POWER SECTOR OF MONGOLIA, REGIONAL COOPERATION POSSIBILITIES

Mr. Yeren-Ulzii,
Senior-Officer,
Strategic Policy and Planning Department

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POWER SECTOR OF MONGOLIA

CURRENT STATE

LEGAL FRAMEWORK AND POLICY DOCUMENTS

KEY DOCUMENTS

RECENT AMENDMENTS

STATE POLICY ON ENERGY 2015-2030

REGIONAL COOPERATION POSSIBILITIES

ENERGY ENDOWMENTS

POTENTIAL TRANSBOUNDARY PROJECTS
# Energy Statistics

## Primary Energy Supply and Economic Indicators

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2012</th>
<th>Annual average growth, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>'00-'05</td>
</tr>
<tr>
<td>Total Primary Energy Supply (1,000 TOE)</td>
<td>2,564</td>
<td>2,800</td>
<td>3,545</td>
<td>8,526</td>
<td>1.8%</td>
</tr>
<tr>
<td>Energy per capita (TOE)</td>
<td>1.06</td>
<td>1.09</td>
<td>1.27</td>
<td>2.97</td>
<td>0.5%</td>
</tr>
<tr>
<td>Population (thousand)</td>
<td>2,408</td>
<td>2,562</td>
<td>2,781</td>
<td>2,868</td>
<td>1.3%</td>
</tr>
<tr>
<td>GDP (billion tog, at 2005 constant price)</td>
<td>2,100</td>
<td>2,780</td>
<td>4,154</td>
<td>5,438</td>
<td>5.8%</td>
</tr>
<tr>
<td>Energy/GDP Intensity (TOE/million Tog)</td>
<td>1.22</td>
<td>1.01</td>
<td>0.85</td>
<td>1.57</td>
<td>-3.8%</td>
</tr>
<tr>
<td>Import Dependency (%)</td>
<td>19.4%</td>
<td>21.4%</td>
<td>25.6%</td>
<td>15.5%</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

## Domestic Production, Import and Export

|                                | 2000   | 2005   | 2010   | 2012   | Annual average growth, (%) |
|                                |        |        |        |        | '00-'05 | '05-'10 | '10-'12 |
| Indigenous Production          | 2,019  | 3,592  | 11,591 | 14,038 | 12.2%   | 26.4%   | 10%    |
| Import                         | 497.1  | 597.9  | 908.9  | 1321.7 | 3.8%    | 8.7%    | 20.6%  |
| Export                         | 3      | 1,405  | 9,028  | 6,227  | 236%    | 45.1%   | -16.9% |
| Total Domestic Energy Supply   | 2,564  | 2,800  | 3,545  | 8,526  | 1.8%    | 4.8%    | 55.1%  |
### Energy Statistics

#### Structure of Primary Energy Supply by Source

<table>
<thead>
<tr>
<th>Source</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2012</th>
<th>Annual average growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'00-'05</td>
<td>'05-'10</td>
<td>'10-'12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coal</td>
<td>1,798</td>
<td>1,895</td>
<td>2,324</td>
<td>6,884</td>
<td>1.0% 4.2% 72.1%</td>
</tr>
<tr>
<td></td>
<td>70.2%</td>
<td>67.7%</td>
<td>65.6%</td>
<td>80.7%</td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>472</td>
<td>584</td>
<td>879</td>
<td>1,284</td>
<td>4.3% 8.5% 20.9%</td>
</tr>
<tr>
<td></td>
<td>18.4%</td>
<td>20.9%</td>
<td>24.8%</td>
<td>15.1%</td>
<td></td>
</tr>
<tr>
<td>Hydro</td>
<td>0.25</td>
<td>0.28</td>
<td>4.73</td>
<td>8.96</td>
<td>2.1% 76.0% 37.6%</td>
</tr>
<tr>
<td></td>
<td>0.01%</td>
<td>0.01%</td>
<td>0.13%</td>
<td>0.11%</td>
<td></td>
</tr>
<tr>
<td>Traditional Fuels &amp; Others</td>
<td>293</td>
<td>321</td>
<td>337</td>
<td>348</td>
<td>1.8% 1.0% 1.6%</td>
</tr>
<tr>
<td></td>
<td>11.4%</td>
<td>11.5%</td>
<td>9.5%</td>
<td>4.1%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2,564</td>
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</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

#### Trend in Supply Share

(2000 ➔ 2005 ➔ 2010 ➔ 2012, %)

- **Coal ➔**: 70.2 ➔ 67.7 ➔ 65.6 ➔ 80.7
- **Petroleum Products ➔**: 18.4 ➔ 20.9 ➔ 24.8 ➔ 15.1
- **Hydro ➔**: 0.01 ➔ 0.01 ➔ 0.13 ➔ 0.11
- **Traditional Fuels & Others ➔**: 11.4 ➔ 11.5 ➔ 9.5 ➔ 4.1
Electricity Production + Import, 2014 by type of sources, total 6.3 billion kWh,

