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Development of electric power industry in Kazakhstan

Abstract. *The article analyzes the market structure of the electric power industry of the Republic of Kazakhstan and describes the wholesale and retail markets of electric power industry. Fair market participants were identified and the regulatory and legal conditions were studied. The scheme of state regulation of the Kazakhstan power system was developed, the main operators of «KEGOC» JSC and «KOPEM» JSC were analyzed, and the main components of the wholesale market were considered.*

Participants in the retail market of Kazakhstan were described and the following issues were discussed: raising the prices of distribution companies, restricting the access of local producers and consumers to networks, and implementing the competitive capacities in given territories. The sales and purchases scheme of the electric power market of the Republic of Kazakhstan was developed. The ways of solving the issues of financing of this sector on the basis of principles of public-private partnership were presented.

Keywords: *power industry, electricity, power system, tariff, energy, investment, market.*

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Introduction. It is known that the socio-economic development of Kazakhstan depends on many factors. The Presidential Addresses and strategic programs adopted by the Government are aimed at ensuring sustainable development of every economic sector and improving the country's welfare. In this regard, the role of the electric power industry, which operates as a link to the continuous operation of the production process, is constantly developing in order to ensure sustainable economic development. This is a sphere that affects the state of all sectors of the country's economy.

Electricity reform is an important part of institutional changes in Kazakhstan's economy. The premise for these steps is considered to be the negative trends in the industry originating in the 1980s. One of the problems of energy companies is the lack of incentives to reducing production costs. The termination of tariffs implemented by regulators was explained by the low solvency of consumers, which caused more than half of the industry enterprises to operate at due to high production costs.

In order to harmonize the pace of development of the electric power industry with the country's economic development trends, it is necessary to create economic relations that create a competitive environment in the industry. However, errors in reform and the adoption of international practices

without the input of local specifics have kept the industry monopolized.

Identifying the issue. The problem of creating a comprehensive system of economic regulation is relevant in all economic reforms, but only regulators, regulating bodies and regulated parameters keep changing. It is no doubt that regulation measures will continue to be introduced during the restructuring of the power industry. The relationship between the principles of economic efficiency and social justice does not create favorable conditions for optimal use of energy resources. Therefore, the power authorities should have the following priority areas in the field of energy: sustainable energy supply, better use of fuel and energy resources, reduction of harmful impact of electric power on the environment, etc.

Goals. The purpose of this research is to determine the problems of the electric power industry based on the analysis of the market structure of the electric power industry of the Republic of Kazakhstan, the principles of trade in its energy system, and the mainstream markets and retail market issues.

History. Issues of regulating monopolies have been researched in depth in domestic economic literature by N.K. Mamyrov, M.B. Kenzheguzin, R.M. Sagieva, K.K. Zhangaskin, S.K. Hanapina and others. The current state of the electric power industry and issues in its development has been considered by Byliyev, R.A. Alshanov, S.Y. Omirzakov, A. Kazbovyzy, S.S. Mahmett, A.A. Zhakupov, B.I. Tuzelbayev.

Research methods. Abstractive, inductive and deductive methods of research are implemented in this paper. The justification of the rules was based on the use of general scientific methods and approaches, methods of analysis and synthesis, systematic and integrated approaches, and the use of personalized control and summary data, in addition to official statistical material and information off the Internet.

Results and discussion. It is necessary to analyze the market structure of the industry in order to assess the current state of its development. In accordance with the Electrical Energy Privatization and Restructuring Program, electricity suppliers and consumers are competing in a competitive wholesale market of bilateral contracts and the market of electric power reserves according to the Law of the Republic of Kazakhstan № 588 – II dated July 9, 2004 I «On electric power industry».

The current electricity market in Kazakhstan is composed of a full and retail level in accordance with the Electricity Law. A complete market is a single entity in the country. The retail market is divided into separate regional and local markets. At the same time, part of the electricity turnover goes through off-market transfer prices, as it is part of industrial holdings. You can see the state regulation of the industry visually in Figure 1 (below).

Principles of free energy trading generally operate in the wholesale market. Buyers of electricity in the wholesale market can freely select suppliers and engage through intermediaries. Electricity prices are not subject to state regulation according to the law. Tariffs for the transmission of electricity in the wholesale market and individual tariffs for dispatching are approved by the state.

The terms of fully entering the market are based on complying with technical requirements, appropriate licensing, minimum power consumption or supply. According to the forecasts of the country's energy supply, the volume of electricity consumption in Kazakhstan in 2024 may reach 109.2 billion kW [1].

