



# NATIONAL DISPATCHING CENTER OF POWER SYSTEMS ,MONGOLIA

TRAINING AND  
DIALOGUE  
PROGRAMS OF JICA

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## COUNTRY PRESENTATION: MONGOLIA

ENERGY POLICY (B)

June 2012



## THEME

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- Country profile
- Current state of energy sector
- Outlook of energy demand and supply
- The energy policy
  - Documents and its implementation.
  - Short term strategy and goals.
  - The goals of demand-supply balancing in future
- Difficulties in energy sector
- The subjects to study





# Country profile:

**Area:** 1,564,116 sq km

**Population:** 3,133,318 (July 2011 estimate)

**Capital City:** Ulaanbaatar (literally, “Red Hero”) Population: 949,000

**People:** 94.9% Khalkha Mongols, 5% Turkic (mostly Kazakh), 0.1% other (inc Chinese and Russian)

**Language(s):** Mongolian. (90%), Kazakh, Russian

**Religion(s):** (2010): Buddhist Lamaism 53%, Muslim 3% (primarily in the southwest), shamanist and Christian 5%, other 0.4% and none 38.6%.





## Country profile:

**Currency:** Togrog (MNT)

**Government:** Parliament, the Great Khural.

**GDP per head:** US\$3600

**Major Industries:** Mining, cashmere, agriculture.

**Major trading partners:** China, Russia, United States, Japan.

**Currency :** Togrogs, US\$1 = 1,232 Togrogs (February 2011)

**Natural resources:** Coal (thermal and metallurgical), copper, molybdenum, silver, iron, phosphates, tin, nickel, zinc, wolfram, fluorspar, gold, uranium, and petroleum.





# THE CURRENT STATE OF THE ENERGY SECTOR

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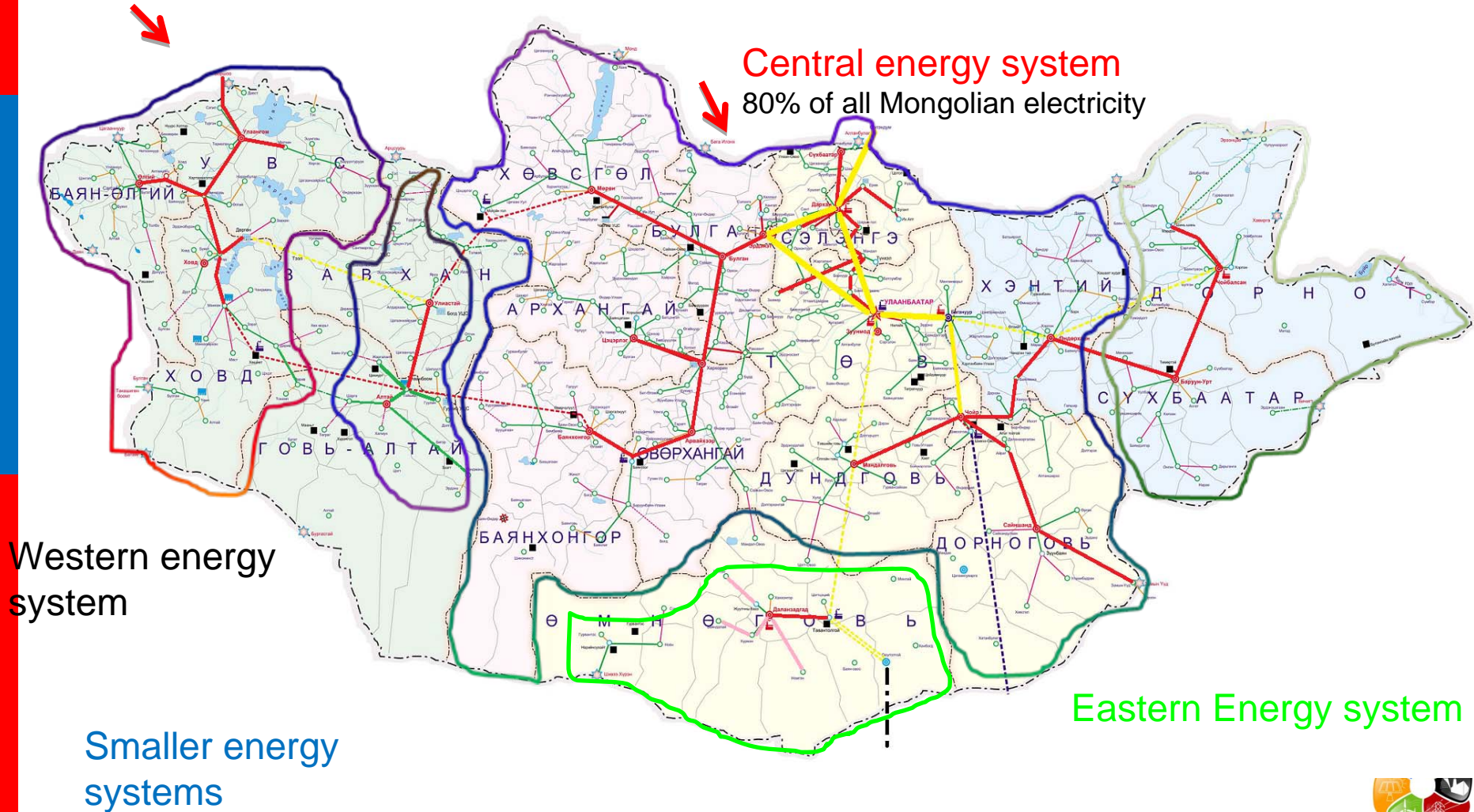
## Power sector

- The current installed power capacity in Mongolia is 1,062 megawatts (MW) but only 836 MW (80%) is available because of aging power plants. The transmission and distribution network, connecting around 70% of the population, has been less than reliable—causing frequent blackouts in major cities mainly because of aging transmission lines and substation facilities.
  
- The energy sector of Mongolia consist of four independent electric power systems:
  - Central Energy System (CES),
  - Western Energy System (WES),
  - Eastern Energy System,
  - Altai-Uliastai energy system
  
- Dalanzadgad combined heat and power plant (CHP)
- and other diesel fuel and renewable energy sources.





