

INTRODUCTION OF RENEWABLE ENERGY SECTOR IN MONGOLIA AND THEIR POLICY ENVIRONMENT

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Brief information of Mongolia

- **Geography**

Mongolia is situated in northern Asia, bordering China and Russia. The geographical coordinates of the country are 46° North latitude and 105° East longitude.

The total land area of Mongolia is 1,564,116 square kilometers.

- Lowest annual average temperature: -33°C (-50°C)
- Highest annual average temperature: $+23^{\circ}\text{C}$ ($+35.8^{\circ}\text{C}$)



CURRENT DEVELOPMENT LEVEL OF MONGOLIA

Level of GDP per Capita

- Mongolia is included in lower middle-income countries according to World Bank's classification of income level.

Human Development Index

- HDI of Mongolia – RANK 100

Year	Mongolia	East Asia and Pacific	World
2010	0.622	0.650	0.624

Index Competitiveness

- Mongolia stands at 99th place among 139 in the World Index Competitiveness Report which is published by World Economic Forum. Index Competitiveness 3.75 (99 out of 139) (2010 est.)

Life Quality Indicator

- Mongolia was to the Rank108, final score 57 position by International Living's research which involved 195 countries.

Source: <http://hdrstats.undp.org/en/countries/profiles/MNG.html>

<http://globaledge.msu.edu/countries/mongolia/risk/>

<http://www.il-ireland.com/il/qofl07/#Mongolia>

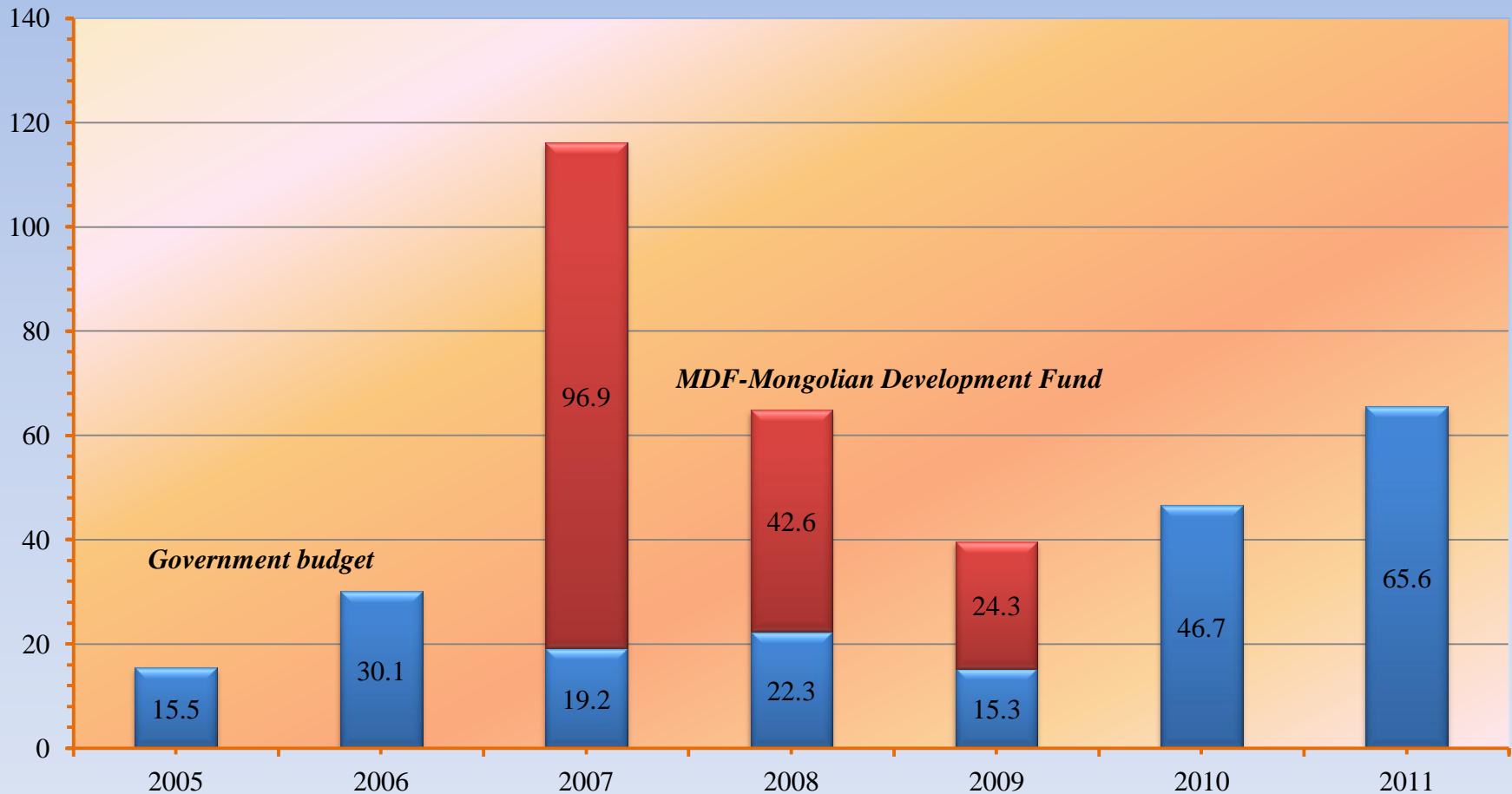
Socio-economical indicators

<i>Indicators</i>	2007	2008	2009	2010
<i>Population, at the end of the year, thous.persons</i>	2 635.2	2 683.5	2 735.8	2 780.8
<i>Households, at the and of the year, thous.household</i>	645.7	677.8	716.5	742.3
<i>GDP, at 2005 constant prices, bln.tog</i>	3 640.0	3 964.0	3 913.7	4 154.0
<i>GNI, at 2005 constant prices, bln.tog</i>	3 556.2	3 841.8	3 746.5	3 771.0
<i>GDP per capita, at 2005 constant prices, thous.tog</i>	1 392.0	1 490.6	1 444.3	1 506.0
<i>Annual exchange rate, 1 USD = togrog</i>	1 169.9	1 166.1	1 437.9	1 355.9
<i>General Government budget, at current prices, bln.tog</i>				
<i>- Revenue</i>	1 880.5	2 170.4	1 994.0	3 078.4
<i>- Expenditure</i>	1 747.3	2 466.8	2 336.6	3 076.3
<i>Investment, at current price, bln.tog</i>	1 252.8	1 785.1	2 146.2	3 370.7
<i>Foreign trade, mln.USD</i>				
<i>- Exports</i>	1 947.5	2 534.5	1 885.4	2 908.5
<i>- Imports</i>	2 061.8	3 244.5	2 137.7	3 200.1