Full market participants include:

- Consumers with a consumption power of no less than 5 MW / day;
- Power suppliers that can provide power up to 5 MW;
- Energy companies of the neighboring states importing or exporting electricity;
- Distributive Energy Companies (UES);
- trade - intermediary companies (traders).

About 40% of the total volume of electricity trade is generated in the open market, which is close to similar indicators of developed countries where electricity is being liberalized. Such a significant share of the competitive market is provided by the lowest rate of qualified consumers in the free market among former USSR and Eastern European countries. A mechanism for the exchange of power plants within the region of the

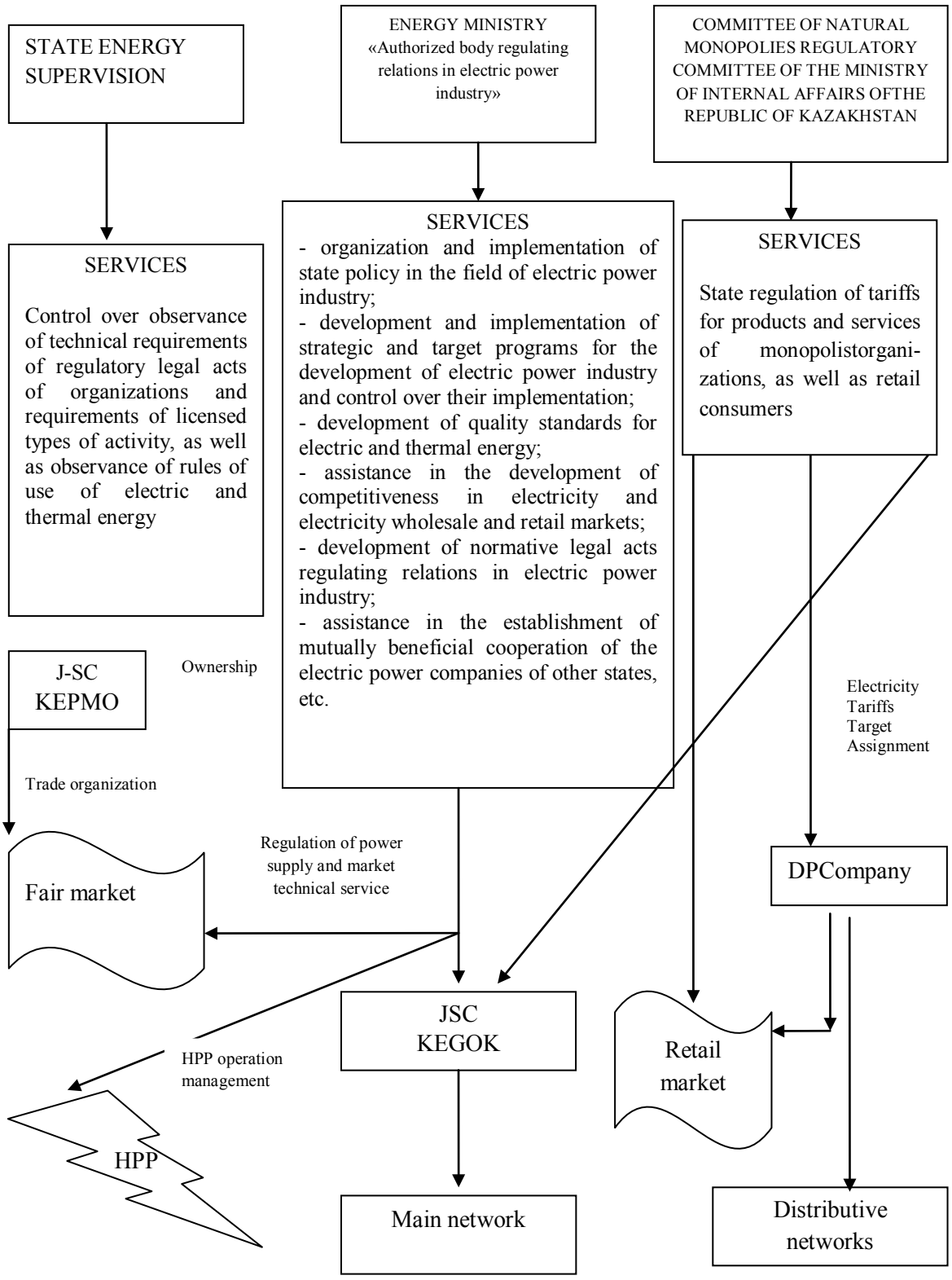

Figure 1 - Scheme of state regulation of electric power industry
Note - The image is from the author

Eurasian Economic Union needs to be created in order to expand the competitive market [2].

