



MINISTRY OF ENERGY

# Renewable Energy Development of Mongolia

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# Brief information



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Territory: 1.564 million km<sup>2</sup>

Population: 2.8 million

Capital city: Ulaanbaatar  
(approx. 1.0 million 35.6%)

Ambient temperature: between -  
33°C (-50°C) and +23°C  
(+35.8°C)

Provincial towns: 335 (318  
connected to grid)

GDP per capita: 4,743 \$ (2012  
IMF source)

# POLICY OF RENEWABLE ENERGY DEVELOPMENT

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- The Parliament of Mongolia approved following laws and programs.
  - “Law on Energy” in Feb 2001 to regulate matters relating to energy generation, transmission, distribution, and supply activities, construction of energy facilities and energy consumption through utilization of energy resources.
  - “Renewable Energy Law” in January 2007 to regulate generation and supply of energy utilizing renewable energy sources.
  - “100000 solar home” national program in 1999 to supply nomadic family by solar home system. The program had implemented during 2000 – 2010.
  - Millennium development coal, the strategy should be implemented 2008 -2021
  - “Program on integrated power energy system” in May 2002 to form the Integrated power system of Mongolia. The program should be implemented in three stages /2007-2040/.
  - “National Renewable energy program” in June 2005 to promote and extend renewable energy development in Mongolia. Program shall be implemented in two stages /2005-2020/.



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# **TRENDS IN OVER THE PAST DECADE THE USE OF RENEWABLE ENERGY MONGOLIA**



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# “100,000 SOLAR GER” NATIONAL PROGRAM

## □ Started in 1999

- By 2000-2002 more than 5000 SHS distributed  
( supported by the Government)
- By 2003 some 11,170 SHS distributed  
(partially supported by the Japanese grant aid)
- By 2004 some 20,620 SHS distributed  
(partially supported by the Chinese grant aid);
- By 2008 40,400 SHS distributed  
(supported by the Mongolian Government);

## □ Completed /2005-2011/

- By 2009-2011 some 25,000 SHS distributed (partially supported by the World Bank grant aid);





# Mongolian land and blue sky



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# Mongolia lies at heart of Asia



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# Nomadic way of life in country



## IMPLEMENTED NEAR TERM TASKS OF NATIONAL RENEWABLE ENERGY PROGRAM

- ❑ Taishir HPP is constructed in 2011 and some soums of two provinces including province centers.
- ❑ Durgun HPP (2004 – 2009) for Western Energy System is constructed and is supplying 30 – 40 percent on the total load of the system;



12 MW Taishir HPP,



11 MW Durgun HPP



## IMPLEMENTED NEAR TERM TASKS OF NATIONAL RENEWABLE ENERGY PROGRAM

- 2007-2009, PV-Wind-Diesel hybrid systems were built in 13 remote areas (soums);
- Constructed small hydro power plants were supplied electricity for 11 remote areas (soums) in summer season;





# RENEWABLE ENERGY LAW

## ❑ Feed-in tariffs (FIT) for renewable power sources

	Hydro			Wind	Solar
	up to 0.5 MW	from 0.5 to 2 MW	from 2 to 5 MW		
Grid-connected	0.045 - 0.06	0.045 - 0.06	0.045 - 0.06	0.08 - 0.095	0.15 - 0.18
Stand alone	0.08 - 0.10	0.05 - 0.06	0.045 - 0.05	0.10 - 0.15	0.2 - 0.3
Prices are given in USD per kWh					

## ❑ Renewable energy fund

## ❑ Promotes, incentives and supports the production of energy from renewable sources by regulating generation, transmission, and pricing of green energy.





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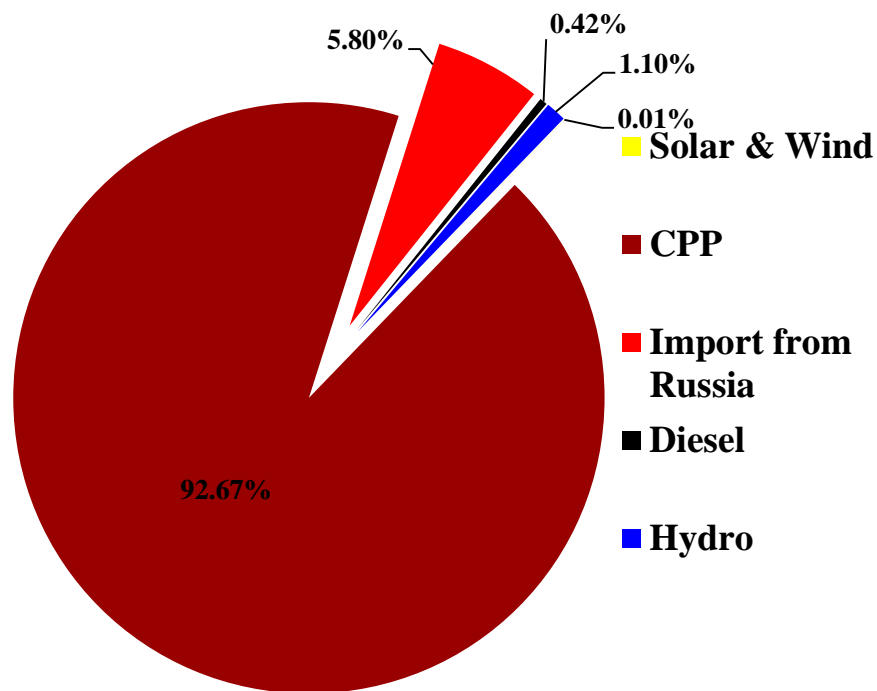
## PRIVATE INVESTMENT INITIATIVES

