Peculiarities of the Electricity Market in the Generation Sector

N K Efimov¹, R R Nogovitsyn²

¹Federal State Budgetary Educational Institution Of Higher Education "Yakut State Agricultural Academy", sh.Sergelyahskoe 3 km, d. 3, Yakutsk, Republic of Sakha (Yakutia), 677007, Russian Federation
²Federal State Autonomous Educational Institution of Higher Education "M. K. Ammosov North-Eastern Federal University", 58 Belinsky str. Yakutsk, 677000, Republic of Sakha (Yakutia), Russian Federation

E-mail: 626enk@mail.ru

Abstract. The reform of the power industry in Russia is not yet complete, but there are clear features for adjusting plans and directing efforts to create competitive markets. This article discusses the sector of generation of electric energy, where healthy competition should develop according to all the rules of economics, but the existing technological features in the generation sector create conditions for the emergence of elements of monopoly and monopoly rent in the electricity market.

1. Introduction

The electric power industry is considered an industry of natural monopoly in Russia and abroad. The reform of the electric power industry aimed, inter alia, at reducing the monopoly power of vertically integrated electric power companies, is taking place almost everywhere in the world.

Due to the volatility of the reform concepts, which are manifested with constant adjustments to the progress of reforms, the process of reforming the electric power industry cannot be considered completed in any of the countries.

The situation in Russia is further complicated by the historical commitment of the state to increase the efficiency of economic sectors through the creation of monopoly structures, the high modern level of monopolization of the areas of resource extraction and resource supply, as well as a significant level of depreciation of the main production facilities of energy companies.

The reform of the electric power industry is a long, multi-stage project in Russia. Should be singled out as its three main stages the period from 1991 to 2000 and from 2001 to 2008 smoothly moving into the modern period (from 2011 to the present) [1].

Moreover, there has been a clear separation of energy companies in the areas of activity at present: generation, transportation, distribution and marketing. Regulatory acts have been developed that regulate the relationships of all participants in this market, the operator of the trading system has been defined (JSC "Administrator of the trading system of the wholesale electricity market").

If the direction of transportation, represented by the unified national electric grid (UNEG), can be unconditionally considered the direction of a natural monopoly, then in other directions the
introduction of market relations is possible and necessary. It is especially pronounced in the direction of generation, that is, the production of electrical energy.

The aim of this work is to study the possibilities and potential of creating a competitive market in the electric energy generation sector and the scientific justification.

2. Features of the electricity market in the field of generation
The electricity market is currently divided into three price zones in Russia.

![Figure 1. 1 - the first price zone; 2 - the second price zone; 3 and 4 - non-price zones; 4 - zone of regionally isolated energy systems.](image)

All subjects of the electric power industry located in the regions of the regions united in price and non-price zones of the wholesale market are granted the right to carry out activities for the sale and purchase of electric energy and capacity in the wholesale market.

The first price zone includes the territories of the European part of Russia and the Urals, the second - the territory of Siberia. This separation is due to a number of reasons, and above all, various technologies used by the system operator in planning and maintaining the regime, since the composition of the generating equipment in the price zones is different, and there are network restrictions on the transfer of active power from one price zone to another. The purchase and sale of electric energy and capacity is mainly carried out at free (unregulated) prices in the price zones of the wholesale market.

Regulated relations are maintained in non-price zones covering the Far East, the Komi Republic, the Arkhangelsk and Kaliningrad Regions, since it is not possible to create a competitive environment with the monopolistic position of individual wholesale market participants and restrictions on the transfer of active power to the price zone (weak electrical connections) [2].

One cannot disagree with A. F. Dyakov, who believes that “it is the unified energy system that spans the six time zones of the country that allows the industry to have less material and financial reserves, thereby saving billions of rubles of investments, guaranteeing reliable provision of capacities and the functioning of the UES” [3], but for this it is necessary to create an EES capable of covering the entire country from Vladivostok to Kaliningrad, this is from the realm of fantasy.
Note that the competitive environment necessary to reduce prices and costs was never created during the last stage of reforms in the generating sector.

A feature of the electricity market is virtuality, in terms of supply and payment for electricity, to the producer who actually produced the electricity consumed by a particular consumer, therefore a special role is assigned to the market operator, who must very clearly conduct, when, at what time and at what price, he is ready to buy electricity from suppliers and sell to consumers at an affordable price, leveling peak hours.

The direction of generation has its own characteristics, which are expressed in various technologies for generating energy, from wind-hydroelectric power stations to complex nuclear power plants operating in a single network (UNEG).

Another feature is the parallel generation of thermal and electrical energy by one station, for example, thermal power plants or nuclear power plants. Moreover, according to the technology the separation of heat and electric energy is impossible, and the duration of the heated period in Russia is 6–9 months. In such situations, the supply is carried out under the conditions of the so-called “forced power supply”.

