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DEVELOPMENT (ANALYSIS) OF STATE SUPPORT FOR THE ELECTRIC POWER INDUSTRY OF KAZAKHSTAN (ON THE EXAMPLE OF KYZYLORDA REGION)

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ABSTRACT

Purpose of the research – to review regulatory legal acts in the field of electric power industry of Kazakhstan and the Kyzylorda region to identify gaps in the state's ensuring of energy security (ES) at the national and regional levels in the context of technological progress and energy transition.

Methodology – this study used the content analysis of the form and content of text arrays for the purpose of subsequent meaningful interpretation of the identified patterns, facts and trends reflected in the documents. Content analysis of the legislation of the Kazakhstan was conducted in order to study the legal regulation of the energy sector and identify key areas of state policy. The analysis was carried out using MAXQDA program.

Originality / value of the research – the relevance lies in the exceptional importance of ES as a key element of the socio-economic development of Kazakhstan. Kyzylorda region has enormous potential for the development of renewable energy due to geographical features. The state implements energy policy through laws, programs, strategies and concepts. Energy policy in conditions of uncertainty plays a main role in ensuring ES, which implies resistance to external and internal threats to the energy system. The novelty of the study lies in the systematization of state support measures for the electric power industry of Kazakhstan and the identification of their compliance with modern challenges at the national and regional levels, using content analysis.

Findings – the absence of a comprehensive definition of regional ES that includes the territorial characteristics of Kazakhstan is revealed. It's noted that the legislation doesn't contain definitions of the concepts of "microgeneration", "smart grids", "Internet of things". In the Kyzylorda region there are no regional programs or strategies aimed at developing the electric power sector.

Keywords: electric power industry, public administration, regional energy security, content analysis, regulatory legal acts.

INTRODUCTION

The development of the country's electric power sector directly depends on government support and regulation by authorized government bodies. Due to institutional and economic factors, the market for the production, transmission and distribution of electricity is a natural monopoly. Energy systems are centralized, and the largest players in the market are national companies. This is especially true for the post-Soviet countries. At the same time, the role of government support is key in industrialized countries. The study by Magasheva & Lomakina (2023) identified ways to improve the efficiency of renewable energy technologies through the results of the government support mechanism in the Russian Federation. It is noted that as a result of the implementation of the government support mechanism, the cost of electricity produced by renewable energy sources will approach world prices in 2025, and from 2027 it will become cheaper than electricity generated by combined-cycle plants. Thus, the competitiveness of the electric power industry increases [1]. Liang & Fiorino (2013) argue that, using the example of the United States, renewable energy largely depends on political and market uncertainty. Government support is of particular importance for renewable energy innovation. The results show that stable government support and predictable spending contribute to the development of renewable energy technologies [2].

The electric power industry of the Republic of Kazakhstan (RK) is an important link in the energy system of Central Asia and the Eurasian Economic Union (EAEU). Due to large reserves of diverse energy resources and the country's climatic features, Kazakhstan has enormous potential in ensuring a high level of energy security (ES).

According to the Address of the President of the Republic of Kazakhstan Kassym-Jomart Tokayev to the people of Kazakhstan dated September 2, 2024, the priority problems requiring solution with the direct participation of the state include infrastructure problems of the electric power industry. It was instructed to approve a national project for the modernization of the energy and utilities sectors by the end of 2024. It is also noted that, given the growing global energy deficit, there is an urgent need for reliable and environmentally friendly energy sources, including nuclear energy. In this regard, a referendum was held in Kazakhstan on October 6, 2024, as a result of which a decision was made to build a nuclear power plant in the Zhambyl district of the Almaty region. One of the barriers to economic growth in Kazakhstan is the lack of industry specialists, including in the electric power industry [3].

The state is the most important player in the country's electricity market and regulates the industry using appropriate tools and mechanisms of influence. These include the development, approval and amendment of the regulatory framework, state policy in the field of electricity tariffs and prices, support for the development of renewable energy sources (RES), holding auctions, implementing projects, etc.

A number of scientific articles are devoted to the international aspect of the energy policy of the Republic of Kazakhstan. Thus, the study by Darke et al. (2022) notes the importance of international support from large countries and organizations in the implementation of Kazakhstan's energy transition [4]. Using the regulatory framework for renewable energy projects and energy project databases based on auctions over a ten-year period, an analysis of international cooperation in the field of sustainable energy between the Republic of Kazakhstan, China and the UN was conducted.

Legislation and regulation are the main tools used to achieve the goals aimed at developing the energy industry. The legal regime provides the basis for interaction between players in the electricity market, and legislation can help remove socio-economic and legal barriers to investment in renewable energy sources. Clear regulatory and legal provisions help stimulate investment growth and stability [5]. In the study by Kasyanov et al. (2022), by analyzing the regulatory framework of the electric power industry, the key areas and current trends in state regulation of the digital transformation of the fuel and energy complex in the post-Soviet countries are considered and the huge potential for further digitalization is noted [6]. The article by Ghosn et al. (2024) analyzes government initiatives in the field of energy transition in Malaysia. The results demonstrate that significant progress in promoting renewable energy sources has been achieved through the joint efforts of the government, the private sector and local communities [7]. Modernization of the fixed capital of the energy sector, transformation of the industry in the context of the energy transition, diversification of energy sources, ensuring energy security in general are long-term processes that require direct participation and control from the state. One example of government support measures for the electric power sector is the National Development Plan of the Republic of Kazakhstan until 2029. According to this document, the main priority areas for the development of the industry until 2029 include modernization and expansion of infrastructure to reduce the depreciation of generating capacities, increasing the share of renewable energy sources in the energy balance, improving the investment climate of the sector by creating predictable transparent conditions for investors in the long term, increasing the energy efficiency of the economy through energy efficiency programs and energy audits in industry. It is noted that there is a need to use digital technologies, such as smart meters, for detailed analytics and improving the quality of monitoring of distribution network services [8]. Digitalization of the industry will help prevent accidents and prevent them. At the same time, increasing investment attractiveness also depends on the introduction of digital infrastructure aimed at simplifying the process of obtaining the necessary documents for the implementation of a renewable energy project.

The role of the energy sector is one of the determining factors in the development of economic growth in Kazakhstan. Energy is the most important component in the functioning of any industry and any aspect of economic activity. The economic development of the Republic of Kazakhstan, historically, is directly related to the export of energy resources and the extraction of fossil fuels. Coal, oil and gas are the dominant fuels in the

energy balance of Kazakhstan. However, the energy industry, as the basis for the socio-economic development of the country, can have a negative impact due to its inability to meet the growing demand for electricity. This leads to a shortage of electricity, which is mentioned in state regulatory legal acts as one of the main problems of the energy sector.

