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Positioning the GMIT as a responsive Mineral Engineering Programme in Mongolia

By

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The views expressed are those of the author and do not necessarily reflect the views of UNCTAD.

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Session 5: Changing Skill Requirements in the Mining Sector

Positioning the GMIT as a responsive Mineral Engineering Programme in Mongolia

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Brief Introduction of Mongolia

- Huge territory: 1.56 Mio. km^2
- Few population: 3 Mio.
- Animal husbandry: 61.5 Mio.
- Educational level of people:

  (18% of Government budget)

  - literacy rate 98.4% (UNESCO, 2015)
  - 95 universities, institutes + colleges

Also….

- Extreme (severe continental) climate: +35° C / -45° C
- No sea access - sandwich position
- Small market
- Low experience in market economy (during 70 years socialist system)
- Economy based on agriculture (animal husbandry) and raw material export
- GDP per capita -3704 USD (statistics times, 2016)

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Current Situation of Mining in Mongolia

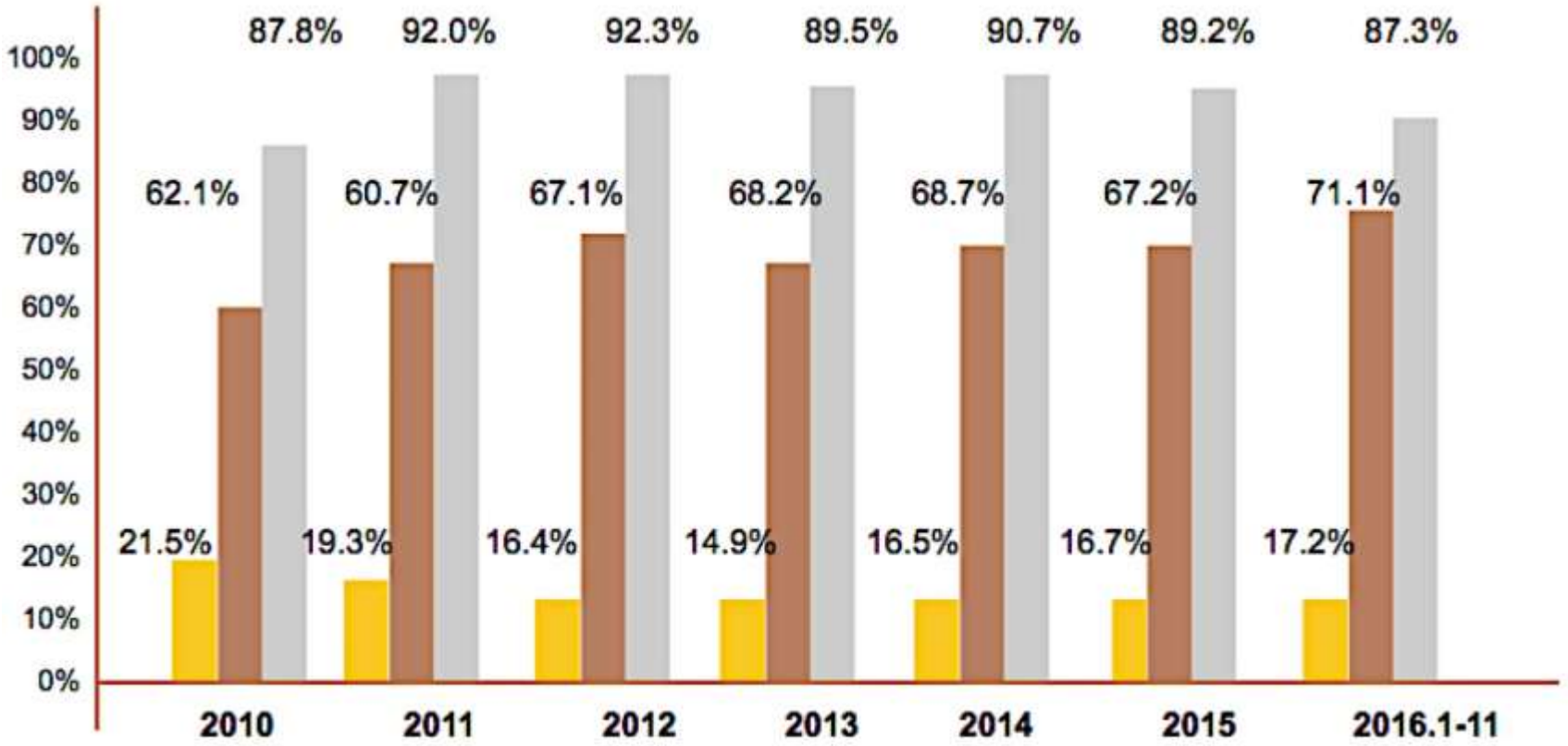
- 3000 deposits and 8000 occurrences of 80 types of minerals

