RENEWABLE ENERGY RESOURCES AND THE UTILIZATION IN MONGOLIA

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4th Annual Meeting of CAREC Electricity Regulators Forum
Karven Issyk-Kul, Kyrgyz Republic
15-19 September 2008

OVERVIEW

- Mongolia is a landlocked country in Central-Northeast Asia, with a total area of 1.6 million square kilometers.
- The population of the country is 2.5 million, of which more then 40% live in rural areas and are mainly nomadic livestock herders.
- 68% of the population having grid access to electricity.
- 100% in the Capital and 92% in aimag centers, compared with 80-85% in soum centers.
- Approximately 90% of soum centers (total number of soum centers are 347) have connected to grid system by end 2007 year.
- Around, 15 soum centers electricity demand will be supplied by renewable energy.

OVERVIEW

- The utilization of renewable energy has been emphasized as one of the priority areas of the energy industry in the Government policy documents such as the Government Action Plan, Millennium Development Goals, Sustainable Development Program of Mongolia for 21st century, Regional Development Concept, Consolidated Energy System Program of Mongolia and Sustainable Energy Development Strategy of Mongolia for 2002-2010.
- The Government of Mongolia attaches great importance to the use of renewable energy for improving power supply through research and use of environmentally friendly and new sources of energy for the benefit of rural households who are not fully provided with power and soums and settlements that would require significant amount of resources to get connected to centralized power grids.

LAW ON RENEWABLE ENERGY

- The Renewable Energy Law of Mongolia which came into force on 11 January 2007.

- The Law clearly articulates the importance of renewable energy for Mongolia, where overdependence on coal is significant and renewable potential, especially wind power, is highly concentrated.

- The purpose of the law is to regulate relations concerning generation of power using renewable energy sources and its delivery.

- This law shall apply to legal entities that generate and deliver electricity and/or heat using renewable energy sources within the territories of Mongolia.

THE ERA POWER UNDER THE LAW

- Review tariff applications by generating licensees that use a renewable energy power source connected to the grid;

- Approve a sample agreement to be concluded between a transmitter and generator that uses a renewable energy power source;

- Monitor the contract implementation.

THE TARIFFS UNDER THE LAW

The Law sets out the tariffs for energy generated and delivered from renewable energy sources. The tariffs must be within the following limits:

- 8-9.5 US cents per kWh for electricity generated and delivered by a wind power source

- 4.5-6 cents per kWh for electricity generated and delivered from a hydropower plant with a capacity of less than 5,000 kWh

- 15-18 cents per kWh for electricity generated and delivered from a solar power source.

THE TARIFFS UNDER THE LAW

- The difference in tariffs for the various renewable energy sources are made up by the tariffs of other generating licensees connected to the grid.

- A generator using a stand-alone power source shall be compensated for any price difference resulting from sales of renewable energy to consumers of respective areas specified in their licences from the Renewable Energy Fund.

POWER PURCHASE AGREEMENT

- The ERA issued a licence to Newcom for the construction of a Wind farm with a capacity of 50 MW, and approved a Power Purchase Agreement between Newcom as a Generator/Seller and the Central Regional Transmission Network company as a Buyer.

- According to the PPA the Seller is obliged to construct and operate a Wind Park and sell its delivered energy to the Buyer on the terms and conditions contained in the Agreement. Buyer agrees on the terms and subject to the conditions of the Agreement to connect the Seller's Wind Park to the Buyer's transmission network and to pay the Seller the tariff set out in the Agreement for the delivered energy of the Wind Park.

NATIONAL RENEWABLE ENERGY PROGRAM

- The Parliament of Mongolia enacted the *National Renewable Energy Program* for the period of 2005-2020 on June 9, 2005.

- The Program aims to create conditions for ensuring ecological balance, unemployment and poverty reduction, and sustainable social and economic development by increasing percentage of renewable energy share in the total energy supply of Mongolia, improving structure of energy supply, and by wide application of renewable energy in rural areas power supply.

