective due to the approval of Vision 2050 rendered
- Government Action Plan for 2016-2020
- Government Action Plan for 2020-2024
- Vision 2050 (in May 2020)
 - 2020-2030, 2031-2040, and 2041-2050
- General Guidelines for Medium-Term Development (2020-2025)

This highlights the strong continuing support from the GoM for the mining-based processing industry at the policy level and its willingness to further develop the industry.





Current projects



Erdenes Mongol LLC



A state-owned enterprise established in Feb 2007.

Fully or partially owned following mining projects:

- Oyu Tolgoi (copper)- 34%, Tavan Tolgoi (coal)- 65%, Baganuur (coal)- 75% and Shivee Ovoo (coal)- 90%

EMGL has expanded its portfolio, covering a wide variety of sectors:

- Downstream Processing (Shivee Energy with Chinese State Grid and Erdenes Steel with local Beren)
- Uranium (Badrakh Energy with French Areva)
- Oil & Gas (Erdenes Gas & Energy with local Altai)
- Infrastructure (Erdenes Ashid with local MAK)
- Gold and Silver Mining
 - Erdenes Gold Resource LLC (in 2018) - build the first national gold refinery plant in Ulaanbaatar's Songinokhairkhan district
 - Erdenes Silver Resource LLC (in 2019) - holds licenses for the Asgat silver deposit (6,400 tons of silver) and the Salkhit silver deposit (982 tons of silver and 1.3 tons of gold).



Coal projects



As of March 2021, Mongolia's coal reserves was 40 billion tons.

The Mongolian Ministry of Mining and Heavy Industry and the Mineral Resource and Petroleum Authority are the main regulators of the Mongolian coal market.

The largest companies:

- Erdenes Tavan Tolgoi (in 2010)
 - Tavan Tolgoi CHP (USD 600 million) - expected to be completed by 2024
 - ETT Coal concentrator (USD 911.53 million)-plans to sell total of 17.5 Mt of concentrate in 2021-2025
 - ETT Coke-Energy Plant
 - Erdenes Shivee Energy LLC (in 2016): Shivee Energy Complex Project- will have an annual capacity of 5,280 MW and use about 20 million tons of coal per year
- Mongolyn Alt- The Nariin Sukhait mine is located in Dalanjargalan soum of Umnugovi province, and has a production capacity of 10 million tons of coal per year
- Energy Resources
- SouthGobi Sands



Iron ore and crude oil projects

Iron ore projects: As of March 2021, Mongolia's iron ore reserves were 1860 million tons.

- EMGL: Erdenes Steel LLC- established in 2017 and required Total investment of MNT 320 million
 - Iron ore processing plant- owned by Beren LLC 50% and EMGL 50%,
 - substitute about USD 250 million imports
 - produce around 500 thousand tons of coke and 300 thousand tons of steel castings
- Beren Group
 - built a direct reduced iron (DRI) plant in Erdenet in 2014- 35 thousand tons of pig iron per year
 - plans to build steel plant with the ability to produce 100 thousand tons of reinforcing

Crude oil projects: As of March 2021, Mongolia's extracted oil reserves are 332.6 million tons and proven reserves are 43.3 million tons

- In 2017, the GoM initiated the “Mongol Refinery” project in Altanshiree soum at Dornogobi province.
- The infrastructure construction work started in 2018 with USD 1 billion soft loan from the Government of India
- A project capacity of 1.5 million tons- 3 quarters of Mongolia's oil demand
- The refinery would boost Mongolia's gross domestic product by 10%.



Copper projects



As of March 2021, Mongolia's copper reserves were 61 million tons.

Oyu Tolgoi: With the commissioning of the underground mine, Oyu Tolgoi will be able to produce 480 thousand tons of copper (stated as recovered metal) annually from the open pit and underground mines between 2028 and 2036.