15 Strategic Deposits

The Central and Eastern parts of Mongolia relatively well studied. While western part of country is untapped, which has a great potential for discovery of new deposits.

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Contribution of the Mining Sector to the National Economy



Share of mining in GDP
Share of mining in industrial outputs
Share of mine products in export

MRAM report 2016

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Environmental Impact of Mongolian Mining

Environmental issues to be solved:

Source: Schwarz, R.: Aktuelle Entwicklungen im Projekt "Nachhaltige Standort-entwicklung der Bergbauregion Erdenet"; FAB Länderworkshop Mongolei, 2015

Erdenet Copper Mining:

- huge tailing pond
- water quality
- waste rocks distributed to different dumps as a function of their acid-generating potential
- heavy metal contamination

Boroo Gold mining:

- waste water quality
- arsenic amount is higher than Mongolian water standard

Zaamar gold minig:

- changes in hydrological regimes
- waste rock and tailing dams

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Small Scale Mining in Mongolia

- in Mongolia: 100.000 small scale miners!
- deep holes are left in the ground
- accidents with nomads and animals, falling into residue holes
- chemicals (Mercury) often used for gold washing
- consequences: poisoning of air, ground, groundwater, rivers and workers healthy


BUSINESS

The Most Dangerous Coal Mine In The World: Mongolia's Illegal Nalaikh Pits

BY JACOPO DETTONI ON 07/31/14 AT 5:25 AM

An illegal miner hitting a coal vein with his pick at the Nalaikh mine in March 2014. Safety equipment, infrastructure, and proceedings are almost non-existent throughout the Nalaikh illegal coal-mining operation.

http://www.ibtimes.com/most-dangerous-coal-mine-world-mongolias-illegal-nalaikh-pits-1564916

German and Mongolian Raw Materials Cooperation

German Raw Material Strategy:

Raw materials partnerships - key element of the German resources strategy → In 2011 partnership agreements have been concluded with **Mongolia** and **Kazakhstan**.

A. Merkel Ts. Elbegdorj

German-Mongolian Development Cooperation:

