Journal of Engineering and Applied Sciences 13 (1): 14-18, 2018
ISSN: 1816-949X

Study on the Processes of Energy Conservation and Efficient Energy Use in the Innovative Development Programs of Russian Companies

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Abstract: Finding ways to improve the energy efficiency of industrial enterprises is given special attention at all levels of management of the Russian economy. Over the past few years among the various public policies, focused on solving this problem, the most important place takes the stimulation of innovative actions taken by enterprises in the sphere of energy conservation and energy efficiency. However, when management decisions are to be made, changes of the role and importance of energy conservation and energy efficiency in the system of innovative development in Russian companies are often not taken into consideration. The study deals with the practice of innovative development programs of the leading state participation Russian companies and other state corporations. Special attention is paid to reflect the various aspects of energy conservation and efficiency as an essential priority of innovative development of the Russian economy. According to the results of this study, it was concluded that solving the problems of energy conservation and efficiency are still not acting as a strategic priority in the programs of innovative development of Russian companies. Programs activities are mostly aimed at solving current operational problems. To change the situation, it is necessary to eliminate the identified barriers to the integration of innovative development and energy saving processes as well as of increasing energy efficiency in a particular management circuit.

Key words: Industry innovative development, energy efficiency, barriers, strategic approach, processes, efficiency

INTRODUCTION

A particular attention to the problem of energy efficiency of the Russian economy has been paid at the various levels of management in recent years. Today, the energy capacity of the Russian gross domestic product is almost 1.5 times higher than the world's one and is almost twice higher than of the leading countries of Europe. Therefore, the innovative modernization in the sphere of energy is one of the biggest priorities in Russian economy for its state. It was reflected in a number of government policies including the intensification of processes of innovative development of Russian industrial enterprises in order to improve the competitiveness of their products (Sadriev *et al*., 2015). This was one of the main causes of a serious revision of the strategic development plans of major companies with state participation and state-owned corporations.

It should be noted that the study of the reciprocal effect of energy conservation and efficiency processes and also the processes of innovative development of industrial enterprises has been given a lot of attention to in the works of Russian and foreign researchers. In particular, they explain the role of the state stimulation of innovations in the energy sector as means of improving the energy efficiency of the economy. They focus on the fact that state policy should provide adjustable but flexible conditions for stimulating innovations (Fri and Savitz, 2014). A special place among regulatory measures taken by the state is given to the issue of innovation and energy policy synchronization (Cambini *et al*., 2016; Thurner and Roud, 2016). The necessary conditions and the possible effects of this synchronization at the state and inter-state levels have been investigated on the examples of cooperation among the countries of the European Union and the United States in the field of transformation of their energy systems using technological innovation (Heras, 2014) and of the assessment of the impact of the reform of the electricity market in the UK on the innovative development of electric power industry. It has been established that the results of energy efficiency measures in BRICS countries including Russia are more related to innovation, while in the countries of G7 they are connected with the social policy of each state (Camioto *et al*., 2016). In addition to that, a positive association was found between the

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production of innovative products and the introduction of energy-efficient technologies in industrial enterprises across Europe (Costa-Campi *et al*., 2015; Gerstlberger *et al*., 2016) and Asia (Sohag *et al*., 2015; Song and Oh, 2015) factors affecting intensified innovative activities in efficient energy were studied (Brutschin and Fleig, 2016; Urpelainen, 2011). Moreover, the recommendations in the field of energy policy, based on a new understanding of the role of innovation in energy development were formulated. Special attention in the research is given to the role and place of transformation processes of energy conservation and efficiency in the industrial enterprises management system (Melnik *et al*., 2014) including issues of the methodical provision on the management processes of innovative development in the field of energy saving and energy efficiency (Anisimova and Zakirov, 2016; Melnik *et al*., 2015).

The subject of the study was the experience of implementing the innovative development programs by the Russian state participation companies and state-owned corporations which was reviewed through the prism of the problems of energy conservation and improving efficient energy use. This approach can be explained by the fact that these particular companies have contributed significantly to the development of the Russian economy and the also have a big potential for improving energy efficiency. In addition, governmental authorities have the most effective methods of a successful cooperation with such enterprises in comparison with enterprises of other ownership forms. All this has predetermined the goal of carrying out a study to identify the role of energy conservation and efficiency in the system of innovative development priorities of Russian companies and reflecting the problems of energy conservation and energy efficiency in their innovative development programs.

MATERIALS AND METHODS

Pursuant to the strategy of innovative development of the Russian Federation for the period up to 2020 major Russian State participation companies and state-owned corporations began to develop their programs of innovative development from 2011. Herewith, the program of innovative development is meant to be a document that describes a set of activities aimed at the development and introduction of new technologies, development and production of new innovative products and services which would further be introduced to the market and meet the international standards. As well as promoting modernization and technological development of companies by a significant improvement in the key indicators of the efficiency of production processes. The full list of companies which were attributed to the obligatory development and implementation of innovative development programs includes about 60 largest Russian enterprises.

