

# Innovative Development of State-Owned Electricity Companies and the Role of Stakeholders in This Process

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***Abstract***—The article discusses the experience of the formation and implementation of development programs for Russian electricity enterprises with full or dominant state ownership and a monopoly position in the market. Based on a study of plans to introduce new technologies, actual, rather than declared, strategies for innovative development of the most significant enterprises operating in the following sectors of the industry were determined: electricity generation (JSC “RusHydro”), electricity transportation (JSC “FGC UES”), energy system management (JSC “SO UES”). It is concluded that the main innovation projects implemented by enterprises at present are improvement of existing technologies, rarer are spot renovations or modernization, elements of radical, breakthrough innovations, although they are declared, but are practically not implemented. The role of the state as the main stakeholder in the design and implementation of a development program is considered. It is shown that the adopted state policy, on the one hand, helps to increase the innovative activity of electric power enterprises, and on the other hand, forms a high level of dependence of many of them on budget financing. The approaches to improving the work with other groups of stakeholders are proposed.

***Keywords:*** *development program, electric power industry, innovations, stakeholders, state-owned companies*

## I. INTRODUCTION

To ensure stable economic growth, the development of the country's electric power industry should be carried out at a faster pace than other sectors of the national economy. This is since the power industry is today the basis for the functioning of industry, has an extremely high social significance and a direct link with state security. At the same time, in order to concretize the directions and plans for the strategic development of electric power companies, answers to a number of fundamental questions are needed: how much should be invested in development; Is it worth it to independently carry out all the necessary developments or is it more profitable to buy technology on the side; how to manage property and assets for the greatest benefit; and, finally, how to balance the interests of all interested parties (stakeholders) [1]. These issues are especially important and controversial for public sector electricity companies – Russia, as a state that declares high social standards and market efficiency in the management of monopolies, must skillfully balance between these facets at the policy level.

The need to develop common approaches to the formation and implementation of programs for the development of industry enterprises is closely connected with access to international financial markets, where absolute transparency is a categorical imperative for financial reporting [2]. However, in practice, the heterogeneity of

regions, the range of local features, due to geographic and economic characteristics, makes it rather difficult to synthesize a common policy not only in all companies in the electric power industry, but even, often, in all branches of one company.

One of the most promising directions for the development of enterprises in the electric power industry is innovative development, which is implemented, including through the introduction of new equipment, new technologies, etc. It should be noted that in the academic literature there is no consensus on how to define, measure and introduce innovations. So, firstly, often there is a very specific or narrow interpretation of the concept of "innovation" in general: often the term "innovation" is understood only as the development of new products or the change of products or organizational processes [3]. Secondly, there is no single classification of innovations in relation to the electric power industry [4]. Thirdly, there is a tendency to measure innovation with the help of simplified and aggregated secondary indicators (such as, for example, the number of patents or the size of the budget for the development of new products, etc.).

The issues of forming programs for the development of enterprises in the electric power industry and assessing the role of various stakeholders in this process, although they are oriented mainly on a practical plane, nevertheless represent a wide field for scientific study and analysis. It can be noted that in general, these issues (especially in combination with the introduction of innovations in the electric power industry) have not been sufficiently considered.

## II. STATE-OWNED COMPANIES IN THE RUSSIAN ELECTRIC POWER INDUSTRY

The largest public sector company is the Federal Grid Company of the Unified Energy System (JSC "FGC UES"), created in accordance with the program for reforming the electric power industry of Russia as an organization for managing a single national electric grid. Today, JSC "FGC UES" is the largest energy company in Russia by market capitalization. Moreover, almost 80% of its shares are in the hands of the state.

The facilities of JSC "FGC UES" are in 73 regions of the Russian Federation. The main areas of production of the company include: managing a single national electric grid; the provision of services to subjects of the wholesale market of electric energy for the transfer of electric energy and connection to the electric network; investment activity in the field of development of a unified national electric network; maintaining in good condition electrical networks; technical supervision of the state of network objects.

