

FUNDAMENTALS IN SYSTEMATIC APPROACH FOR THE DEVELOPMENT
OF AN EFFECTIVE STATE REGULATION OF ENERGY MARKET

The structure of energy markets, differentiated by the type of activity, and the development of their areas of state regulation are substantiated. A basis of a systematic approach to the formation of an effective state regulation of market power is proposed.

Keywords: state regulation, energy industry reform, market power formation.

Щапін Є. С. Основи системного підходу до формування ефективної організації державного регулювання ринку енергопостачання

Обґрунтовано структуру ринків енергопостачання, диференційованих за видами діяльності і напрямках розвитку їх державного регулювання. Запропоновано основи системного підходу до формування ефективної організації державного регулювання ринку енергопостачання.

Ключові слова: державне регулювання, енергетична галузь, реформа, ринок енергії, формування.

Щапин Е. С. Основы системного подхода к формированию эффективной организации государственной регуляции рынка энергоснабжения

Обосновано структуру рынков энергоснабжения, дифференцированных по видам деятельности и направлениям развития их государственного регулирования. Предложены основы системного подхода к формированию эффективной организации государственного регулирования рынка энергоснабжения.

Ключевые слова: государственное регулирование, энергетическая отрасль, реформа, рынок энергии, формирование.

Introduction

Energy sector reform in terms of competition between producers had been implemented in order to achieve the lowest possible energy prices for consumers, while also being the best for its producers. Commercial relations between sellers of energy and its customers were executed by the means of the Agreement between the members of the wholesale electricity market, under which the wholesale energy-supply market was created. The subject of competition between producers of the energy (power generating companies) was the price, and between suppliers – the quality of provided services. In order to achieve this goal new market approaches towards pricing, methods of payment, the system of collection and distribution, the system of organization and regulation of relations between subjects of the wholesale market have been introduced.

Analysis of recent research

Quite actively the question of efficiency of state regulation of energy-supply market is being analyzed in the writings of such scholars as A. Amosha, V. Bogdanovich, V. Bushuev, A. Voinov, M. Gnidy, V. Zhovtyansky, V. Kono-

valyuk, Y. Lega, V. Mikitenko, O. Novoseltsev, B. Pilyushenko, A. Prahovnyk, G. Sytnyk, O. Sukhodolya, S. Farenik, A. Chemeris, A. Chylikin, A. Shevtsov, A. Szydowski and others.

Statement of research objectives

– to justify the structure of energy-supply markets, differentiated by the type of activity and the development of their areas of state regulation;
– to provide the basis for the system of approach towards the formation of an effective state regulation of energy-supply market.

Results

Disputes from the side of the Energy Community on directions and ways to reform the energy-supply market (hereinafter – the market) do not subside in our country. The authority and official position of the experts involved in discussion and those posting their opinions in the press, the controversy of the polemics proof that we deal with a difficult question, and the ways to resolve it are directly involved with short-term and long-term public interests.

Goals and expectations from the side of the supporters of the reform can be formulated as a reduction of the content of the energy complex

for the sake of the community by the means of introducing competitive market mechanisms and deregulation of the market by the state.

It is noted that one of the major trends in the development of the energy systems is the weakening of activities ties (autonomous) within vertically integrated regional energy companies. These include: generating of electricity and thermal energy, transportation of energy from sources to consumers and energy-sale activity. In line with the methodology of system analysis we will use one of the types of equivalenization, which means a dismemberment of a single system on independent systems with relatively weak links by the mean of decomposition [1, p. 21].

In order to determine the conditions for an effective functioning of the energy complex we shall consider the structure, type and characteristics of the energy-supply market separately with the help of the above stated activities and objectives of the effective state regulation of each of them. Market analysis is conducted based on those economic indicators that, to our point of view, reflect fundamental differences in the structures of markets to the fullest by the means of determining differences in their approaches on government regulation [2].

1. The degree of standardization (inter-changeability).
2. Dependence of the effectiveness of meeting the demand from the presence of competition in the market.
3. Dependence of the cost from production.
4. Elasticity of demand at a price.
5. Potential of growth.
6. Barriers for the entry into the industry
7. Technical potential.
8. Public interest in introducing competition to the market.