Erdenet Mining Corporation (EMC): plans to establish a metallurgy-chemical plant complex

- Smelting and processing copper concentrate- 125.5 thousand tons of copper cathode, 72 kg of pure gold, 38 thousand kg of pure silver and elemental sulfur and sulfuric acid per year
- Processing low-grade copper ore, using SX-EW technology- produce 6 thousand tons of copper cathode
- Manufacturing sulfuric acid and emulsion explosion

A total investment of MNT 1.8 trillion is required for the establishment of the complex

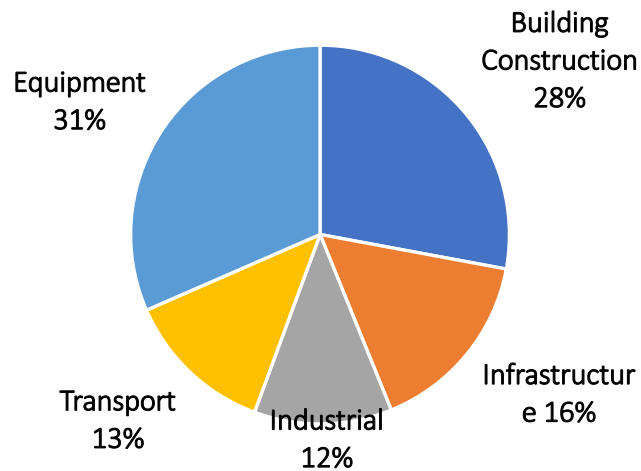


*International copper downstream
market*

International copper downstream market

- The lead importers of semi-fabricated copper products are China (48%) and EU 28 (11%).

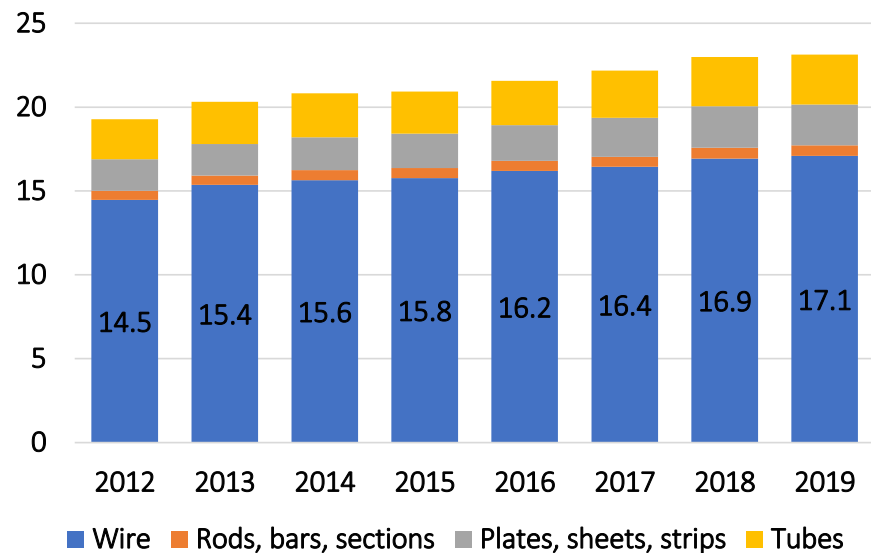
Copper usage by end-use sector, 2019



Source: IWCC

- Production capacity is mainly dominated by China (46%).