The development program of JSC "FGC UES" [5] declares that the main goal is to increase the reliability, quality and efficiency of energy supply to consumers by modernizing the electric networks of UES of Russia based on innovative technologies with their transformation into an actively adaptive (intelligent) core of the technological infrastructure of the energy sector. The creation of an active-

adaptive (intelligent) network will allow for the regulation of network loads beneficial to consumers, the adaptive response of generation and networks in real time to various types of deviations, as well as the prediction and prevention of emergency and critical situations.

The company notes that the innovative scenario for the development of the organization is focused on the functioning of JSC "FGC UES" within the framework of the "Big Energy" model with the preparation of the transition to the Smart Energy model. Thus, the applied research and development of the company is aimed at diversifying the services of JSC "FGC UES", optimizing the grids, combining regenerative and targeted deep innovative modernization, ensuring the growth of energy efficiency in networks and at the system level, promoting the formation of advanced technologies and industries for them base.

Analyzing this scenario, we can determine that the innovation development strategy of the monopoly under consideration corresponds to a mixed model that alternates defensive, offensive and imitation strategies implemented for the development and implementation of innovations, mainly of an incremental innovation group. This strategy allows you to compete in the implementation of innovations at the international level [6]. The strategic priority, therefore, is the uninterrupted operation of integrated networks, which, given the scale of generating capacities and networks, is one of the most difficult tasks in the world. A significant part of investment projects implementing innovations was funded by the state, which thus provided direct benefits to consumers. Borrowing was also attracted in foreign markets, which led to higher tariffs for consumers. In general, the innovation implementation strategy is characterized as rather successful in comparison with other state corporations, however, in the context of the closure of external financing markets and an increase in the cost of attracting financial resources, state support or an additional burden on consumers seems to be no alternative. On the other hand, such a course of events cannot be called specific either, because, due to the external nature of these restrictions, all Russian companies will face the same threat.

The largest generating company in the country with state participation (in terms of installed capacity) is the holding company "RusHydro". The company's securities are traded on the MICEX-RTS stock exchange in quotation list A1, while the state's share in the company exceeds 50%.

The main field of activity of the company is hydro generation. JSC "RusHydro" unites more than 70 renewable energy facilities, and each generating facility of the holding is unique. To date, the holding company "RusHydro" has 20 branches located almost throughout the country. In addition, the company is a shareholder of another 67 electricity and energy retail companies.

The company's development program [7] notes that innovative development is an integral part of a set of hierarchically interconnected program documents of JSC "RusHydro". At the same time, the development program itself is formed and updated based on the strategic plan of the

company, that is, it is not a static, but a constantly updated document.

An analysis of the goals and objectives of R&D of “RusHydro” shows that they are aimed, first of all, at fulfilling the main production goals of the company, as well as at increasing the company's value, creating strategic competitive advantages by introducing innovative solutions, methods, competencies and technologies into the business-processes of the company. Nevertheless, exploring the strategy of JSC “RusHydro”, we can say that it is largely “wait-and-see” in nature, in particular, it states that any application for funding will receive a functional customer's visa at one of the stages of approval, interested in applying a positive project outcome. The company positions itself not so much as a manufacturer of innovative solutions, but as a major consumer of technological innovations in various fields of energy. It can be said that this, unfortunately, is the characteristic position of most leading electric power companies; the companies themselves practically do not plan to do R&D directly. Thus, an analysis of the real strategy for innovative development of JSC “RusHydro” allows us to conclude that it is mostly inertial, defensive and imitative, suggesting the introduction of innovations of a predominantly incremental innovation group.

A significant role in the electric power industry is played by the System Operator of the Unified Energy System (JSC “SO UES”), a specialized organization that single-handedly performs centralized operational and dispatch control in the Unified Energy System of Russia. The units included in its structure are located throughout the Russian Federation and consist of an executive office, 66 branches and subsidiary. 100% of the shares of JSC “SO UES” belongs to the Russian Federation.