- Today, 5 legal entities have obtained licenses for construction wind park from Energy Regulatory Commission.
  - Clean Energy (50 MW)
  - Clean Tech (250 MW)
  - Sainshand wind power (50 MW)
  - Aydiner (50 MW)
  - AB solar (100 MW)

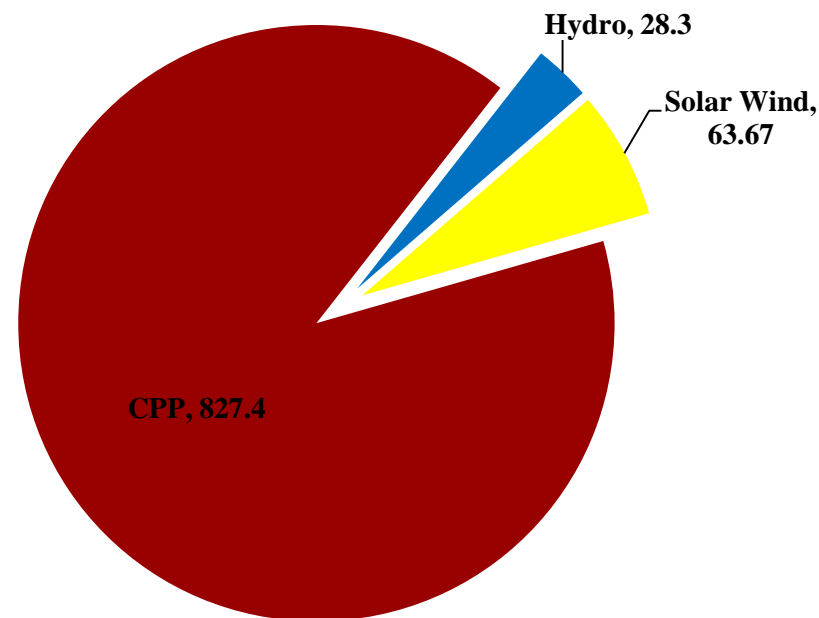


- National renewable energy program maintains following targets for renewable energy development in the country:
  - To increase the share of renewable energy in the total energy supply to 20 – 25 % by 2020;
  - To decrease in overall energy losses by 10 % by 2020;

# CURRENT SITUATION OF ELECTRICITY SUPPLY & INSTALLED CAPACITY POWER SYSTEM



**1. The electricity supply, %**



**2. The power capacity, MW**

Due to recent intensive activities in mining sector, in near future Mongolia should become a large producer and exporter of electricity...



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# NORTHEAST ASIAN ENERGY COOPERATION IN MONGOLIA





## NORTHEAST ASIAN ENERGY COOPERATION

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- ❑ In November 2005, an Intergovernmental Collaborative Mechanism (ICM) on Energy Cooperation in North-East Asia was established under ESCAP to facilitate energy cooperation and trade to enhance energy security in North-East Asia.
- ❑ ICM was adopted by the first session of the Senior Officials Committee on Energy Cooperation in North-East Asia hosted by the Ministry of Fuel and Energy of the Government of Mongolia. The seventh session was organized in Korea on November, 2011.