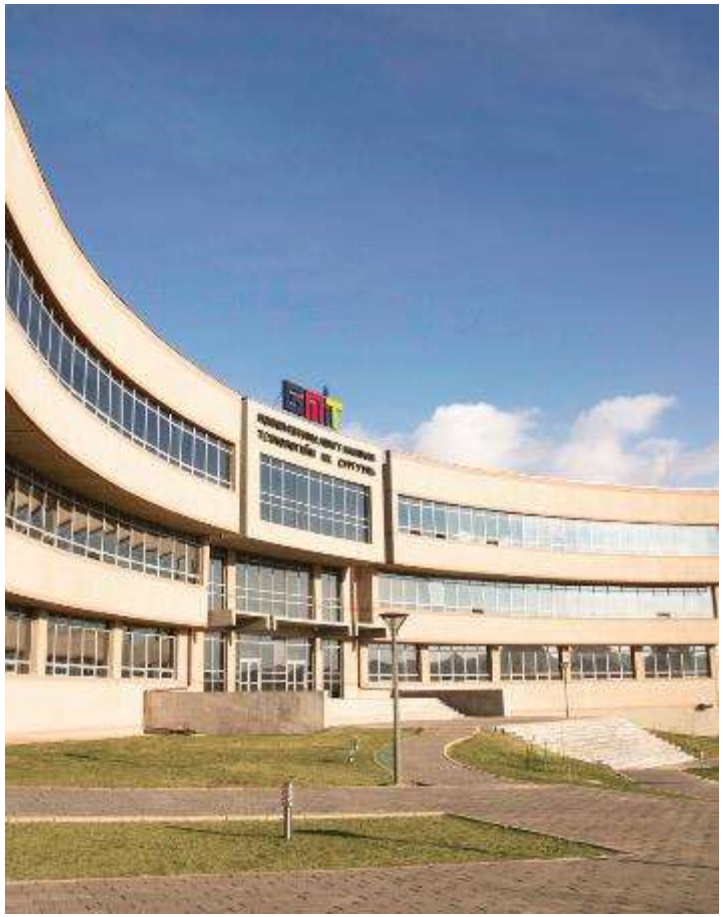
- **promotion of sustainable resource management**
- biodiversity
- improvement of energy efficiency

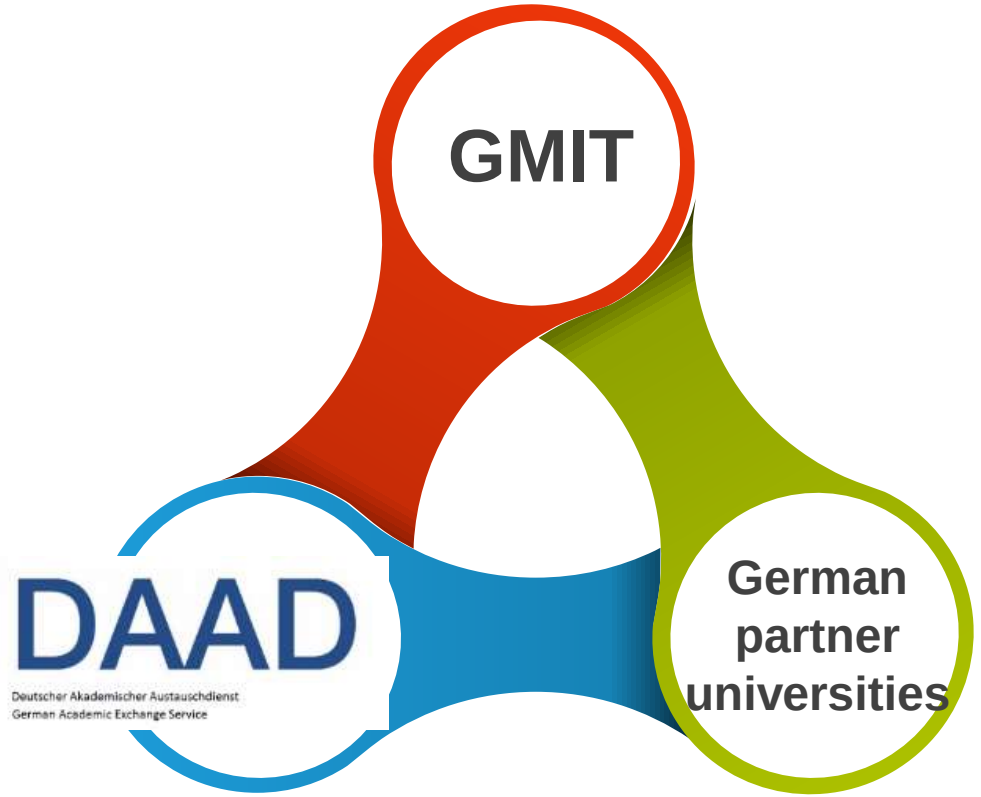
2012	MoU on establishing **GMIT** between "Mongolian Ministry of Education and Science" and giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH **German Corporation for International Cooperation**	
2013	Official founding of **GMIT**	Start of first academic year
2014	Opening of **GMIT** campus in Nalaikh	Start of Bachelor programs