Hundreds of power plants, thousands of power lines and tens of millions of consumers are simultaneously involved in a single process of production, distribution and consumption of electric energy on the scale of the Unified Energy System of Russia. Only in advance to calculate and plan the operating modes of all objects of the power system, and then in real time solve the problem of controlling the continuous production, transmission, distribution and consumption of electricity in such a way as to ensure at every moment of time at each point of the power system the equality between production and consumption of electricity and power is only possible a system operator with the necessary tools, technologies and competence. For this purpose, JSC “SO UES” is endowed with unique rights: to determine the list of dispatching objects — electric power facilities and power receiving installations of electric power consumers, the technological mode of operation and the operational state of which affect or may affect the electric power mode of the power system; plan the operation modes of these objects; give binding objects and permissions to objects. Refusal to execute dispatch commands is unacceptable, except when their execution poses a threat to people's lives, the safety of equipment or leads to a violation of the conditions for the safe operation of nuclear power plants.

The company's development program [8] notes that the system operator's innovative development program specifies the ideas and directions of innovative development of the technology for centralized control of the electric power regime of the UES of Russia, which is the only and exclusive for the company. The R&D of the company determines that the goal of the System Operator's development program is: innovative development of technology for centralized control of the electric power regime of the UES of Russia; development and improvement of tools created specifically to support the functions of operational dispatch management, on the principles of selection and economically sound application of the best domestic and foreign technologies, technical solutions, the latest equipment and instruments, measuring instruments and telecommunications, other products compatible with tools, competencies and activities related to calculations, analysis of electric power regimes and their management; development and improvement of modern market mechanisms and tools to maintain the required level of reliability and the proper quality of functioning of the UES.

An analysis of the design and development work of JSC “SO UES” for goals and objectives shows that they almost completely coincide with the production and operational goals of the company and are ultimately aimed at improving the efficiency of the entire electric power industry. The maximum synergy of all facilities and improving the quality of management is the basic priority of the innovation strategy. In addition, it should be recognized that the scale of these tasks, without exaggeration, is one of the most difficult in the world-energy networks of this scale are being built in several countries of the world. An analysis of the functions of JSC “SO UES” allows us to conclude that the main directions of the company's innovative activities are implemented as part of its production tasks, and innovations are quite pronounced in their modernization character. Thus, it can be determined that the strategy of innovative development of the company corresponds to a mixed model, alternating defense and imitation strategies with the inclusion of elements of an offensive strategy for the implementation of innovative products of an incremental innovation group.

### III. PROGRAMS FOR THE INNOVATIVE DEVELOPMENT OF THE RUSSIAN ELECTRIC POWER INDUSTRY

Analyzing global trends in the formation of industrial enterprise development programs, it can be concluded that companies whose products are intended for sale to consumers or other companies prefer to spend significant R&D funds only if this allows them to clearly separate the corresponding product or service from competitors [9]. Infrastructure enterprises, as a rule, spend significant funds on R&D only with substantial control by the state – as state regulation loosens, the amount of corresponding costs decreases [10].

Regional monopolists, as well as companies not experiencing serious competition, neglect research, investment and innovation [11]. However, in Russia there is a radically different trend - despite the existence of

monopolists in the electricity market, the share of their budgets invested in R&D is relatively large and significantly exceeds the performance of foreign competitors. For example, “RusHydro”, “FGC UES”, “SO UES” of the East have R&D costs ranging from 2,60–3,04%, while in developed countries the average indicator of expenditures by energy companies on innovations does not exceed 1% (for example, Tokyo Electric Power and EdF it is about 0,7%).

This is partly due to the action of a well-known factor - the lack of clear boundaries between innovative and investment projects in domestic design and development

projects, as a result of which the share of innovative costs is artificially overstated. However, these companies are really overactive in the field of innovation, and their high rates of the share of R&D expenses serve as objective evidence of this trend, which can only be explained by the policy of stakeholders, the largest of which is the state.