Before turning to more detailed consideration of the operating conditions of each market separately, we should define the types of goods, which are proposed by the supplier in each market by the criteria of its activity.

The subjects of the market for electricity producing are generating companies, individual state power plants, and independent power producers (including non-conventional energy sources). Product offered in the market will be the electric power of the power plants as the market players.

The subjects of a transmission of electric energy are transport companies, which operate the networks of NEC «Ukrenergo», networks of re-

gional energy companies, and finally, local networks. The product, which is being offered by the suppliers in this market, is the service of transmission of electricity within the boundaries of each of the transport companies.

Under sale we should understand the market-ing services, which are provided by specialized organizations and which include the following functions:

- Organization of exploitation of the technical means in commercial accounting;
- Contractual work;
- Monitoring of electricity consumption during the billing period;
- Billing and accounting for the payment of debts.

Let us analyze the structure of each of the energy markets, provided above more precisely:

1. The market of power generation.
2. Electricity which is released from any of the stations or generating company is a homogeneous product with similar quality characteristics that are standardized, meaning an interchangeable product.

3. One of the main indicators of market relationships between seller and buyer is the performance in meeting the demand (utility) for electricity, which is determined by providing the necessary volume of production of quality electric power that meets the standards required by consumers daily schedule, with the lowest possible market price that maximizes the net benefit of both producers and consumers. These requirements, which enable the selection of goods according to consumer demand, are possible only under the existence of competing companies that will allow consumers to select the product that matches their needs for quality, required amount, allowing consumers not to adjust to the regime of generating companies while breaking the daily schedule of individual loads.

The existence of competition will not allow each generating energy company to separately influence the level of prices prevailing in the market, which provides choice for consumers.

Thus, providing more efficient satisfaction of demand is achieved by the existence of competing companies.

Because the product, which is being offered in this particular market is standardized, companies come up primarily into a price competition, while the known factors of the economic theory of non-price competition are not essential. In this

case, the decisive condition for the seller is to minimize the cost of 1 kWh. One of the options that is being described by the economic science is the so-called economies of scale production, which is when the volume of goods increases in the proportion that exceeds the proportion of resources spent. [3, p. 556]

Notably, in addition to the traditional effect of saving conditionally fixed costs per unit of output with increasing volumes of production, there is also a variable cost in energy savings. Thus, partial load of the power plants is accompanied by an increase in the unit of variable costs, mainly due to the increased consumption of fuel and the reduction of efficiency. Thus, the work of the energy station at a full load (at nominal parameters), meaning an increase in the output, is the most economical mode of exploitation with minimal costs'.

Thus, an increase in the production of the electricity's generation is accompanied by more significant costs of reduction in production of one kWh than in other areas.

4. As we know, the price elasticity of a demand is characterized by a change in the sensitivity of demand towards the changes in the prices of goods, provided that other factors that affect the demand remain constant.

The seller by means of increasing the price of electricity will cause a shift of demand towards other, cheaper sources of energy. This pattern is confirmed by so-called income and substitution effects, when increasing prices of consumer goods actually reduces revenue and encourages the buyer to choose the cheaper goods from competing companies, which proves the price elasticity of demand, meaning $E > 1$.

5. Over the period of 1991-1998 consumer demand for electricity dropped by 19%. However, since 1997 there has been a trend to increased energy consumption, followed by a projected growth, so we can talk about the existing growth of the potential in consumer market that is associated primarily with the prospects for GDP growth.

6. The existing potential for growth of electricity consumption attracts investors for the investments into the market with a guaranteed income. However, it must be stressed out that the construction of major sources of electricity is very capital-intensive, which essentially serves as an investment restriction for investor's entry into the industry. It affects primarily the construction of large energy facilities. The construction of relatively small sources of capacity enables greater

participation in the market due to the number of investors.

7. Up to date, the structure of production capacity allows us to speak about the presence of a large reserve.

8. The current interest of the society concerning the installation of market conditions (the emergence of competing companies) should be considered from different points of view [4]:

– The interest of the electricity consumer is in hoping for a price reduction while competing companies emerge;

– From the side of the authorities – the emergence of new jobs, social infrastructure: gardens, schools, roads due to the emergence of new production volumes;

– From the side of the sellers of fuel for power stations – the possibility of concluding new long-term contracts for the supply of their goods.