Thus, in the National Infrastructure Plan of the Republic of Kazakhstan until 2029, the deficit of electric energy is caused, first of all, by the high level of depreciation of the infrastructure, which directly increases the chances of emergency situations, aggravates the technical limitations of generating equipment and, as a result, leads to instability in the functioning of the country's energy system. As of January 1, 2024, the depreciation of fixed assets at power plants reached 56%, and at some stations, such as the Uralskaya and Kentauskaya TPPs, it is 85-88%. According to the plan, by 2029 it is necessary to reduce the degree of depreciation of generating capacities to 47%, increase the share of electricity from renewable energy sources in the total volume to 12.5%, strengthen the electrical networks of the Southern Zone of the Unified Energy System of Kazakhstan, modernize power supply and heat supply facilities, and introduce new capacities to cover growing demand [9].

The state attaches strategic importance to the problems of digitalization of the energy sector, development of renewable energy sources, energy transition and reduction of regional energy differentiation, as can be seen from the above national programs and plans. The construction and further operation of nuclear power plants is aimed at strengthening energy security and minimizing electricity shortages. The state's approach to combating energy security threats is medium-term and long-term. Thus, according to forecasts of the Ministry of Energy of the Republic of Kazakhstan, an electricity surplus of 1.2 billion kWh is expected by 2027, due to the commissioning of new generating capacities. And the construction of nuclear power plants is planned to be completed by 2035 [10]. The development of the electric power industry in different regions is uneven, due to institutional, socio-economic and geographic factors. Thus, the energy system of western Kazakhstan is isolated from the Unified Energy System of the Republic of Kazakhstan, the southern regions are subject to a deficit exceeding 55% [11]. These issues are raised in the National Infrastructure Plan until 2029, which states that in order to improve the country's energy security, it is necessary to unite the western regions of the Republic of Kazakhstan with the Unified Energy System and strengthen the energy system of the southern zone.

Measures of state support for the electric power industry of the Republic of Kazakhstan include digitalization of the sector and the introduction of artificial intelligence (AI), innovations and information and communication technologies (ICT). In the National Development Plan of the Republic of Kazakhstan until 2029, the introduction of digital technologies is due to the need to modernize the infrastructure and improve the efficiency of the network. The use of AI will improve the quality of monitoring the operation of energy systems, remotely control the power grid, and more accurately predict the dynamics of electricity consumption. These topics are especially relevant in the scientific community. For example, the study by Żywiołek et al. (2025) aims to study the relationship between digital technologies and environmental innovations in the energy sector in order to improve efficiency and achieve sustainable development. The paper identified challenges to the digitalization of the industry – slow implementation of digital technologies in the energy sector compared to the financial and IT sectors, insufficient attention to the early and late stages of value creation in the energy sector, a limited number of works combining digital competencies, sustainable development goals and innovation management in different sectors [12]. The article by Lee et al. (2025) examines the relationship between AI and the new energy system (ES) and analyzes the constraining effect of labor supply. According to the results, AI significantly improves the efficiency of the ES, stimulating innovation, improving production and reducing labor costs [13]. The review article by Radvilė & Urbonas (2025) presents an analysis of the role of digitalization in the development of energy systems with an emphasis on AI, the Internet of Things and blockchain. The results highlight that digital technologies have transformative potential in addressing energy challenges, particularly in achieving UN Sustainable Development Goal 7 – ensuring access to affordable, reliable, sustainable and modern energy for all [14].

Despite its large mineral reserves, Kazakhstan’s electricity sector faces a number of chronic challenges. First and foremost, electricity consumption. As of 2024, electricity production was 117.9 billion kWh, while consumption was 119.9 billion kWh. Consequently, the electricity deficit was 2 billion kWh. In 2025, a deficit of 5.7 billion kWh is projected. This problem affects the entire country, especially the southern regions. At the same time, the deficit is being filled by imports from Russia [15].

Thus, the main problems of the electric power industry of Kazakhstan include, first of all, a high degree of depreciation of fixed assets, which provokes a shortage of electricity; lack of investment, caused, among other things, by poor payback of energy facilities and tariff policy; high dependence of the economy on traditional energy sources. One of the consequences of these problems is the lack of production innovations and digital technologies in the electric power industry, which negatively affects the investment attractiveness of the industry. As noted above, the stability and predictability of the regulatory framework have a positive effect on investment and the introduction of digital innovations, which is critically important for the qualitative growth of the electric power industry and renewable energy sources in Kazakhstan. There is a need to analyze the regulatory legal acts of the Republic of Kazakhstan for the presence and use of terms related to the energy security of the region, the energy transition and digitalization of the industry. At the same time, the above problems are also relevant for the regions of the country, in particular, for the Kyzylorda region. The Kyzylorda region is highlighted in this study due to its geographical and climatic features, due to which the region can become a leader in the development of renewable energy sources in the country.

A number of scientific articles are devoted to the problems of development of the energy industry in modern conditions. Researchers Yusifbayli & Nasibov (2022) considered the positive aspects and problems of energy security arising from the widespread use of renewable energy sources, including the need for large volumes of investment and financing, possible technical limitations in the operation of renewable energy sources, the solution of which requires the introduction of digital technologies [16]. In the study by Karanina & Abasheva (2021), the authors, using a systemic-structural approach, came to the conclusion that the key way to solve the problem of increasing the level of ES in the Russian Federation is to expand state participation in project financing of the industry, which is reflected in the Fuel and Energy System Modernization Program [17]. In the scientific article by Nurgaliuly et al. (2024) a comparative bibliometric analysis of foreign and domestic publications devoted to energy security in the context of public administration of the energy sector was carried out. According to the results of the study, foreign authors are more focused on the environmental aspects of ensuring ES, and domestic ones – on studying the mechanism of energy industry management [18]. The study by Nurgaliuly & Smagulova (2025) is devoted to a quantitative assessment of the level of regional ES in Kazakhstan. The results showed that an increase in the volume of investments attracted to the industry and an increase in electricity production have a positive impact on the level of ES. A negative impact is exerted by a high level of depreciation of fixed assets and an increase in the urban population [19].

The Government of Kazakhstan is implementing legal and political mechanisms aimed at both the development of renewable energy and the modernization of traditional energy sources. The introduction of the Emissions Trading System (KazETS) is one such example. However, as Howie & Akhmetov (2024) note, inconsistency in regulation and an ambiguous attitude towards emission reduction are significant obstacles to its effective implementation [20]. The administration's efforts are focused on ensuring a balance between economic and environmental interests, which is critical for a country dependent on fossil fuels.