COMMON GOALS OF THE PROGRAM

- Constitute conditions for reliable, independent and effective operation of centralized energy grids and regional power supply systems by increased use of renewable energy;
- Gradually increase share of renewable energy in the total energy production and reach 3-5 percent share in the national energy supply by the year 2010, 20-25 percent share by 2020;
- Provide power to all distant soums and settlements, which are require significant amount of resources to be connected to centralized power grid system, by introduction of renewable energy generating systems;
- Develop and implement step by step sub-programs to provide schools, hospitals and public service institutions in remotely located soum centers from the centralized energy grid system with renewable energy sources;

COMMON GOALS OF THE PROGRAM

- Reach full achievement of objectives raised in the National Program titled "100,000 Solar Gers" to supply all herding household in rural area with renewable energy sources;
- Based on the results of detailed study of renewable energy (solar, hydro, geothermal, hydrogen, and biomass etc.) potentials of Mongolia develop and implement Master Plan to use these sources;
- Take measures to perform technical economical feasibility studies of large hydropower plants namely “Eg river” 220 MW station, “Artsat” 118 MW station on “Selenge River” and “Orkhon river” 110 MW plant on rivers with significant hydropower resources, and to implement these studies;
- To reduce air pollution in urban areas of Ulaanbaatar and other cities and towns expand activities to penetrate renewable energy generators to centralized power grid system and increase the percentage share of renewable energy in the total supply stage by stage.

COMMON GOALS OF THE PROGRAM

- Perform surveys to determine locations with significant applicable geothermal resources, develop technical economical feasibility study to utilize geothermal resources for urban areas energy supply and implement these studies;
- Widely exploit solar water heating technologies and equipments for heating, hot water supply and other purposes to building and constructions;
- Perform research and introduce of modern techniques and technologies to produce heat and power using hydrogen, fuel cell elements and other new sources of energy.

FINANCIAL RESOURCES FOR THE PROGRAM

- The central government budget investment;
- Support and assistance of international funds to support activities for use of renewable energy and new sources of energy;
- Income to be generated from activities of using funds from clean development mechanism aimed to reduce green house gas emission;
- International and domestic invertors investment;
- Soft loans and grants provided by donor countries and international organizations;
- Donations and grants provided by foreign, international and domestic non government organizations.

PROGRAM OUTCOMES

- Utilization of hydropower plants will create flexibility of operational regime of the power system and to increase its independence and reliability.
- The Full achievement of objectives raised in the National Program titled "100,000 Solar Gers" and delivery of renewable energy power sources to over 180 thousand herding households will encourage development of household production and reduce the migration from countryside to urban areas.
- Completion of the task to deliver renewable energy source to all remote soums and settlements not connected to centralized power grids will result with increasing opportunities for rural inhabitants in education, information access and will create conditions for development of electronic governance and knowledge in rural areas.

PROGRAM OUTCOMES

- Construction of medium capacity wind parks in sites with proven wind energy potential and utilization these farms in the centralized power grid will create efficient and reliable operation condition.
- Creation of favourable legal environment for the use of renewable energy, for energy conservation and for increasing the industry efficiency will result with wide opportunities for domestic and international companies and business entities to work in the renewable energy area.
- Extensive use of renewable energy will exert significant positive influence in decreasing emissions of waste greenhouse carbon dioxide and other poisonous gases into the environment due to limited use of organic fuel (coal and oil etc.).