# THE CURRENT STATE OF THE ENERGY SECTOR





# THE CURRENT STATE OF THE ENERGY SECTOR

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- The main Mongolian electric system is the Central Energy System (CES) representing 80% of all Mongolian electricity,
- The CES power supply is comprised of five coal burning generating plants and an interconnection Russia. The other two networks – Eastern and Western Energy Systems (WES and EES) are quite small. WES operates on imports of electricity from Russia, EES has one Combined Heat and Power Plant (CHP) with installed capacity of 36 MW.
- Considering the seasonal variations in electricity demand, imported electricity is required to meet demand especially during peak demand times in the winter.
- The CES and the WES grid are both connected to the Russian grid. 220 kV double lines connect CES and the WES is connected at 110 kV.





## THE CURRENT STATE OF THE ENERGY SECTOR

- Typically 10 MWs is imported from Russia into the Western Energy System (WES) and up to 130 MW into Central Energy System (CES) during peak demand hours. The maximum available capacity from Russia is 250 MW.

The maximum electricity import and export for both systems:

Electrical Systems	IMPORT						EXPORT					
	2004		2009		2011		2004		2009		2011	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
<b>CES</b>	130	108.5	120	132	120	205	21	8.2	25	21	15	21.4
<b>WES</b>	11	40.3	15	60,3	18	75.2	--	--	-	-	-	-
<b>Total</b>	<b>141</b>	<b>148.8</b>	<b>135</b>	<b>190.3</b>	<b>138</b>	<b>280.2</b>	<b>21</b>	<b>8.2</b>	<b>25</b>	<b>21</b>	<b>15</b>	<b>21.4</b>

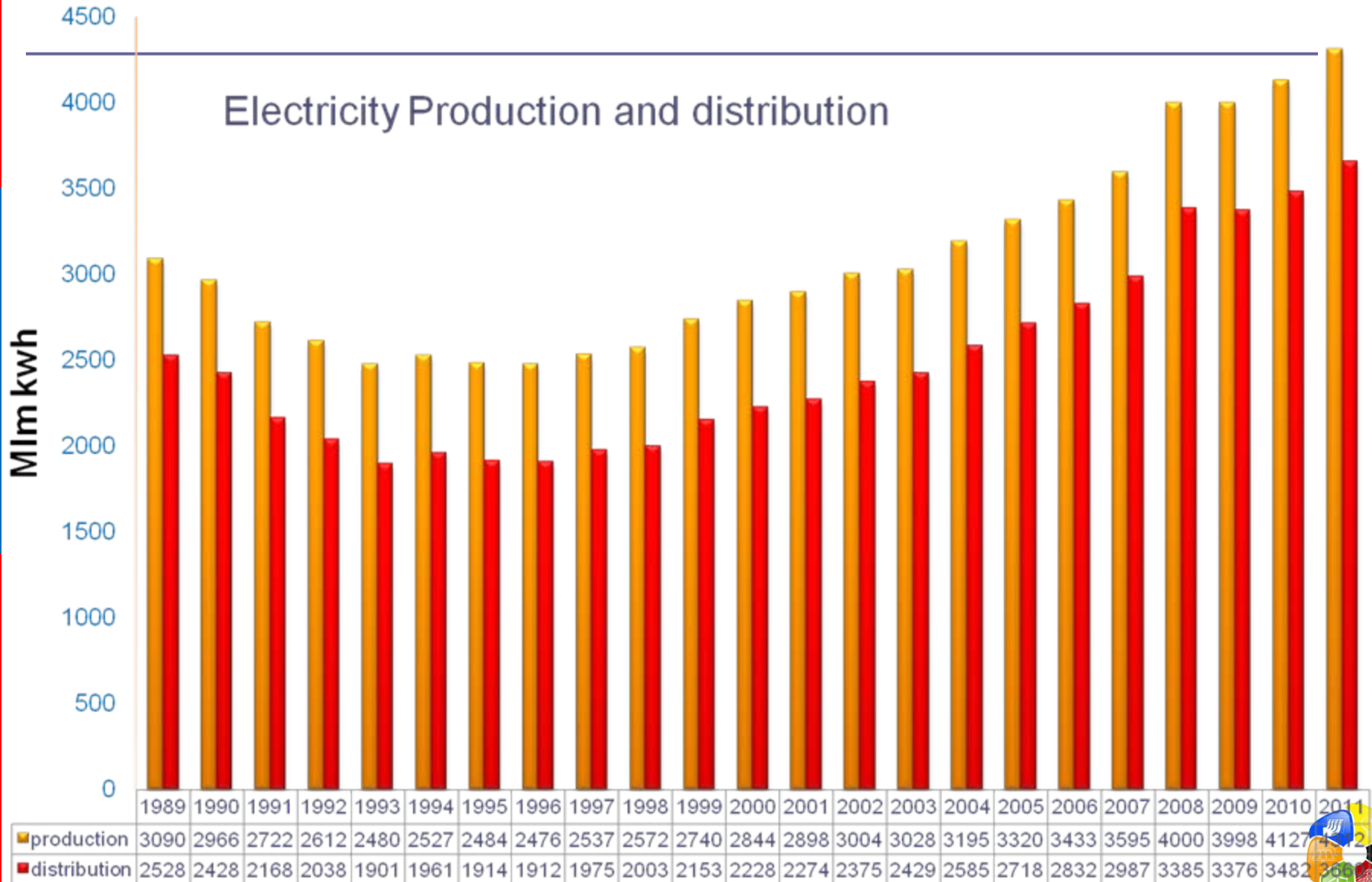
- In addition there are small grid Altai-Uliastai ES interconnected Uliastai, Altai aimag centers not connected to the three grid systems, and Dalanzadgad, each with a power plant supplying small local networks. Numerous off-grid rural soum centers have a local diesel power supply (some 600 diesel units with capacities ranging from 60 to 1000 kW).
- Gross generation capacities of electricity have continuously been expanded in the last years with rates of 2–4%. In 2011, Mongolia's total installed electricity generation capacity was 1,062 MW and the total electricity generated 4,300 GWh.