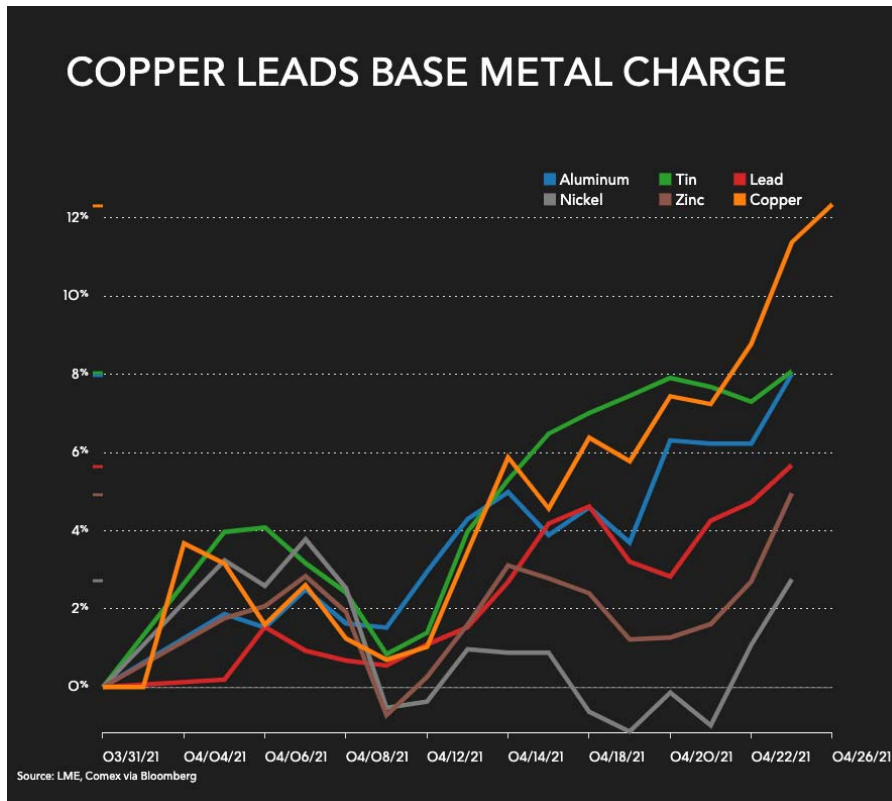
Global semi-finished copper production by product, Mt



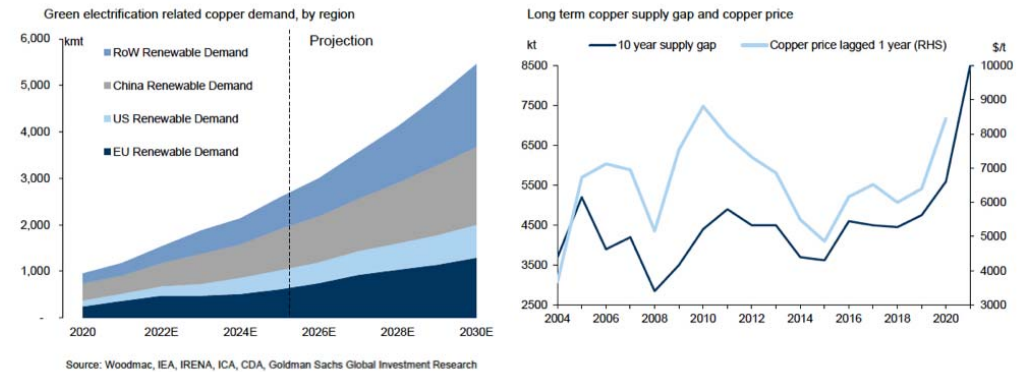
Source: IWCC



World commodities market:



GREEN ENERGY TRANSITION + LONG TERM SUPPLY GAP = \$10,000 COPPER



Goldman Sachs forecast (2021, LME).
 Copper prices rise because of environmental policies and copper is core of green energy transition.
 "It's all copper, copper, copper, copper, copper, copper," said Robert Friedland during the CRU World Copper Conference.
 By 2025, the metal could be priced at \$15,000 a tonne, a rise of 66%, Goldman said in a report titled "Copper is the new oil" 2021.



International case studies

- Russian SUMZ plant
 - SUMZ is a subsidiary of UMMC, the largest copper smelter in Russia
 - Annual capacity of 150,000 tons of blister copper
 - Since 2014, SUMZ has also been producing copper wire and cathode copper
 - Very profitable in recent years, moving production to wires and cables mostly
- Aurubis
 - Founded in 1866 and headquarter in Hamburg, Germany
 - Largest copper producer in Europe
 - Primarily produces semi-fabricated copper products, such as rods, wires, shapes, etc.



