

## About possibilities of expansion of power cooperation Mongolia with Northeast Asia countries

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**The summary – in article is told about huge stocks of high-quality energy coal of Mongolia, and also about the first big strides after the organization of cooperation with some countries of region SEA and possibilities of the further expansion of this cooperation with other countries of region.**

**Keywords: Stocks of coal of Mongolia, interstate electric communications, large condensing power stations, efficiency of Interstate Electricity Ties (ISET).**

Mongolia has got a huge stock of high-quality energy coal. The geological stock of coal of Mongolia makes more than 150 bln tons, and dissolved with the little more than 10 bln. tons.

Using these rich stocks of coal and with rather favorable arrangement to the large markets, Mongolia could expand essentially the power cooperation with the countries of Northeast Asia, such as the Peoples Republic of China, Democratic People's Republic of Korea, Republic of Korea and Japan.

Now very limited, power cooperation with the region countries has Mongolia. Unfortunately, even traditionally wide and long-term power cooperation with Russia is minimized in a current of the last more than twenty years. However, the government of Mongolia in a current of last years starts to pay special attention to expansion of power cooperation with the region countries. So, since 2005 from the Peoples Republic of China negotiations are carried on for building on a brown coal deposits in the Gobijsky zone of Mongolia a number of large Coal fired power stations. There are to end negotiations about building of the first of these Coal fired power stations, with seven blocks of 800 MBt each. It will allow our country to join to the large and fast-growing power market of the countries of Northeast Asia (CBA). This

power station will work almost purely for export (90 % of the established capacity are exported) to the Electric Energy System of the Northern China.

In the World countries are conducted the wide power cooperation issued in the form of regional power supply systems, uniting the countries of the given region, such as, NORDEL, USTE, SHARC, NEAREAST and others.

At our conference, in a current of last years we speak about widening power cooperation between the region countries much. It is a lot of variants about creation of regional electro power systems.

But for some reason almost all of an alternating and a direct current high-voltage transmission lines, connecting power systems of the SEA countries bypass territory of Mongolia.

In too time all of us know, that reduction of length of interstate electric ties has the major value connected, as with reduction of primary capital investments, and increasing of capacities and the electric power transferring of these High Voltage Transmission lines (HVTL).

For example, the shortest route big quantities of capacities and the electric power from East Siberia (Russia) in the Central zone of the Peoples Republic of China and further is the route through territories of Mongolia. The territory of Mongolia also could be used and for passage HVTL of the ultrahigh voltage, transferring the big capacities and the electric power in Democratic People's Republic of Korea, Republics Koreas and Japan.

In this work we offer results of the calculation, connected with representation to your attention of operating modes and level of transferring capacities HVTL to transfer of the big capacities and a electric power from territory of Mongolia to the countries of region.

Here, we used the scheme of potential interstate electric ties (ISET), developed by the Russian scientific and design organizations between the countries and sub regions of Russia and the other of SEA countries.

In the work possible directions of these power ties have been revealed, their basic technical parameters, including throughput, a current

type, voltage level, section and quantity of wires in a phase and a pole etc. are estimated economic indicators are defined: demanded capital investments, annual cost also are made redesign substantiations separate ISET taking into account a line of their passage and places of placing of trailer substations [1-3].

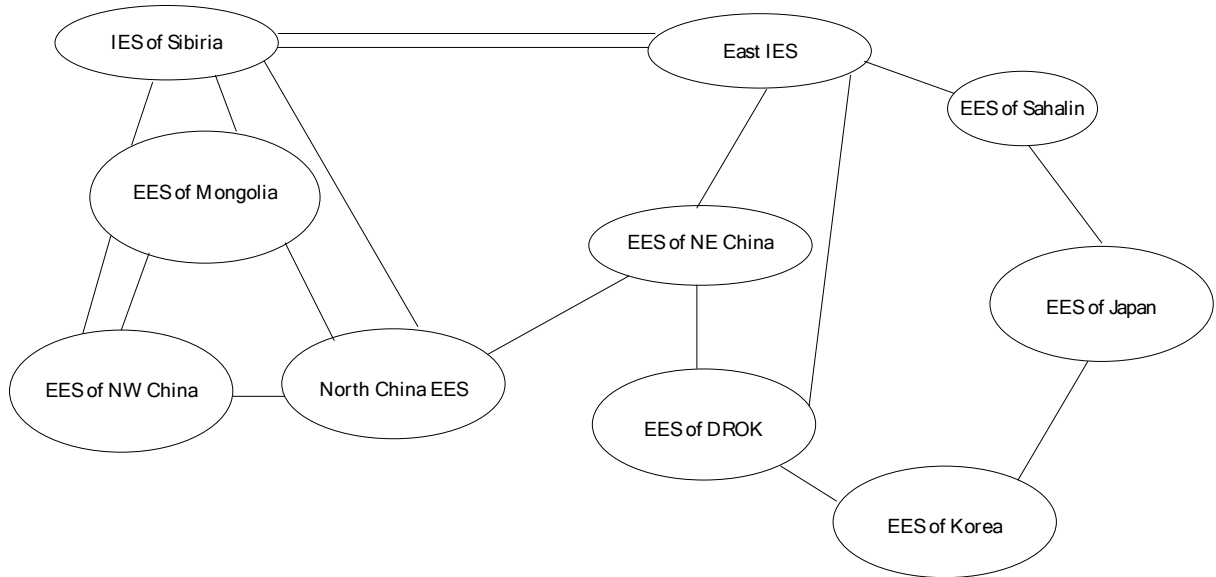


Fig. 1. The basic scheme of the interstate electric ties in Northeast Asia.