Source: Mongolian statistical yearbook 2010

INVESTMENT FOR THE ENERGY SECTOR

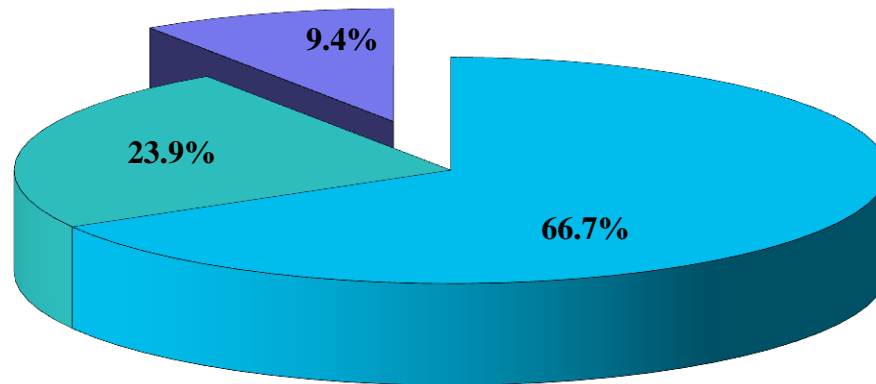
Investment for the energy sector was 15.3 billion tug in 2005 and it had increased with 328.7 percent and reached to 65.6 billion tug by 2011.



Index of gross industrial output, 2005=100%

Items	2005	2006	2007	2008	2009	2010
Mining and quarrying	100.0	105.6	105.7	105.9	108.3	119.2
Manufacturing	100.0	124.8	174.3	185.3	157.3	175.4
Electricity, thermal energy and water supply	100.0	102.5	106.2	113.5	115.5	122.2

Composition of gross industrial output of 2010, by divisions, at current prices



■ Mining and quarrying

■ Manufacturing

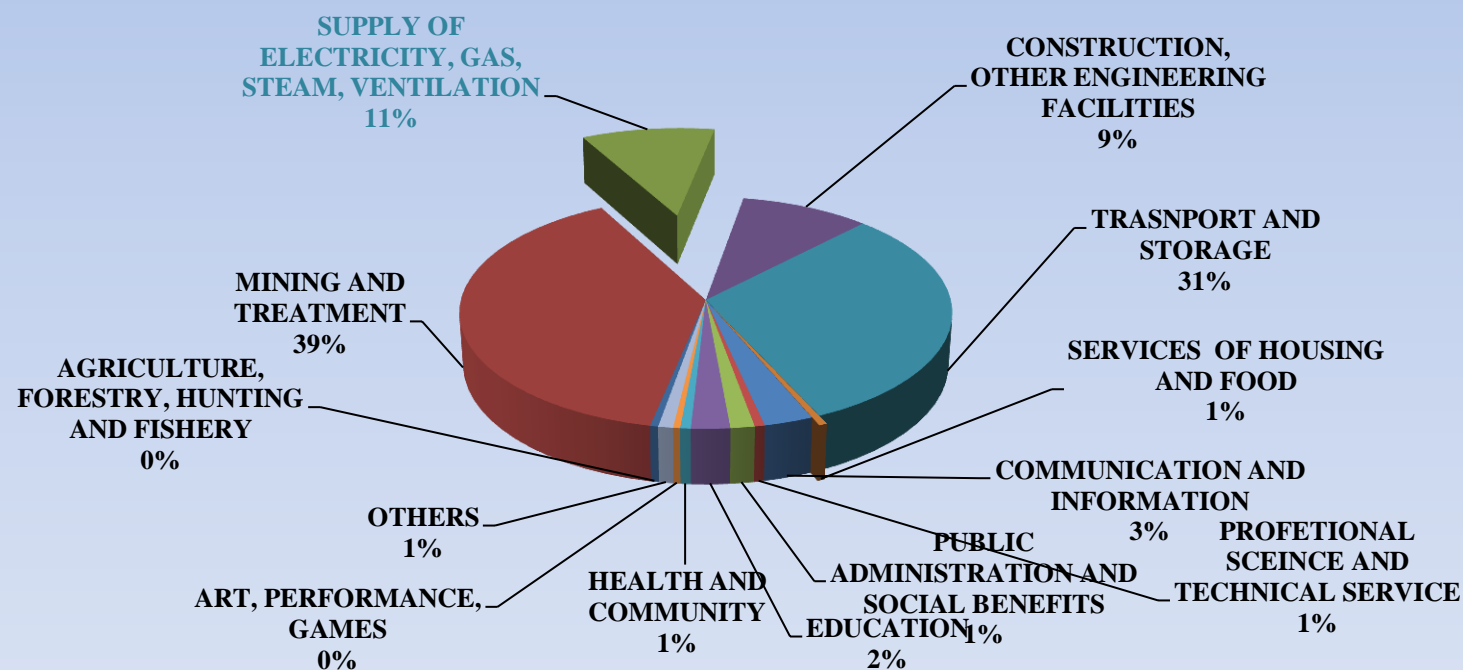
■ Electricity, thermal energy and water supply



