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LEGAL PROVIDING OF APPLICATION OF ENERGY EFFECTIVE LIGHTNING TECHNOLOGY AND INTELLECTUAL NETWORKS IN THE CONDITIONS OF DIGITAL ECONOMY

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ABSTRACT

The article substantiates the expediency of improving the legal support for the introduction and use of energy-efficient lighting equipment, as well as smart networks (Smart Grid), taking into account the ongoing digitalization of the Russian economy and electric power industry. The goal of scientific research is formulated, which is to develop practical recommendations on optimization of the public relations legal regulation in the digital power engineering sector. The research methodology is represented by the interaction of the legal and sociological aspects of the scientific methods system. The current regulatory and legal basis for the transformation of digital electricity relations has been determined. The need to modernize the system of the new technologies introduction legal regulation for generation, storage, transmission of energy, intelligent networks, including a risk-based management model, is established. A set of standard-setting measures was proposed to transform the legal regulation of public relations in the field of energy-efficient lighting equipment with the aim of creating and effectively operating a single digital environment, both at the Federal and regional levels. A priority is set for the development of "smart" power grids and highly efficient power equipment in the constituent entities of the Russian Federation through a set of legal, economic (financial), educational measures.

Keywords: digital economy, energy-efficient lighting equipment, smart networks, intelligent lighting control systems, legal regulation, government programs, digitalization, equipment technical state index

1. INTRODUCTION

In the digital technologies development conditions, the modernization of lighting equipment and electric grids, digital electricity is of particular relevance in the Russian Federation and regions and, consequently, the need for legal support for its development.

In June 2018, the first digital electrical substation "Medvedevskaya" will be put into operation in the Russian Federation, designed to power the Skolkovo Innovation Centre. This fact indicates the development of the digitalization process in the Russian electric power complex.

Digital transformation of the electric power complex is one of the directions for the implementation of the state program "Digital Economy", approved by the Government of the Russian Federation in July 2017. According to the Director of the Department of Operational Control and Management in the Electric Power Industry of the Russian Federation Economy Ministry, today the mechanism of the power system needs significant optimization with the orientation toward the introduction and use of digital technologies, energy efficient lighting equipment, intelligent networks, risk-ori-

ented management model, which in turn requires significant financial costs. However, the results of such a transformation in the electric power industry can exceed all expectations for their energy security, safety and efficiency [1].

In addition, during the St. Petersburg International Economic Forum held in May 2018, an agreement was signed between "GAZPROMNEFT" and "TSIFRA" on the implementation of the "Digital Plant" project, which is necessary to develop a digital platform for managing the oil industry. In the period from 2018 to 2035 the activities of the normative "road map" Energy net of the National Technological Initiative approved by the Government of the Russian Federation will be implemented through the launch of pilot projects, as well as the creation of a legal and economic basis for the wide application of modern solutions in the electric power industry [2].

Development and further improvement of legal support of energy-efficient lighting engineering and intelligent lighting control systems, as components of the Russian Federation power complex is one of the digital economy development priority directions. However, the lack of harmonized Federal and regional regulatory system not only hinders, but prevents further digital development of the Russian power industry.

In this regard, it seems advisable to develop at the federal and regional level a system of legal norms for the integrated economic and legal regulation of relations arising in connection with the development of the digital power industry, as a result of which the regulatory environment in full will provide a favourable legal regime for the emergence and development of modern lighting equipment, intellectual networks, and economic activities related to the use of digital infrastructure tools.

Thus, the goal of the study is to develop practical recommendations for improving the legal support for the use of energy efficient lighting and smart grids in the Russian Federation and the constituent entities of the Russian Federation on the basis of a problematic issues analysis that hinder the effective regulation of the electric power digitalization processes in Russia and the region.

In order to achieve this goal, it is necessary to solve problems:

- To define the operating system of standard and legal regulation of Russian energy efficient lighting engineering and clever networks (Smart Grid) use;
- To estimate positive effects from use of energy efficient lighting engineering and clever networks (Smart Grid) in the conditions of development of digital economy;
- To estimate energy efficient lighting engineering and clever networks (Smart Grid) introduction experience in the Russian Federation.

2. MATERIALS AND METHODS (MODEL)

The problems research methodology of legal support for the use of energy efficient lighting and smart grids in Russia with the aim of further improving the development of digital power engineering is the synthesis of legal science methods based on materialistic dialectics: comparative legal, formal legal, systemic (legal aspect), – with basic sociological research methods: empirical analysis of data, analytical research (sociological aspect).

Formally, a legal (logical) method allows to formulate and analyze the normative legal acts system in the digital power industry field from the point of view of a legal regulation and essential legal gaps and collisions lack sufficiency.