The investment liabilities of power companies with dominant state ownership, estimated by the author based on strategic development plans, are shown in the table (“Table I”).

TABLE I. INVESTMENT OBLIGATIONS OF POWER COMPANIES (COMPILED BY THE AUTHORS ACCORDING TO [12])

The state owns the enterprise through	Company name	Investment liabilities (million rubles)
JSC “InterRAO UES”	OGK-1	68 820
	OGK-3	76 107
	TGK-11	15 726
JSC “Gazprom”	OGK-2	75 039
	OGK-6	49 089
	TGK-1	104 220
	TGK-3	91 411
Federal Property Management Agency	FGC UES	2 696 000
	RusHydro	1 131 000
SC “Rosatom”	RosEnergAtom	1 737 000

Assessing the sources of financing of innovative development programs of Russian state-owned companies, first, I would like to draw attention to the high level of dependence of many of them on budget financing. More than 40% of the funding needs were covered by federal targeted programs and other public funding.

Since mid-2012, JSC “FGC UES”, JSC “RusHydro” and JSC “SO UES” have been included in the list of strategically important enterprises of the country approved by the Government. This is due not only to the sphere of activity of these companies, but also to their monopoly position in the market and maximum state support, which can be described as, to some extent, paternalistic.

However, in conditions of a significant reduction in state financing and limited access to foreign financial resources, electric companies need to use innovative forms of financing innovative development, such as, for example, project financing, own funds for innovative development, etc.

At the same time, it is also obvious that we are also talking about maximizing the effectiveness of interaction with stakeholders at all levels. Undoubtedly, it was the work with stakeholders that enabled state-owned companies in the electricity sector to successfully formulate and implement development programs. In order to be convinced of this, one can use the study of the expert “Rating of innovative development programs of state-owned companies” [13], which assesses the implementation of innovations among large state-owned companies-monopolists of industries. In

this rating, power companies were assigned the highest places.

#### IV. CONCLUSION

Concluding the review of development programs for state-owned companies in the electric power industry, it should be emphasized that these strategies are not determined on the basis of official declarations of intentions of companies, but on the basis of analysis of those innovative products that the entities under consideration plans to implement at home. And this, mainly and first of all, technologies, which are any improvements, additions, improvements to existing technologies, as well as targeted renovations and modernizations. Elements of radical, breakthrough innovations practically do not occur.

The main objectives of the modernization strategy, in which all the companies studied in this work participate, are:

- formation of a strategic vision for the implementation of the concept of integrated energy systems in Russia;
- determination of the basic requirements and functional properties of the domestic electric power industry based on the concept of integrated energy systems and principles for their implementation;
- determination of the main directions of development of all elements of the energy system: generation, transmission and distribution, marketing, consumption and management;

- determination of the main components, technologies, information and management decisions in all of the above areas;
- ensuring coordination of modernization (bridging the technological gap) and innovative development in the Russian electric power industry.

These are priority tasks for state-owned companies in the energy sector, some of which they have successfully implemented in production. Moreover, it was state-owned companies in the energy sector who initiated these innovative development strategies.

To further improve work with stakeholders, it is important to understand that dialogue with stakeholders must be carried out continuously, and not ex post. The main incentives for this can be developing a strategy for corporate social responsibility or individual environmental programs, social partnership programs, evaluating the effectiveness of the company's social functions, reporting on sustainable development, etc. It is important to involve the main departments of the company (those whose budgets he sent). It is difficult to implement new initiatives without their active involvement.

It should be noted that a common feature of large electricity companies is their fragmentation, which causes problems associated with internal communication. In this regard, it is important that not only the central office, but also local managers be involved in the dialogue with stakeholders. The headquarters team often loses touch with reality and does not quite understand the expectations and needs of stakeholders. Field managers better understand the local context and stakeholder interests.

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