At the same time distinctions between the presented countries in security power resources, in economic potential and a climate, do desirable mutual cooperation of the certain countries SEA and development of their fuel and energy complex, including electric power industry.

In particular, distinction in security power resources of the countries SEA and in a combination to socio-economic factors demands optimum use of fuel and energy resources of this region. More low we consider one of the problems concerning to this question.

For example, scheme ISET “EES Mongolia-EES Northern China” is presented in the form of two knots (a Fig. 2.) where in Mongolia it is allocated coal fired Power station Shivee-Oboo, connected by a direct current transmis-

sion line  $\pm 500$  kV to EES Northern China. The converting substations (software) assuming a reversible operating mode, take places in area of Mongolia and Northern areas of China. As it has been told above, scientific and design workings out of this of stations, with following parameters are conducted: Coal fired power station (CFPS) 4,8 GWt (6x800 MWt), of 700 km length of a direct current line, through put 4-6 GWt, voltage  $\pm 500$  kV, 23000 bln kW·h electric power, capacity converting substations 2x5 GWt.

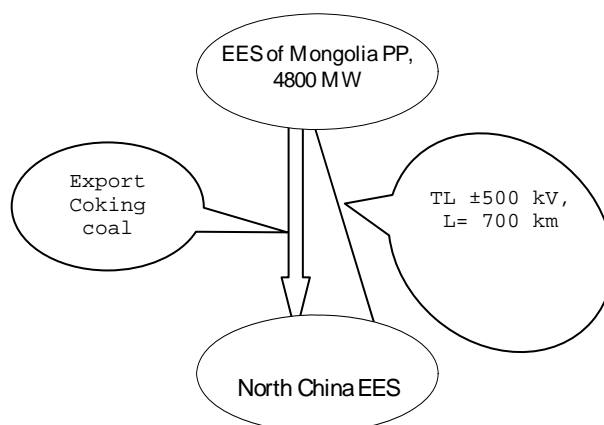


Fig. 2. Settlement scheme ISET "EES Mongolia-EES of Northern China"

The total cost of Power station with the established capacity 4,8 GWt was estimated approximately 7,6 bln. USD. and electricity transmissionlines -0,94 bln. USD. In total capital investment 8,5 bln. US dollar.

For an estimation of an energy-economic indicators ISET and export of Coking coal from Mongolia two variants of the settlement scheme were considered. In the first variant it was supposed, that national Electric energy systems work separately. Exports only coking coal from Mongolia. Thus three knots, representing of EES Mongolia and EES Buryatiya, EES Krasnoyarsk (Russia) have electric ties with each other. In the second variant there is an electric communication "EES Mongolia-northern of China" and export coal is absent.

Calculations of efficiency ISET were carried out for both specified above variants with use of the nonlinear mathematical model, developed Mongolian scientists.

Calculations were spent for two time levels: 2010 and 2020 the received results 2010-2020 allows to analyze dynamics of development of capacities Shivee-Oboo power station AND EES of Mongolia. In all calculations was accepted conditions EES of Mongolia in 2010, i.e. to optimize developments EES of Mongolia and ISET for the periods 2010-2020

From the analysis of calculations it is visible, that if from Shivee-Oboo power station of EES

Mongolia exports for a year on the average 23 TWt.h electric power to EES of Northern China, it would be equivalent, that from Mongolia 2825,6 mln t coal was exported. This quantity of coal 5-6 hundred times more present import of coal from Mongolia. But, thus vehicles for coal transportation there is no also a building of new power station in EES Northern China will not be. For EES Mongolia Shivee-Oboo power station can allocate not getting capacities.

Export of coking coal now on the average for a year makes 4,8 million here. As a result the greatest effect is necessary the Peoples Republic of China which receives from import of electric power from EES of Mongolia about 2800 million here. It is more than coal every year, in comparison by direct import of coal from Mongolia.

Short conclusions:

1. At formation interstate electric ties (ISET) the SEA countries it would be wrong неключить from consideration Mongolia, the country with rather favourable arrangement for creation of power communication between Russia, the country with huge and various power resources and the Peoples Republic of China, Democratic People's Republic of Korea, Republic Korea and Japan for

which are required these resources.

2. In territory of Mongolia there are possibilities of the organisation not only multilateral power cooperation, using its rich stocks of high-quality power coal, but there are possibilities of the organisation of cooperation and in other branches, such as in mining, being based on its rich stocks of mineral resources.
3. And at last, territories of Mongolia for interstate electric ties from ultrahigh voltage transmission lines the most short route represents to the Peoples Republic of China and in other SEA countries that allows to reduce essentially lengths of these transmission lines and to increase capacity transferred on them and the electric power.

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