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# Electricity Market in Kazakhstan

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## ANNOTATION

The report is devoted to investigation of the current standing of the electricity market in Kazakhstan and forecast of its development for the period up to 2015. The report consists of four sections, contains 39 pages, including 12 tables and 10 figures.

As information sources data of the following state bodies were employed: the Agency of Statistics of the Republic of Kazakhstan, JSC “Kazakhstan Electricity Grid Operating Company” “KEGOC”), JSC “Kazakhstan operator of electricity and power market” (JSC “KOREM”). In addition, data of the sectoral and regional press, annual and quarterly reports of companies, web-sites of company-producers and large industrial consumers of electricity were also used.

The first section of the report is devoted to the characteristics of the electricity market in Kazakhstan, including the sectors of production, transmission, and supply of electricity, as well as the consumption sector.

The first chapter of the first section examines the structure of a power generation in Kazakhstan by types of energy resources.

The second chapter presents the data for the production of electricity and heat in the country in 2005-2011.

The third chapter is devoted to the production of electricity by energy zones in 2009-2010, as well as to the distribution of production by regions of Kazakhstan.

The fourth chapter examines the main producers of electricity in the country, including JSC “Aksu GRES”, LLP “Ekibastuz GRES-1”, JSC “Ekibastuz GRES-2” (GRES stands for a state regional power plant). Statistics data on the dynamics of the power generation at 15 major stations in 2005-2010 are provided, as well as information on the supply of electricity from Aksu GRES to aluminum enterprises in Kazakhstan.

The fifth chapter of the first section is devoted to the consumption of electricity in the country. The structure of consumption by major sectors in 2010 is given, as well as the consumption of electricity by large industrial enterprises of Kazakhstan in 2007-2010.

The second section deals with the Kazakh export-import of electricity in 2005-2010.

The third section is devoted to the prices of electricity in Kazakhstan. Limiting rates for groups of power plants are presented up to 2015. In addition, a graph of the dynamics of prices and the price indices for electricity purchased by industry in 2005-2011 is given. In this section, for comparison, the ranking of countries by the cost of electricity (for the public) in 2010-2011 is presented.

The fourth section includes the forecast of the development of electric power energetics in Kazakhstan until 2015. A list of major projects for the development of industry in the country is presented.

The conclusion section provides the forecast of the balance of generation and consumption of electricity in Kazakhstan.

## 1. Characteristics of the electricity market in Kazakhstan

Kazakhstan has sufficient energy resources. Electricity in Kazakhstan is produced by thermal power plants (90%) and at hydroelectric power stations (10%).

The electric power industry of the Republic of Kazakhstan includes the following sectors:

- The production of electricity;
- The transmission of electric energy;
- The supply of electric energy;
- The consumption of electric energy;
- Other activities in the electricity sector.

### *The electric power generation sector*

Electricity in Kazakhstan is produced at 63 power plants. The design capacity of thermal power plants for the electricity generation in 2010 was 17.2 million kW, of hydroelectric power stations - 2.3 million kW; the average annual operating capacity is 10 million kW and 1.3 million kW, respectively.

Electric power stations are divided into stations of national importance, power stations of an industrial use and stations of regional importance.

Electric stations of national importance include large thermal power plants, ensuring the production and sale of electricity to customers in the wholesale electricity market of the Republic of Kazakhstan:

- LLP “Ekibastuz GRES-1”;
- JSC “Ekibastuz GRES-2”;
- JSC “Eurasian Energy Corporation” (Aksu GRES);
- LLP GRES “Corporation Kazakhmys”;
- JSC “Zhambyl GRES”,

and hydroelectric power plants (HPP) of high capacity, used for an additional control of the production schedule of the Unified Electric Power System of the Republic of Kazakhstan:

- Bukhtarminskaya HPP JSC “Kazzinc”,
- LLP “AES Ust-Kamenogorsk HPP”,
- LLP “AES Shulbinskaya HPP”.

Commercial power plants of an industrial use are thermal power stations with a combined production of electricity and heat, which are used for the supply of electricity and heat to large industrial enterprises and nearby settlements:

- CHP-3 LLP “Karaganda Zhyly”;
- CHP PVS, CHP-2 JSC “Arcelor Mittal Temirtau”;
- Rudnenskii CHP (JSC “SSGPO”);
- Balkhash CHP, Zhezkazgan CHP LLP Corporation “Kazakhmys”;
- Pavlodar CHP-1 JSC “Aluminium of Kazakhstan”;
- Shymkent CHP-1, 2 (JSC “Yuzhpolimetal”) and others.