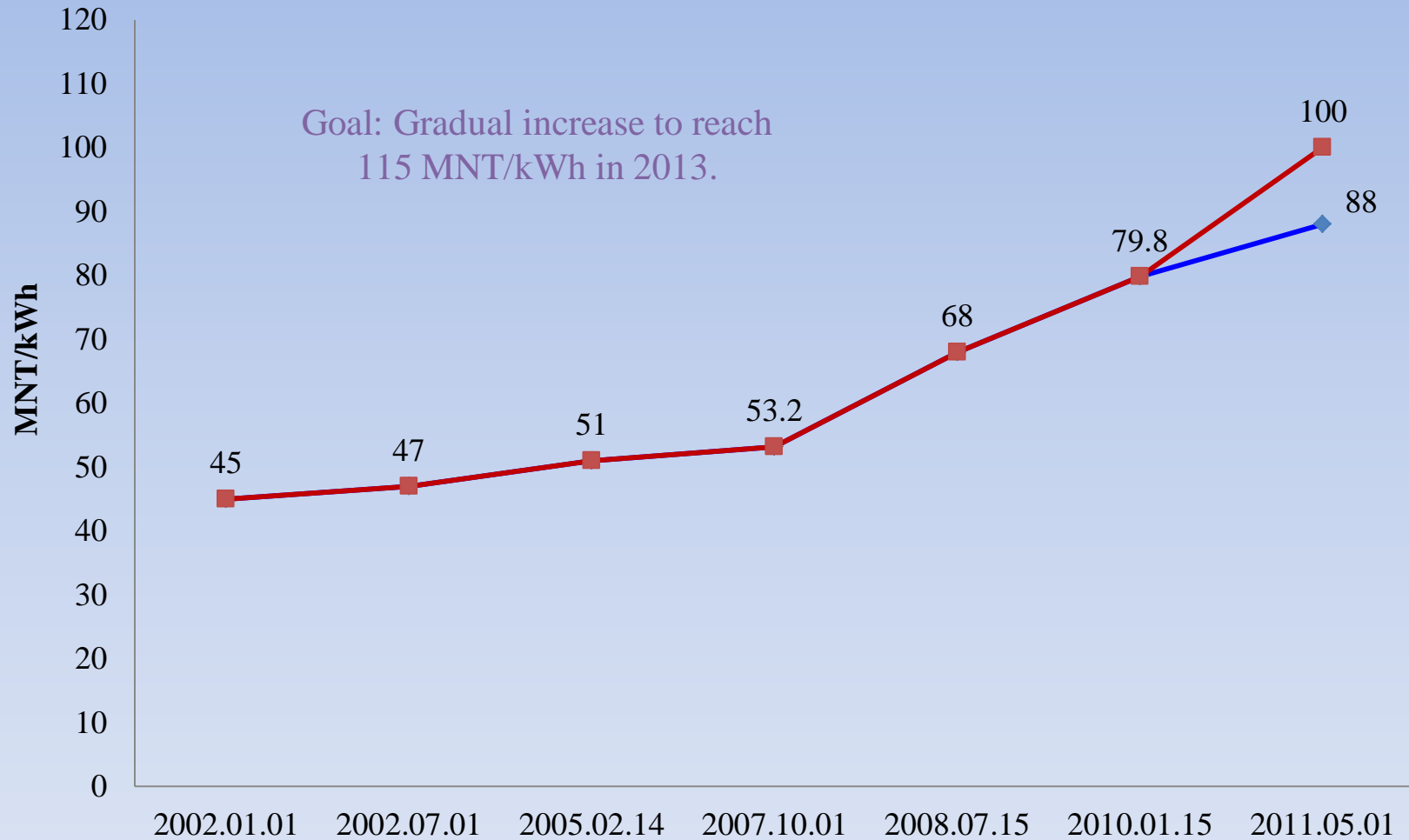
LAW, REGULATION AND PROGRAM FOR ENERGY SECTOR

INVESTMENT PROJECTION OF THE ENERGY SECTOR

According to the Government investment program 2011-2016, investment for the fuel and energy sector planned to have permanent increase of 10 percent every year and invest 3,280.6 billion tug for this sector. Investment for the fuel and energy sector accounted for 11 percent of total investment of sectors by the classification of sectors.



INCREASE IN ELECTRICITY TARIFF FOR INDUSTRIAL USERS, ENTERPRISES AND OTHER ENTITY CLASSES IN CENTRAL REGION



The energy sectoral development programs and policy documents and its implementation

- The State Great Khural and the Government of Mongolia approved following documents:
 - “Program on Integrated Energy System of Mongolia”,
 - “The National Renewable Energy Program”
 - “The 100 000 Solar Ger’s” National Program
 - “The Comprehensive Policy on National Development” and Government programs include concrete short-term and long-term strategies for the development of the energy sector.
- Short and mid term development plan of the sector was termed following documents:
 - Government Action Plan 2008-2012
 - Sustainable Development Plan of Energy Sector

“National Renewable Energy program”

/2005-2020/

- **3-5% share by the year 2010**
- **20-25% share by the year 2020**

which implies that an increased use of renewable energy systems will be an important contribution

Term Development Tasks: 2011-2020

- ❖ Complete construction and launch 100MW Orkhon hydro power plant.
- ❖ Construct small and medium capacity energy complexes in Ulaanbaatar and other cities and towns to reduce air pollution in these areas using solar, wind, hydrogen and geothermal resources.
- ❖ Construct medium capacity (30-50 megawatts) wind parks in sites with proven wind energy potential and connect to the centralized power grid system creating efficient operation condition.
- ❖ In the scope of international research activities in very large scale PV power generation system, gradually implement pilot project in Gobi region of the country.

RENEWABLE ENERGY LAW OF MONGOLIA

(approved by the Parliament on 11 January, 2007)

- Feed-in tariffs for RE power sources**
- Renewable Energy fund**

Renewable Energy tariffs and prices

	Types of energy	Capacity	Tariff /cent/
On Grid	Wind energy		8-9.5
	Hydro energy	till 5 MW	4.5-6
	Solar energy		15-18
Off Grid	Wind energy		10-15
	Hydro energy	till 0.5 MW	8-10
		0.5-2 MW	5-6
		2-5 MW	4.5-5
	Solar energy		20-30

Article 12. Duration of application of prices and tariffs

12.1. Prices and tariffs of renewable energy shall be stable for a period of minimum 10 (ten) years starting with the date of entry into force of this law.

COOPERATION AND INVESTMENT OPPORTUNITIES IN RENEWABLE ENERGY

In order to meet Mongolia's energy consumption growth for 2015- 2030 which is estimated as 1500-3000 MWs and to export electricity, it is necessary to build power stations near mining deposits such as Tavan Tolgoi, Shivee Ovoo, Baganuur, Aduunchuluun, Hotgor, Booroljuut, Chandagan.