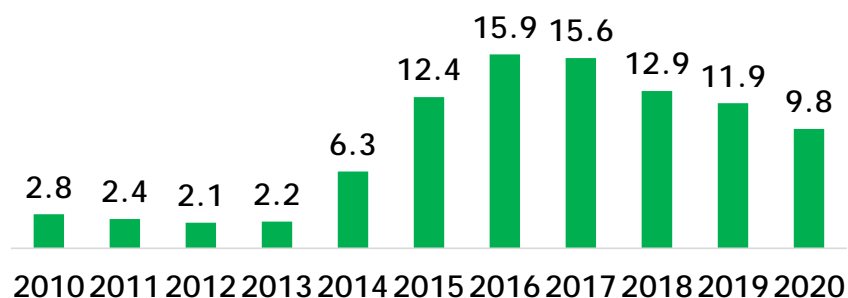
Mongolian copper downstream market

Domestic import and export

Export: Export of refined copper increased 3.5-fold from 2010 to 2020.

- Mongolia's copper end-products export consists(excluding refined copper and alloys) copper pipes, wires, rods and nails.

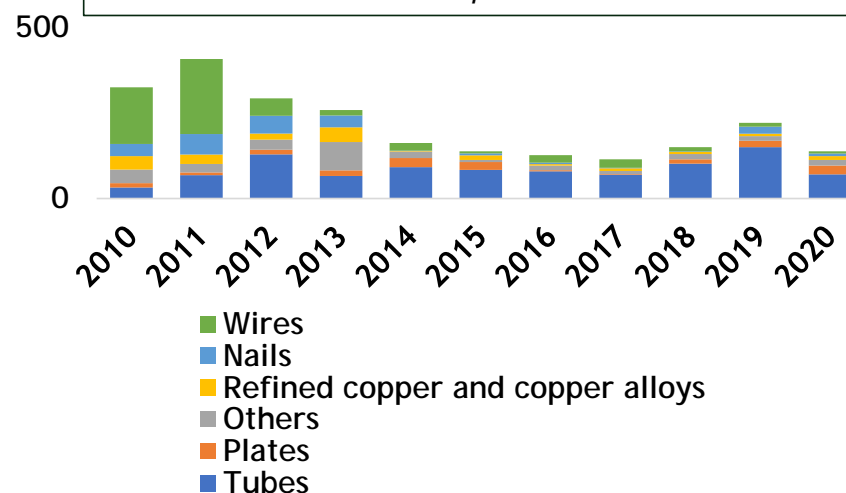
Export of Mongolia's refined copper, thousand tons



Source: Customs office

- In the early 2010s, most of the refined copper import was copper wires.
- In recent years, copper tubes imports have dominated.

Import of refined copper by products 2010-2020, tons



Source: Customs office



Copper product consumption

- Mongolia's annual copper product consumption was on average 305 tons between 2010 and 2019.

Mongolia's copper products export, import production and consumption (except for refined copper and copper alloys), tons

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Export	6	0	0	0	0	43	53	1	0	0	154
Import	257	381	269	239	162	138	127	115	150	221	137
Production				150	150	150	150	150	150	150	150
Consumption	252	381	269	389	312	245	224	264	300	371	133

Source: Customs Office of Mongolia, JICA "Data Collection Survey on Copper Industry Sector in Mongolia" and research team calculation

- Approximately 0.72 kg of copper products are used to for one square meter of an apartment.
- In 2019, a total of 750 tons of copper products was used in the construction of new buildings.
- The consumption of copper products correlates with the construction sector performance.



Mongolia case study: Achit Ikht Copper AIC



- The Achit Ikht case is an ideal example of starting a downstream project in Mongolia-commissioned on 10 Oct 2014.
- The company is owned 34 percent by EMC.
- An annual capacity of 10 thousand tons per year.
- Full utilization rate was achieved in 2017 as the company was able to utilize the L-SX-EW equipment to process residual copper from waste ore.
- The plant was financed by a USD 24.4 million loan from Noble Resource International, a Singapore based company and bank loan from Golomt Bank.
- The hydrometallurgical plant, the company has also the necessary infrastructures.
 - 6 km 35 KW electricity line with two power sub-stations
 - 1200 m3 tank for acid storage
 - 200 meters of railway
 - 2.4 km of road
 - a heating power station
- Reached top 10 mining taxpayer rank in the country despite the relatively small size