In the process of the research the analysis of the problems of energy conservation and efficiency in the innovative development programs of the Russian State participation companies and state-owned corporations was conducted. To do this, 9 largest state-owned companies from different sectors of the economy were selected: PJSC United Aircraft Corporation (PJSC UAC), OJSC United Shipbuilding Corporation (OJSC USC), OJSC KAMAZ, OJSC Rosneft, OJSC RusHydro, OJSC Aeroflot-Russian Airlines (OJSC Aeroflot) State company Russian highways (Avtodor) FSUE Rosmorport, PJSC Rostelecom.

The following key areas were specified for the further analysis: firstly, the presence of various activities in the sphere of energy saving and energy efficiency in the programs of innovative development; secondly, the presence of the key indicators of innovative development programs indicators which reflect the results of activities in the field of energy conservation and efficiency as well as an assessment of the contribution of the program activities to the achievement of those targets; thirdly, the assessment of the nature of the activities in the field of energy conservation and efficiency; fourthly, the assessment of the allocation of responsibility for innovation and activities in the field of energy saving and energy efficiency.

As a source of the initial data a publicly available information on the programs of innovative development and energy conservation and efficiency as well as annual reports on the results of these companies activities have been used.

RESULTS AND DISCUSSION

The enterprises selected for the research belong to different sectors of the Russian economy. Their total revenue for the year 2015 was about $120bn that generates almost 10% of Russi's gross domestic product over the same period. Changes in revenues of the largest Russian state-owned companies for the recent years are presented in Table 1.

The analysis revealed that almost half of the surveyed companies concurrently develop a separate strategic program on energy conservation and efficiency and also a relevant section in the program of innovative development. The results are presented in Table 2.

Table 1: Revenues of the largest state-owned companies ($bn) (compiled by the researcher based on the public data on the official websites of the companies)

Companies	Industries	Revenue ($bn) 2012	2013	2014	2015
PJSC UAC	Military-industrial complex and aircraft industry	2.85	3.67	4.91	5.86
OJSC USC	Shipbuilding	N/A	3.14	4.35	5.07
OJSC KAMAZ	Automotive industry	1.98	1.91	1.84	1.62
OJSC Rosneft	The extractive sector	51.48	78.23	91.72	85.83
OJSC RusHydro	Energy undustry	5.16	5.45	5.70	6.03
OJSC Aeroflot	Transportation services	4.22	4.85	5.33	6.92
Avtodor	Infrastructure networks and their operation	1.50	1.60	1.87	2.09
FSUE Rosmorport	Infrastructure nodes	0.22	0.25	0.29	0.30
PJSC Rostelecom	Communications	4.95	4.85	4.98	4.96

Table 2: Reflection of energy saving and energy efficiency issues in the various documents of the largest state-owned enterprises (compiled by the researcher based on the public data on the official websites of the companies)

Companies	The problems of energy conservation and efficiency are reflected in a separate program/policy	The problems of energy conservation and efficiency are reflected in the program of innovative development for 2011-2015	The problems of energy conservation and efficiency are reflected in the program of innovative development for 2016-2020
PJSC UAC	Yes	Yes	Yes
OJSC USC	No	Yes	Yes
OJSC KAMAZ	Yes	Yes	Yes
OJSC Rosneft	Yes	Yes	Yes
OJSC RusHydro	Yes	Yes	Yes
OJSC Aeroflot	No	Yes	Yes
Avtodor	No	Yes	Yes
FSUE Rosmorport	Yes	Yes	Yes
PJSC Rostelecom	No	Yes	Yes

Table 3: Reflection of energy conservation and energy efficiency problems in the programs of innovative development of the largest state-owned enterprises (compiled by the researcher based on the public data on the official websites of the companies)

Companies	Energy conservation and efficient energy use on top of innovative development priorities	Indicators of energy conservation and energy efficiency in the list of key indicators of development program	The nature of the energy conservation and efficiency in development innovative program	Responsibility for activities in the sphere of energy use and improving energy efficiency in the sphere of
PJSC UAC	One of the key requirements for innovative projects	No	Mainly innovative technologies are used. The activities are of a technical nature	Decentralized
OJSC Aeroflot, FSUE Rosmorport	One of the priority directions of research and development	Yes	Mainly standard solutions and technologies are used.The activities are of a technical nature	Centralized
OJSC Rosneft,OJSC OJSC KAMAZ,USC	One of the priority directions of innovative development	Yes	Standard solutions and innovative technologies are used.Activities are of both technical and organizational nature	Decentralized
JSC Rostelecom, Avtodor, OJSC RusHydro	One of the priority directions of innovative development	Yes	Mainly innovative technologies are used. Activities are of both technical and organizational nature	Centralized

The results of the analysis reflecting energy conservation and energy efficiency issues in the programs of innovative development of enterprises are presented in Table 3.