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

GMIT - Product of German and Mongolian Cooperation

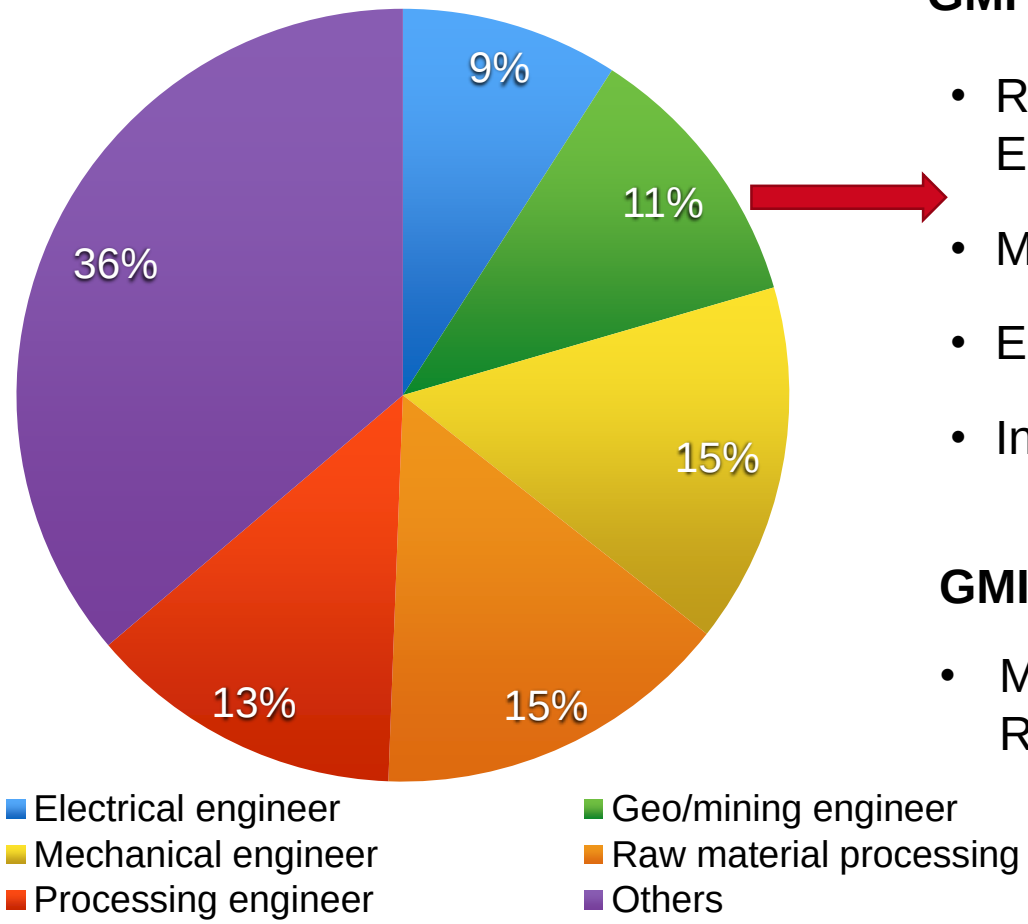
German-Mongolian Institute for Resources and Technology





Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Study Programs – Surveys of the Industry



Results of a survey (2015) conducted amongst 30 plus companies operating in Mongolia on their engineering needs.