In the "Concept for the further development of market relations in the electric power industry of the Republic of Kazakhstan» the following key components of the wholesale electricity market are formed:

- decentralized electricity market;
- centralized electricity market;
- a «real-time» balancing market;
- market of systematic and auxiliary services [3].

To date, most of the wholesale market turnover is part of decentralized trade, which is based on bilateral long-term contracts between consumers and suppliers of electricity. In contrast to bilateral trade contracts, trading is traded on a multilateral basis on a centralized basis. Participation in centralized sales is voluntary. At the beginning of 2004, there was actually a «one day early» trades in centralized trading, but after the appointment of KOPEM JSC as a centralized electric power market operator, the Minister of Energy announced that on March 20, on the basis of Order № 26, it also provided services for the development of operations involving mid-term (weekly, monthly) and long-term (quarter, year) centralized trade, as well as supply of electric power in the operational day (day market).

KEGOC's balancing market as an Operator provides real-time trading. The purpose of this market is to swiftly minimize the discrepancy between actual and contractual quantities of electricity generation and consumption included in the hourly dispatching table. In this sector of the market urgent sales of low-demand holding capacities are carried out.

Balance sheet market was launched in our country only in 2008, and this segment operates in imitation-mode: electricity consumers and suppliers work based on bilateral contracts. Sales and purchases in the electric power market of the Republic of Kazakhstan can be illustrated in the following figure (Figure 2).

While the legal basis of cash energy trade is formed, Kazakhstan's power industry is not yet fully technically ready for large-scale trade in the nearest real-time mode, as it requires the modernization of both the infrastructure and the market itself: an advanced energy management and control system, along with equipment for monitoring and regulating modern telecommunication systems are required.

The development of the exchange market will ultimately expand the scope of multilateral trading partners through facilitating the exchange of information and transactions that simplify the immediate response of market participants to the situation. The government has undertaken a part of this commitment: the sector under its control has been re-equipped with the state budget guarantee under the National Electricity Transmission Rehabilitation Program implemented by KEGOC. However, the development of cash energy and exchange markets also requires the modernization of private infrastructure.

National monopolies execute important policies that ensure contractual obligations are carried out in the free market. Most of the transmission services from KEGOC to the consumer are carried out by KEGOC's system operator, and it should provide all market participants with equal access KEGOC's national electricity grid infrastructure.

«The concept of further development of market relations in the Republic of Kazakhstan" considers the redistribution of KEGOC and KOREM JSC services. JSC «KOREM» is engaged in the organization of centralized trading, which is still growing. In addition, KEGOC and its subordinate structures will perform a number of new functions along with the tasks of the former system operators, namely, the creation of a real balance sheet and diagram of production and consumption of electricity, the organization and management of the real-time balance market, and its systemic and auxiliary markets. The Concept envisions the introduction of amendments to the regulatory legal acts that authorize the distribution of powers.

The next level of the market is the retail electricity market. Electricity sales in the retail market are as follows:

- distribution companies and their structural subdivisions;
- local power stations, some of which are private equity dealers (traders) affiliated with UEK;