The initiatives, active participation and support from international banks, financial institutions, foreign and domestic investors, and business entrepreneurs of the energy sector, are of vital importance for the best implementation of these projects.

PROPOSED PROJECTS

ELECTRIFICATION

1. Oyu-tolgoi wind park, 250 MW, /Feasibility study was completed/
2. Sainshand solar power plant, 30 MW, /Pre-feasibility study was completed/
3. Taishir solar power plant, 7.8 MW, /Pre-feasibility study was completed/
4. Industrial complex in Sainshand city, 300MW electrical demand
5. Tavantolgoi mining complex, 300-500MW electrical demand
6. East coal fired thermo-electrical power plant /increase capacity up to 100MW/
7. Electric railways in southern region, 200 MW
8. Delger Hydro Power Plant, 250 MW; /Feasibility study was completed/
9. Egiin Hydro Power Plant, 220 MW; /Feasibility study was completed/
10. Erdeneburen Hydro Power Plant, 60 MW; /Feasibility study was completed/
11. Chargait Hydro Power Plant, 24.6MW; /Feasibility study was completed/
12. Orkhon Hydro Power Plant, 100MW; /Feasibility study was completed/

PROPOSED PROJECTS

HEATING

1. Thermal power plant, 5MW x 3 aimag`s /renewable energy source/
2. Heating households using renewables, /capital city and remote areas/
3. Thermal power plant in capital city, /coal-fired power plant/

Wind power potential

- Mongolia has potential to be a major wind power producer.
- Mongolia has enormous wind power resources;
 - Good-to-excellent wind resources equivalent to **1,113,300 MW** of wind electric potential

