



MINISTRY OF ENERGY

Renewable Energy Development of Mongolia

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- Renewable energy target
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Brief information



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Territory: 1.564 million km²

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

- 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 goal, 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)



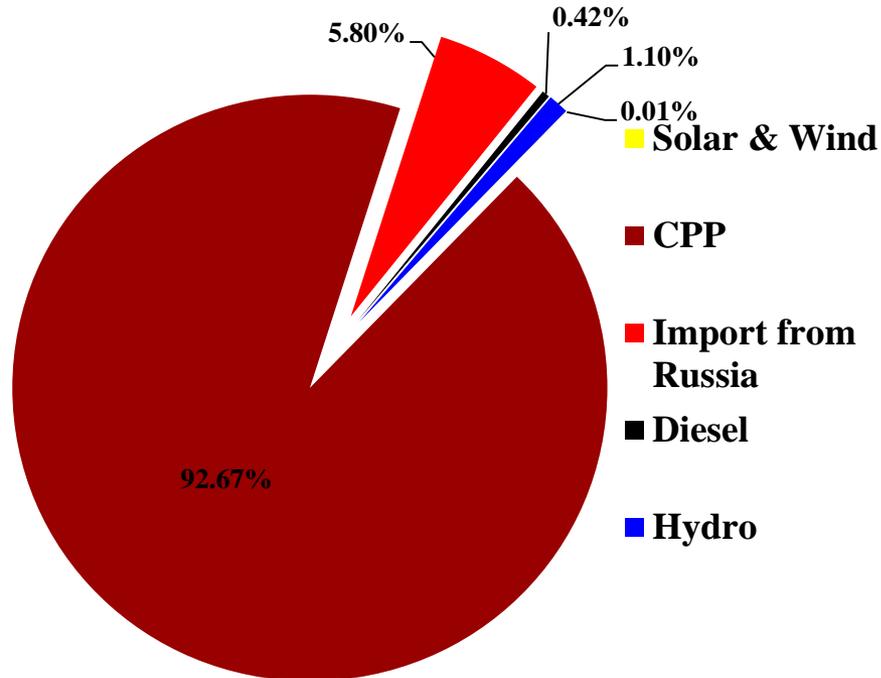


RENEWABLE ENERGY TARGET BY 2020

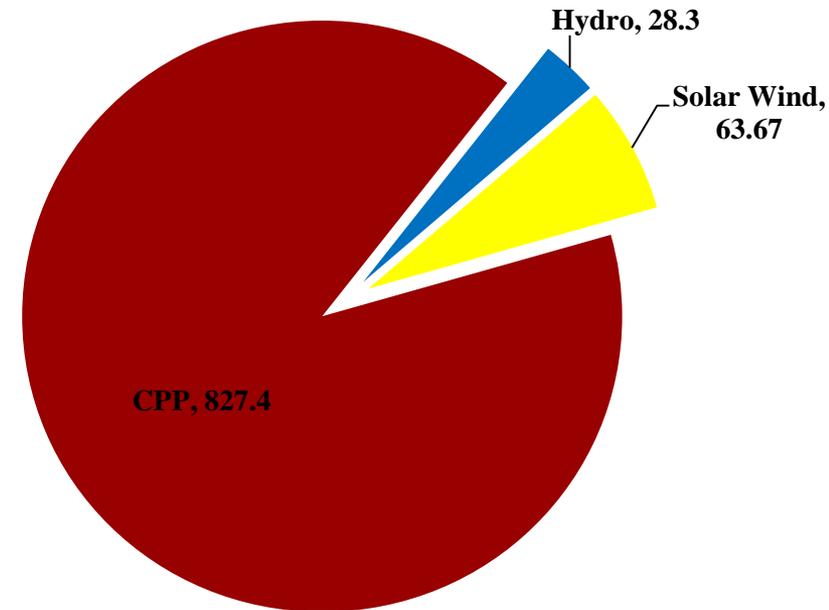
- National renewable energy program maintains following targets for renewable energy development in the country:
 - To increase the share of renewable energy in the total energy supply to 20 – 25 % by 2020;
 - To decrease in overall energy losses by 10 % by 2020;