# THE CURRENT STATE OF THE ENERGY SECTOR

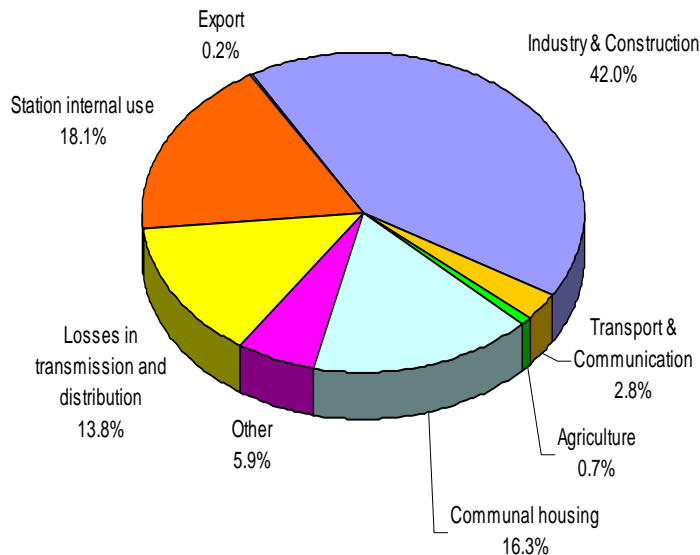




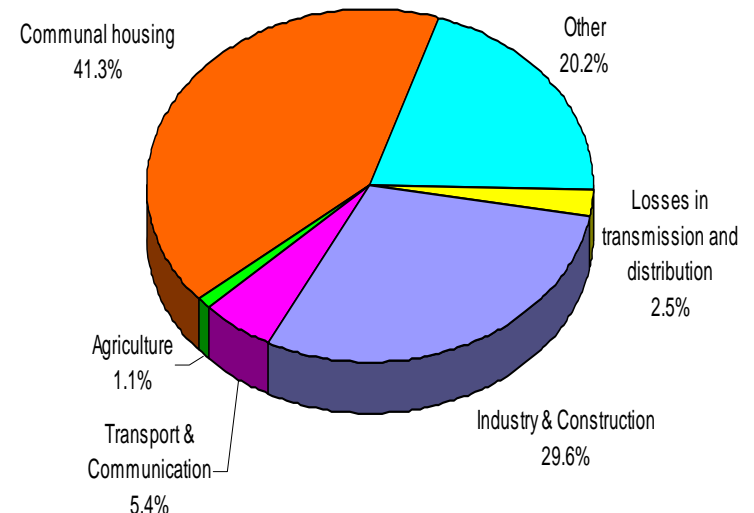
# THE CURRENT STATE OF THE ENERGY SECTOR

- All coal fired power stations are cogeneration plants for production of base load electricity, hot water for district heating and process steam for industry.
- Because of the cold winters, heating is especially important in Mongolia—it is necessary for survival.
- In terms of heat supply sources for central or district, systems, Mongolia has combined heat and power (CHP) thermal power plants in major cities.

**Electricity consumption by sector**



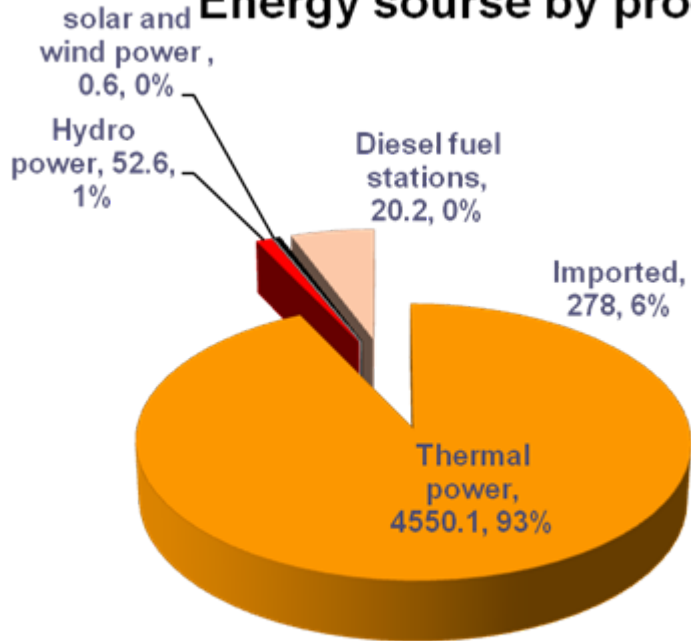
**Heat consumption by sector**





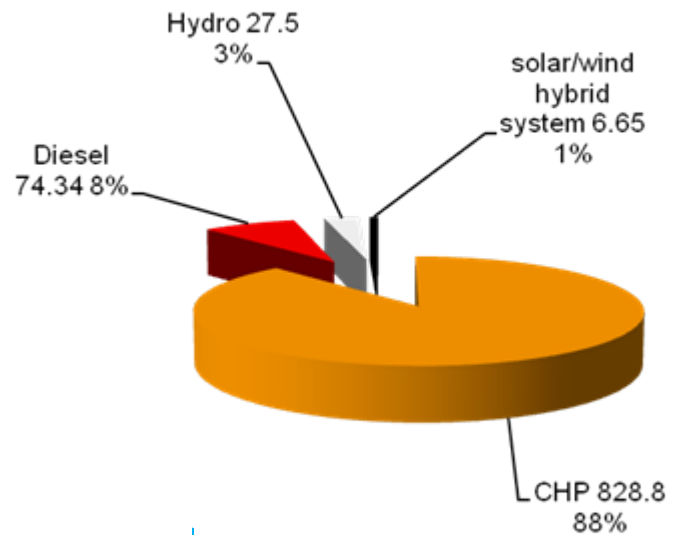
# THE CURRENT STATE OF THE ENERGY SECTOR

### Energy source by production



Total installed capacity  
 7 coal fired combined heat and power plants  
 600 small diesel generators by 60-1000 kw  
 13 hydroelectric  
 solar/wind hybrid system

### Energy source by installed capacity



1062 MW  
 828.8 MW  
 74.34 MW  
 27.5 MW  
 6.65 MW.





# THE CURRENT STATE OF THE ENERGY SECTOR

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## Electricity market

After the implementation of the Energy Law of Mongolia in 2001, the power sector unbundled according to the Government Decree No 164. This resulted in 18 state-owned companies involved in generation, transmission or distribution, and operating under the framework of the 'Single-Buyer Model':

- **Generation:** Five generation companies arranged around Thermal Power Plants (TPPs): UB, Darkhan TPP and Erdenet TPP
- **Transmission** Central Regional Electricity Transmission Company (CRET)
- **Dispatch:** National Dispatching Centre Company (NDC)
- **Distribution:**
  - Regional electricity distribution network companies (EDNs) including: UB, Darkhan-Selenge, Erdenet-Bulgan, Baganuur and South-Eastern Region
  - District Heating Network Companies (DHN) including UB and Darkhan.