UTILIZATION OF RENEWABLE ENERGY SOURCES

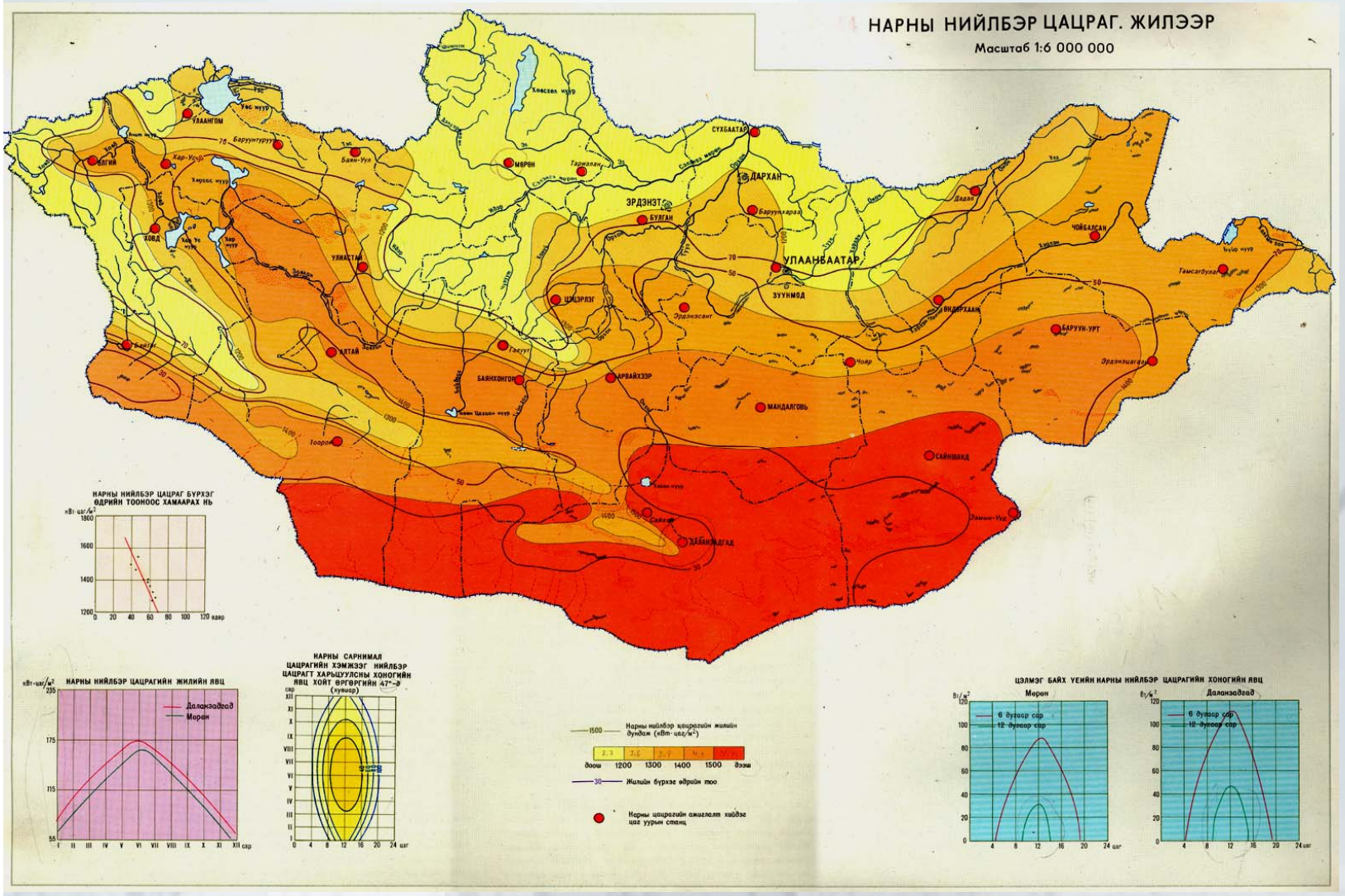
Solar Energy

- The high intensity of solar radiation, long periods of sunshine, high air transparency, and constant presence of moisture in the air favour the development of solar energy in Mongolia.

- Approximately 70% of the total land area receives solar insolation at the rate of 5.5-6.0 kWh/m2 per day and 2900-3000 sunshine hours per year.

- The average solar radiation received by Mongolia comes to 1400 kWh/m2.