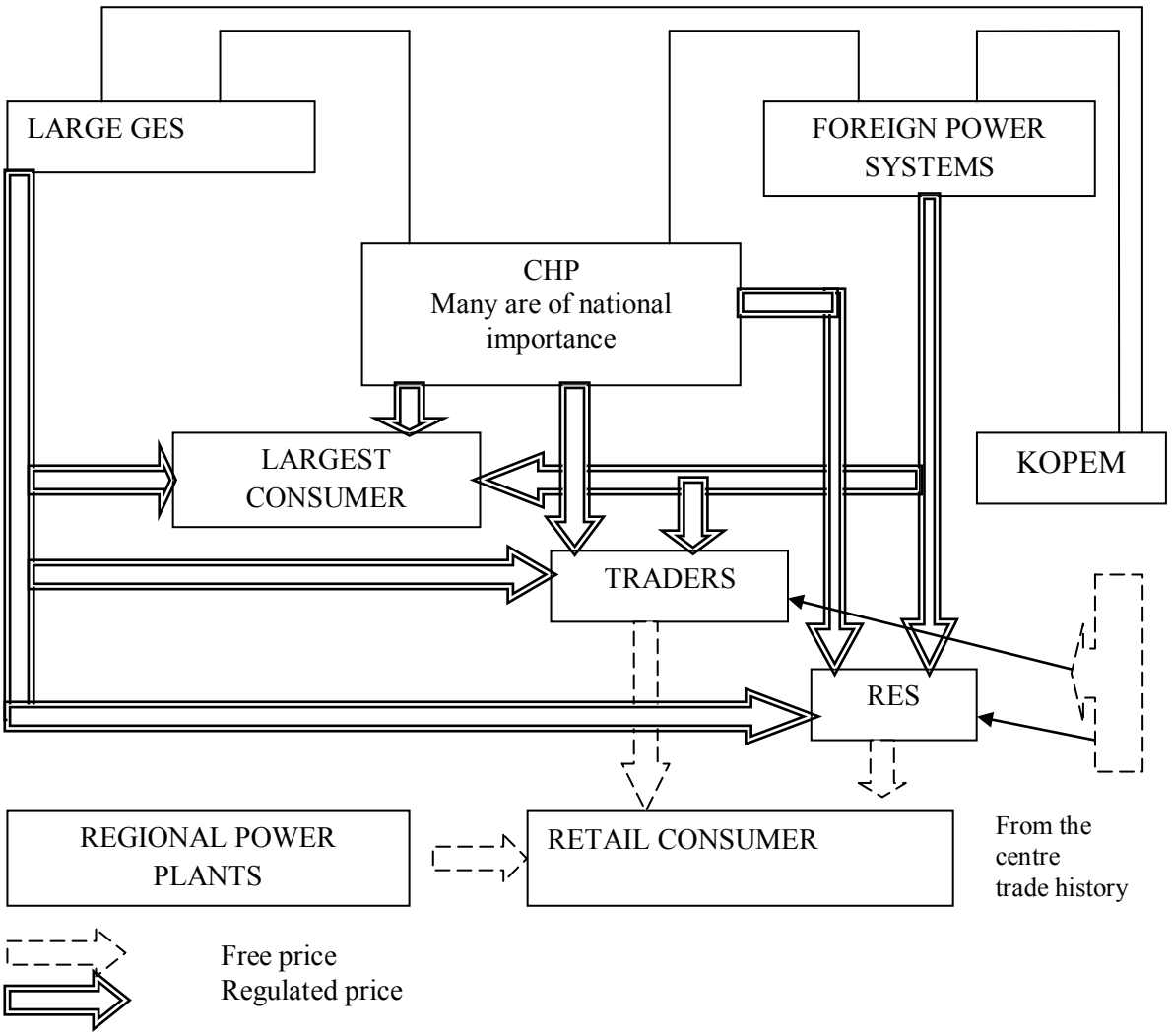

Figure 2 – The sales and purchases scheme of the electric power market of the Republic of Kazakhstan (n.b. the diagram was prepared by the authors.)

- communal services and power providers in communal ownership typically incorporate electricity and heat energy for local needs.

Part of the electricity sold on the retail market is purchased on the free market by intermediaries.

As already mentioned, Vertically Integrated Companies, which maintain monopoly positions on many retail markets in Kazakhstan, are still inoperation. State regulation of these markets can not be a barrier to abuses of monopoly: price increases of the UEK, limitations in availability to local producers and consumers, and impediments to the introduction of competitive capacities in given territories have been noted.

Despite the fact that the state retains retail tariffs, electricity in the local markets (in the case of shipping costs) is sold at twice the priceof that sold on the wholesalemarket. This situation requires reform of the retail trade and the UEK. The efficiency coefficient of domestic power plants is estimated at 36 per cent, and more than one-tenth of electricity is generated at devices with a coefficient of less than 25 per cent. [4]

The use of the principle of uniform tariffs in the wholesale and retail markets of electric power will help to equip them with homogeneous commercial metering devices, to move to a uniform principle of relationships between providers and consumers.

One of the key issues in the industry is the provision of electricity to the rural population. The vast territory of Kazakhstan and the low

population density in rural areas sometimes cause the length of power lines to reach 360,000 km. In the case of long-term consumption and long-term losses (25-50%) in long-distance rural networks, the cost of electricity also increases. Experts estimate that electricity transmission for low-power consumers can reach up to 5 cents per kWh, which does not make the provision of electricity to such consumers cost-efficient. At the same time, some of the rural electric networks were damaged over the past years, and the repairing of these networks is economically inefficient. According to the Ministry of Agriculture, 255 rural settlements in the country are not provided with electricity.