# THE CURRENT STATE OF THE ENERGY SECTOR

## Coal sector

- Coal accounts for 73 percent of total national energy consumption in Mongolia.
- There are 200 coal deposits within 15 coal basins in Mongolia
- There are more than 30 surface (or open cast) mines in Mongolia, providing almost 99 percent of Mongolia's coal production.

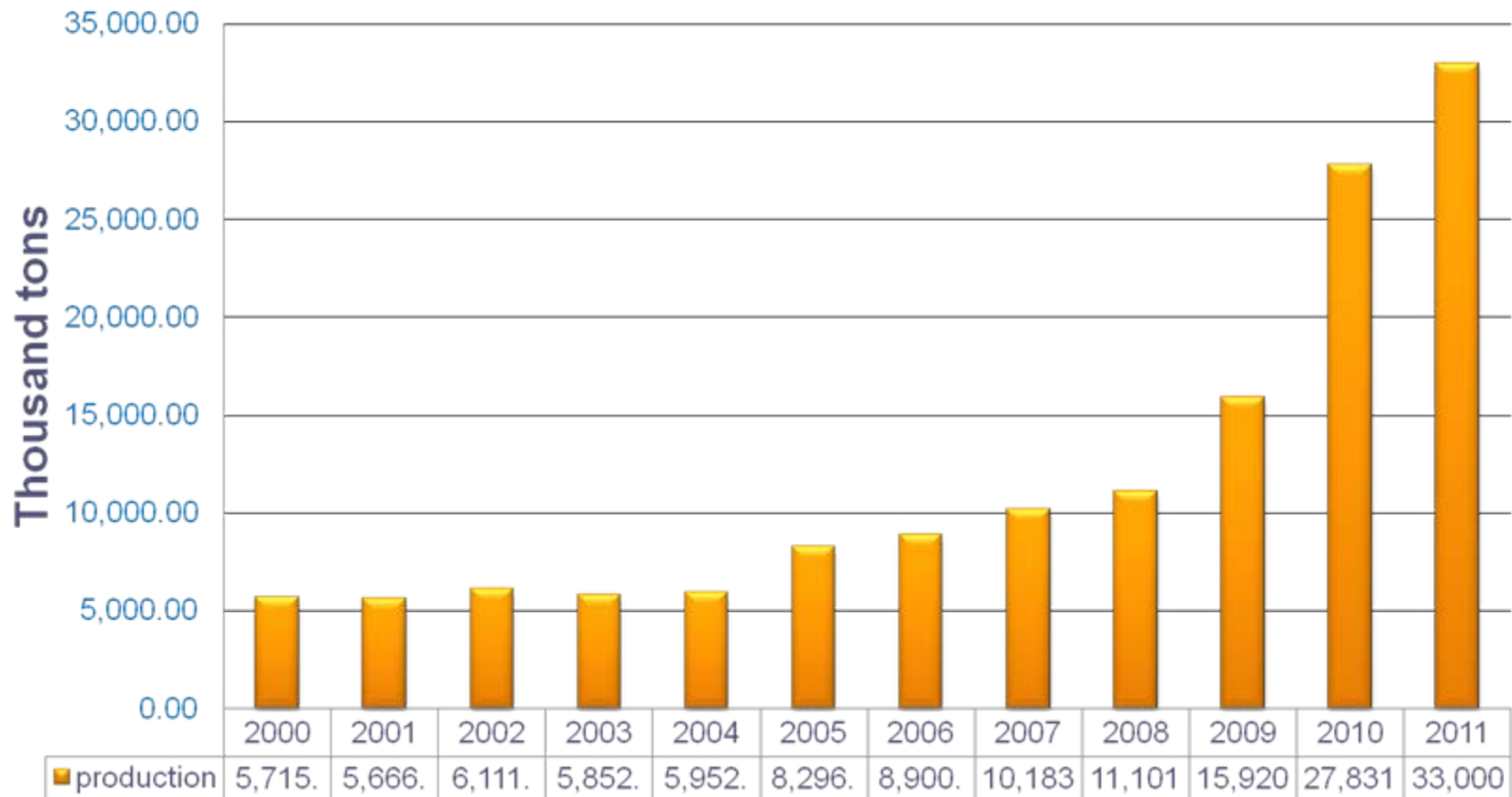
	Total	Coking coal	Thermal coal.
Total estimated reserve	162.33 billion tonnes		
Estimated economically recoverable reserve by preliminary and detailed exploration activities.	22.3 billion tonnes.		
Proved coal reserve	12.2 billion tonnes,	2 billion tonnes	10.1 billion tonnes
Annual Coal Production in 2011.	32,99 million tonnes		





# THE CURRENT STATE OF THE ENERGY SECTOR

## Coal production





# THE CURRENT STATE OF THE ENERGY SECTOR

## Oil sector

	Total
Total estimated reserve	1,6 billion tonnes.
Proved oil reserve	199,2 million tonnes,
Annual Oil Production in 2011.	2,549 million barrels