The Kazakh authors Smagulova et al. (2024) emphasize that in the near future there are certain threats to reduce the pace of development of the energy sector, which directly affect the achievement of economic growth. Such threats include deterioration of energy infrastructure, shortage of qualified engineering and technical personnel, shortage of thermal power plant energy capacities, and the impact of anti-Russian sanctions on the economy of the Republic of Kazakhstan. The importance of a predictable tariff policy for attracting investment, conducting an energy audit of energy industry enterprises to formulate measures to save energy and improve energy efficiency in the country was noted [21].

The goal of the study by Karatayev et al. (2021) is to study the policy instruments used to promote renewable energy technologies in the countries of the former Soviet bloc (including Kazakhstan), and to determine the prospects for this industry [22]. Public administration plays a key role in creating mechanisms to support the development of renewable energy sources. Teleuyev et al. (2017) emphasize that the effective implementation of renewable energy requires a stable legal framework and economic incentives, such as subsidies and tax breaks [23]. In addition, the government supports the development of renewable energy sources through investments in infrastructure and programs aimed at developing local technologies.

The government administration must also address the challenges of high levels of corruption, the dominance of the fossil fuel sector, and the limited capacity of the state to manage investments in the renewable

energy sector. As Koulouri & Mouraviev (2018) highlight, complex administrative structures and inefficient interactions between public and private entities are obstacles to investment in sustainable energy [24]. Addressing these challenges is critical for a successful energy transition.

Panasiuk (2023) argues that improving public administration efficiency, eliminating corruption, and simplifying administrative procedures are critical to strengthening Kazakhstan's energy security [25]. These measures are fundamental to ensuring a stable energy supply and increasing the country's energy independence. Optimizing public administration practices will contribute to the long-term sustainability and resilience of the energy sector.

The theoretical positioning of the study is based on state regulation of the electric power sector as a key aspect of ensuring energy security and the sustainable functioning of a strategically important industry. The state forms the regulatory framework and provides state support measures for the industry. A content analysis of the regulatory legal acts of the Republic of Kazakhstan allows us to identify the structure and main areas of state support.

MAIN PART

The Republic of Kazakhstan consists of 17 regions and three cities of national significance - the capital Astana, Almaty and Shymkent. The electric power industry of the Republic of Kazakhstan includes the following sectors: production, transmission, supply and consumption of electricity, as well as other types of activities in the electric power industry.

The electric power industry of Kazakhstan operates within the framework of the unified electric power system (UES RK), consisting of power plants, power lines and substations that meet the needs of the country's consumers in high-quality and reliable electricity. Conventionally, the UES is divided into three zones – Western, Northern and Southern. The Northern zone includes Akmola, Aktobe, Abay, Karaganda, Kostanay, Pavlodar, North Kazakhstan, East Kazakhstan, Ulytau regions and the capital – Astana. The Western zone includes Atyrau, Mangistau and West Kazakhstan regions. The southern zone includes the Almaty, Zhetysu, Zhambyl, Kyzylorda and Turkestan regions, as well as the cities of republican significance – Almaty and Shymkent. The unified electric power system of the Republic of Kazakhstan is exposed to external and internal threats that negatively affect the stability of electricity production and transmission and, accordingly, the functioning of the most important links in the socio-economic life of the country.

The prevalence of thermal power plants operating on coal and natural gas is also due to the geographical and geological features of the country, which has large reserves of the corresponding energy resources. According to data for 2022, Kazakhstan ranks 9th in the world in coal and lignite production [26]. Power plants in the Republic of Kazakhstan are divided into the following types: of national importance, industrial purpose and regional purpose. The production and sale of electricity to consumers on the wholesale electricity market in the Republic of Kazakhstan are carried out by large thermal power plants and hydroelectric power plants of national importance. Industrial power plants include thermal power plants that provide electricity and heat to industrial enterprises and nearby settlements. Regional power plants are thermal power plants integrated into the regional energy system and provide heat to nearby cities. The main characteristics of the listed power plants are given below (Table 1).

Table 1 – The largest power plants in Kazakhstan by installed capacity

Name	Installed capacity, MW	Energy source	Region	Commissioning year
Thermal power plants				
Ekibastuz SDPP-1	4000	Coal	Pavlodar region	1980
Aksu SDPP	2475	Coal	Pavlodar region	1968
Shamble SDPP	1230	Fuel oil	Zhambyl region	1967
Ekibastuz SDPP-2	1000	Coal	Pavlodar region	1990
Karaganda SDPP-2	663	Coal	Karaganda region	1962
Hydroelectric power stations				
Shulbinskaya HPS	702	Irtysh River	East Kazakhstan region	1987
Shulbinskaya HPS	675	Irtysh River	East Kazakhstan region	1960
Ust-Kamenogorsk HPS	367,8	Irtysh River	East Kazakhstan region	1952
Note – compiled by the authors based on sources [27-33].				

As can be seen from Table 1, the country's largest power plants were built between 1950 and 1990. In total, more than 70% of thermal power plants in Kazakhstan have been in operation for more than 50 years [34]. The longer the service life, the higher the level of wear and tear of power equipment due to the impact of external factors and technical progress. For example, according to data as of December 2022, the depreciation level of the Zhambyl State District Power Plant equipment reached 82% [35].

State regulation in the electric power industry is carried out in order to maximize the demand of electricity consumers and protect the rights of participants in the thermal and electric energy market, ensure the development, stability and safe operation of the energy complex of the Republic of Kazakhstan. The state policy for the development of the electric power industry is based on: ensuring energy security and independence; creating conditions for attracting investment in new construction and modernization of existing energy sources; consistent implementation of goals to achieve environmental sustainability, including through the conversion of coal-fired power plants to gas; development of network infrastructure, including the use of elements of the Smart Grid software. State functions in the electric power industry are carried out by various government bodies, the key one of which is the Ministry of Energy of the Republic of Kazakhstan (ME RK).

The instruments of state management of the electric power industry are: development and approval of strategic and operational documents, financing from the republican budget, monetary policy of the National Bank of the Republic of Kazakhstan, activities of the Ministry of Energy of the Republic of Kazakhstan, which directly affects the socio-economic indicators of the country.

Holding auctions for renewable energy sources is part of the state regulation of the electric power industry. In Kazakhstan, an auction mechanism has been introduced to select renewable energy projects, aimed at choosing the most effective projects at the lowest prices. in the Republic of Kazakhstan. JSC “KOREM” was determined as the organizer This mechanism replaced the fixed tariffs that were in effect until 2018, which made it possible to launch the renewable energy sector at an initial stage of the auctions on the basis of the Order of the Acting Minister of Energy No. 280 dated August 7, 2017.