SOLAR RADIATION MAP



SOLAR ENERGY

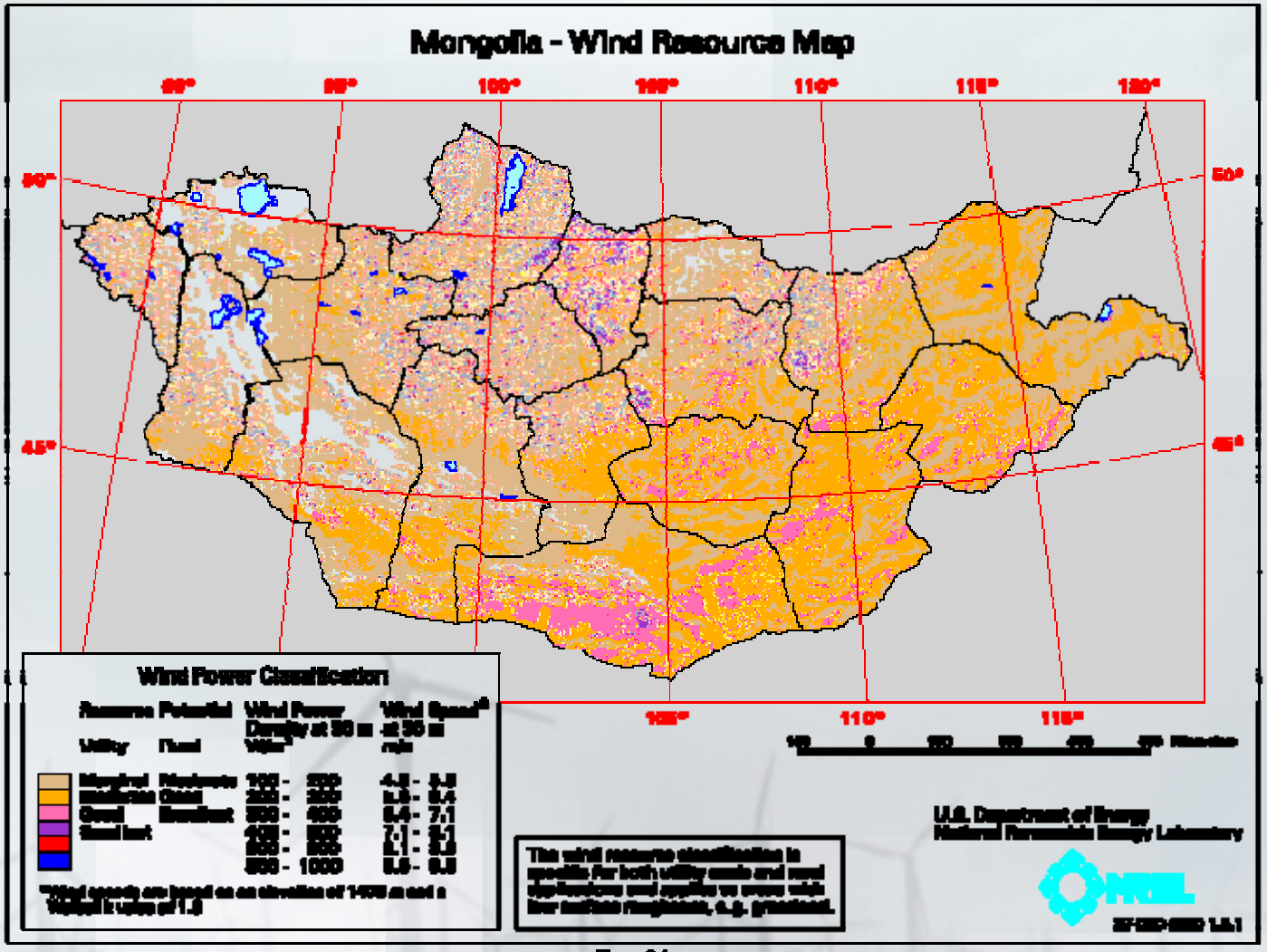
- Government has programs and plans to exploit the solar resource of which, “The 100.000 Solar Gers program” has been established in 1999.
- The program has three phase / first 2000-2002 year, second 2003-2004 year, third 2005-2010 year / and under this program will be provided 100,000 small PV systems with capacity 20-75 W to households, herders in rural area.
- At present, close to 60,000 independent solar PV systems are reportedly in use by herders for operating lights, radios, TVs and satellite dishes.

Soum senter Electrification Applications

WIND ENERGY

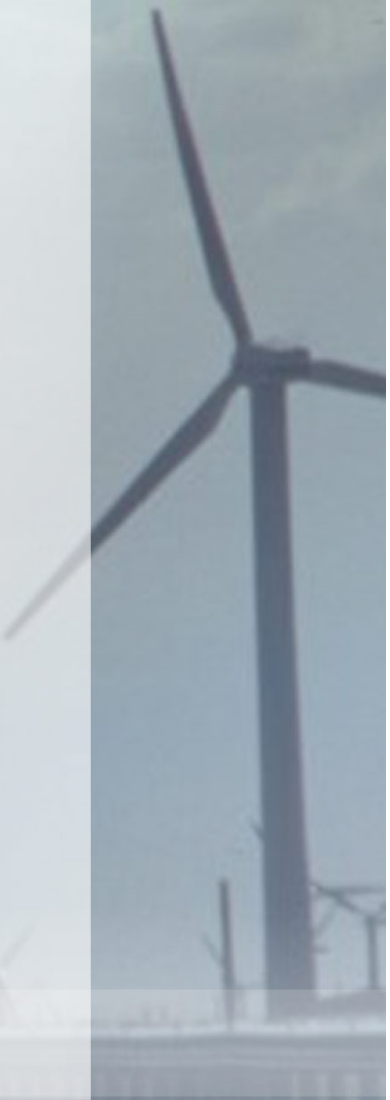
- In year 2000, The National Renewable Energy Laboratory of USA developed a wind energy resource map for Mongolia in cooperation with The Renewable Energy Center of Mongolia and The National Institute of Meteorology of Mongolia.