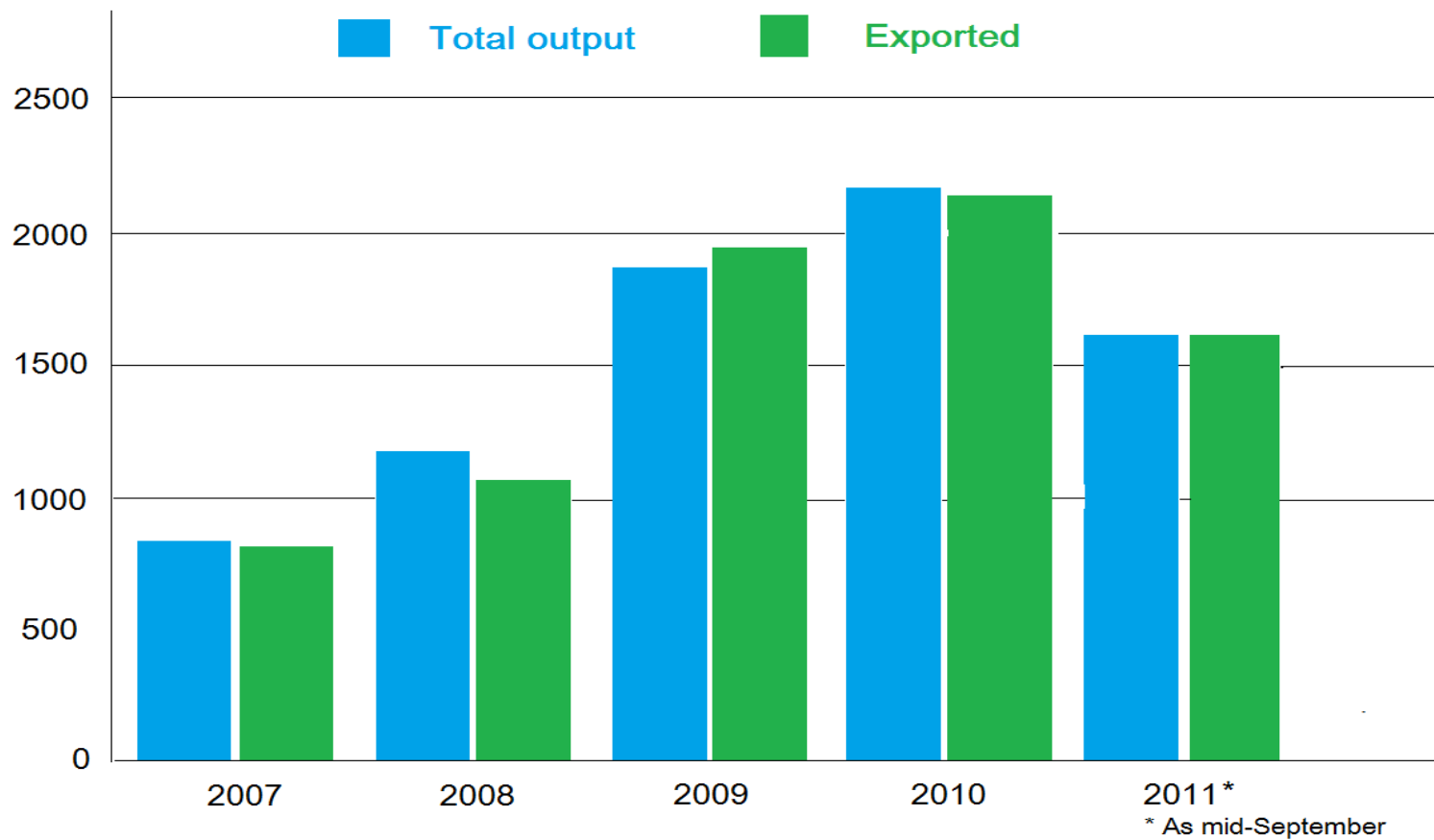
- So 95 % of the oil is imported from Russia, with strong dependency on the Russian petroleum company ROSNEFT, and the remaining 5 % originate from China.





# THE CURRENT STATE OF THE ENERGY SECTOR

OIL OUTPUTS&EXPORTS 2007-2011 ( `000 barrels)







# OUTLOOK OF ENERGY DEMAND AND SUPPLY OF MONGOLIA.

## Electricity Load Forecasts,

The Energy demand increases at an annual average growth rate of 2.9 percent between 2005 and 2020 . (by GWh)

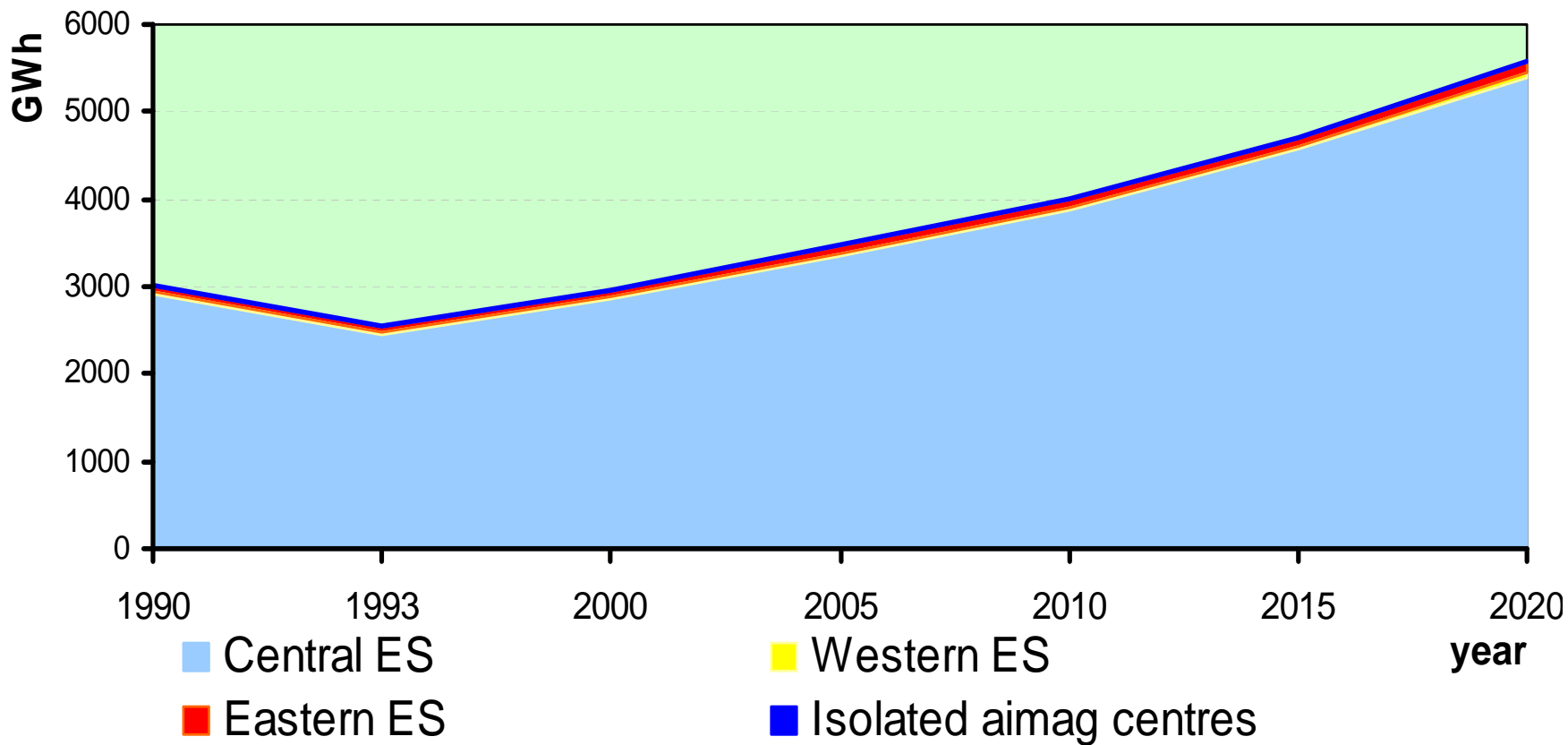
Systems	2005	2010	2015	2020
CES	3450.5	3868.2	4559.0	5400.9
Western ES	41.2	45.8	51.7	58.8
Eastern ES	65.6	73.0	82.3	93.1
Isolated aimag centres (Altai, Uliastai, Dalanzadgad)	26.6	29.6	33.4	37.8
Total	3483.8	4016.6	4726.4	5590.6