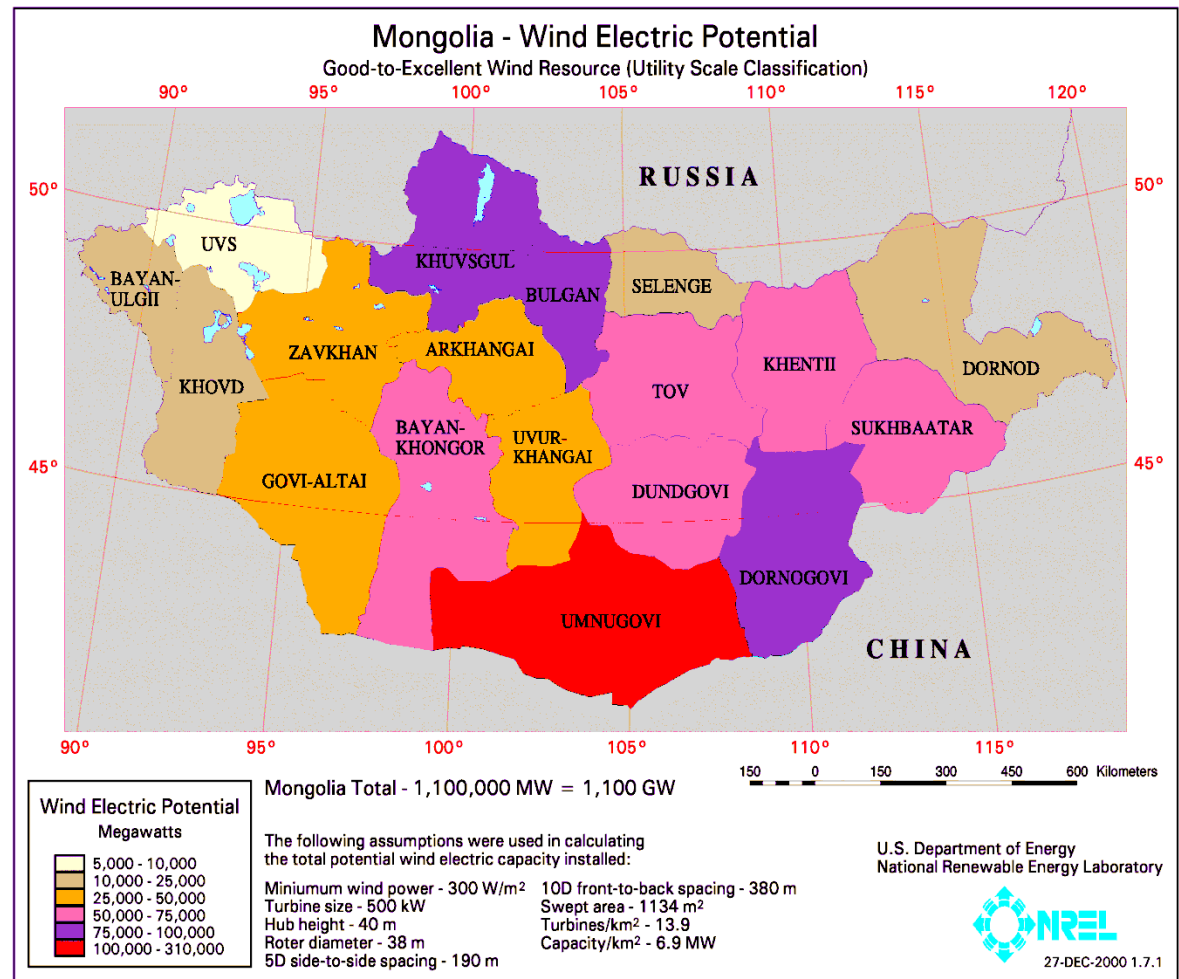


Figure 7-1

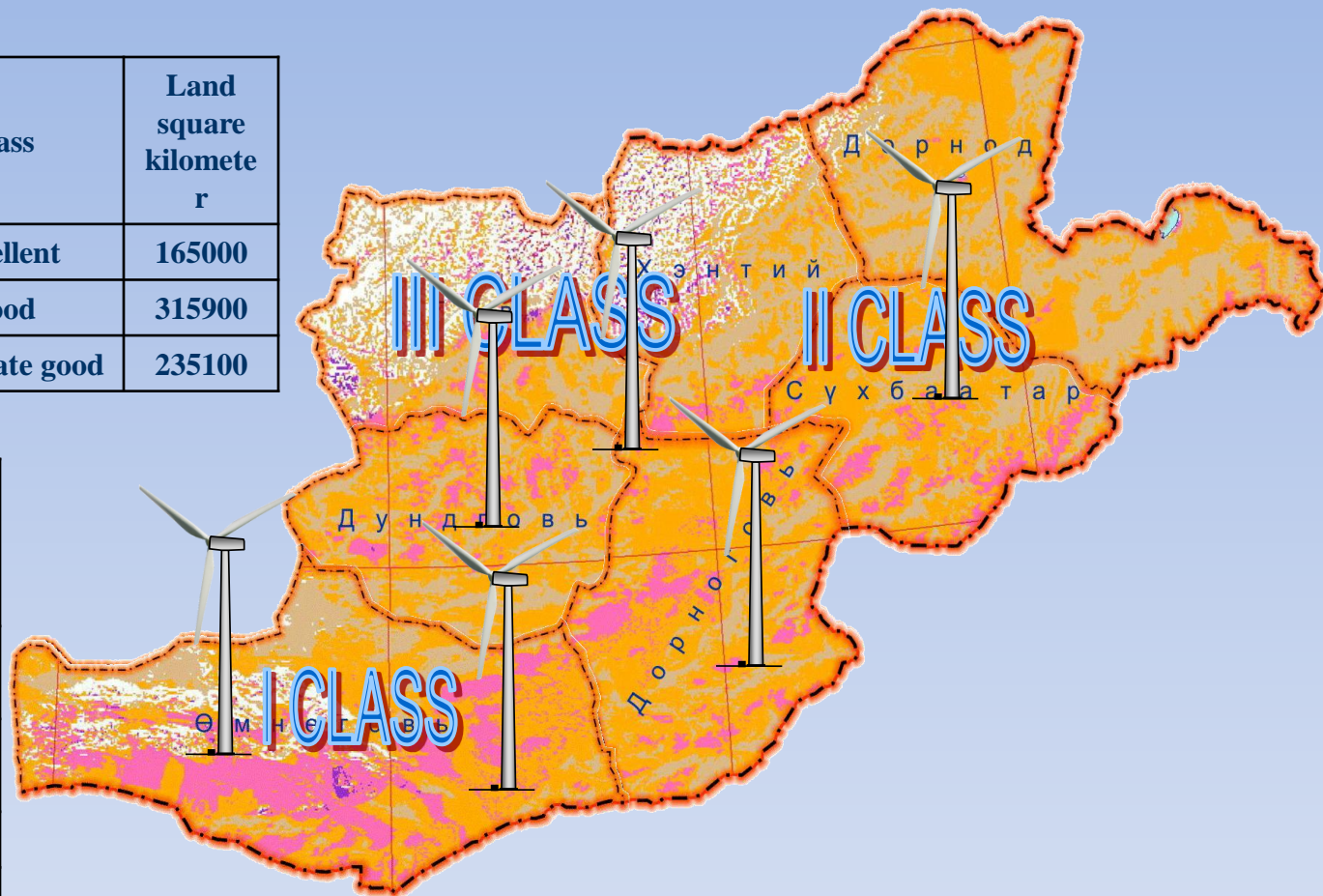
Source: Wind resource Map of Mongolia, NREL, 2001