## VISION & OBJECTIVES

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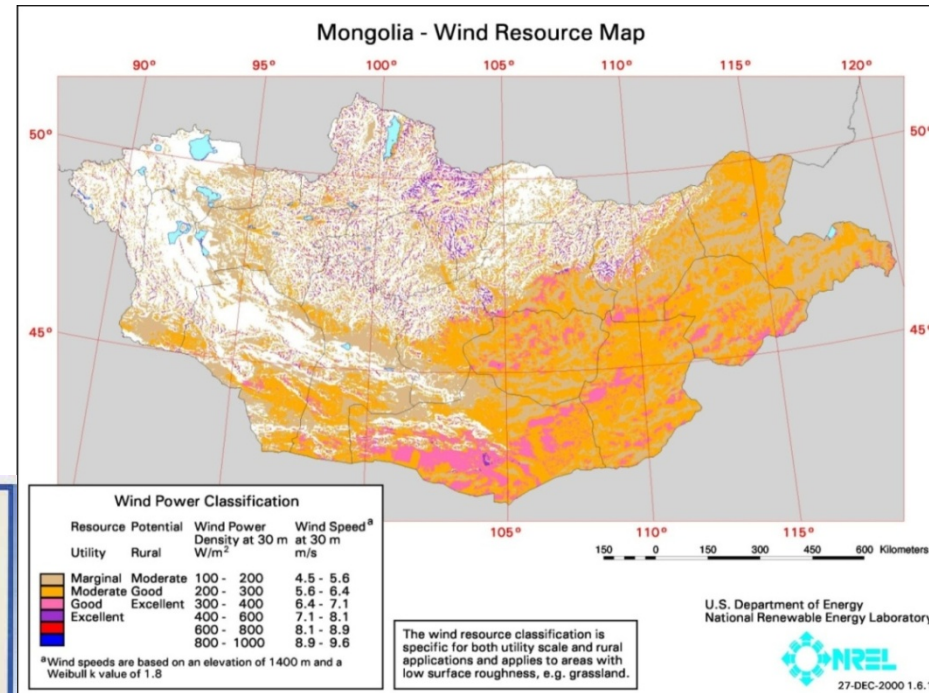
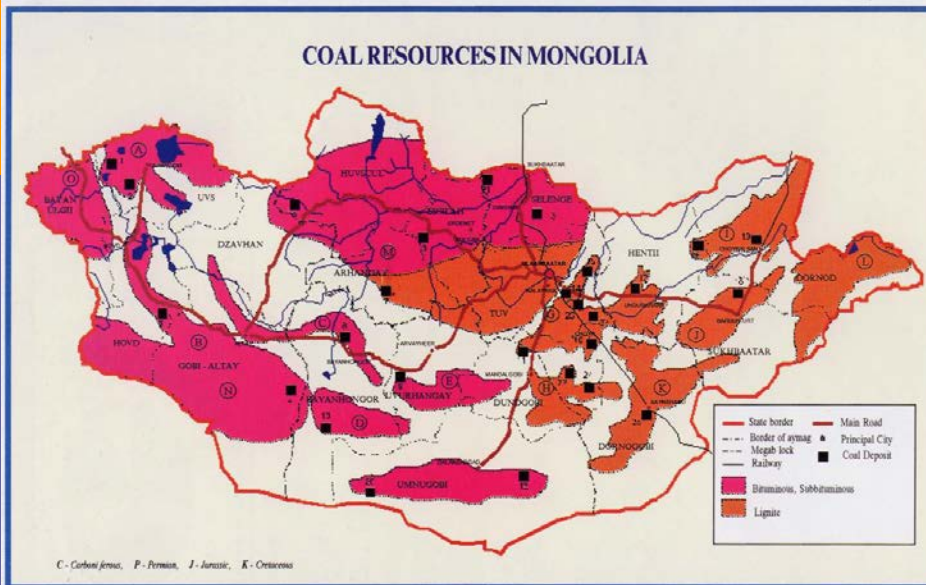
- ❑ The vision: "By 2020, improved energy security in North-East Asia through energy cooperation in a sustainable manner"
- ❑ The objectives:
  - To increase the supply of energy in the North-East Asian sub-region, lessening its dependence on energy imports from outside the sub-region;
  - To optimize the economy and efficiency of the supply and use of energy;
  - To minimize the environmental impact of energy production and consumption through an improved energy mix and greater energy efficiency.
- ❑ Northeast Asian countries would agree that cooperation is necessary in order to use energy efficiently and to promote enhanced utilization of renewable energy.



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# ENERGY POTENTIALS (WIND & COAL)

Mongolia has potential to be a major wind power producer.  
Mongolia has enormous wind power resources;  
Good-to-excellent wind resources equivalent to **1,100 GW** of wind electric potential.



Preliminary estimates of geologists, geological reserves of coal in Mongolia is more than **160 billion tons**, which includes Mongolia, one of the 15 countries of the world, with large coal reserves.