# OUTLOOK OF ENERGY DEMAND AND SUPPLY OF MONGOLIA.

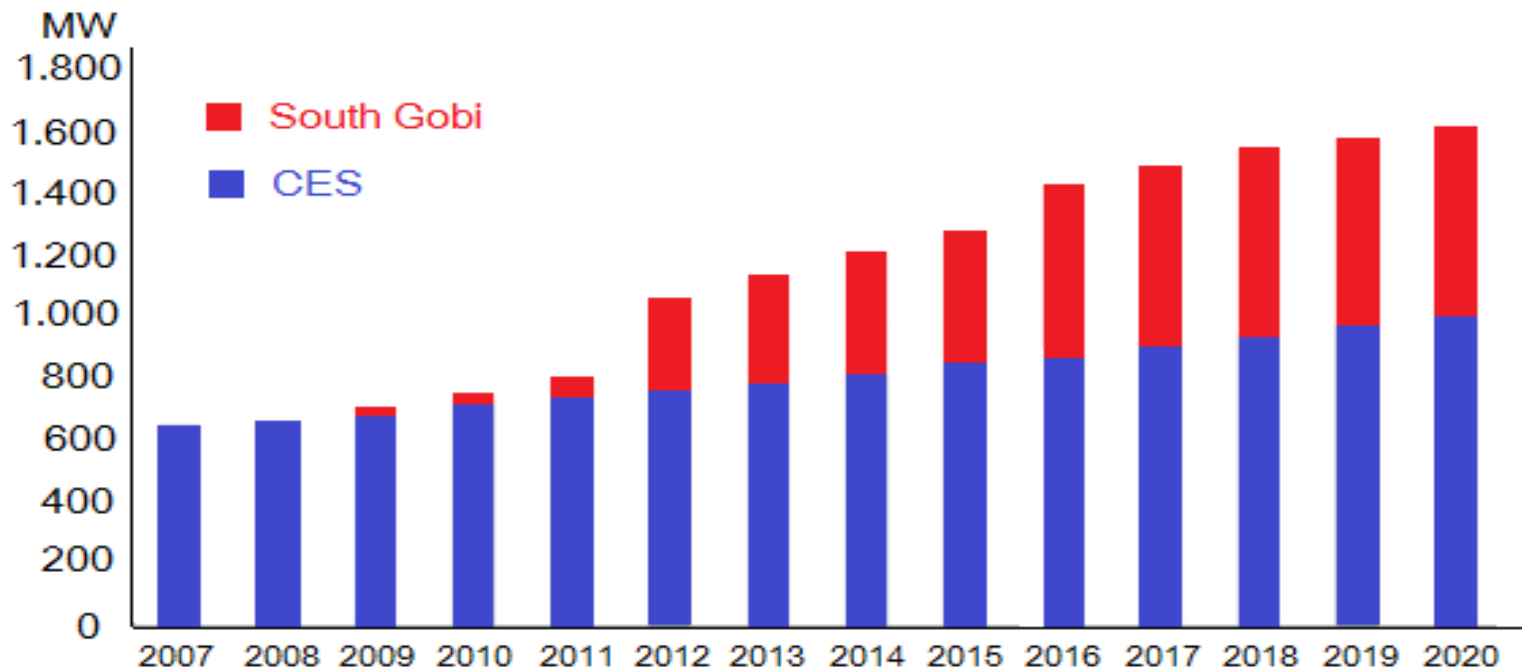
## Electricity Demand Development of Electricity Systems





# OUTLOOK OF ENERGY DEMAND AND SUPPLY OF MONGOLIA.

The dramatic and continuing rise in Mongolia's energy demand is being driven by the rapid development of the country's mining based economy. Power demand in South Gobi region is expected to grow rapidly as a result of both the existing and new mining developments.





# OUTLOOK OF ENERGY DEMAND AND SUPPLY OF MONGOLIA.

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- Power demand in the South Gobi is expected to grow sharply (around 400 MW) by 2020 as a result of various mining developments including gold and copper and coal mines,
- Coal mining development in the South Gobi could also provide an opportunity for Mongolia to add power supply capacity and enhance revenues through power export via cross border power trade with the China.
  - In 2005, the government signed memorandums of understanding with the State Grid Corporation of the People's Republic of China, jointly developing power plants (3,600 MW) in Siveovoo, South Gobi; and interconnected transmission line.





# THE ENERGY POLICY DOCUMENTS AND ITS IMPLEMENTATION.

The government has initiated various energy sector reforms and developments since 2001, including sector commercialization, energy efficiency, and renewable energy.

2001	Energy Law	<ul style="list-style-type: none"> <li>• To unbundle the energy sector ,</li> <li>• To establish a sector regulatory agency,</li> </ul>
2002	Energy Sector Development Strategy	<ul style="list-style-type: none"> <li>• To focus on sector restructuring, energy conservation, planning and operational capacity enhancement, and energy access for all.</li> </ul>
2007	Renewable Energy Law	<ul style="list-style-type: none"> <li>• To target increasing the share of renewable energy in total primary energy sources up to 3%–5% by 2010 and 20%–25% by 2020.</li> </ul>
2008	State Policy of Mongolia on Fuel and Energy	<ul style="list-style-type: none"> <li>• To identify sector strategies, priorities, and actions from 2008 to 2015.               <ul style="list-style-type: none"> <li>○ The priorities include enhancing energy security, improving the efficiency of the sector and creating favorable conditions for operation in the market environment, developing coal processing and clean coal technologies, and building energy exporting capacity.</li> </ul> </li> </ul>





# THE ENERGY POLICY DOCUMENTS AND ITS IMPLEMENTATION.

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The State Great Khural ( Parliament ) and the Government of Mongolia approved following documents:

- “Program on Integrated Energy System of Mongolia” ,
- “the National Program on Renewable Energy”
- “the Comprehensive Policy on National Development”

Implementation of the Program on Integrated Energy System of Mongolia:

- Currently, all 21 *aimags* and 318 *soums* are supplied by centralized energy source while 15 *soums* are supplied from renewable sources and other hybrid systems.
- The first phase or short-term (from 2007 to 2012) action plan of “the Program on Integrated Energy System of Mongolia” is currently being implemented successfully.

