INDIA-MONGOLIA COAL WEBINAR

COAL RESEARCH IN MONGOLIA

B. Avid, Mongolian Academy of sciences

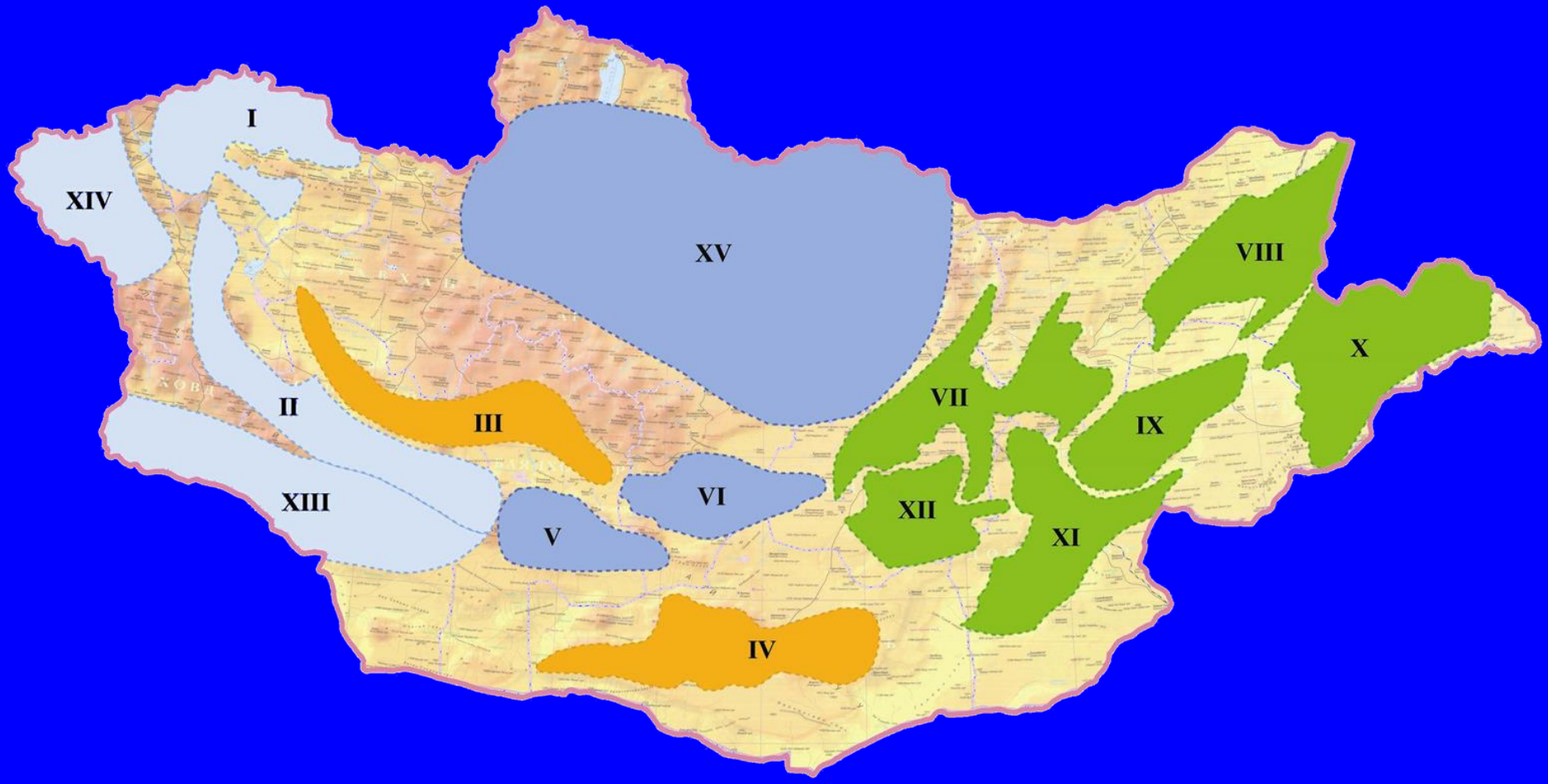
What we have…

- Big territory - 1.56 mln.sq.km (2.1 times smaller than India)
- Rich in natural resources – Copper, Molybdenum, Gold, Coal (175 Billion ton)
- Livestock (71.0 mln: Cattle-4.8, Sheep-32.3, Goat-29.3, Horse-4.2, Camel-0.5)

