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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Mineral Engineering Programme in Mongolia

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Global Commodities Forum
Building skills for sustainable development

8th Forum: 23 - 24 April 2018
Palais des Nations - Geneva

Session 5: Changing Skill Requirements in the Mining Sector

German-Mongolian Institute for Resources and Technology (GMIT)
Brief Introduction of Mongolia

- Huge territory: 1.56 Mio. km²
- 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

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

MRAM report 2016
Environmental Impact of Mongolian Mining

Environmental issues to be solved:

**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 mining:**
- 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

![Image of mining site with men working]

Source: [IBTimes](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*.

**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)

2013 Official founding of **GMIT**

2014 Opening of **GMIT** campus in Nalaikh

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
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
Challenges of Mining in Mongolia

Total Industrial products

- Process plants
- Mining
- Electricity, power and water supply
- Others

Technological refinement of export products (%)

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<td>Low-tech products</td>
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<td>15.16</td>
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<td>No technology sophistication products</td>
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<td>82.66</td>
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<td>83.25</td>
<td>85.25</td>
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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: Battšengel, 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
- Railways: $16.0 bln
- Coal to Liquids: $2.5 bln
- Highways: $0.46 bln
- Copper Smelter: $2.0 bln
- Oil refinery: $1.2 bln
- Oil washing: $0.8 bln
- Oil production: $0.8 bln
- Power plant V: $1.2 bln
- Power plant on Tavantolgoi coal mine: $1.0 Bln

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

Construction of Coking Plants near Mongolian Coal Mines

Installation of modern Continuous Transport Systems in Mongolian Mining Operations

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