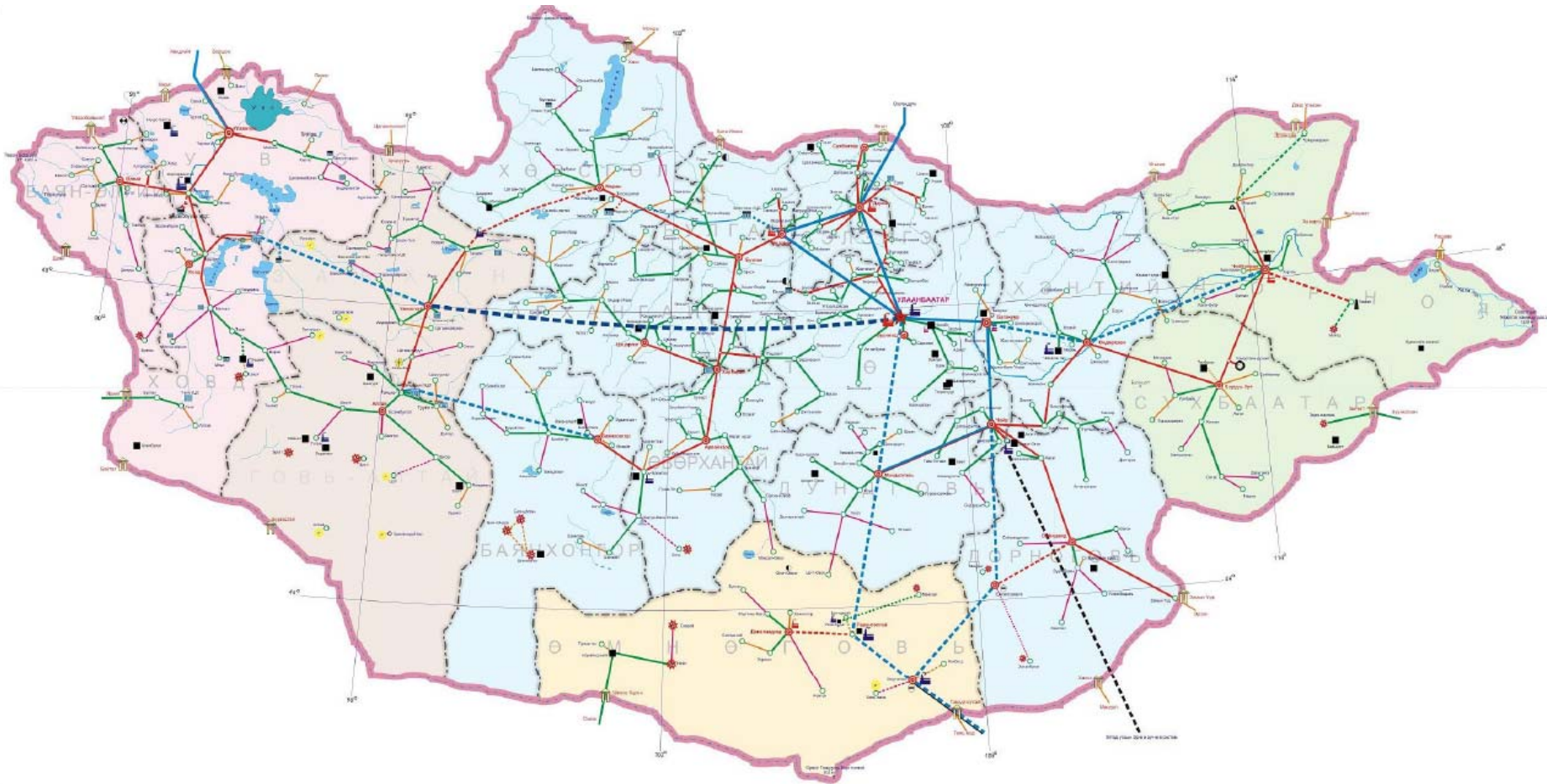
Implementation of “the National Program on Renewable Energy”:

- Currently, use of renewable energy sources for power generation has become a reality as a result of which about 100,000 nomadic (“100,000 Sun Lights” national program) and 15 *soums* have access to electricity using a renewable energy sources.





# MONGOLIAN INTEGRATED POWER SYSTEM.





# THE ENERGY POLICY DOCUMENTS AND ITS IMPLEMENTATION.

## Implementation of “the Comprehensive Policy on National Development”

- The energy sector has spend following developmental phases,

Period	Policy and objectives
<b>2002-2008</b>	<ul style="list-style-type: none"> <li>• Structural changes into the energy sector was made,</li> <li>• State policy on providing electricity were implemented, all aimags and soums in the countryside were connected to electricity.</li> <li>• nomads were provided with small scale renewable energy sources.</li> </ul>
<b>2008-2011</b>	<ul style="list-style-type: none"> <li>• Equipment and technologies were upgraded and renovated and when preparatory works for supplying sources to regional electricity systems went underway.</li> </ul>
<b>2011-2016</b>	<ul style="list-style-type: none"> <li>• new development era in which large scale energy supply networks and main power lines will be built to establish an Integrated Energy System which will meet the country’s ever-growing energy demand.</li> </ul>

In 2011 updates and amendments will be made to legal framework and main policy documents:

- “Law of Mongolian on Energy”
- “Integrated Energy System of Mongolia” National programme,
- “Master plan of Energy sector”







## SHORT TERM STRATEGY AND GOALS.

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- According to Power consumption prognosis of conducting large industrialized and settlement regions and cities the estimated energy consumption rate will reach 1,500 to 3,000MW between 2015 and 2030.
- The government's policy and legal environment are favorable in supporting the public-private sector cooperation and investment .
- In order to meet Mongolia's energy consumption growth for 2015- 2030 and to export electricity, it is necessary to build power stations near mining deposits and big capacity hydropower, wind parks, and solar systems.
- In the near future, Mongolia's Ministry will implement the following principles and strategies towards the development of the energy sector, including:
  - Conducting a well-grounded estimate and revision of energy consumption rate, and drafting an action plan based on these data;
  - Providing financial and economic opportunities to build new sources of energy supply networks and developing energy sector;
  - Supporting the construction of new energy supply networks by the private sector, developing the legal environment of energy prices and tariffs, and developing a public-private sector partnership;





## SHORT TERM STRATEGY AND GOALS.

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- Developing and expanding power line networks under the review of the Government in accordance with the consumption and energy supply sources projections;
- Increasing the efficiency of the energy sector, providing its financial sustainability, implementing economically feasible regulations, and fully transferring the energy sector and prices to market regulations.