The market operates the number of power suppliers, which are limited by territorial boundaries. It is necessary to consider the increased cost of services for power transmission in the structure of the final price for the consumer. Thus, we can identify the following specific features of electricity markets:

- electricity – a standardized product;
- the number of suppliers of electricity is limited by territorial boundaries;
- the existence of financial barriers for the entry into the market from the side of new investors.

According to the given economic criteria, the most appropriate type of market structure is oligopoly.

2. The market of services for power transmission.

Commodity in this market is the service to transmit electric power.

Sellers are electricity distributors, NEC «Ukr-energo» – an organization of municipal energy power.

1. While determining the degree of standardization of services for power transmission, one must consider an isolated, rigid electrical connection between the consumer and electricity supplier on transmission services, as well as continuity in the time of production and consumption process. This once again confirms the possibility of providing services for power transmission from only that supplier whose networks a consumer is connected to. This proves a non-interchangeability meaning the low degree of standardization of transmission of electricity as a service.

2. The effectiveness of meeting the demand for transmission services in providing electrical energy is being caused by an electrical network of bandwidth, which is required for transmission of electricity, retaining the quality at a minimal cost, which allows to expand the reproduction of an adjustable bandwidth. Consider these two situations:

- when the consumer is connected to a transmission line and there is one supplier;
- when another supplier is building transmission lines and attaches the consumer. In this case, the question arises: how does the building of parallel networks influence the effectiveness of meeting the demand for services in the sphere of power transmission?

Thus, the emergence of new sellers in the market under the condition of an unchanged consumer demand could have led to an increase in an average production cost of each of them, and, consequently, higher prices for services. Therefore, meeting the demand in this market is more effective with an absence of competing companies.

3. A transmission of electricity through networks is characterized by almost 100% of conventionally fixed costs (no fuel costs, etc.) [5, p. 158], is not dependent on the amount of transmitted product. So the total costs do not change regardless of the number of transmitted power.

4. While considering the elasticity of demand for transmission services of electricity, three points should be considered:

– As long as there is a consumer demand for electricity, there will be also a demand for transmission services.

– If we consider the current structure of electricity prices, the share of the costs of network businesses is 3 times lower than the cost of electricity. Thus, the impact of the cost of transmission services on the total price for the consumer is less significant than changes in the cost of electricity.

– The cost of the transmission of energy does not depend on the volume of transmitted energy. Therefore, the demand for transmission services while changing consumption can be characterized as inelastic ($E < 1$).

5. The presence of a potential of market growth shows the demand for the services of transmission and hence - the presence of the potential of growth in the market for the transmission of electrical energy

6. The existing demand in the market of electricity producing is being caused by the constant

demand for electricity transmission services, which makes it attractive for foreign investors to enter into the branch. However, the construction of new transmission lines is accompanied by large investments of investment funds, which is a barrier for the entry of potential investors into the field.

7. During the construction of transmission lines the capacity of networks is being projected and designed to forecast consumer demand. The situation today is that the level of electricity has decreased 1.2 times, meaning that the real network traffic is below the network capacity, which indicates a significant potential of the market.

8. The construction of new, overlapping lines will require a deforestation, land alienation, additional expenditure of resources, which will cause a backlash from a side of the public. So we can talk about the lack of interest of the public in implementing competition into the market.

Summarizing all of the above stated, we can underline the following points:

- Because of economic and technological features of services in the sphere of transmission of electricity it is an almost non-refundable commodity.

- Demand for the price is inelastic.

- There is an investment barrier for the entry into the market of services for the transmission of electrical energy.

Thus, according to economic indicators and specific features, it can be concluded that the market for electricity transmission has a monopoly character. Moreover, the feasibility of appearance of competing companies into the market shows that this is a typical natural monopoly.

3. The market of sales services.

A product is a service of distribution of electricity and services connected with the payments for consumed electricity. Sellers are energy-supplying enterprises

1. In theory, the presence of a large number of distributors should allow the buyer to choose a range of services, which are appropriate to consumer benefits: removal of data counters, billing, monitoring of passage of the payment, client services, that shows the complete interchangeability of the proposed market services. In practice, however, goods may be differentiated only in connection with the peculiarities of specific marketing service provider.