Based on the analysis of the problems on energy conservation and efficiency in innovative development programs, the following was revealed. Firstly, the solution to the problems in the sphere of energy saving and energy efficiency are given significant importance in all the investigated Russian companies. In their strategic policy documents almost all of them define energy conservation and efficient energy use as one of the most important directions of innovative development. Furthermore, the relevant indicators are included into the list of the key indicators of innovative development programs.

Secondly, although, according to the programs documents, the activities in the field of energy conservation and efficiency are stated as a priority, usually the real situation is not associated with the strategic development of companies. Therefore, energy conservation and energy efficiency are not considered to be prioritized in the system of long-term strategic goals and objectives of the innovative development of companies.

Thirdly, innovative development programs do not reflect a correlation of results of various activities in the field of energy conservation and efficiency. This fact does not allow to evaluate the impact of innovation on energy efficiency change.

Fourthly, in the number of considered companies the energy saving management system and innovations

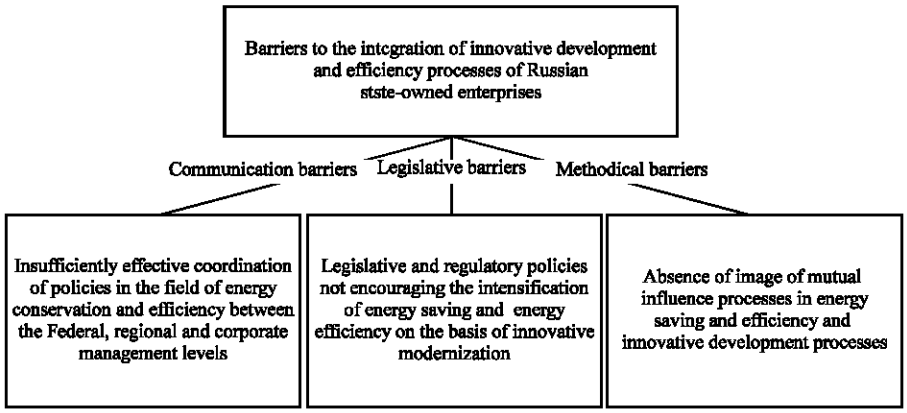

Fig. 1: Barriers to the integration of innovative development and energy conservation and efficiency processes

management system operate independently. This is reflected in the various structures responsible for implementing the processes of innovative development and the processes of energy conservation and efficiency that formulate not enough correlated strategic documents and define the target indicators of enterprise development in particular areas and then define the methods and forms of organizational, financial, economic and legal support for the decisions taken.

Thus, we can conclude that the reflection of the processes of energy conservation and efficiency in innovative development programs considered by the Russian companies is usually carried out by rather formal introduction into the existing program of innovative development.

To change the situation, it is necessary to eliminate the identified barriers to the integration of innovative development and energy saving processes as well as of increasing energy efficiency in a particular management circuit. Among them, we can highlight (Fig. 1), firstly, insufficiently effective coordination of policies in the field of energy conservation and efficiency between the federal, regional and corporate management levels. Absence of a close co-operation determines quite a small role of energy conservation and efficiency in the system the current management priorities of major Russian companies. Secondly, the existing legislative and regulatory policies which do not encourage the intensification of processes in the sphere of energy saving and energy efficiency on the basis of innovative modernization of various branches of the Russian economy. Thirdly, the absence of a clear image of mutual influence processes in energy saving and energy efficiency, also of the innovative development processes and the possible effects for the country's economy of their integration into a particular system of management.

The elimination of the identified barriers will not only enhance energy conservation and efficiency processes among the possible directions of development of state-owned companies and corporations but will also allow to consider the intensification of activities in the field of energy conservation and efficiency as an essential competitive advantages of the country and a prerequisite for achieving the strategic objectives of the development of the Russian economy.

CONCLUSION

The results of the conducted analysis allow to conclude that the majority of Russia's leading state-owned companies still do not include solving the problems of energy conservation and efficiency in the scope of their strategic priorities and these problems do not define a vector of their innovation development. Among the senior managers of the investigated companies several simplistic views on the role of energy conservation and efficiency processes in systems of socio-economic development are still dominated. The managers take them into consideration only when the current challenges require, so, putting aside the strategic issues of innovative modernization of the Russian economy. Integration of innovative development and efficient energy use in a single administrative circuit can be considered as the most important directions for improving the energy efficiency of the Russian enterprises in the conditiond of their innovative development.

ACKNOWLEDGEMENT

The study was performed by a grant from the Russian Science Foundation (Project No. 16-18-10227).

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