Power stations of regional importance are CHPs, integrated with the territories, which sell the electric energy through a network of regional power grid companies and power transmission organizations, and also sell the heat to surrounding towns.

As can be seen, most of the Kazakhstan power stations are thermal, coal-fired. They produce three-quarters of all electricity. Kazakhstan has large reserves of thermal coal at low cost, and this gives the industry a strong competitive advantage.

On the other hand, due to the proximity to the coal deposits, the generating capacity is very unevenly distributed: **42% of the design capacity of the Unified Electric Power System of Kazakhstan is concentrated in the Pavlodar region.** Because of the low proportion of hydroelectric power plants (about 12%) there is a deficiency of the maneuver generation capacity to meet a peak demand.

In addition, the generation equipment of power stations is largely worn out, which limits the capacity of existing power plants. Thus, the power stations of the national importance have only 18-30% of the residual economic life. Currently, about 41% of the generating capacity was used for more than 30 years.

### **The electric energy transmission sector**

The electrical network of the Republic of Kazakhstan is a set of substations, switchgear and their connecting lines, with the 0.4-1150 kV voltage for the transmission and (or) distribution of electric power.

On their balance sheets there are 310 power transmission lines of the 0.4-1150 kV voltage.

The length of lines is 24,501.9 km, of which:

1. 1150 kV - 4 objects, of the length of 1,421.2 km;
2. 500 kV - 42 objects, of the length of 6,420.1 km;
3. 220 kV - 203 objects, of the length of 15,966.6 km;
4. 110 kV - 34 objects, of the length of 558.7 km;
5. 35-0.4 kV - 27 objects, of the length of 135.35 km.

The backbone network in the Unified Electric Power System of the Republic of Kazakhstan is the National Power Grid (NPG), which provides the electrical connection between the regions and the energy systems of neighboring countries (Russia, Kyrgyzstan and Uzbekistan), as well as the issuance of electricity by power plants and its transmission to wholesale customers. Substations, switchgear, interregional and (or) interstate transmission lines and power lines, issuing electricity of power stations of the voltage of 220 kV and above and belonging to NES, are on the balance of the Kazakhstan Electricity Grid Operating JSC “KEGOS”.

Regional electric networks provide electrical communication in the region, as well as the transmission of electric energy to retail customers. Electrical networks at the regional level are on the balance and under operation of regional power companies (RECs).

Power transmission organizations (EPOs) provide the transmission of electric energy on the basis of contracts through their own or used (rental, leasing, asset management and other types of use) electrical networks to consumers of wholesale and retail markets or the power supply organizations.

### **The electric power supply sector**

The sector of power supply in the electricity market of Kazakhstan consists of power supply companies (ESO), which carry out the purchase of electricity from energy producing organizations or on centralized tradings and its subsequent sale to end retail customers. Some power supply companies function as “guaranteed suppliers” of electricity.

The electricity market is divided into two levels: a wholesale and retail electricity markets; the market for thermal energy consists of one level - the retail market.

The system operator, regional power companies that own a power grid, provide an access to the market of electric power to all participants in accordance with the regulations of the state body, responsible for the leadership in the sphere of natural monopolies and on regulated markets.

Relations arising in the production, transmission and consumption on the market of electricity or thermal energy, are regulated in the power energetics by corresponding contracts.

The functional structure of the wholesale electricity market of Kazakhstan includes:

- the market of decentralized sales of electricity (bilateral contracts of sale of electricity);
- the centralized electricity trading market, comprising of the purchase and sale of electricity in the short term (spot trading), medium term (week, month) and long term (quarter, year) basis;
- the balancing market in real time, functioning for physical and the subsequent financial settlement of hourly imbalances arising during an operating day between actual and contractual quantities of production and consumption of electrical energy in the power system of the Republic of Kazakhstan;
- the market of system and auxiliary services. The system operator of the Unified Electric Power System of the Republic of Kazakhstan shall provide system services and acquisition of support services from the subjects of the market of electricity of the Republic of Kazakhstan.

Relations between the subjects of the wholesale electricity market of the Republic of Kazakhstan are governed by the civil legislation of the Republic of Kazakhstan, the rules of organization and operation of the wholesale electricity market of the Republic of Kazakhstan, other legal acts and agreements between the participants of the wholesale electricity market.