GMIT Bachelor Study Programs:

- Raw Materials and Process Engineering
- Mechanical Engineering
- Environmental Engineering
- Industrial Engineering

GMIT Master Study Program:

- MBA: International Management of Resources and the Environment

All Studies strong practice oriented:

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

GMIT and Mongolian Industry Cooperation

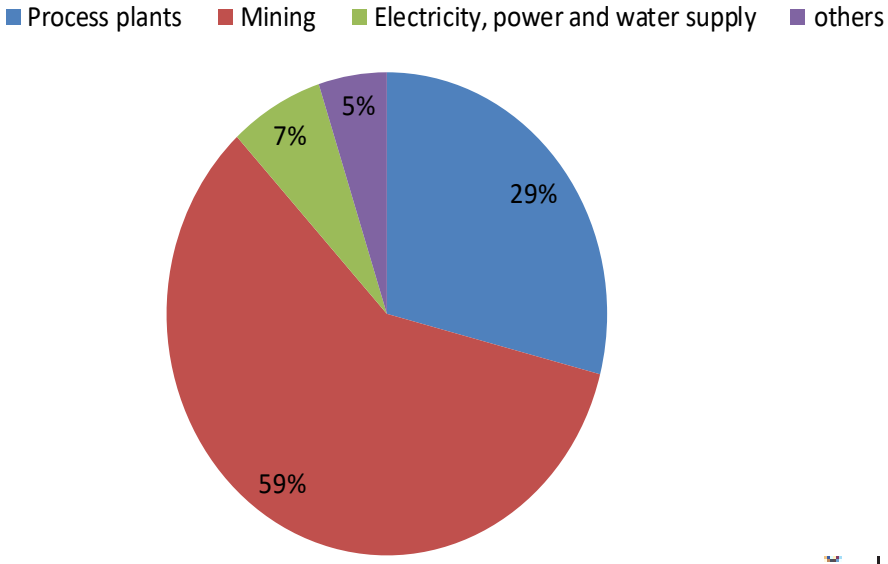
- Currently **69 industrial partners** have relationships to GMIT
  - 35 of them have an actual signed MoU with GMIT
  - 34 related to GMIT by long and short term contracts

- Relationships with industry are based on **Internship, Joint research programs, Training programs, Expat exchange, Solve problems**, etc.
  - Technical English course to American Comp. Cummins (Mongolian branch)
  - "Health, Safety, Environment" (HSE) training program for industry partners
  - "Industrial Research program" with Oyu Tolgoi, GMIT students shall solve certain industrial problems
  - Copper ore leaching research project with "Achit Ikht processing"
  - Air pollution measurement project, initiated by Nalaikh district office
  - National University of Mongolia (NUM) and GMIT are cooperating in 'Virtual underground research project'
  - Wear protection project with Erdenet Mining Corporation (EMC)
  - Mongolian Mining Corporation (MMC) is partner of "Final Study Project": 8th semester students should solve an industrial problem

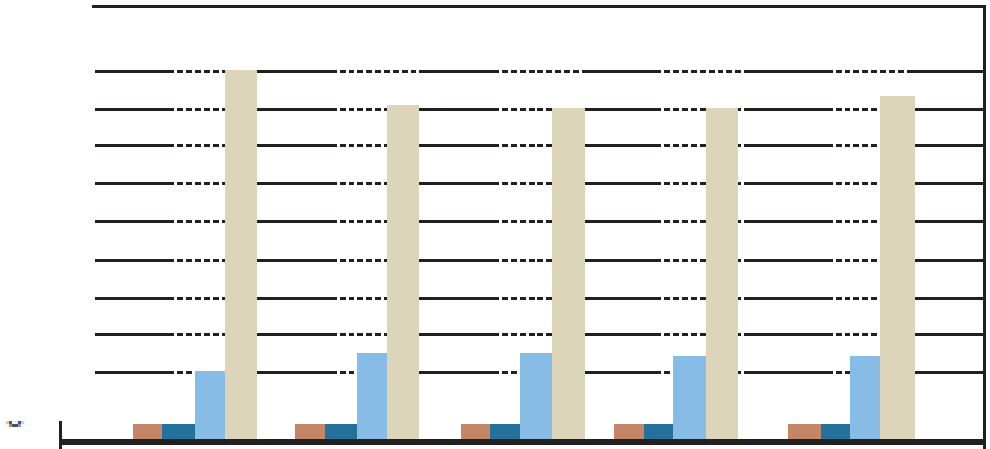
- **"Strategic Research Development Fund"** (SRDF): funded by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Challenges of Mining in Mongolia