Developmental conditions

Developmental conditions

○ Infrastructure

- Railways:
 - Tavan Tolgoi-Gashuunsukhait railway
 - Tavan Tolgoi-Zuunbayan railway
 - Other government planned projects
- Roads:
 - Altanbulag-Darkhan-Ulaanbaatar-Bayan
 - Tsagaannuur-Ulaanbaishint
- Power
 - Tavan Tolgoi Power Plant

○ Financing

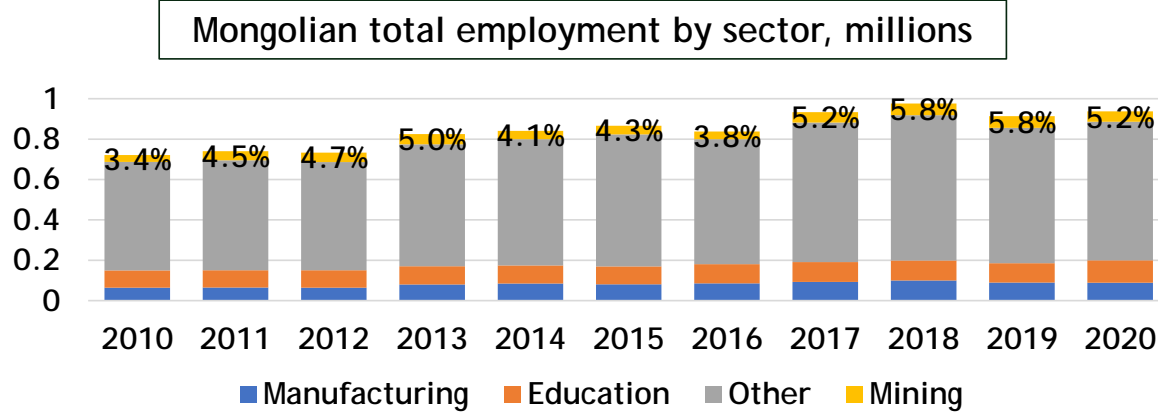
- Commercial banks
- Development Bank of Mongolia
- IPO or public corporate bond
- State-owned enterprises (SOEs)
- External assistance and foreign borrowing/investment
- Private domestic investment
- Foreign development loans



Human resources



- Current engineering schools in Mongolia:
 - National University of Mongolia
 - Mongolian University of Science and Technology
 - Mongolian German Institute of Mining Technology
 - New Mongol Institute of Technology
- Since 2009, Oyu Tolgoi has invested around USD 120 million in various educational programs around the country.



Source: NSO



*Pre-feasibility of copper fabricating
plant*

Pre-feasibility of copper fabricating plant



Hypothetical copper wire manufacturing plant producing 3 mm copper wires with three scenarios of capacity: 6000 tons per year, 60,000 tons per year, and 120,000 tons per year

- Key operating costs:
 - Raw material: cathode copper, which accounts for around 75% of total annual revenue
 - Technology: continuous copper rod casting and copper wire drawing machine
 - Financing options consist of: soft project loans through developmental organizations, bank loan, or own equity drawn from individual investors
- Key risks associated with construction of a downstream plant are:
 - Price of copper wires on international market
 - Price of raw materials
 - Taxation
 - Infrastructure costs
 - Financing costs

A copper wire manufacturing plant can be profitable under the right circumstances (i.e., low operating costs, high selling prices, special taxation, industrial zone, low interest rate, government stake)



Conclusions and recommendations

Recommendations and conclusions



- Existing unfavorable conditions
 - Diversification is not progressing
 - Downstream industry needs more human resource and infrastructure
 - Financing needs for general economic and social developments persist
 - Inability to focus on projects or failure to complete projects due to political and social conflicts
- Recommendations
 - Create and approve specialized legislation for downstream, which contain tax incentives
 - Focus Erdenes MGL activities on steel and copper processing and provide government guarantees
 - Initiate unilateral negotiations on grants and loans for downstream plants
 - Aim education efforts on management of downstream processing plants
 - Intensify public investment in infrastructure for the industrial zones



Thank you for your attention