WIND POWER POTENTIAL

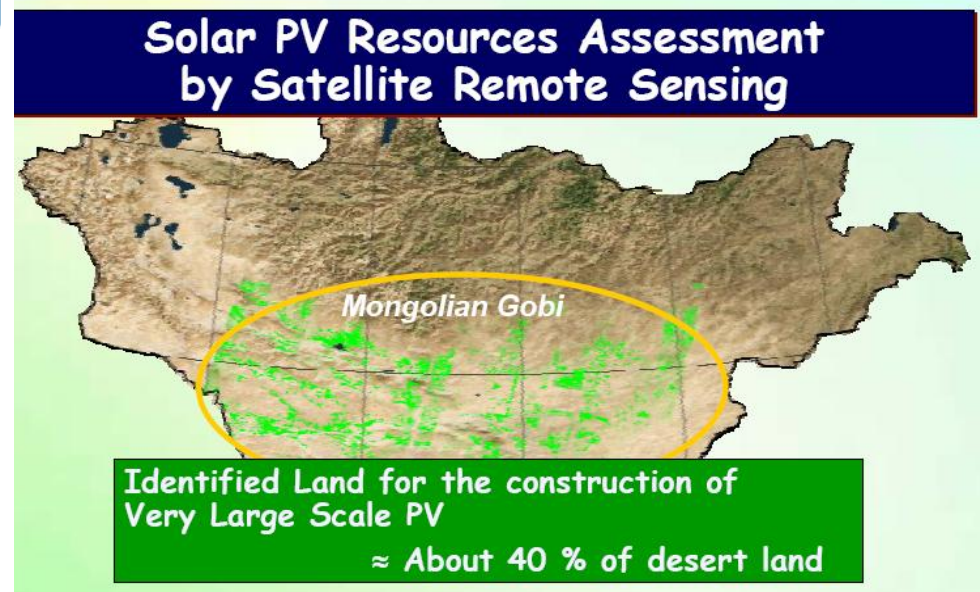
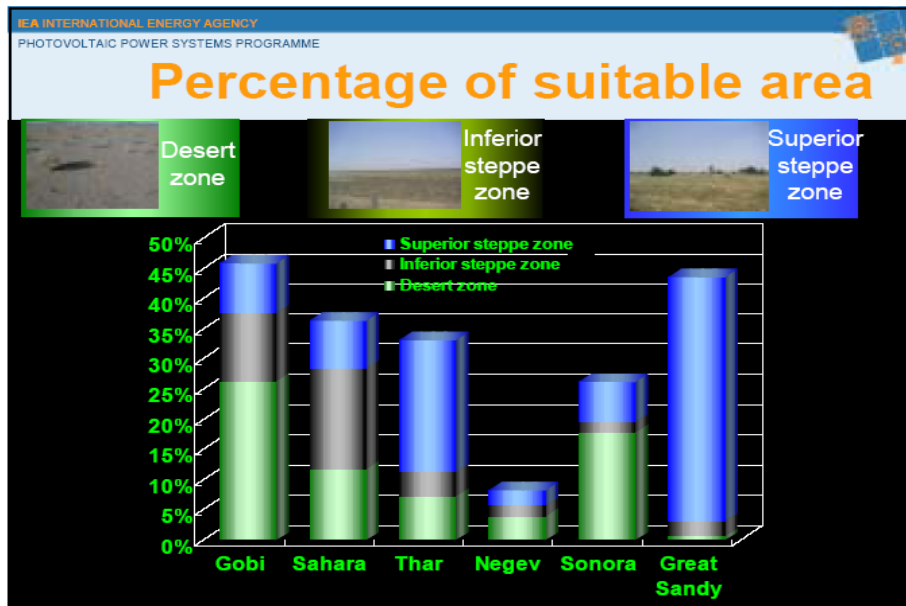
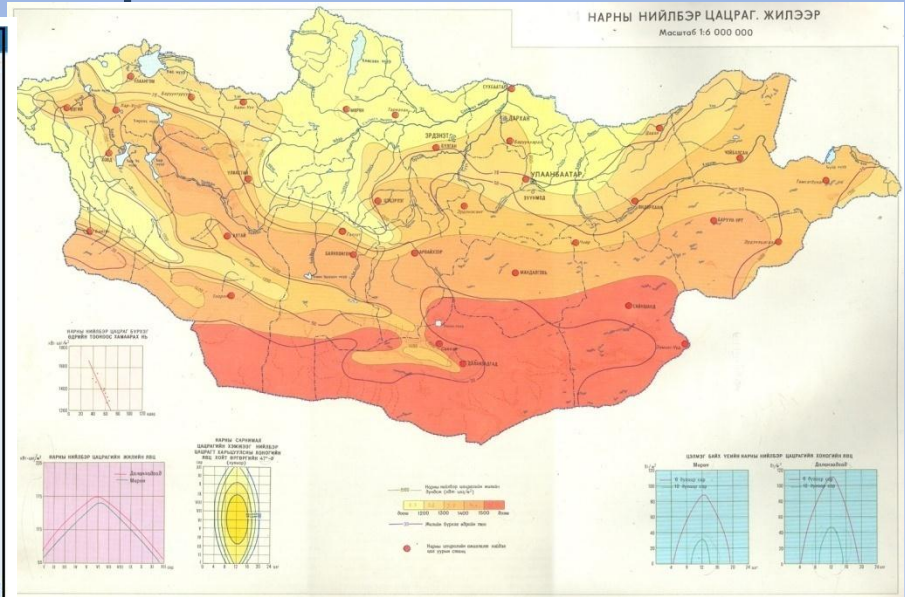
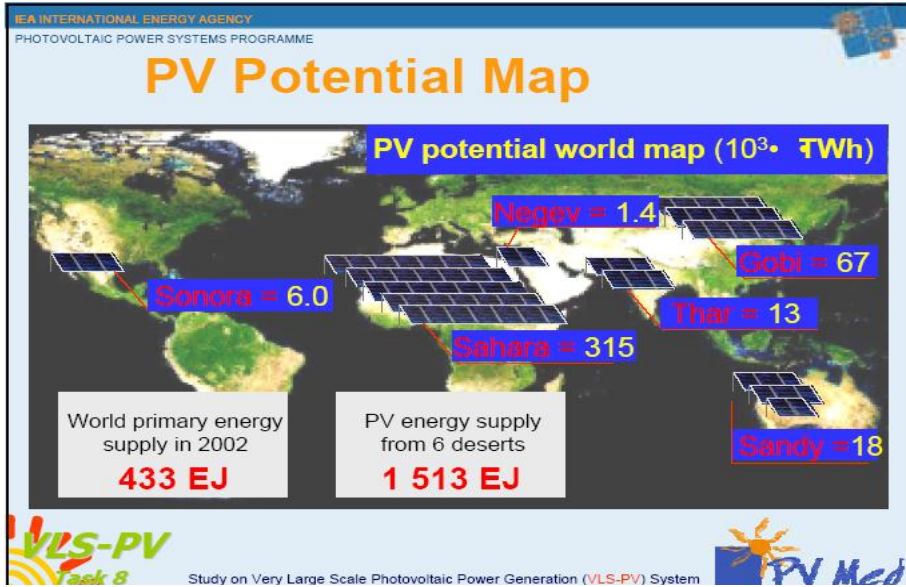
#	Wind power density, W/m ²	Wind speed m/s at 30 m	class	Land square kilometer
I	400-600	7.1-8.1	excellent	165000
II	300-400	6.4-7.1	good	315900
III	200-300	5.6-6.4	Moderate good	235100