Preconditions of transfer the energy sector to market regulations consist of activities such as:

- Making energy tariffs and the legal environment attractive to investors,
- Developing public - private partnership, and establishing ,
- Exploiting new energy sources with the participation of the private sector,
- Privatization of the current energy supply networks and the building of new private energy supply networks.
- Improve power lines networks under Government purview, and expand and develop it in line with the construction of new energy supply networks in accordance with the law .





# THE GOALS OF DEMAND-SUPPLY BALANCING IN FUTURE.

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The followings are the mid term priorities of the Energy sector :

- Form the Integrated Power System by connecting the Western, Central and Eastern Energy Systems with power transmission lines.
- Construct 220kV transmission line in order to supply increasing electricity demand in the Eastern, southern Gobi regions and build the power plant with a minimum capacity of 300MW,
- Start utilization the first blocks with 450 MW capacity in order to supply increasing heat and electricity demand of the Capital city.
- Construct totally 70 MW Power plant based on coal mines in order to supply to electricity demand of the Western region and Altai-Uliastai energy system.
- Construct Wind farms with total capacity of 100 MWs in Tuv and Dornogovi provinces with a support from Government.
- Increase the share of renewable energy on the total capacity of power sector until 10 percent.
- Improve legal environment of energy sector and introduce market structure.





# THE CURRENT MAJOR DIFFICULTIES IN ENERGY SECTOR.

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## □ The lack of power generations.

- Power demand since 2003 in industry, transportation, agriculture, and households have increased 31% (459.2GWh), 30% (30.2 GWh), 22% (7 GWh), and 31% (174.7 GWh) respectively. The installed capacity growth has increased by 53.7 MW since 2003, a modest increase (6.8%).
- Mongolia is in danger of a serious energy shortfall as early as 2012, at which point the maximum imported capacity of 255 MW from Russia may not meet demand. In addition, Russian power has become more expensive. This shortfall will grow with rapid expansion of the country's mining sector. The GoM will need to attract private investment to build new power facilities and to upgrade and improve existing capacity.





# THE CURRENT MAJOR DIFFICULTIES IN ENERGY SECTOR.

		2010	2011	2012	2013	2014	2015
<b>CENTRAL ENERGY SYSTEM</b>							
1	Generation capacity	776	776	776	776	758	758
2	Import	120	120	120	120	120	120
3	Demand	711	768	964	1.166	1.297	1.375
4	Existing Peak load	734	782	829	896	967	1.045
5	New Potential Customer			135	272	330	330
6	Deficit of capacity		6	188	390	539	617
<b>EASTERN ENERGY SYSTEM</b>							
7	Generation Capacity	24	24	24	24	24	24
8	Demand	21	23	79	126	149	151
9	Existing Base load	21	23	24	26	29	31
10	New Potential Customer			55	100	120	120
11	Deficit of capacity			55	102	125	127
<b>TOTAL DEFICIT</b>		<b>68</b>	<b>9</b>	<b>243</b>	<b>492</b>	<b>664</b>	<b>744</b>





# THE CURRENT MAJOR DIFFICULTIES IN ENERGY SECTOR.

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## The aging of Coal fired power plants

- 1) IOAs the primary source of energy for Mongolia, the coal industry is critical to the operation of Mongolia's energy system. The 7 thermal power plants generates approximately 80% of the Mongolia's electricity power generation capacity.
- The aging of the existing power plant infrastructure results in energy inefficiency and electricity loss due to:
  - lower actual available power capacity and load factors
  - Higher self-electricity consumption in power plants.





# THE CURRENT MAJOR DIFFICULTIES IN ENERGY SECTOR.

## □ Diesel generators - unstable diesel supply and high cost

The diesel generators are popular in rural areas with no connection to the grid. In the South Gobi region, the Tavan Tolgoi mine is building a 20MW diesel power plant as a temporary electricity solution. Two major problems need to be solved for diesel power plants to be viable long-term:

### 1) The unstable supply of diesel.

- Mongolia sources over 90 percent of its fuel from Russia. These imports are unstable as Russia may suddenly curtail its fuel exports as it has done in the past. This has the corollary effect of driving up domestic prices.

### 2) The high operating cost for using diesel to generate power.

- Because Mongolia is forced to import diesel to offset its domestic energy needs, the selling in that country is higher than China, Kazakhstan and Russia.





## THE SUBJECTS TO STUDY

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Nowadays Mongolian Energy sector development plan are updating by Mineral and Energy Ministry in assistance ADB. Therefore we The National Dispatching Center, Power systems Mongolia need to include some our offers that plan. There are:

- To extend our activities in nationwide range, so establish some branch control centers in Eastern and Western Energy systems,
- To ensure national energy security and efficient utilization resources in order to establish comprehensive energy Policy and supply-demand forecasting,
- To implement Energy Policy based on energy supply-demand forecasting as well as energy balance,
- To implement Market Oriented Operation on Energy sector.







## THE SUBJECTS TO STUDY

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Our organization would like to achieve some items described in below.

There are:

- To learn experiences of Japanese enterprises,
- To establish good relationship with same or similar organization in Japan,
- To establish connection to invite Japanese experts for implementing Energy Policy, especially at establishing new control centers in Western and Eastern Energy systems,
- To gain acknowledge about market oriented system operators, (to study experiences of Japanese power companies)
- To gain knowledge Energy demand forecasting in World, especially in Japan,
- To gain experiences for formulation of future activities for energy policy making based on energy supply-demand forecasting as well as energy balance.
- To study for planning perspectives of ensuring national energy security and efficient utilization of resources in order to develop energy supply-demand forecasting.





# THE SUBJECTS TO STUDY

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The areas of Interesting in:

- Energy demand forecasting
- Knowledge on energy situation and its policy
- Formulation of future activities for energy policy making based on energy supply-demand forecasting as well as energy balance.
- The perspective of ensuring national energy security and efficient utilization of resources in order to develop energy supply-demand forecasting.
- Deregulation or liberalization of Energy sector
- Smart grid
- EMS





**Thank you for attention!**