At the same time, there will be cross-subsidization of electricity consumers at the expense of consumers of thermal energy (since thermal power plants will reduce the costs of electric energy and increase the costs of thermal energy in order to win in the competition) [4];

Each type of power plant has its own cost of generating electricity and opportunities that differ significantly, for example, the cost of generating at a hydroelectric power station, as of July 27, 2019, amounted to 182.98 rubles / MWh, then at the CHPP - 1212.45 rubles / MWh, which is almost 7 times higher. [5]

3. The manifestation of the principles of "entrepreneurial" or "monopoly rent"

With the creation of a single price zone in Russia and the full introduction of mechanisms of competitive market relations between market participants, in particular in the generation sector, the principle of "entrepreneurial" or "monopoly rent", that is, the extraction of rent as superprofits, begins to manifest itself clearly.

The term “entrepreneurial rent” was first introduced into scientific circulation in 2016, in the article by V. Komarov and N. Morozova, “Rent as superprofit, as rental income and as corrupt income” in the journal “World of Economics and Management” T. 16, No. 3. P. 68–83.

The authors described in detail the nature of the occurrence of various types of rent. The article provides the formulations of the named scientific facts, the corresponding formulations of the concept of “rent”, as well as the rationale, formulas, illustrations of the identified theoretical principles and examples of their practical manifestations.

They argue that natural monopoly is based on positive economies of scale, which is so significant that one firm can provide products with all market demand at lower cost than several openly competing firms. An example of a natural monopoly is the company Gazprom, RAO UES. Even if it is technically possible for two or more firms to exist in these industries, it is economically inefficient. Natural monopolies receive from the state the right to serve a specific market or geographical area, and in return agree to obey state control and regulation aimed at protecting consumers’ rights from abuse of monopoly (market) power. Overcoming such a barrier is only possible for large diversified corporations. In Figure 2, the authors schematically show how monopoly rents operate. [6]
Figure 2. The balance of demand (DD) and (a) monopoly supply (SS), (b) the estimated (by “fairness” price) monopoly supply (S₁S₂).

Let's see to what extent this statement is true in relation to the electricity generation sector.

In the case of introducing free prices in the direction of generation, the value of the goods will determine demand, since, as demand increases, the operator must enter additional capacities of market participants standing in line with the highest costs. And the cost of goods on the market will be increased to the level of the offer of the last participant.

In such a situation, hydropower plants and nuclear power plants - the market participants with the lowest costs, become non-alternative, will extract rents as super-profits, at the same time they will become base stations and will be provided with demand constantly, completely legally.

Other stations, these are thermal, powered by hydrocarbon fuels (TPPs) will compete with each other, with the highest costs will be used at half-peak and peak hours (used up to 12 hours a day).

The peculiarity of this market is that the higher the demand, the higher the offer price. This is caused by the deficit (limited) of cheaper capacities (hydroelectric power stations, nuclear power plants) and the monopoly position of thermal power plants during peak periods (on the principle of “buy or sit without light”).

The consequences of the electricity shortage can be disastrous for the Russian economy, since the construction of power plants lasts 10-15 years, and the “invisible hand of the market” will not be able to provide optimal commissioning of power plants by their types (basic, peak and half-peak), locations and timing [7].

Abyzov M. A, Khlebnikov V.V., authors of the article “Economic Aspects of Reforming the Russian Electric Power Industry”, describe the foreign experience that attempts to make the electricity market competitive lead to the development of a monopoly or oligopoly, the concentration of capital and the absorption of competitors, the organization of cartels, the conclusion of explicit and subsequently hidden agreements to limit competition and hold prices, tariff formation based on market power, and not based on the interaction of supply and demand [8].
Figure 3. Dependence of supply and demand on the electricity generation market.

Figure 3 shows the dependence of demand and supply prices on the electricity generation market on July 27, 2019 (according to BIGPOWER ELECTRIC). [5]

As can be seen from the figure, the difference in offers by type of station is significant. At the same time, competitive relations, at first glance, did not seem to be violated, however, traces of monopoly rents from two participants (hydroelectric power stations, nuclear power plants) are clearly visible.

Thus manifestations of elements of monopoly and monopoly rents are inevitable in a limited market of service providers.

4. Conclusion
Based on the foregoing, it was concluded that the expected effect will not be obtained with the introduction of free prices in the generation (electricity) sector, in order to create an effective competitive market and reduce (restrain) the price (tariff) for electricity.

Aspects of O. G. Bespalova, in the article "Modern Trends in the Development of Market Relations in the Electric Power Industry" in 2005 [9], did not lose relevance, on the contrary, they began to gain clear features that the authors of this article tried to scientifically substantiate as a manifestation of "monopoly rent" on the electricity market in the field of generation.

It should be noted that this situation in the electricity market has a stimulating effect on attracting investment in the construction of power plants with low cost of energy generation from consumers, these are the so-called "small distributed energy" and "renewable energy sources".

The development of energy generation technologies, their quick payback, reliability and affordability are increasingly attracting energy consumers.

The chaotic development of this direction is not permissible, since it can lead to collapse and destruction of the balance of power and energy of the entire region of the country.

Development must be carried out under the control and long-term forecasting of the scientific communities of the regions with the development of various development scenarios (recommendations) for energy suppliers and consumers that ensure energy security.

To date, the most acceptable option in the country remains the option of retaining the existing operator JSC “Administrator of the trading system of the wholesale electricity market”, its further
natural development, transferring part of its authority to private business entities and the introduction of information technology.

A special role is assigned to the market operator, which must very clearly “conduct” and bring wholesale buyers and energy suppliers at an affordable price, leveling peak hours.

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