WIND RESOURCE MAP



WIND ENERGY

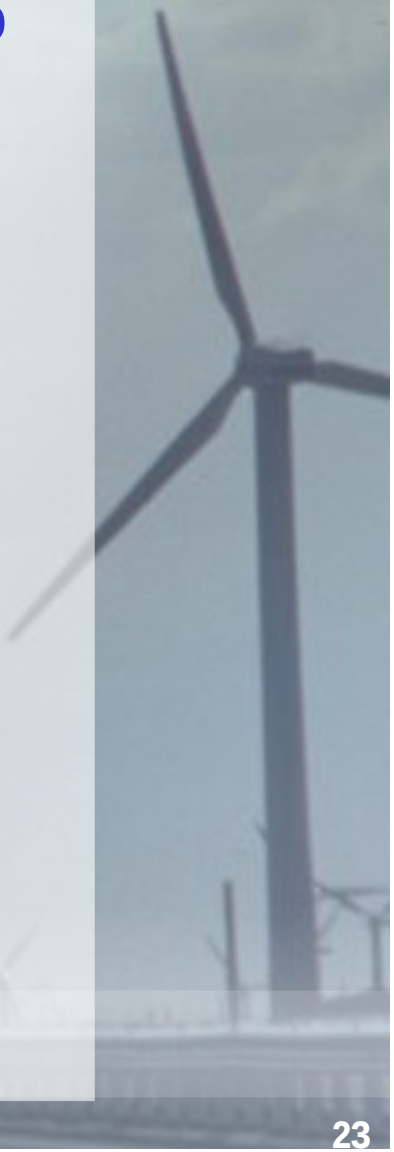
- Regions in Mongolia with more than 160000 sq. km area have possibility and are convenient to use high capacity wind power stations connected to the electric grid network.
- Using the standard calculation method in these regions with abundant wind resources, 7 MW power could be obtained from one square kilometer or in other words, installing 1.100.000 MW capacities could produce 2.5 trillion kW electricity per year.
- All aimags of Mongolia have at least 6000 MW wind energy resource. Of which, 9 aimags have more than 50.000 MW wind energy resource, southern province Umnugobi aimag have 300.000 MW wind energy resource.



WIND ENERGY

- At present time, over 4000 portable, small wind generators with capacity from 50 Wp to 150 Wp are use by herders for operating lights, radios, TVs in rural area.

- In last years, number of feasibility studies were made for the construction of wind power plants with capacity of 50 MW at “Salkhit uul”,near capital city Ulaanbaatar and 100 MW in “Umnigobi” province.