2. The effectiveness of meeting the demand for services from sales is by the means of ensuring timely billing for electricity supply under the

contract and in accordance with the actual electricity-consumed quantity per billing period, at the lowest price for the service that allows an adjustable expanded reproduction services. This means enabling the buyer to choose the services which are appropriate to his consumer needs, which is possible if there are competing companies. But we can only theoretically think about the competition which exists in the market of sales services and must be accompanied by market supply and low prices, because the matter requires further study.

3. Since the amount of work for the provider of marketing service does not depend on the amount consumed by the purchaser of electricity, unit costs of marketing services per unit do not depend on the value of consumption, and depend only on the number of serviced customers.

4. Today, the cost in structure of 1 kWh is the share of energy-consumed cost and is equivalent to 2-3 %. Thus, higher prices for sales service hardly influence the consumer price of electricity, which indicates the inelasticity of demand ($E < 1$).

5. The continuous growth of energy consumption, relatively low sales activity give investors an incentive to join this market.

6. Because in today's energy systems priority was traditionally given to the production and transmission, as well as due to the fact that the share of energy-consumption services in the structure of electricity tariffs is low (2-3 %) the marketing activities are nowadays funded by the residual, resulting the technological level to be very far from the market requirements.

7. Consumer is interested in a safe and secure energy supply, at the minimum prices for energy. On one hand, while having a variety of sales representatives, users can, in theory, chose a particular company guided by their own preferences. On the other hand, because today's market conditions are characterized by low payment discipline, non-transparency of financial reporting, control of financial flows is much easier to be organized under the central energy supply. Also today the energy supply provides marketing services, conducts extensive work on the management of electricity consumption, particularly in emergency situations (during the shortage of power or fuel). Implementation of the above stated problem is possible only through centralized management of sales activities or by the means of transfer of functions of management to future regional load dispatch control.

According to this background, the current public interest should rather bow to the central-

ization of marketing, with the preparation for the introduction of competitive terms.

While summarizing we can conclude, that depending on the level of standardization of goods and the number of sellers in the market it is theoretically possible to have a monopolistic competition in the market of energy supply. However, it should be noted that such transformations are possible only with the course of a long period of time. It is, however, possible for a pegged so-called organized monopoly to exist due to technological features of the existing market today.

Thus, by determining conditions for the effective functioning of the energy production, we made a decomposition of the energy supply system of separate markets for each of the activities, found their significant fundamental differences, and identified the types of market structures, showing their advantages and disadvantages.

As the analysis revealed, oligopolistic competition should become dominant in the market of electricity generating in the course of its development and adaptation to the modern business environment. As for the market for energy transmission, it is the most efficient while operating in the mode of natural monopoly. The market of energy supply expects slow evolution from artificial monopoly of markets to competition, which doesn't exclude the long time-period of centralization of services in the sphere of electricity sales.

Conclusions

Thus, we can conclude that the presence of specific features in the functioning of the markets, which are divided by the types of activity of the energy complex leads to a significant reduction in the effectiveness of state regulation of energy, which was so far carried out as a single universal approach.

As a result of the above carried out analysis it seems appropriate to note the following trends in the system of state regulation of energy market exist:

1. For the effective functioning of the oligopolistic market for energy generating the state regulation should be directed to support the competitive relations and promote investment activity vendors, which would reduce market prices and, ultimately, achieve more efficient satisfaction of consumer demand.

2. In the monopolistic market for electricity transmission, including economic and technological features of the product, it is reasonable for a state to provide regulation aimed at monitoring

the costs of network firms and the establishment of economically reasonable prices for transmission services.

3. Continuous transformation of the market of supply of energy services from artificial monopoly to competitive one will require close attention from its regulators. Therefore the main task from the side of the government regulation, taking into account different mentality of Ukrainian consumers, will become the legal (imperative) and financial policy of improving the payment discipline,

improvement of logistics and service opportunities of energy supply companies.

We have proposed the theoretical grounds for the foundation of a systematic approach of an effective state regulation of the energy market in our country. The definition of the term «energy-supply market» had been given. Also the definition of a public regulation of the energy supply sector had been revealed, as well as the concept elements that allow us to classify this system as a type of complex systems.

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