In Kazakhstan, there are republican and local levels of state regulation of the electric power industry. State policy at the local level is formed and implemented by the Departments of Energy and Housing and Public Utilities of the respective regions, which are authorized by local executive bodies – akimats, to exercise leadership in the areas of energy, energy saving, housing and public utilities, and regional infrastructure. State regulation and control over the electric power industry at the regional level is carried out with the help of regional or city development plans, which comprehensively characterize the problems of the regional economy and provide ways to solve them. At the national level, plans approved by the Government of the Republic of Kazakhstan may also include points aimed at developing the electric power industry of specific regions.

Kyzylorda region belongs to the Southern zone of the energy system of Kazakhstan and is an industrial and agricultural region. The determining sector of the regional economy is the oil and gas sector. It should be noted that the regions with the greatest electricity deficit are represented in the southern zone of the Unified Electric Power System, which includes Kyzylorda region.

The administrative center of the Kyzylorda region is the city of Kyzylorda. As of June 1, 2024, the territory of the region is 226 thousand km², the population is 844.5 thousand people. The volume of electricity production in 2023 amounted to 1646.6 million kWh. According to this indicator, the region ranks 10th out of 17 regions of the Republic of Kazakhstan.

According to the Development Plan of the Kyzylorda Region for 2021-2025, the main problem of the energy and housing and communal services of the region is the high level of depreciation of power supply networks. At the same time, since the region is subsidized, the regional budget is not able to cover the costs of implementing projects to upgrade and build electric power facilities, which requires financing of expenses from the republican budget [36].

The total installed capacity of renewable energy in the Kyzylorda region is 89 MW. The region's share in the total installed capacity is 4.4%. Renewable energy in the region is represented by nine solar power plants as of March 2025. At the same time, further construction and operation of renewable energy sources is planned in the Kyzylorda region. For example, in 2025, green projects for the construction of solar and wind power plants will be launched with the help of investors from China [37]. Given its geographical location and climatic

conditions, the Kyzylorda region has enormous potential for generating solar energy. The duration of sunshine here is more than 3,200 hours per year. Today, solar power plants are successfully operated by many farms in the region. The climatic features of the region, characterized by a large number of sunny days per year (on average more than 280 sunny days), create favorable conditions for the development of solar energy. The level of solar radiation in the Kyzylorda region is one of the highest in Kazakhstan, which makes the construction of solar power plants (SPP) of various capacities economically feasible [38].

Content analysis of state and legal regulation of various aspects of the electric power industry is used in a number of foreign scientific publications. Wehbi & Kemper (2025) assess the impact of government regulation on the introduction of renewable energy sources in small and medium-sized communities in the United States. The authors used the method of complex content analysis to study regional community development plans for the development of renewable energy sources. The importance of a multi-level approach to governance and local authorities for a successful energy transition is emphasized [39]. In the study by Kimuli & Kirabira (2025), the authors use content analysis to assess gaps in Uganda's energy policy and opportunities for improving the regulatory framework. Legislation that directly impacted the country's energy sector was selected. A coding process was conducted to systematically analyze the selected documents, aiming to identify key themes including regulatory effectiveness, policy fragmentation, enforcement mechanisms, and financial incentives for the transition to clean energy. The importance of data-driven policymaking and effective financial incentives to accelerate the adoption of energy efficient technologies is highlighted [40]. In the article by Gray & McArdle (2025), content analysis was used to examine four policies of the European Green Deal. The methodology involved extensive coding of a sample of documents using the software program NVivo. Word count searches were conducted to complement the qualitative coding. Tables were compiled of key terms used to refer to communities, groups, and individuals [41]. In the study by Conde & Takano-Rojas (2025), content analysis is used to synthesize and critically evaluate the application of social representation theory to the study of the impact of public reaction to energy policies and projects [42]. In the work by Meng et al. (2025), a content analysis of the existing literature on hydrogen energy policy was conducted to clearly demonstrate the evolution of the research topic and provide valuable information on issues that deserve due attention in the future [43].

The descriptive section of the study provides an overview of government support measures for Kazakhstan's electric power industry. These measures are reflected in regulatory and legal acts governing the electric power industry. The selection of regulatory legal acts on state support measures for the electric power industry of Kazakhstan was carried out through the official website of the information and legal system of regulatory legal acts of the Republic of Kazakhstan "Adilet.kz". This part of the study aims to identify and classify current threats to the country's energy security by examining government support measures for the industry in each of the selected regulatory legal acts.

The analytical part of the study consists of conducting a content analysis of current regulatory legal acts in the field of electric power industry of the Republic of Kazakhstan. Content analysis consists of searching for pre-selected keywords in regulatory legal acts of the electric power industry for the qualitative assessment of state support measures for the industry in terms of innovativeness and relevance to energy transition and digitalization. The search for keywords in the selected documents was carried out using the MAXQDA application software. In addition, thanks to the review of government support measures for the industry, it is possible to analyze which measures are currently prevalent.

A content analysis was conducted for key categories, such as energy transition and digitalization. The purpose of the analysis is to identify gaps in the sphere of ensuring of energy security of the Republic of Kazakhstan and the Kyzylorda region in terms of compliance of regulatory legal acts with modern challenges of technological progress and energy transition. The indicators selected for content analysis should reflect key aspects of digitalization of the energy sector and energy transition, which are relevant topics in the current conditions of development of the global energy system. The relevant indicators were selected for this category by the authors – key terms and phrases: "regional energy security", "smart grid", "microgeneration", "energy transition", "digitalization in the electric power industry", "local generation", "distributed generation", "Internet of things" ("IoT"). In our opinion, the innovativeness and relevance of the legislative framework of the electric power industry lies in the introduction of full-fledged formulations of terms reflecting modern trends

and their active use in measures of state support for the industry. The presence of clear definitions and the use of such terms in legislation and regulatory legal acts aimed at the development of the industry indicate the readiness of the state legal apparatus to respond to modern challenges and trends.