Village Electrification Applications

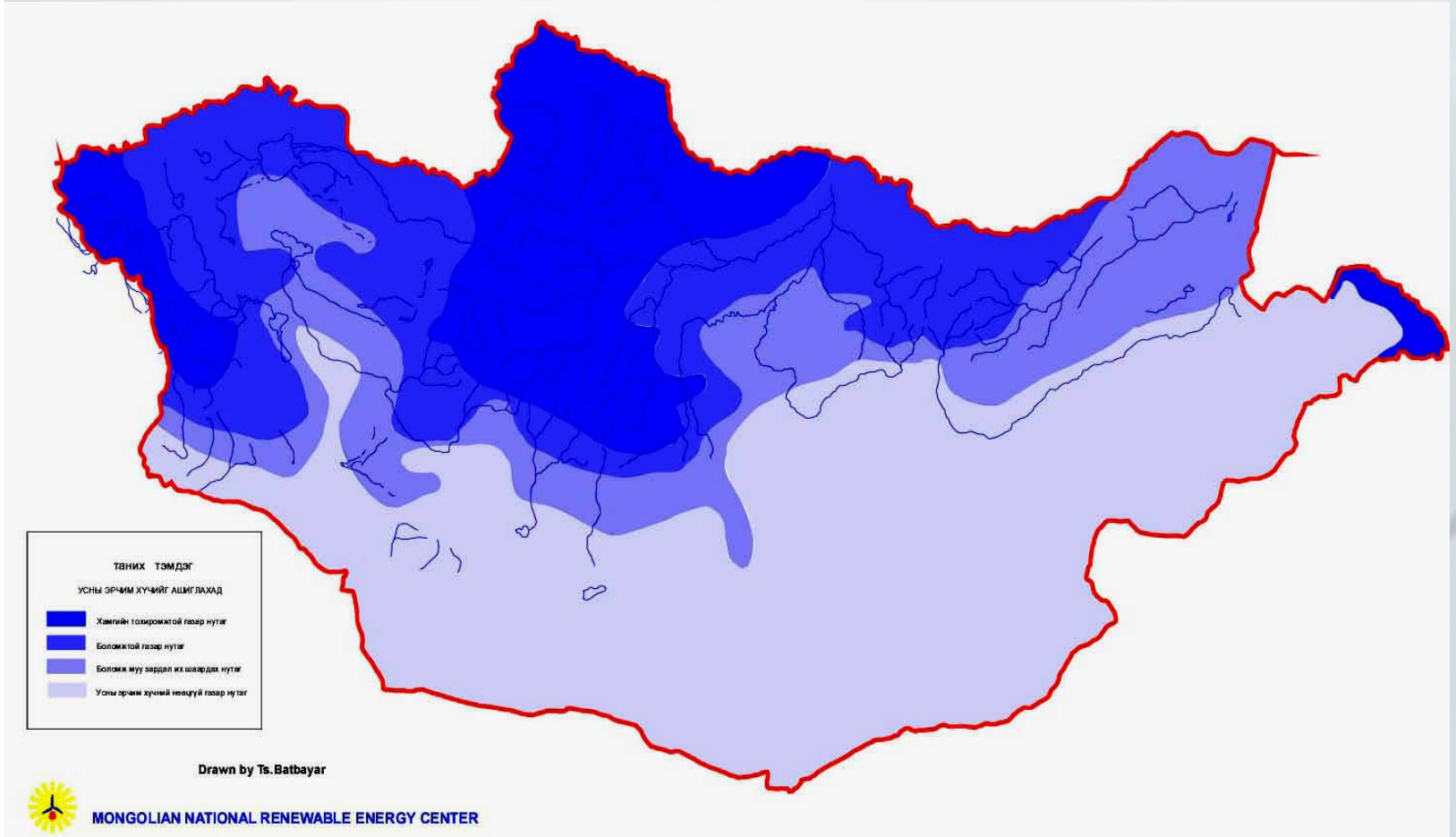
HYDRO ENERGY

- It is estimated that the average flow of our country's 3800 big and small rivers with a total of 65000 km in length, total precipitation of catchments area is 3,46*1010 m3, energy resource 6300 MW and producible energy is 56*107 KW.h.
- The majority of hydro energy resources belong to the mountainous areas in western and northern part of Mongolia.
- At present time, 9 small hydro plants operating with capacity from 150 kW to 2.0 MW.
- The first small hydro plant with capacity 528 kW was established in Khar-horin soum in1958 year.

HYDRO ENERGY

- In recent years, number of feasibility studies were conducted for the construction of hydro power plants with capacity of 220 MW at “Egiin” river, 100 MW at “Orkhon” river, 11 MW at “Zavkhan” river, 12 MW at “Durgun” river and many sites were identified for the possible construction of hydro power stations to supply the energy needs of the soum centers.
- The “Zavkhan” HPP with capacity 11 MW would supply electricity to two aimag centers and 8 soums.
- The “Durgun” HPP with capacity 12 MW would supply electricity to three aimag centers and 40 soums in the frame of Western Energy System.