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

- ❑ 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

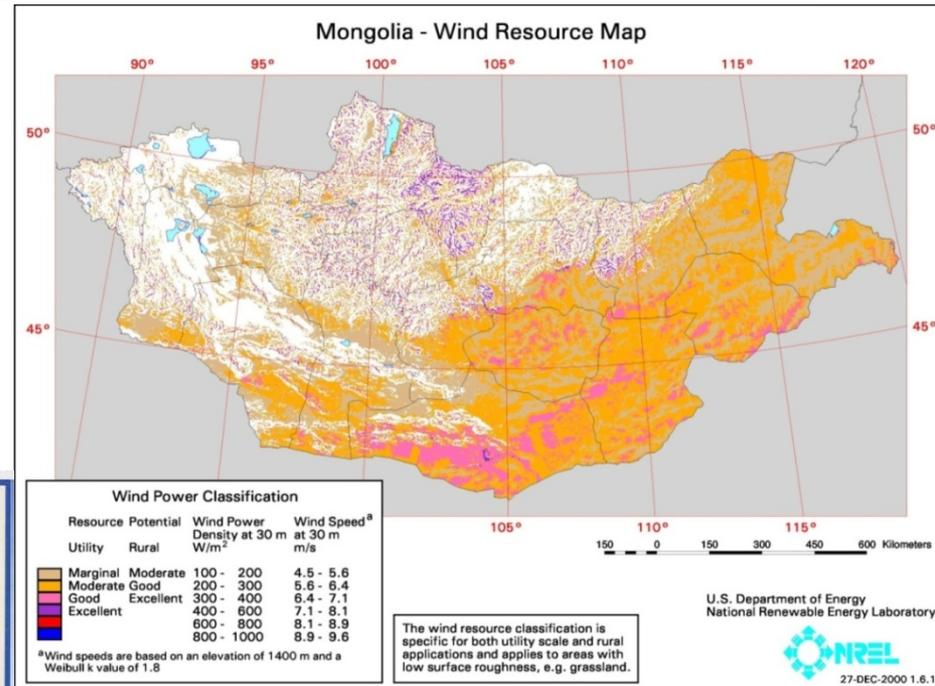
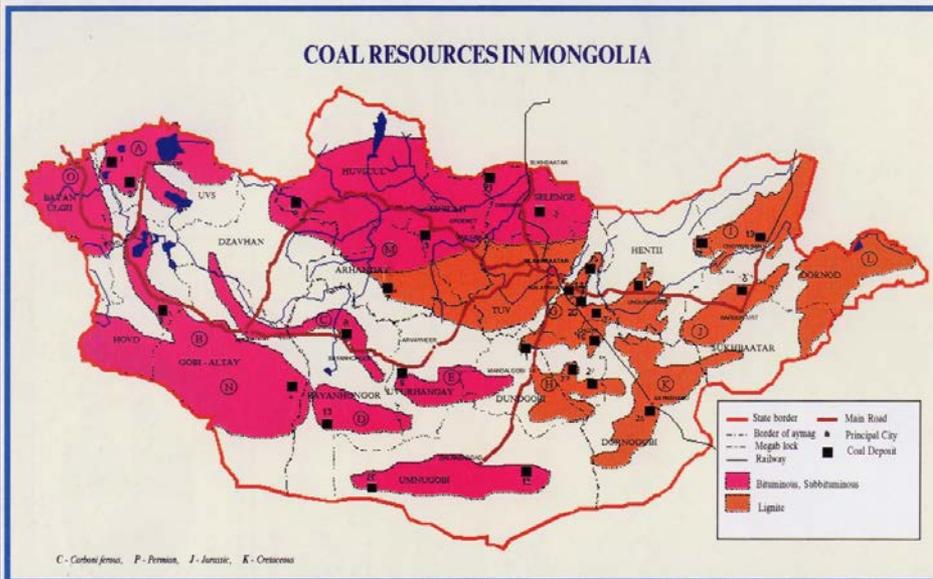
- ❑ The vision: "By 2020, improved energy security in North-East Asia through energy cooperation in a sustainable manner"
- ❑ The objectives:
 - To increase the supply of energy in the North-East Asian sub-region, lessening its dependence on energy imports from outside the sub-region;
 - To optimize 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.