Total Industrial products



Technological refinement of export products (%)



	2012	2013	2014	2015	2016
Hi-tech products	0.02	0.04	0.06	0.05	0.05
Medium hi-tech products	0.56	1.57	1.63	1.54	1.21
Medium-tech products	0.49	0.57	0.86	0.65	0.55
Low-tech products	9.11	15.16	13.8	15.1	12.85
No technology sophistication products	89.82	82.66	83.65	83.25	85.25

Mining and Processing:
Challenges and Cooperation Opportunities

Legal framework and human resources

- Exchange experience in mining sector's administration, management, legal environment, investment, education system and technology
- Exchange specialists, professional development, training

Geological survey

- Geological survey, mapping and remote sensing survey projects,
- Conduct detailed survey of certain minerals on already studied blocks,
- Cooperation of Geophysical survey

Processing technology and Environment

- Exchange experience of enrichment and processing technologies on **copper, gold, uranium, rare earth elements, coal, coking coal**
- Cooperation on development and processing projects
- Cooperatively conduct laboratory study and technological testing
- Finding solution for environmental issues of big companies and small scale mining

Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Value-adding Activities: Planned Mega Projects in Mongolia

Coal to Gas
$30.0 bln

Iron Ore processing
$1.0 bln

Railways
$16.0 bln

Coal to Liquids
$2.5 bln

Copper Smelter
$2.0 bln

Highways
$0.46 bln

Coal washing
$0.8 bln

Oil production
$0.8 bln

Oil refinery
$1.20 bln

Power plant on Tavantolgoi coal mine
$ 1.0 Bln

Power plant V
$1.2 bln

Mining of Mongolia today and future, Ministry of Mining, Business forum, 2016.june

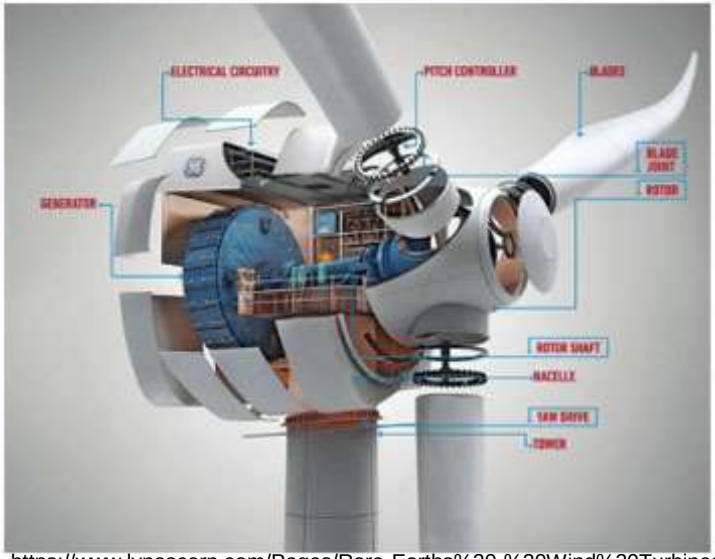
Source: Battsengel, B.: Mineral Resources and Environmental impacts of mining in Mongolia; Continuing Education Event for RWTH Alumni, Aachen 2017

Value-adding Recommendations for the Commodity Sector

https://www.gettyimages.com/detail/photo/zeche-zollverein-former-colliery-unesco-high-res-stock-photography/533667440

Construction of Coking Plants near Mongolian Coal Mines

Installation of modern Continuous Transport Systems in Mongolian Mining Operations



https://www.lynascorp.com/Pages/Rare-Earths%20-%20Wind%20Turbines.aspx

Use of Mongolian Rare Earth (e.g. Neodymium, Praseodymium) Metals to produce Permanent Magnets for Wind Turbines