Perspective of WP

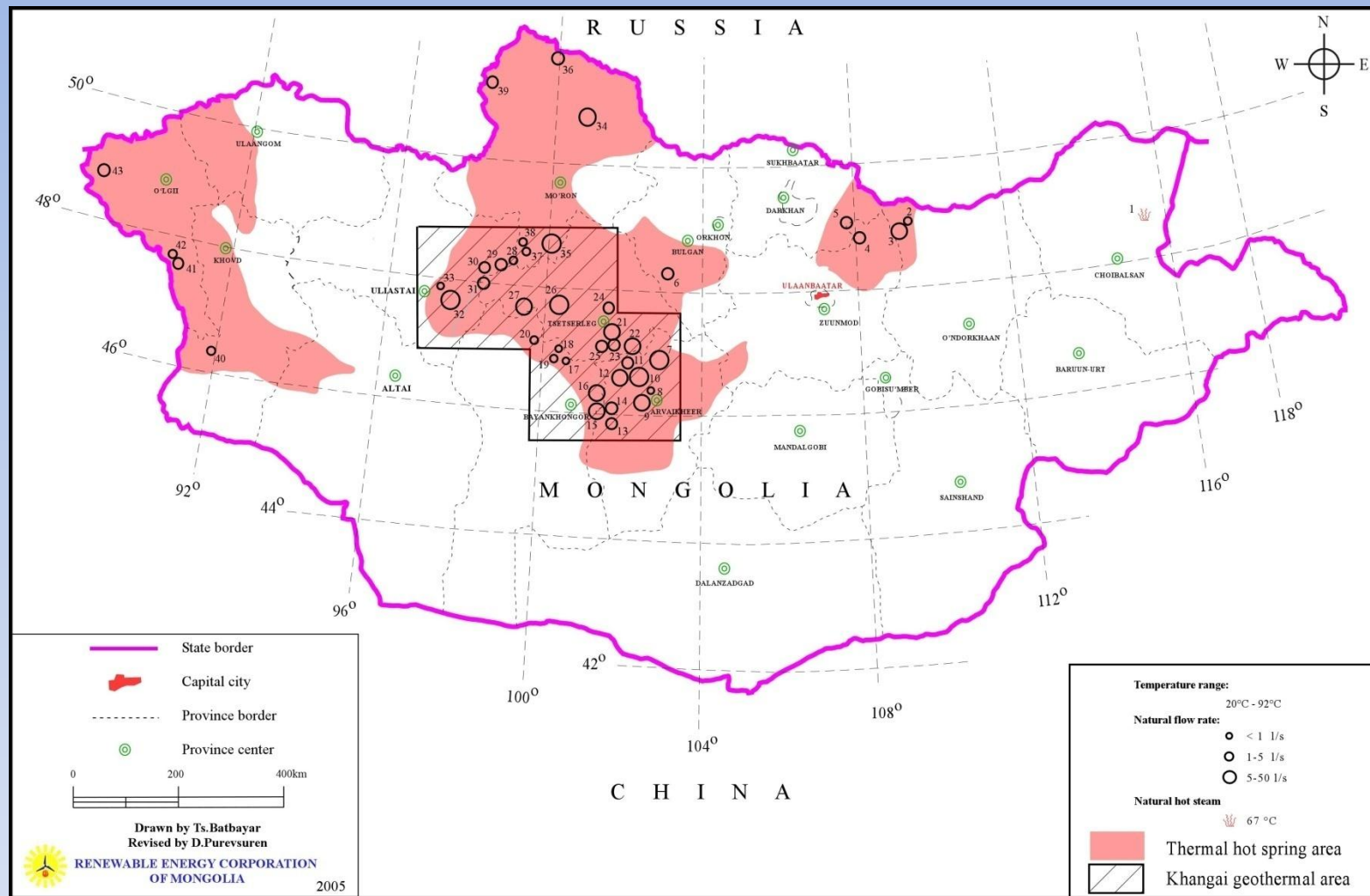
#	Name of WP	Capacity, MW	progress
III	Salkhit	50	Under const
II	Choir	50,4	Under const
II	Sainshand	50	R&D
I	Oyutolgoi WP	250	R&D
I	Khurmen	-	R&D
I	Tsot-tsetsii	-	R&D