The issue of pollution of the environment with electric power facilities is also on the agenda. The concentration of harmful substances in the electric power plant emissions in Kazakhstan is several times higher than that of international standards. Production of harmful substances to the atmosphere by electric power stations amounts to 1 mln tons. Total pollutants are about 11 million tons. Thermal power stations are the main source of greenhouse gas emissions. The share of the sector in the total greenhouse gas emissions accounted for about 43%. According to expert calculations, the cost of environmental damage of coal power in Kazakhstan is 7.7 tenge per kWh per hour. Taking into account the volumes of electricity generated in the coal-fired electric centers, the value of external damage may amount to 4.3 billion USD. In this regard, the development of local renewable energy sources can be an economic and ecologically viable alternative for large coal power plants. One of the main ways to address these issues, as well as meet the needs of the population in electricity, is the use of renewable energy sources [5].

According to the Ministry of Energy of the Republic of Kazakhstan, 2.8 trillion tenge is currently necessary for the development of the electric power industry. This amount is not available in the state, therefore it is necessary to create favorable conditions for investments and search for new instruments of investment. One of them is concessions that are a legal form of contractual relations between the state and private investors aimed at stimulating the attraction and construction of capital for the development of national economies, which have proved their effectiveness in many countries. In our opinion, concessions are a powerful tool for attracting private foreign and domestic investment in the power industry.

Conclusions.

1. The current electricity market in Kazakhstan is composed of wholesale and retail levels in accordance with the Electricity Law. The wholesale market is a single entity in the country. The retail market is divided into separate regional and local markets.

2. The terms of fully entering the market are based on complying with technical requirements, appropriate licensing, minimum power consumption or supply.

3. Vertically Integrated Companies, which maintain monopoly positions on many retail markets in Kazakhstan, are still in operation. State regulation of these markets can not be a barrier to abuses of monopoly: price increases of the UEK, limitations in availability to local producers and consumers, and impediments to the introduction of competitive capacities in given territories have been noted.

4. One of the key issues in the industry is the provision of electricity to the rural population. The vast territory of Kazakhstan and the low population density in rural areas sometimes cause the length of power lines to reach 360,000 km. The issue of environmental pollution is also on the agenda. The concentration of harmful substances in powerplant gas emissions in Kazakhstan is several times higher than that of international standards.

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Развитие электроэнергетической отрасли Казахстана

Аннотация. В статье проанализирована рыночная структура электроэнергетической отрасли Республики Казахстан, даны характеристики оптовых и розничных рынков электроэнергетики. Определены участники оптового рынка, изучены условия нормативно-правового обеспечения. Разработана схема государственного регулирования казахстанской энергосистемы, изучены услуги основных операторов на данном рынке АО «KEGOC» и АО «КОРЭМ», рассмотрены основные сегменты оптового рынка.

Описаны участники розничного рынка энергетической системы Казахстана, рассмотрены следующие вопросы: повышение цен распределительными энергетическими компаниями, ограничение доступа местных производителей и потребителей к сетям, препятствие введению конкурентных мощностей на данной территории. Разработана схема продажи и покупки на рынке электрической энергии Республики Казахстан. Были предложены пути решения вопросов финансирования данной отрасли на основе принципов государственно-частного партнерства.

Ключевые слова: электроэнергетика, электроэнергия, энергосистема, тариф, энергоемкость, инвестиции, рынок.

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Қазақстан электр энергетикасы саласының дамуы

Аңдатпа. Мақалада Қазақстан Республикасының электр энергетикасы саласының нарықтық құрылымы талданып, электр энергетикасының толайым және бөлшек нарықтарына сипаттама берілді. Толайым нарық қатысушылары анықталып, нормативтік-құқықтық қамтамасыз ету шарттары зерттелді. Қазақстандық энергожүйенің мемлекеттік реттеу сызбасы жасалып, аталған нарықтағы негізгі операторлар «KEGOC» АҚ мен «КОРЭМ» АҚ қызметтері зерттеліп, толайым нарықтың негізгі сегменттері қарастырылды.

Қазақстанның энергетикалық жүйесінің бөлшек нарығына қатысушылар сипатталып, келесідей мәселелер қарастырылды: үлестіруші энергетикалық компаниялардың бағаларды жоғарылатуы, желілерге жергілікті өндірушілер мен тұтынушылардың қол жетімділігін шектеу, берілген территорияда бәсекелік қуаттылықтарды енгізуге кедергі жасау. Қазақстан Республикасы электр энергиясы нарығындағы сату және сатып алу сызбасы жасалды. Аталған саланың қаржыландыру мәселелерін мемлекеттік-жекеменшік әріптестік қағидалары негізінде шешу жолдары ұсынылды.

Түйін сөздер: электр энергетикасы, электр энергиясы, энергожүйе, тариф, энергиясыйымдылық, инвестициялар, нарық.

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