Total Installed Capacity of Power Plants-1090 MW, by type

CHP/Coal/90%

Renewables 6%

Diesel 2%

Hydro 2%

Import 18.8%

CHP/Coal/79.3%

Diesel 0.1%

Wind Farm 0.8%

Hydro 0.9%
### Key Documents

<table>
<thead>
<tr>
<th>№</th>
<th>Document</th>
<th>Approved/Last Update</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Millennium Development Goals-based Comprehensive National Development Strategy</td>
<td>2007</td>
<td>The Millennium Development Goals-based comprehensive national development strategy has been developed as per the Decree No 05, 2006 of the President of Mongolia. The NDS will be reflected in detail in the medium and short term development policy documents, the Government action program as well as in programs undertaken jointly with the international partners and donors.</td>
</tr>
<tr>
<td>2</td>
<td>Infrastructure Development Program of Southern Gobi</td>
<td>2010</td>
<td>Plans and actions to develop infrastructure for strategic mineral deposits in Gobi area</td>
</tr>
<tr>
<td>3</td>
<td>State policy on petroleum sector up to 2017</td>
<td>2011</td>
<td>The Government policy in the petroleum sector is aimed at developing exploration of the petroleum potential of Mongolia, increasing production and fully supplying oil products from a domestic oil refining industry based on domestic resources to the country’s needs through mutually beneficial cooperation with potential international oil companies.</td>
</tr>
<tr>
<td>5</td>
<td>State Policy on Energy</td>
<td>2015</td>
<td>Government Policy for Power sector development for 2015-2030. The scope of this policy comprise the electricity and heat production, transmission, distribution and their consumption as well as the fuel supply sector.</td>
</tr>
</tbody>
</table>

Purpose:
• Enhance legal environment for investors in energy sector of Mongolia

Amendments:
• Utilization of Natural gas /coal bed methane/
  • Definitions
  • Regulation to relating matters for gas supply infrastructure
• Interagency Relationship
  • Obligation of National Dispatching Center
• Independent Power Producer and its regulations
• Power Purchase Agreement and its regulations
• Interrelationship between supplier and consumer
  • Obligation

Purpose:
- Enhance financial situation of single buyer model of Power sector and ensure feeding tariffs in the Law on Renewable Energy

Amendments:
- New term – “Encouraging tariff” /gap between feeding tariff and consumer’s tariff /
  - Definitions
  - Regulation to relating matters in tariff system
- Power Purchase Agreement and its regulations
  - Regulation to relating matters
“State Policy on Energy” 2015-2030

**PRIORITY AREAS AND STRATEGIC GOALS**

**SAFETY**
- Ensure energy safety and reliable supply
- Develop mutually beneficial cooperation with regional countries
- Develop a human resource

**STATE POLICY ON ENERGY**

**EFFICIENCY**
- Transfer the state dominated energy sector into private based competitive market
- Support innovation and advanced technology in energy sector, and implement conservation policy

**ENVIRONMENT**
- Increase the production share of renewables and reduce negative environmental impact from traditional power generation and greenhouse gas
“State Policy on Energy” 2015-2030

Expected Results

In the 1st stage 2015-2023: The stage to develop energy safety resources and backup capacity, establish a foundation for the development of renewable, and commence large scale power plant and DC line projects cooperating with neighboring countries.

- The installed power capacity will be doubled, and start using critical technology with high parameters. Hydro will be taken place at least 10% of the total installed power capacity and it will increase packup capacity to 10%, and create fundament for renewable sector to development intensively.

In the 2nd stage 2024-2030: The stage to export secondary energy and develop sustainably the renewable sector.

- Integrated smart energy system will be created by connecting regions with high capacity transmission lines. State owned Power companies will be become a public company. Distribution and supply service will be privatized and energy sector will be worked as a competitive marked with regulation. Secondary energy will be exported by connecting with North east Asian countries with high capacity DC lines.
### “State Policy on Energy” 2015-2030

#### Expected Results - Criteria

<table>
<thead>
<tr>
<th>Indicators</th>
<th>2014 он /Base year/</th>
<th>1\textsuperscript{st} stage /by 2023 /</th>
<th>2\textsuperscript{nd} stage /by 2030/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve Capacity for Electricity Generation</td>
<td>-10%</td>
<td>10 % ≤</td>
<td>20% ≤</td>
</tr>
<tr>
<td>Reserve Capacity for Heat Generation in Cities</td>
<td>3%</td>
<td>10 % ≤</td>
<td>15% ≤</td>
</tr>
<tr>
<td>Profit Share on Tariff Structure in Central Region</td>
<td>-16.22 %</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>Own Use of CHP’s</td>
<td>14.4 %</td>
<td>11.2%</td>
<td>9.14 %</td>
</tr>
<tr>
<td>Transmission &amp; Distribution Loss /excluding Oyutolgoi/</td>
<td>13.7%</td>
<td>10.8%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Share of Renewables on total Installed Capacity for Domestic Supply</td>
<td>7.62%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Greenhouse Gas Emission per 1 Gcal Power Generation</td>
<td>0.52 ton CO\textsubscript{2} equivalent</td>
<td>0.49 ton CO\textsubscript{2} equivalent</td>
<td>0.47 ton CO\textsubscript{2} equivalent</td>
</tr>
<tr>
<td>Reduction of Building Heat Loss</td>
<td>0%</td>
<td>20%</td>
<td>40%</td>
</tr>
</tbody>
</table>