Solar power potential

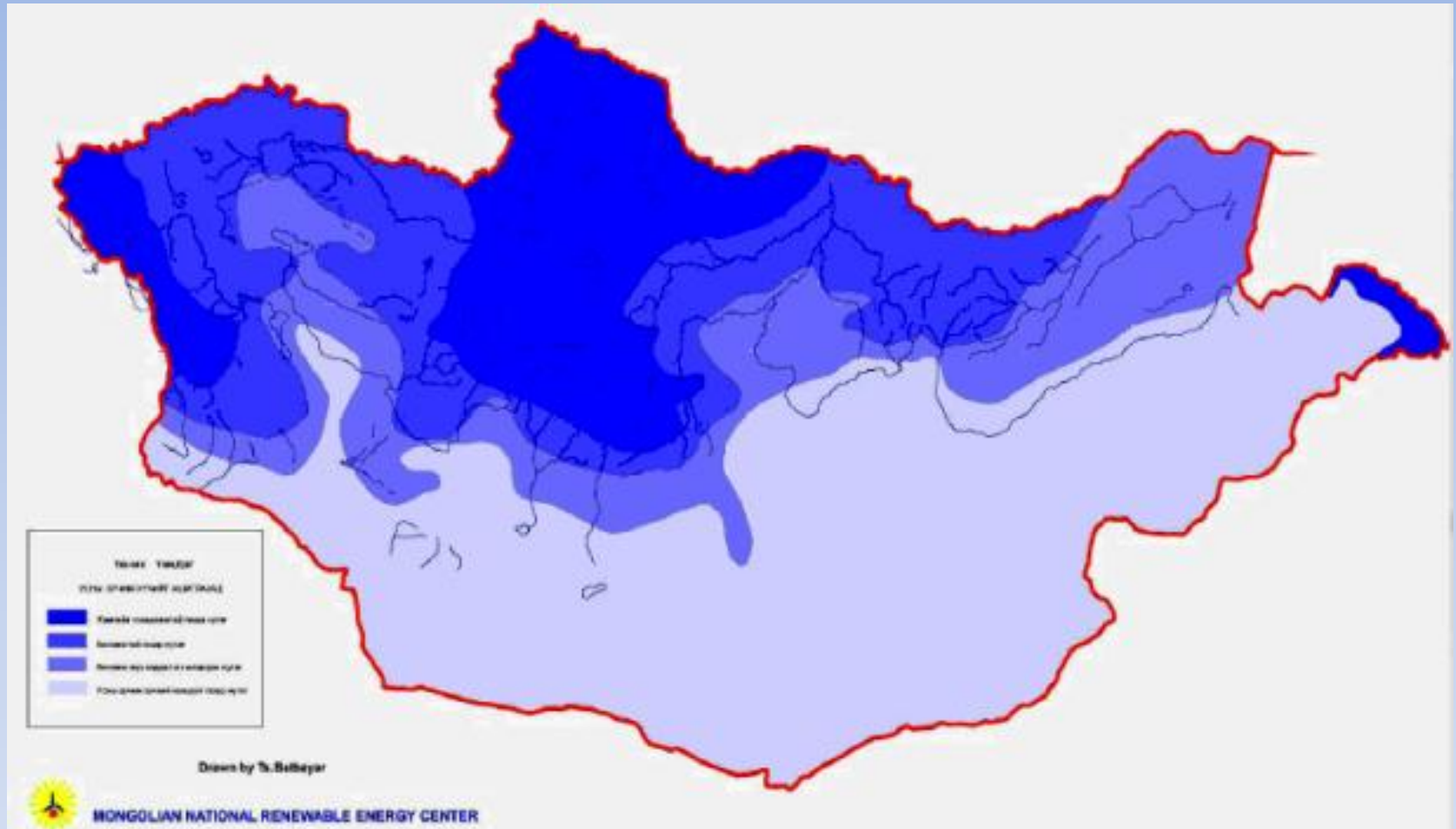


Geothermal power potential



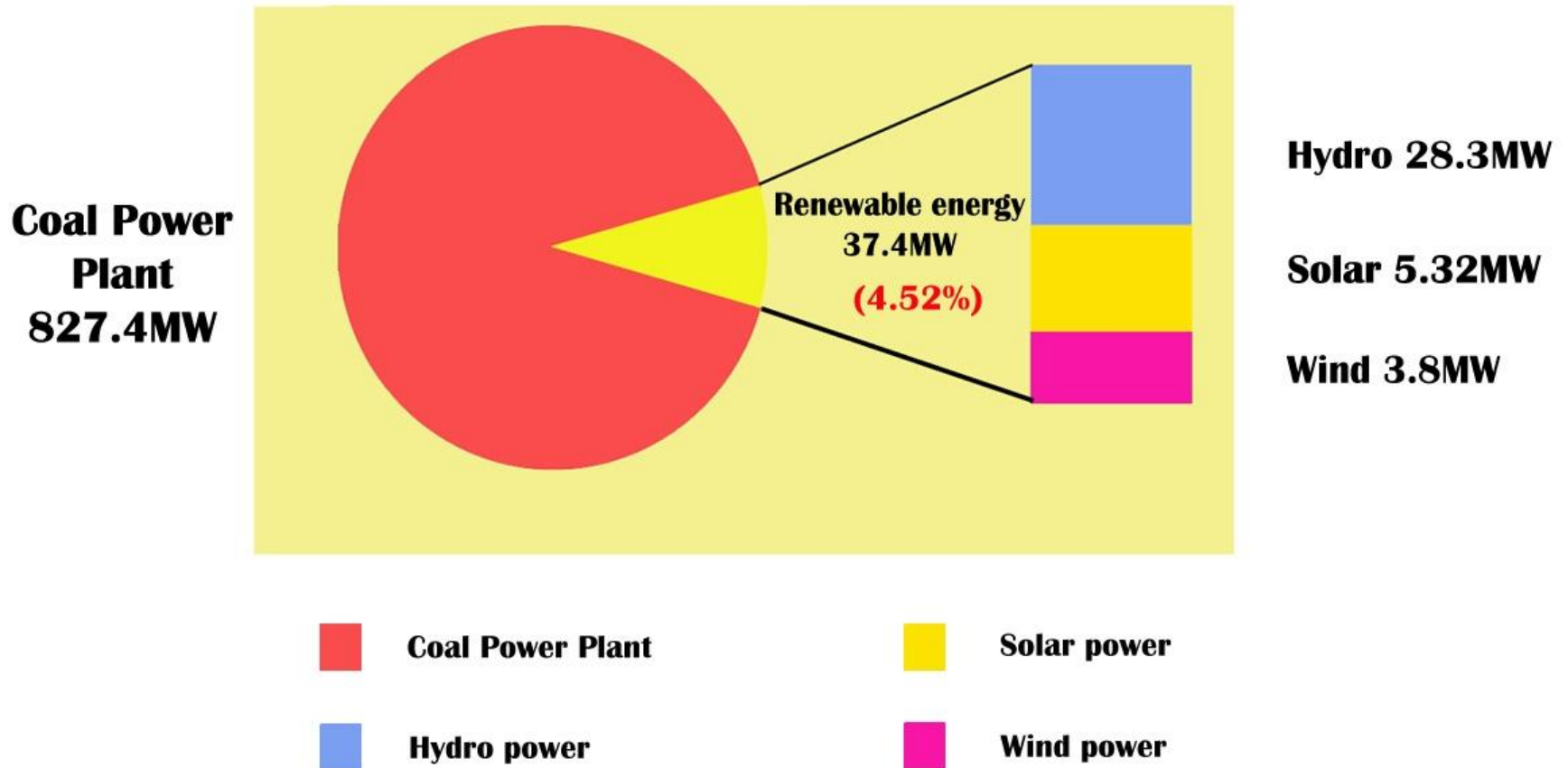
Totally founded by 43 hot springs, but their application is limited not so great.

Hydro power potential



There are 3800 small and big streams and rivers in our country, which could support 6417.7 megawatts of power and deliver 56.2 billion kWh of electric energy in a year.

ELECTRIFICATION UTILIZATION



Wind - solar – diesel hybrid power plants

No	Location	Capacity	Start year of operation	Investment
1	Manlai	150 kW	2008	Gov.budget - 910,0 mln.₮
2	Tseel	150 kW	2008	Gov.budget - 960,0 mln.₮
3	Shinejist	150 kW	2008	Gov.budget - 920,0 mln.₮
4	Bayan-Undur	150 kW	2008	Gov.budget - 920,0 mln.₮
5	Nalaikh	110 kW	2009	Korea gov.budget – 2,5 mln.\$
6	Mandakh	200 kW	2010	Gov.budget - 484,0 mln.₮ Kor.gov.bud – 3,6 mln.\$

Wind - diesel power plants

No	Location	Capacity	Start year of operation	Investment
1	Erdenetsagaan	100 kW	2004	Gov.budget - 348,0 mln.₮
2	Bogd	80 kW	2008	Gov.budget - 395,0 mln.₮
3	Sevrei	80 kW	2008	Gov.budget - 395,0 mln.₮
4	Khatanbulag	150 kW	2008	Gov.budget - 890,0 mln.₮

Solar power plants

No	Location	Capacity	Start year of operation	investment
1	Noyon	200 kW	2004	NEDO
2	Tsetseg	100 kW	2008	Gov.budget - 1195 mln.₮
3	Bugat	140 kW	2009	Gov.budget - 1220 mln.₮
4	Urgamal	150 kW	2010	WB project –1350.0mln\$
5	Durvuljin	150 kW	2010	WB project –1350.0mln\$
5	Bayantooroi	100 kW	2010	WB project –900.0mln\$
6	Altai	200 kW	2010	WB project –1800.0mln\$
7	Matad	52.4 kW	2010	Gov.budget – 890. mln.₮
8	Bayantsagaan	60 kW	2011	Gov.budget - 920 mln.₮



THANK YOU FOR YOUR
ATTENTION