The research gap in this review article is the lack of analysis of the content of the legislative framework in the field of state regulation of the electric power industry at the national and regional levels in terms of innovation and relevance in the context of technological progress and energy transition, especially in the Republic of Kazakhstan. This leads to difficulties in assessing the innovativeness and relevance of government support measures for the electric power sector, which also contributes to a decrease in the competitiveness of the industry and a slowdown in its growth compared to leading countries in the field of electric power and renewable energy, such as Germany, Denmark, South Korea, China. The authors emphasize the exceptional role of government agencies in the development of the electric power industry. It allows not only to develop and implement plans to minimize threats to the electric power industry, but also plays a key role in the introduction and regulation of innovations. Long-term and medium-term regulatory legal acts (RLA) aimed at achieving the goals and implementing the objectives of state regulation in the electric power industry, determining the directions of state policy in this industry, are developed and approved by the Government of the Republic of Kazakhstan and the authorized body. The authors of the study identified the following types of regulatory legal acts: laws, strategies, state programs and plans, national projects, concepts and codes.

The regulatory legal acts of the Republic of Kazakhstan for content analysis were selected based on the following criteria: they regulate the electric power industry; they must be current and not invalid; and they must reflect the current state and trends in the digitalization of the industry and renewable energy in the Republic of Kazakhstan. The objects of content analysis are the Law of the Republic of Kazakhstan "On Electric Power Industry" No. 588-II dated July 9, 2004 (with amendments and additions), the Law of the Republic of Kazakhstan "On Support of Renewable Energy Sources" No. 165-IV dated July 4, 2009, the Law of the Republic of Kazakhstan "On Natural Monopolies" No. 204-VI dated December 27, 2018, the Law of the Republic of Kazakhstan "On Energy Saving and Improving Energy Efficiency" No. 541-IV dated January 13, 2012, the Strategy for Achieving Carbon Neutrality of the Republic of Kazakhstan until 2060, the National Development Plan of the Republic of Kazakhstan until 2029, the National Infrastructure Plan of the Republic of Kazakhstan until 2029, the Concept for the Development of the Fuel and Energy Complex of the Republic of Kazakhstan for 2023-2029, the Concept for the Development of the Sphere of Energy Saving and Improving Energy Efficiency of the Republic of Kazakhstan for 2023-2029 years, the Concept of digital transformation, development of the information and communication technology industry and cybersecurity for 2023-2029, the Concept of development of the electric power industry of the Republic of Kazakhstan for 2023-2029, the Environmental Code of the Republic of Kazakhstan, the Code of the Republic of Kazakhstan on subsoil and subsoil use, regional regulatory legal acts of the Kyzylorda region dedicated to the electric power industry.

Methodological limitations of the study include the qualitative nature of the analysis, based on current regulatory legal acts of the Republic of Kazakhstan in the electric power sector. The dynamic nature of the regulatory framework must be taken into account. The study results reflect the state of state support measures for the industry at the time of analysis. The study is based on current regulatory legal acts, which does not allow for a full assessment of state support measures for the electric power sector over a long period of time. The content analysis was conducted taking into account state support for the sector in the Kyzylorda region, which limits the ability to extrapolate the findings to other regions of Kazakhstan.

Based on the identified gap in the study, the chosen methodology, the theoretical value of the work and the subject of the study, research hypotheses were formulated to be tested:

- Hypothesis 1: the concepts of "microgeneration", "smart grid", "digitalization of the electric power industry", "local generation", "distributed generation" are not enshrined in legislation at the national level.
- Hypothesis 2: there is no comprehensive definition of regional energy security at the national and regional levels that takes into account local territorial characteristics.
- Hypothesis 3: state regulation of electric power and renewable energy sources in the Kyzylorda region is carried out on the basis of national legislation.

A content analysis of the selected documents was carried out for resistance to the modern challenges of technological progress and energy transition. Below, in Table 2, the classification of regulatory legal acts of the Republic of Kazakhstan in the field of electric power industry and the main measures of state support for the industry in Kazakhstan are presented.

Table 2 – Main measures of state support for the electric power industry of Kazakhstan

RLA types	Name	Main measures
Law	On Electric Power Industry / Law of the Republic of Kazakhstan dated 9 June 2004 No. 588	Regulates public relations arising in the process of production, transmission and consumption of electric power. State regulation in the field of electric power industry is carried out for the purposes of: maximum satisfaction of consumer demand for energy and protection of the rights of participants in the electric power market; ensuring safe, reliable and sustainable functioning of the electric power complex of the Republic of Kazakhstan; unity of management of the electric power complex of the Republic of Kazakhstan as a particularly important life support system for the socio-economic complex of the country.
	On support of the use of renewable energy sources / Law of the Republic of Kazakhstan dated 4 July 2009 No. 165-IV	Defines the goals, forms and directions of support for the use of renewable energy sources, and regulates the mechanism for supporting the use of waste in energy and the use of secondary energy resources. State regulation in the area of support for the use of renewable energy sources is carried out in order to create favorable conditions for the production of electricity using renewable energy sources in order to reduce the energy intensity of the economy and the impact of the electricity and heat production sector on the environment, and to increase the share of renewable energy sources in electricity production.
	On natural monopolies / Law of the Republic of Kazakhstan dated December 27, 2018 No. 204-VI	Natural monopoly entities include services for the transmission of electricity and the organization of balancing the production and consumption of electricity. Electricity is a commodity of strategic importance. The law also establishes the procedure for setting tariffs for electricity.
	On energy saving and increasing energy efficiency / Law of the Republic of Kazakhstan dated 13 January 2012 No. 541-IV	Regulates public relations and determines the legal, economic and organizational foundations for the activities of individuals and legal entities in the field of energy conservation and energy efficiency.
Strategy	Strategy for achieving carbon neutrality of the Republic of Kazakhstan until 2060	Achieving sustainable development of the economy of Kazakhstan in the context of climate change and carbon neutrality by 2060; reducing greenhouse gas emissions by 15% by 2030 relative to 1990 emissions (unconditional goal) and achieving a 25% reduction while receiving international support for decarbonization of the economy (conditional goal); given the extremely high depreciation of fixed assets, the level of investment will have to increase significantly by 2030.
State program or plan	National Development Plan of the Republic of Kazakhstan until 2029 // Resolution of the Government of the Republic of Kazakhstan No. 611 dated 30.07.2024	The main threats to the industry have been identified: electricity shortages and high levels of infrastructure deterioration; high energy intensity and greenhouse gas emissions; limited investment attractiveness. The main development priorities have been identified: increasing the investment attractiveness of the industry; increasing the share of renewable energy sources in the energy balance; modernizing thermal capacity and infrastructure; increasing the energy efficiency of the economy.
	Territorial development plan of the Republic of Kazakhstan until 2025 // Decree of the President of the Republic of Kazakhstan No. 812 dated 02.21.2022	Ensuring territorial, including energy, connectivity to reduce distance costs; physical and affordable accessibility of electricity supply; modernization of regional energy infrastructure.
	National Infrastructure Plan of the Republic of Kazakhstan until 2029 // Resolution of the Government of the Republic of Kazakhstan dated 25.07.2024. - No. 606	It is planned to implement 46 energy infrastructure projects; strengthen the country's power supply by strengthening the southern zone of power grids and merging the western zone of the Republic of Kazakhstan with the Unified Energy System. The main objectives of the plan are to modernize power supply facilities, introduce new capacities, and increase the share of renewable energy sources.