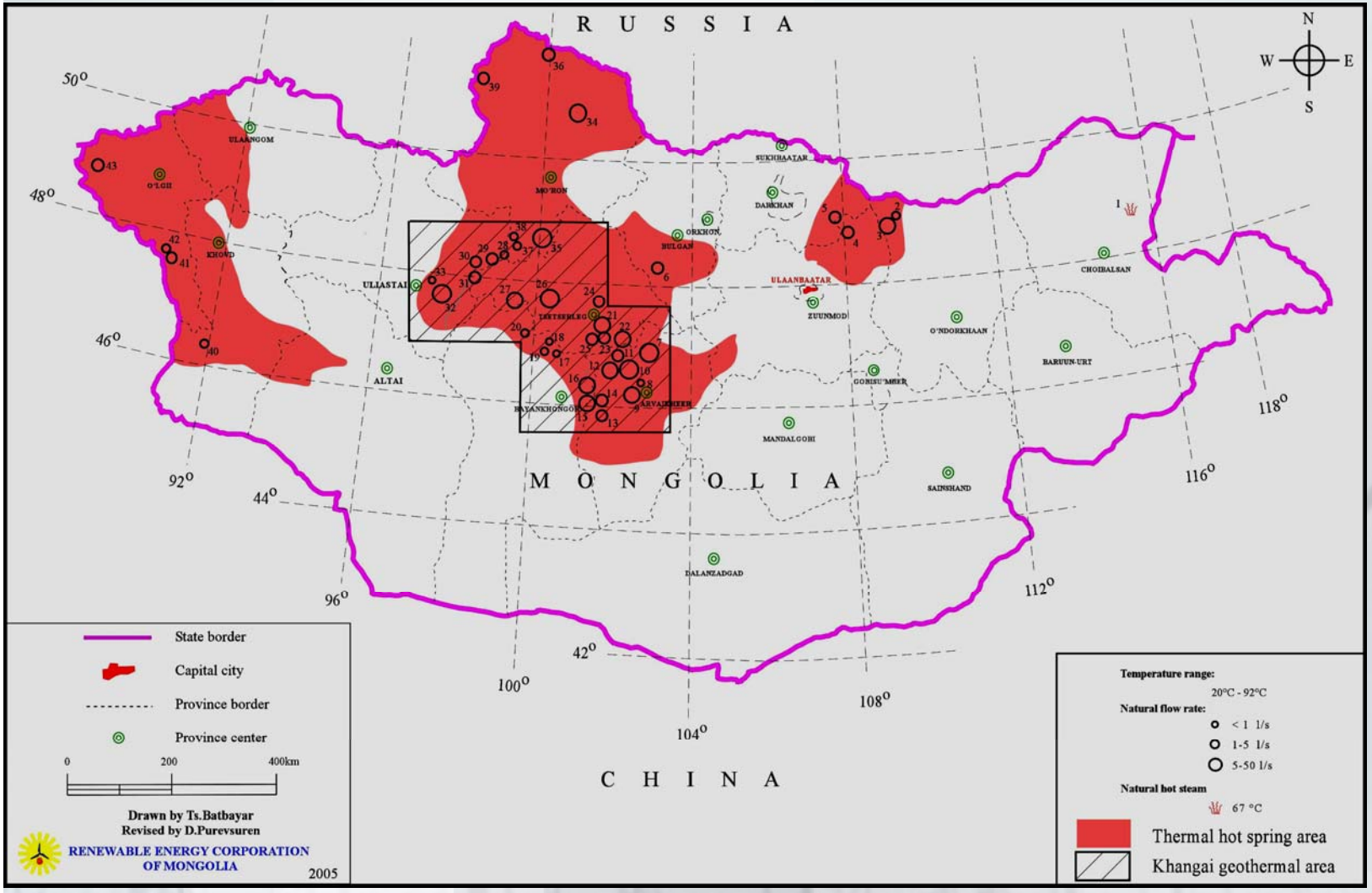
Hydro energy resource map



GEOTHERMAL ENERGY

- Presently, there are 43 hot springs in Mongolia some of them are in use of public health, but they are not studied thoroughly.
- The resources of hot springs are mostly located in mountainous areas of “Altai”, “Khangai” and “Khentii mountains ridges, where the infrastructure is poorly developed.
- The priority use of the hot springs is the non-medicine health treatment.
- The ‘Shargaljuut” sanatorium’s central facility is heated by the surface exposed found of “Shargaljuut” hot spring. The “Shargaljuut” hot spring one of the largest hot springs in Mongolia and its exposed water temperature reaches 920C, and fount flow speed reaches to 251/s.

Locations of Mongolian hot springs



BIOMASS ENERGY

- Biomass – the natural resources that can produce energy by burning the wood, animal droppings, vegetations etc. and they are the accumulated and converted forms of energy derived by the sun and one of the renewable energy sources.
- The research results suggest that 15.2 million hectares of Mongolian territory is covered with forest and of which, 80 % is coniferous and 20 % is broadleaved forest.
- Mongolia have a form of renewable energy resource – biomass fuel originated from livestock (dried cow dung, pellets, horse-dung, hardened dung and urine of sheep and goats) and other types of biomass such as straw, woods, shrubs, biomass waste of urban settlements.
- As of 2007 Mongolia had 40.0 million heads of livestock, which means that Mongolia have considerable amount of biomass resource originated from the livestock.


Thank you for your attention.