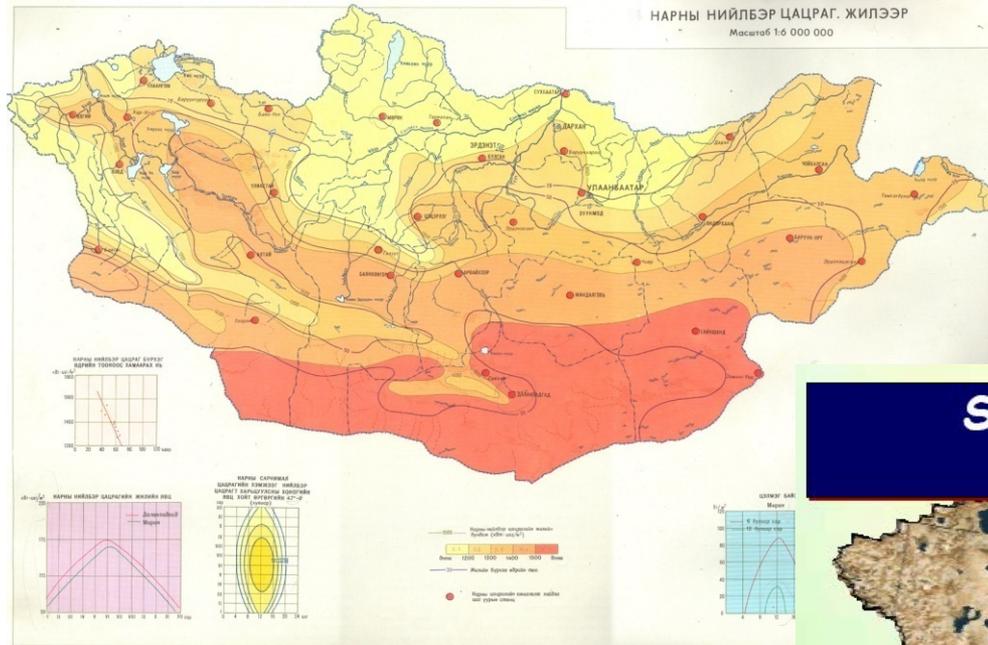


Preliminary estimates of geologists, geological reserves of coal in Mongolia is more than **160 billion tons**, which includes Mongolia, one of the 15 countries of the world, with large coal reserves.



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ENERGY POTENTIAL (SOLAR RESOURCES)



About 270-300 sunny days per year with an average sunlight duration of 2,250-3,300 hours are available in most of the territories of Mongolia.

Solar PV Resources Assessment by Satellite Remote Sensing



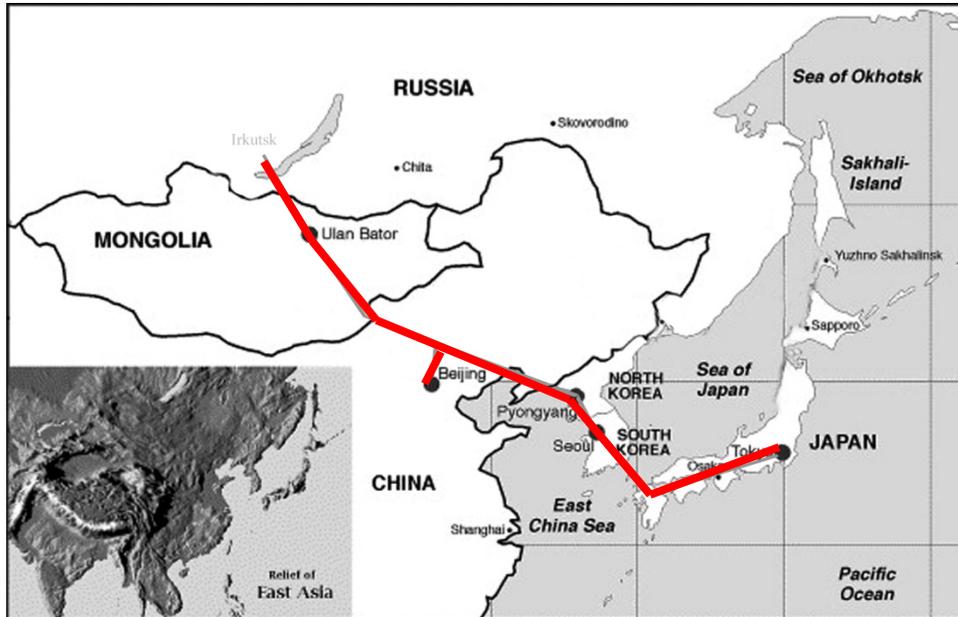
Identified Land for the construction of
Very Large Scale PV

≈ About 40 % of desert land 20

An annual average amount of solar energy is 1,400 kWh/m²/y with solar intensity of 4.3-4.7 kWh/m² 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

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.





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