RLA types	Name	Main measures
Concept	Concept of development of the fuel and energy complex of the Republic of Kazakhstan for 2023-2029 // Resolution of the Government of the Republic of Kazakhstan dated June 28, 2014 No. 724	Formation of an energy complex that meets modern requirements for sustainable economic development; development of the nuclear industry and energy; production of products that meet international standards and norms; improvement of the energy saving system.
	Concept of development of electric power industry of the Republic of Kazakhstan for 2023-2029 // Resolution of the Government of the Republic of Kazakhstan dated March 28, 2023 No. 263	Full satisfaction of the needs of the economy and the population for electrical and thermal energy; increase in the share of electricity generated from renewable energy sources; reduction in the level of depreciation of fixed assets of the energy infrastructure; formation of a unified energy system of the country and increase in energy efficiency.
	Concept of development of the sphere of energy saving and increasing energy efficiency of the Republic of Kazakhstan for 2023-2029 // Resolution of the Government of the Republic of Kazakhstan dated March 28, 2023 No. 264	Attracting funds from international financial organizations for financial support of energy saving projects; modernization and reconstruction of buildings, structures, equipment of industrial enterprises; revision of approaches to the formation of maximum tariffs for electric power organizations; purchase of energy efficient equipment; saving energy resources.
	Concept of digital transformation, development of the information and communication technology industry and cybersecurity for 2023-2029 // Resolution of the Government of the Republic of Kazakhstan dated March 28, 2023 No. 269	The Council for Technological Policy under the Government of the Republic of Kazakhstan has identified priority technological areas, including AgriTech – the development of green energy-efficient technologies. In implementing the digital transformation policy, industry and local executive bodies should play a particularly important role.
Code	Environmental Code of the Republic of Kazakhstan // Code of the Republic of Kazakhstan dated January 2, 2021 No. 400-VI	Regulates public relations in the sphere of interaction between man and nature, arising in connection with the implementation of activities by individuals and legal entities that have or may have an impact on the environment; public relations arising in the process of production of electric energy by waste disposal facilities, its transmission and consumption, are regulated by the legislation of the Republic of Kazakhstan on electric power and in the field of support for the use of renewable energy sources.
	On subsoil and subsoil use // Code of the Republic of Kazakhstan dated 27.12.2017. - No. 125-VI	The program for managing the state subsoil fund is being developed taking into account the need to ensure national, environmental and energy security of the Republic of Kazakhstan.
Note – compiled by the authors based on [8-9; 44-55].		

According to Table 2, it can be concluded that the regulations adopted in the 2010s addressed such issues as the need to attract investment funds, low electricity tariffs, a low share of electricity generated from renewable energy sources, providing the population with affordable electricity and gas, depreciation of fixed assets and industry infrastructure in general. These issues remained relevant in the 2020s and also worsened significantly and require comprehensive solutions at the present time.

According to Samruk-Energy JSC, the volume of electricity production in 2023 amounted to 112.8 billion kWh. It should be noted that the greatest deficit is observed in the southern zone of the Unified Energy System, which covers metered supplies of electricity from the northern regions of Kazakhstan, rich regions, as well as from the Russian Federation (RF) and Uzbekistan [56]. One of the reasons for the growing electricity deficit is the unacceptably high level of depreciation of fixed assets in the electric power sector, aggravated by the growth of consumption in industry [57]. Given the electricity shortage projected by the Ministry of Energy of the Republic of Kazakhstan, it can be concluded that the threat remains acute, potentially slowing production growth over time. The high level of depreciation of fixed assets requires the constant commissioning of new capacity and the purchase of electricity from abroad.

Based on a review of the current regulatory legal acts of the Republic of Kazakhstan in the field of electric power, the main threats to energy security were identified. The electric power system of Kazakhstan is exposed to external and internal threats to energy security. Threats, with an insufficient level of prevention and warning by the state, cause direct damage to the links of the system. The consequences of the impact of threats on

the electric power industry can be chronic. In this case, comprehensive measures of state support are required over a long period of time. For example, to cover the electricity deficit caused by the high level of depreciation of energy facilities, including strategically important ones, it is necessary to attract large investments in the long term. The list of the most dangerous and urgent threats to the energy system, typical for Kazakhstan, is presented in Table 3.

Table 3 – Threats to energy security of the Republic of Kazakhstan

Type	Name	Overview	Consequences
Internal	High degree of physical and moral depreciation of fixed assets	The critical level of wear and tear of power facilities makes it extremely difficult for power plants to operate at full capacity without significant costs. The risk of failure of important power facilities increases, which makes it impossible to meet the demand for electricity.	Electricity shortage. Interruptions in the work of industries strategically important for the country's economy. Low competitiveness of the country in the global energy market. Environmental pollution.
	Ineffective tariff policy	Low energy prices compared to other countries shape behavioral attitudes towards energy resources, increase the energy intensity of the country's GDP and lead to insufficient financing of the industry.	
	Electricity losses in electrical networks are at unacceptable levels	Failure to meet the growing demand for electricity leads to an increase in emergency situations at civilian and strategic facilities, public discontent and distrust of the government apparatus.	
	Lack of funding for the electricity sector	It significantly complicates the timely elimination of accidents, modernization of equipment, digitalization of the industry, development of renewable energy sources and new sources of electricity.	
	Low level of diversification of energy sources	The prevalence of thermal power plants operating on coal is more than 70%. The share of renewable energy sources in the total volume of electricity production is small – 5.9%.	
External	Volatility of global oil and gas prices	Kazakhstan's economy is directly dependent on energy exports. A fall in oil prices in the long term will lead to a budget deficit, a reduction in public investment and economic stagnation.	
	Radical changes in the structure of global energy demand	The prevalence of energy-intensive industries, natural and climatic conditions and high energy intensity of products may lead the economy of Kazakhstan to recession due to a decrease in demand for traditional energy resources and a transition to alternative energy sources.	
	Unstable geopolitical situation	Russia's invasion of Ukraine in 2022, the COVID-19 pandemic and the escalation of the situation in the Middle East have led to a global energy crisis, which has negatively affected Kazakhstan's economic growth and energy security.	
Note – compiled by the authors based on their own research.			