#### Technological Achievements that have to be utilized in Energy Sector

- CFB
- Sub Critical Coal Bed Methane, Battery Energy Storage, Pumped Storage
Energy Endowments in Mongolia

Mongolia is among the top ten mineral richest countries in the world with only 17 percent of its vast territory properly explored.
- Estimated total resources ~ 173 billion ton in 15 coal basins
- Over 370 identified occurrence in 85 deposits
- Proven Reserves 12 billion ton, of which 2 billion is coking coal
- Around 1/3 in Gobi Region
- Around 1/3 in Eastern Region

- Mines in Gobi area are for export /18 million in 2013/
  - Nariin Sulhait
  - Tavan Tolgoi
- Mines in other region are for power production and household heating /12 million in 2013/
  - Baganuur, Shivee-Ovoo, Shariin Gol, Aduunchuluun etc.
- Total 31 exploration blocks
- Current Proven reserve is 332 million ton
RENEWABLES

- Rich resources of Solar, Wind and Hydro in Mongolia:
  - **Solar:** 270-300 sunny days in a year, 4.3-4.7 kWh/meter or higher per day
  - **Wind:** 10% of the total land area can be classified as excellent for utility scale applications, Power density 400-600 W/m², the resource could potentially supply over 1100 GW of installed capacity.
  - **Hydro:** Theoretical potential 6.2 GW, more than 1 GW of these ahs been identified
Mongolia contains six uranium strata and more than 100 uranium deposits.

Mongolian geologists now believe that Mongolia has 60,000 metric tons of uranium reserves, while Russian experts have much higher estimates, ranging from 120,000 to 150,000 metric tons.

Main uranium deposits located in the Western province.

- Dornod Deposits-28868 tonne,
- Gurvanbulag Deposite- 16073 tonn,
- Mardai Deposit 1104 tonne.

Gurvanbulag, 30 km west of Dornod, 7 000 – 9 000 tU (development).

Dornod 25 000 indicated resources supporting production of 1 200 tU/a.

Gurvan Saihan JV has several exploration rights and indicate 7 600 tU in Omnogovi and estimated and registered reserves resources of 8 400 tU for Khair Khan, and 7 300 tU for Kharat.

AREVA Mongol LLC has several prospects in Dornogovi. AREVA sees 1 000 tU/a production possible from 2016 in Sainshand.
Potential projects of regional energy cooperation for Mongolia
Recourse Based Power Trade

Coal Based

• On-Site Electricity Production for Purpose of Export.
  – Abundant thermal coal resources in Mongolia
  – China, Korea, Japan lead its Electricity demand in the region
  – One of the potential ways to support economic development for Mongolia
Mongolia- China Power Sector Cooperation Development Potential

- On-Site Electricity Production for Purpose of Export.
  - The Shivee Ovoo mining area is 25 km long from east to west and 17 km, 2700Mt coal reserve
  - 9240 MW coal-fired power plant and cross border 800 kV DC transmission line project.
Recourse Based Power Trade

Renewable based

- Rich Solar and Wind Rich Resources in Gobi Area /Southern part of Mongolia and Northern part of China/
- Green and Sustainable Energy
  - Gobi Tec and Asia Super Grid Initiative

– Gobi Tec and Asia Super Grid Initiative

Russia-China Infrastructure Interconnection through Mongolia

**Taliin Zam /Field Gate/ Initiative**

It can be:
- Gas Pipeline
- Oil Pipeline
- HVDC Line
- Rail
- High Way

It saves:
- Distance
- Investment
Major Obstacles

Main challenges of Mongolia to develop energy trade and cooperation can be classified into the following reasons:

- Lack of infrastructure development for cross-border energy trades
  - Roads
  - Railway
  - Power supply
- High initial capital requirement to commence energy projects and needs to attract massive foreign investment on the energy related projects
- Lack of human resource and domestic labor force
Conclusion

- Rich natural resource endowment is the regional economic cooperation opportunity for Mongolia and Mongolia can be supplier;

- Mongolian economy is very tight dependent on mining sector and revenue from mineral export in these days;

- There is a notable potential for Mongolia to develop energy cooperation with neighboring countries and active cooperation is imminent matter and vital for the continued economic growth and advancement of the country nowadays;

- Coal can be the main resource to develop energy cooperation with NEA-n countries for Mongolia nowadays but in the future Renewable can be a leading one;

- Challenges of Mongolia to develop the energy cooperation
  - Lack of infrastructure development
    - Road, Railway and Power supply
  - High capital requirement, needs to attract massive foreign investment on the energy related projects
  - Lack of human resource and labor

- What should be the Mongolian perspective to develop energy cooperation with NEA-n countries?
  - To have a clear policy for governmentally and politically
  - Keep sustainable legal environment for foreign investors
THANK YOU FOR YOUR ATTENTION

Website: http://www.energy.gov.mn/