At the moment, the standard and legal regulation system of energy efficient lighting and intelligent lighting control systems is represented by the following normative acts:

- At the federal level: Forecast of the scientific and technological development of the Russian Federation for the period up to 2030; "Russian Energy Strategy for the Period Until 2030"; Federal Law No. 261-FZ of 23 November 2009 (as amended on 23.04.2018) "On Energy Conservation and on Improving Energy Efficiency and on Introducing Amendments to Certain Legislative Acts of the Russian Federation"; Order of the Ministry of Industry and Energy of the Russian Federation of 07.08.2007 No. 311 "On the Approval of the Strategy for the Development of the Electronic Industry of Russia for the Period until 2025"; Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation of 17.11.2017 "On Approval of Energy Efficiency Requirements for Buildings, and Structures" and other by-laws.
- At the regional level (on the example of the Mordovia Republic): Law of the Mordovia Republic of March 26, 2013 No. 18-3 "On the Powers of the Government Bodies of the Mordovia Repub-

Table 1. Effects from Introduction of Smart Grid Technologies [6]

Technological direction	Effect from implementation
Different components of Smart Grid	– Saving 20–45 % of the energy consumed – Reduction of losses from interruptions in the supply of electricity to 15 % – Reducing the capital costs of equipment by (5–10) % – Reduction in the accident rate and the cost of repairs to 10 %
Intelligent instrumentation systems	– Improving the quality and reliability of power grids – Supply and demand balance of electricity – Providing infrastructure for smart cities
The new generation of control and monitoring of distribution networks	– Minimization of expenses at construction of additional (spare) stations
Renewable energy generators with low CO_2 emissions	– Increase in environmental friendliness – Increase in stability of network – Uninterrupted power supply, including, remote regions, of the country.

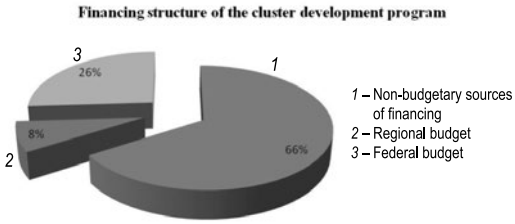

Fig. 1. Total volume of investments in the cluster development program "Energy Efficient Lighting and Intelligent Lighting Control Systems" in 2012–2016 [3]

lic in the Field of Energy Conservation and Energy Efficiency" (Edited 16.04.2015); Decree of the Government of the Mordovia Republic from December 23, 2013 No. 583 "On Approval of the State Program of the Republic of "Mordovia Energy saving and Energy Efficiency in the Republic of Mordovia for 2014–2020".

Besides, in the Republic of Mordovia, the republican program for supporting the development of the innovative territorial cluster "Energy-efficient Lighting Equipment and Intelligent Lighting Control Systems" for 2013–2016 was started, approved by the Resolution of the Government of the Russian Federation of 15.04.2014 No. 316 (an edition of 31.03.2018) "On Approval of the State Program of the Russian Federation "Economic Development and Innovative Economy". Financing of the cluster "Energy-efficient Lighting Technology and Intelligent Lighting Control Systems" is presented in Fig. 1.

At the same time, analyzing the standard regulation system of the public relations in the sphere to power industry, it should be noted lack of coherence of the acts stated above with the "digital economy" program of the Russian Federation. Besides, it is expedient to carry out some systematization of normative legal acts on power industry sphere. In this regard, it is necessary to harmonize the current legislation in the field of digital power industry on the basis of investments attraction continuous monitoring for the energy saving main mechanisms realization and use of "smart" technologies.

Thus, monitoring as purposeful system process of observation at the regional level, helps to provide in due time to public authorities the relevant information on the current investment processes, changes, including, in the digital power industry sphere [4].

3. RESULTS AND DISCUSSION

For the development of smart technologies in the electricity sector, significant funding is needed, mainly budgetary funds. So, since 2007, more than 100 billion roubles have been invested from the federal budget. At the same time, the introduction of intelligent networks in Russian cities will reduce losses in networks by 30 billion kWh per year and save 90 billion roubles. Priority directions in this area are increasing energy efficiency, reducing costs, developing renewable energy sources in the city (sunlight, wind), which is generally accessible and environmentally friendly for the environment [5].