The above threats to the energy system are interconnected. Thus, in addition to the root causes, electricity shortages can lead to a high level of depreciation of fixed assets, which can lead to electricity losses in the networks. Ineffective tariff policy leads to underfunding of energy facilities in need of renovation. In response to the high level of depreciation of the energy supply infrastructure, the national project “Modernization of the Energy and Utilities Sectors for 2025-2029” was approved. It stipulates that by 2030 the share of equipment covered by an intelligent control system should reach 90%, as well as a reduction in the accident rate by 20%.

Below is a content analysis of the regulatory legal acts listed in Table 2, aimed at regulating the energy sector, from the perspective of digitalization, energy transition and state support for the Kyzylorda region (Figure 1).

According to Figure 1, content analysis shows that the National Development Plan of the Republic of Kazakhstan until 2029 does not mention the Kyzylorda region. An imbalance in the economic situation of the macroregions is noted. Energy problems and ways to solve them are of a national nature, without specifying the state of the industry in individual regions. The National Infrastructure Plan of the Republic of Kazakhstan until 2029 identifies the main problems of the industry in the context of the Unified Energy System zones. The

need to strengthen the southern zone of the power grid is noted. It is planned to build a CCGT in the city of Kyzylorda with a capacity of 240 MW and 1100 MW. The document is of a national nature and does not contain a comprehensive plan for the development of the electric power industry of the Kyzylorda region.

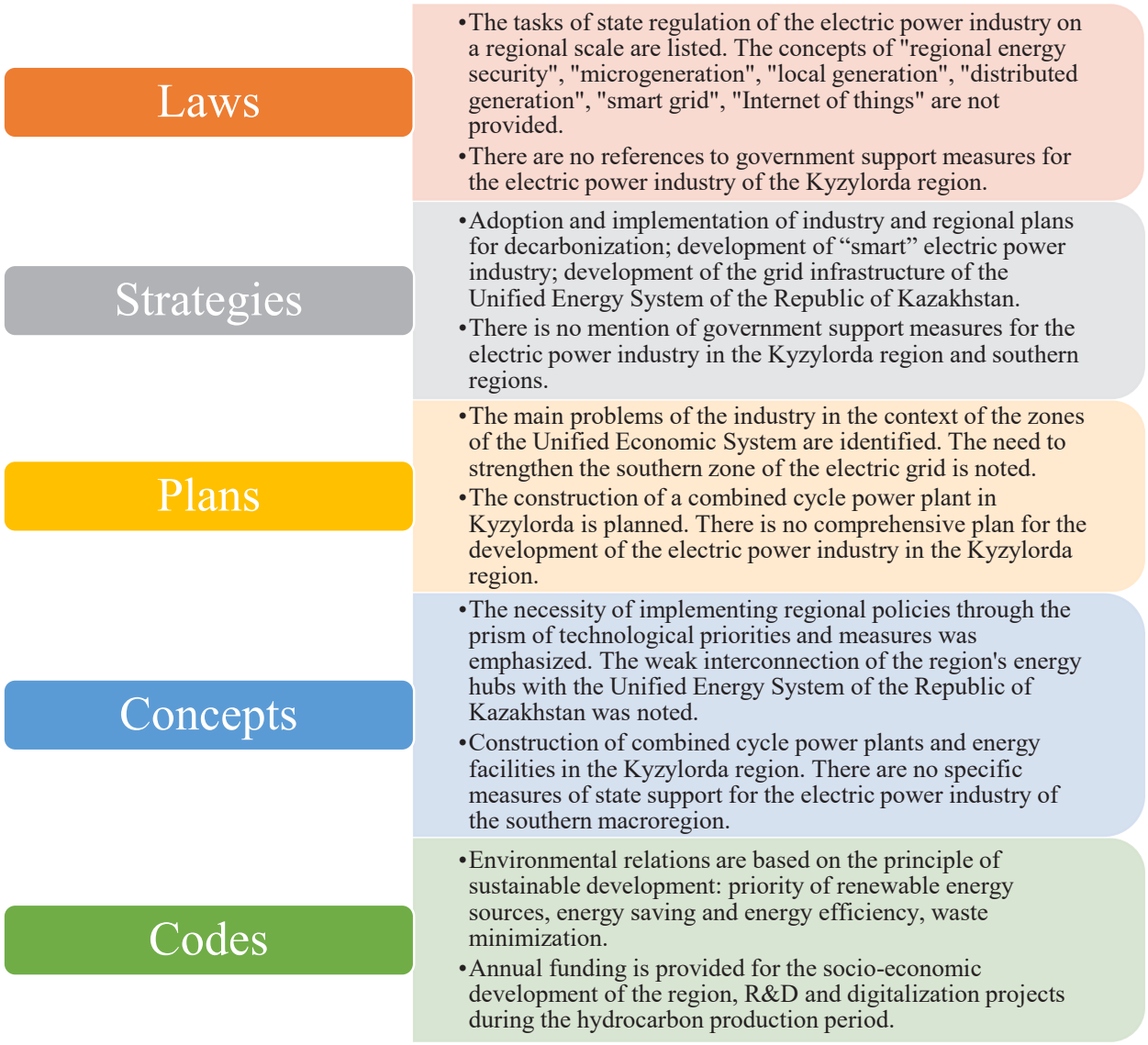

Figure 1 – Analysis of government support measures in the electric power industry of the Republic of Kazakhstan

Note – compiled by the authors based on their own research

According to content analysis, the Concept of Digital Transformation, Development of the Information and Communication Technologies and Cybersecurity Industry for 2023-2029 notes that the role of local government is especially important in implementing technology policy within the industry, including the electric power industry. However, there are no specific measures of state support for the electric power industry of the Kyzylorda region and the southern macroregion as a whole.

As analysis has shown, the Concept for the Development of the Electric Power Industry of the Republic of Kazakhstan for 2023-2029 indicates that there is a critical situation in the Kyzylorda region, in which the average salary at the CHPP is less than the average salary in the region. As part of the technological re-equipment,

it is planned to commission new CCGT power plants and build 500-220 kW power grid facilities in the Kyzylorda region, as well as strengthen the Southern zone of the Unified Energy System.

Analysis has shown, that the Concept for the Development of the Sphere of Energy Saving and Improving Energy Efficiency of the Republic of Kazakhstan for 2023-2029 does not contain specific measures of state support for the electric power industry of the Kyzylorda region. The Concept for the Development of the Fuel and Energy Complex of the Republic of Kazakhstan for 2023-2029 notes a weak relationship between the energy hubs of the Kyzylorda region and the Unified Energy System of the Republic of Kazakhstan, which complicates the energy supply to the southern regions.