**Power generation companies** carry out their activities for the production and sale of electricity in the wholesale electricity market of the Republic of Kazakhstan if the following conditions are met:

- 1) the availability of a license;
- 2) an access to a national and (or) regional power grid;
- 3) the supply to the wholesale market of electricity in the amount of at least 1 MW average daily (base) and the availability of accounting systems,



telecommunications, providing their unification with the systems installed in the System Operator.

Power generation companies, which are connected to the national electricity network, obtain an access to the national power grid in the case of availability of contracts with the System Operator:

- 1) for the provision of technical control of modes of production/consumption of electrical energy in the Unified Power System of Kazakhstan.
- 2) for the provision of services on balancing the production/consumption of electrical energy in the Unified Power System of Kazakhstan.

Power generation companies, which are connected to the power grids of regional power companies, obtain an access to the national power grid in the case of availability of the contract between a power generation company and the System Operator for the provision of services on the technical control of modes of production/consumption of electrical energy in the Unified Power System of Kazakhstan.

**Consumers** in a decentralized electricity market in accordance with the Civil Code sign contracts for sale of electricity at agreed prices, volumes and delivery terms.

Consumers of electricity participate in the wholesale electricity market when the following conditions are fulfilled:

- 1) the availability of an access to the national and (or) regional power grid;
- 2) the purchase on the wholesale market of electricity in the amount of at least 1 MW of average daily (base) of power and availability of automated accounting systems, telecommunication systems, ensuring their unification with the systems installed in the System Operator.

Consumers of electrical energy, which are connected to the national electricity network, obtain an access to the national power grid in the case of the availability of contracts with the System Operator:

- 1) for the provision of services for the transmission of electric energy in the national grid;
- 2) for the provision of services for technical control of imported electricity (in the case of the import of electricity);
- 3) for the provision of balancing of production/consumption of electrical energy in the Unified Power System of Kazakhstan.

Consumers of electrical energy, which are connected to the power grids of regional power companies, obtain an access to the national electricity network if the following conditions are met:

- 1) there is an agreement with the System Operator for the provision of electricity transmission in the national power grid;
- 2) there is an agreement with the System Operator for the provision of technical control of imported electricity (in the case of the import of electricity);
- 3) there is an access to the regional power grid.

**Energy supplying companies** operate in the wholesale electricity market of the Republic of Kazakhstan under the following conditions:

- 1) there is a license for the right to purchase electric energy for power supply;

2) there is an access to the national and (or) regional power grid;

3) requirements are met for the supply/consumption in the wholesale electricity market in the amount of at least 1 MW of average daily (base) of the power and presence of automated accounting systems, telecommunication systems, ensuring their unification with the host system, installed at the System Operator.

An access to the national electricity network is provided to power supply organizations under the following conditions:

1) there is an agreement with the System Operator for the provision of electricity transmission in the national power grid, indicating consumers of electricity, and (or) for the provision of technical control of imported electricity (in the case of the import of electrical energy, or the acquisition of such services) indicating consumers of electric energy;

2) there are agreements with the System Operator for the provision of balancing of production/consumption of electrical energy in the power system of Kazakhstan, showing consumers of electrical energy and/or energy producing organizations;

3) there is an access to the regional power grid in cases where power supply companies have entities connected to the regional power grid.

The retail electricity market participants are all consumers of electricity with a capacity of less than 1 MW and power supply organizations, exercising sales of electricity to them in a competitive environment.

### **Operators in the electricity market:**

The System Operator of the Unified Electric Power System of the Republic of Kazakhstan, JSC “KEGOC” (MEMR order of 27.08.2004 № 198) performs the following functions:

- Provides system services for the transmission of the electric energy in the national electricity network in accordance with the treaties, provides maintenance and technical readiness;

- Provides system services for technical control, performing the centralized maintenance control of modes of the Unified Electric Power System of the Republic of Kazakhstan in accordance with the treaties, including the drafting of the actual balance and the formation of the daily schedule of production and consumption of electricity;

- Ensures the reliability of the Unified Electric Power System of the Republic of Kazakhstan;

- Provides system services for regulation of electric power;

- Provides system services on balancing generation and consumption;

- Provides financial settlement of imbalances electricity in accordance with the legislation of the Republic of Kazakhstan;

- Interacts with the energy systems of neighboring countries for the management and sustainability of parallel operations;

- Organizes the functioning of the balancing energy market in real time and the market of system and auxiliary services;