Table 2. Russian Experience of Using Smart Grid. Source: Presentation – Report "Technologies for Smart Cities" [6]

Belgorod and the Belgorod region	The Belgorod region is the only region of the Russian Federation, the networks of which are united by a single centralized control system based on the solutions of the company "IVTBelGU".
Kursk	Implementation of the largest energy service project in Russia with the participation (electronic ballasts) of the electronic ballast "Helios", which allows controlling and dimming the light points.
Sergiev Posad	The automatic metering has reduced the network losses from 26 % in 2005 to 11 % in 2012. Metering shoot multiple parameters, including the voltage level, they can be used to create other services.
Ufa	The project is being implemented by the Bashkir network company in conjunction with Siemens since 2014, the end is planned for 2018. It is expected to significantly reduce losses (from 19 % to 1 %), reduce the time for switching between different segments of the network, to troubleshoot problems up to several minutes.
Kaliningrad region	RES "Mamonovskaya", "Bagrationovskaya". The plans to reduce losses twice, the number of outages per year – four times. More importantly, a decrease in the cost of owning assets, which can be reduced by 25 %.
Lipetsk	Since 2013 (automated control system for outdoor lighting), ASELO "Helios" manages outdoor lighting in the territory of Novolipetsk Metallurgical Combine and uses a modern solution that allows controlling each light with the help of "Helios" semiconducter ballast.
Perm	9736 smart metering devices in multi-apartment and private houses, with legal entities in the territory of Motovilikhinsky district of Perm. All metering devices are integrated into an automated information and measuring system.
Ryazan	In the second half of 2014, the company "IVTBelGU" launched an energy service project: the city's outdoor lighting was completely modernized; LED luminaires and "Helios" automated control systems were installed.
North Caucasus	Optima Engineering has carried out large-scale construction and installation and commissioning works on relay protection and emergency automatics equipment, as well as reconstruction of high-frequency communication channels in more than 60 substations.
Tyumen region, Uspenskoe municipality	A pilot project on adaptation to Russian conditions of Smart Grid technologies was developed based on distribution networks of "TYUMENENERGO".

The main "smart" technologies in the electricity sector, as well as the benefits from their use for the development of the projects "Smart City" and "Smart Region" are presented in Table 1.

The problems of public relations legal provision in the field of energy-efficient lighting and intelligent lighting management systems in the digital economy should be considered primarily through the prism of regulatory and legal normative acts regulating energy conservation and digital electricity.

Due to the high cost of developing energy efficient lighting technology and intelligent lighting control systems, it is advisable to provide for legislative changes in the electric power industry concerning the need to use the form of public-private partnership, especially in the regions of the Russian Federation.

At the moment, the introduction and use of energy-efficient lighting technology and smart technologies in the electric power industry in the Russian regions is presented in Table 2.

The issue of legal support for renewable energy sources remains a topical issue. In the Russian legal system, the subordinate normative acts regulate this sphere: Government Decree No. 449 of May 28, 2013 (as amended on February 28, 2017) "On the Mechanism for Stimulating the Use of Renewable Energy Sources in the Wholesale Electricity

and Capacity Market"; Decree of the Government of the Russian Federation No. 426 of 03.06.2008 (as amended on May 23, 2017) "On the Qualification of a Generating Object Operating on the Basis of Using Renewable Energy Sources" and others.

In this regard, it is necessary to envisage fixing at the legislative level a mechanism for the implementation and development of the renewable energy system, taking into account the climatic conditions of individual Russian regions.

4. CONCLUSION

Based on the analysis, we can identify a number of measures to develop legal support for the use of energy-efficient lighting technology and intelligent lighting control systems, both at the federal and regional levels.

First of all, at the federal level, it is necessary to implement the following:

- Optimization of federal legislation in the field of digital power generation, energy saving, giving priority to the development of mechanisms for the use of renewable energy sources in the subjects of the Russian Federation that have specific climatic conditions;
- Creation of legal conditions for the formation of a single digital trust environment that allows participants in the digital power industry to be provided with means of safe, reliable and energy-efficient lighting equipment;
- Creation of a legal field for the necessary tax incentives and a mechanism for protecting the rights and interests of investors in attracting private resources in the form of public-private partnerships with the goal of introducing smart technologies in the regions of Russia;
- Adoption of targeted state programs or other mechanisms of state support at the legislative level to finance the pilot projects "Smart City", "Smart Region".

At the regional level, the improvement of the legal regulation of the digital economy is possible through the implementation of such activities as:

- Development and adoption of a regional normative act – a "roadmap" for the development of digital power generation, taking into account the specifics of the region;
- Development and implementation of the digital project "Smart City" / "Smart Region" within the framework of regional programs for the development of the digital economy in order to improve the quality, safety of people's lives, ensure a high level of urban environment improvement, create opportunities for business development, facilitate interaction between citizens and organizations with state structures;
- Establishment of tax incentives for entities that produce modern, "smart" technologies in the field of digital electricity;
- Provision of consultative and methodological assistance from regional authorities and local governments to business entities on investing in the development of "smart" technologies in electric power engineering;
- Increase of the population literacy on the costs minimization for the use of various kinds of intelligent lighting control systems and energy efficient lighting equipment.

In modern conditions, the introduction of new technologies for generation, storage and transmission of energy should be intensified. In the next six years, it is planned to attract about 1.5 trillion roubles of private investments in the renewal of the Russian electric power industry. Throughout the country, the digital mode of operation must go to the power system [7].

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