## Solar PV Resources Assessment by Satellite Remote Sensing



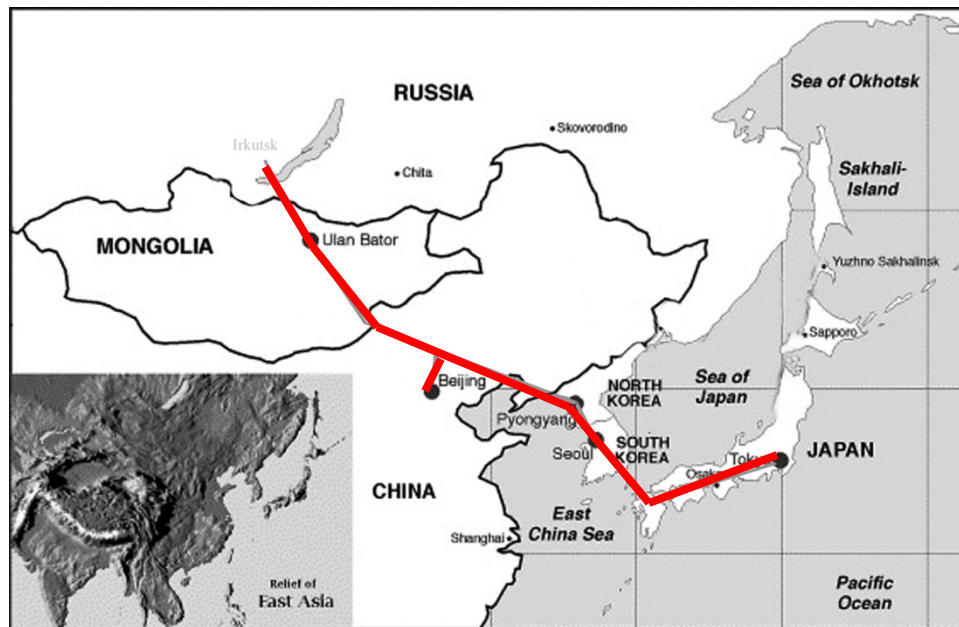
## Identified Land for the construction of Very Large Scale PV

≈ About 40 % of desert land 20

An annual average amount of solar energy is 1,400 kWh/m<sup>2</sup>/y with solar intensity of 4.3-4.7 kWh/m<sup>2</sup> per day.



# THE GRID INTERCONNECTIONS IN NORTHEAST ASIA COUNTRIES



To promote building a high-voltage, direct current (HVDC) electric power transmission system between Northeast Asian countries through Mongolia

# CONCLUDING REMARKS FOR ENERGY POLICY ON SUSTIANABLE DEVELOPMENT

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## Purpose:

- ❑ Sustain safety and reliability of sector operation,
- ❑ Meet efficiency and conservation requirements and growing demand for energy,
- ❑ Introduce environmentally friendly equipment and technologies,
- ❑ Facilitate and underpin private sector participation
- ❑ Increase power exporting capability of Mongolia.

## Energy Sectors Priorities:

- ❑ Increase energy sector safety and reliability
- ❑ Develop renewable energy
- ❑ Improve energy sector economic capability
- ❑ Accelerate Energy sector Innovation



# Mandakh Soum of Dornogobi Aimag 80 kW Wind Hybrid Systems

Hybrid systems installed: 80kW Wind Turbine (8 pcs \* 10kW wind turbine, BBWC EXCEL R-240 type, Bergey, China). Inverter 100kVA, CPTT-180KVA type, China). Battery 1000Ah (2V) \* 360 pcs (Shandong, China). Rectifier 3x380, 60kW, GDF-60KW, China





Hybrid systems installed: 120kW  
Wind Turbines (12pcs \* 10kW, BWC  
Excel-R type, Beijing Bergey Wind  
Power Co.) and 30kW Solar System  
(PV module 180 pcs \* 160W, 165W,  
170W; Trina Solar). Inverter: 2 pcs \*  
60kVA), MTP-416F type, "Leonics"  
Co., Ltd. Battery 1000Ah (2V) \* 360  
pcs. Solar control box SCP-240120  
type, "Leonics" Co., Ltd.

## Bayantsagaan Soum of Bayankhongor Aimag 150 kW Solar-Wind Hybrid Systems





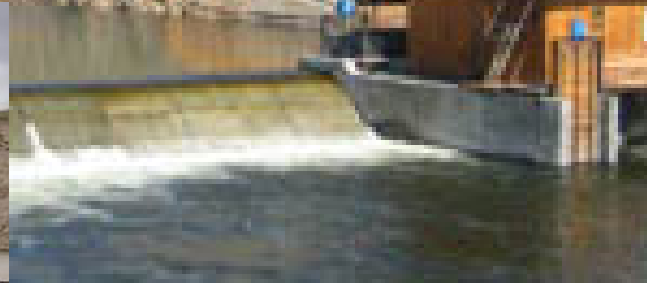
# Bugat Soum of Gobi-Altai Aimag

## 140 kW Solar System

Hybrid systems installed: 140kW Solar System (PV module 570 pcs \* 175W; Trina Solar). Two inverters consisted of 60kVA & 100kVA, Tailand “Leonics” Co., Ltd. Battery 1000Ah (2V) \* 600 pcs (GFM type). Charge controller – 4 pieces, SCP-240120 type, “Leonics” Co., Ltd.







7 9 2006