What we do not have…

- Few population : 3.3 mln. (410 times less than India)
- Economy based on agriculture (livestock) and raw material export
- GDP per capita 4100 $
- Net oil importer
- Extreme climate - +/-35^{0}C
- No sea access

Coal resources of Mongolia



Present energy situation

- Coal is main source of energy, economy and air pollution
- Demand for energy increases quickly
- Oil products dependency become more and more severe

Possible way of coal utilization

- High quality coal: Export
  - Raw coal
  - Washed coal

- Low rank coal: Energy source
  - Fuel for Power plants
  - Briquette fuel for domestic

Polygeneration
- Chemicals
- Polymer materials
- IGCC
- CTL

The policy should be associated with projects to be realized like Oil refinery plant in Mongolia; Russia to China gas pipeline through the Mongolia.

Ministry of Education and Science

- **Mongolian Academy of Sciences**
  - **Institute of chemistry and chemical technology**
- **National university of Mongolia**
  - **Centre for coal research**
- **Mongolian university of science and technology**
  - **School of applied sciences**
  - **Institute of mining**

Institute of chemistry and chemical technology, MAS

Current projects:

- **Research on pyrolysis and gasification of coal**
- **Application of humic acid for agriculture**
- **Research on obtaining of pitch using thermal dissolution of coal**
  - **Some collaboration with Russian and Chinese institutes**

Projects Carried Out on Coal Liquefaction in the Past

- 1980-1990. Chemical Technology Institute of Mongolia, with Combustion Mineral Institute of Russia (Soviet Union)
- 1988. Fluor Daniel Corporation, USA
- 1994. NEDO (New Energy Development Organization), Japan

The Results of Liquefaction tests

Samples	Products yield, % (slurry organic mass)					H_2 consumption, %	Conversion (based on coal organic mass), %
	Liquid products			Gas (by diff.)	Water		
	Total	< 300°C	> 300°C				
Stage 1 (1980-1986)							
Uvdugkhudag II	84.6	23.0	61.6	7.7	7.7	2.1	**96.0**
Bayanteeg	83.6	23.4	60.2	12.4	4.0	2.3	**91.8**
Talbulag	83.8	23.6	60.2	14.5	1.7	1.6	**96.8**
Sharyn gol II	78.0	25.6	52.4	16.4	5.6	2.3	87.8
Baganuur	79.1	27.3	51.4	19.3	1.6	3.7	82.0
Baganuur II	72.5	24.1	48.4	21.6	5.9	1.3	82.0
Chandgantal V	65.8	24.6	44.2	27.9	6.3	2.1	86.0
Tavantolgoi II	58.6	18.8	40.0	37.2	4.2	1.5	59.0
Stage 2 (1987-1989)							
Uvdugkhudag	79.1	26.3	52.8	17.9	3.1	1.6	**67.6**
Hashaatkhudag	80.5	26.7	53.8	18.5	1.0	1.8	**73.1**
Shivee-Ovoo	81.5	30.5	51.0	16.9	1.6	1.9	60.8

Centre of coal research, NUM

Current projects:

- **Research on coal gasification**
- **Research on processing of oil shale**
  - **There are good collaboration with Japanese universities and institutes**

Centre of coal research, NUM

Current projects:

- **Utilization of coal ash**
- **Research on catalysis for coal conversion and steam reforming**
  - **There are good collaboration with Chinese universities and institutes**

REFERENCES

- Erdenetsogt, B.-O,, Lee, I., Bat-Erdene, D., Jargal, L., Mongolian coal-bearing basins: Geological settings, coal characteristics, distribution, and resources, *International Journal of Coal Geology*, 2009, 80(2), pp. 87–104

- Avid, B., Purevsuren, B. and Temuujin, J. Bituminous coals of Mongolia: Occurrence and Characteristics, Advances in Energy Research, 2016, 22, Nova publishers, New York, 159-178

- Enkhsaruul Byambajav, Yasuyo Hachiyama, Shinji Kudo, Koyo Norinaga and Jun-Ichiro Hayashi, Kinetics and Mechanism of CO_2 Gasification of Chars from 11 Mongolian Lignites, *Energy Fuels* 2016, 30, 3, 1636–164

CONCLUSIONS

- ✓ **Coal research is key area of the R & D of Mongolia and should be forced in further**
  - ❑ **Dry beneficiation**
  - ❑ **Gasification**
  - ❑ **Clean energy with low emissions**
  - ❑ **Research obtaining of carbon materials**
- ✓ **Capacity building of human resources both in Science and Industry have to be strengthened.**

Thank you

avid@mas.ac.mn