Next, using the MAXQDA Analytics Pro application program, the absolute frequency of word occurrence in a number of relevant regulatory legal acts of the Republic of Kazakhstan in the field of electric power industry was determined. The terms were selected by the authors of the study. Since most of the documents are written in Russian, the search for terms was carried out in it. Some technical terms, such as “smart grid”, “IoT”, are also given in English. For the completeness of the search, the words in Russian are presented in different declensions. The conducted content analysis shows that the fundamental regulatory legal acts in the electric power industry do not contain the definition of terms “microgeneration”, “local generation”, “regional energy security”, “distributed generation” related to the energy transition and innovative development of the industry, hence they are not on the graph. A clear definition of these terms in the legal environment and their direct application in target programs and plans are important aspects of the competitiveness of state regulation of the electric power industry. Thus, Hypothesis 1 is confirmed. The result of the analysis is shown in Figure 2.

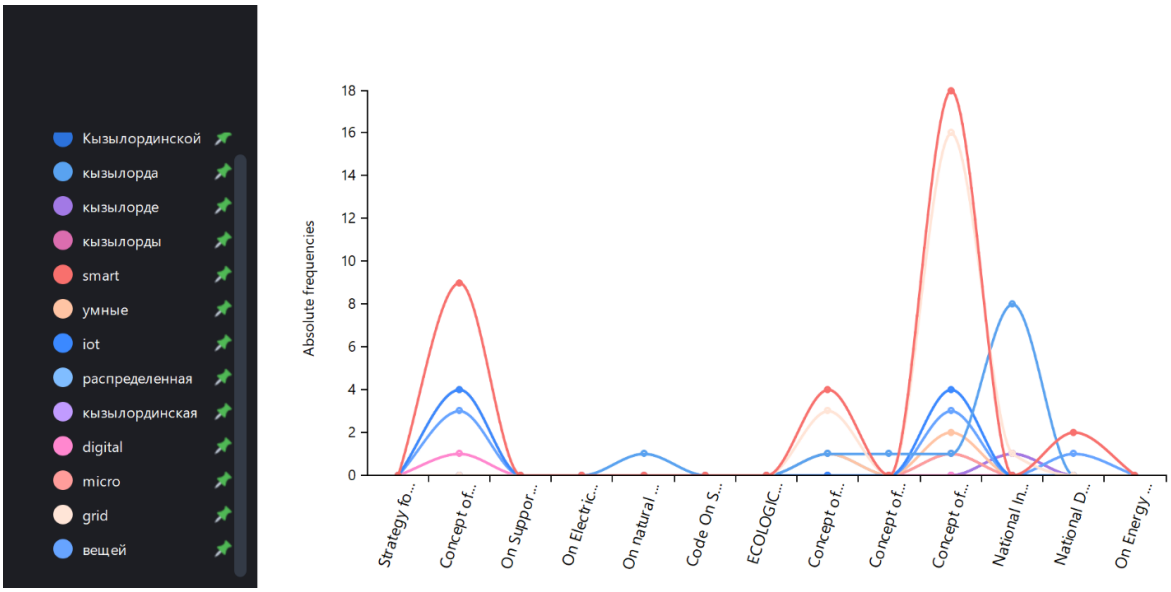

Figure 2 – Frequency of use of words in the regulatory legal acts of the Republic of Kazakhstan in the field of electric power industry

Note – compiled by the authors based on their own research using MAXQDA Analytics Pro program

As content analysis has shown in Figure 2, the most frequently encountered words are “smart” and “grid”. They are mentioned 18 and 16 times, respectively, in the Concept for the Development of the Electric Power Industry of the Republic of Kazakhstan for 2023-2029, in the context of “smart grid” and foreign experience in their application. The word “smart” is found nine times in the Concept for Digital Transformation, Development of the ICT Industry and Cybersecurity for 2023-2029 in the context of a broader concept of “smart city”, which is associated with the socio-economic and cultural aspects of the urban life sphere. In addition, the phrase “smart grid” is found in the Concept for the Development of the Fuel and Energy Complex of the Republic of Kazakhstan for 2023-2029. State support measures for the electric power industry of the

Kyzylorda region are limited mainly to the construction and commissioning of new energy facilities. Distributed generation is mentioned in the Concept of Development of the Fuel and Energy Complex of the Republic of Kazakhstan for 2023-2029 as one of the areas of renewable energy development. It is noted that the level of use of small renewable energy projects on a regional scale is low due to insufficient awareness of the population and businesses.

The term "energy security" is found in the Law of the Republic of Kazakhstan "On National Security" dated January 6, 2012 No. 527-IV and is considered as one of the types of economic security. At the same time, this concept is absent from the Law of the Republic of Kazakhstan "On Electric Power Industry". The Law of the Republic of Kazakhstan "On Support of Renewable Energy Sources" notes that energy security is one of the principles of state regulation in the field of support for the use of renewable energy sources. The Concept for the Transition of the Republic of Kazakhstan to a "Green Economy" pays special attention to food and water security. It is also noted that the development of the electric power sector will be aimed at achieving carbon neutrality by increasing the share of renewable energy sources, as well as the development of carbon capture and storage technologies with a gradual reduction in coal generation. The Strategy for Achieving Carbon Neutrality of the Republic of Kazakhstan until 2060 notes the intersectoral nature of ensuring energy security. The Concept for the Development of the Fuel and Energy Complex of the Republic of Kazakhstan for 2023-2029 indicates that issues of modernization, reconstruction, replacement of technically obsolete equipment, as well as the development of nuclear energy are relevant in ensuring energy security. In the Concept for the Development of Energy Saving and Improving Energy Efficiency of the Republic of Kazakhstan for 2023-2029, the main principle of the development of the electric power industry is a policy focused on energy security – ensuring the safe, reliable and sustainable functioning of the industrial and energy complexes of the country. The Environmental Code of the Republic of Kazakhstan provides for carbon emission quotas, including for the electric power industry. Specific emission limits are approved in the National Carbon Quota Plan.

According to the content analysis of regulatory legal acts of the Republic of Kazakhstan and the Kyzylorda region in the field of regulation of the electric power industry, there is no comprehensive definition of regional energy security that takes into account the territorial characteristics of the regions of the country, therefore, Hypothesis 2 is confirmed.

To date, there is no specialized regional program or strategy for the development of renewable energy sources in Kyzylorda region. However, regional geographic and climatic features contribute to attracting investment funds for the construction and operation of solar and wind power plants. At the same time, the region continues to develop traditional energy sources, in particular, it is planned to build a combined cycle plant with a capacity of 240 MW. The development of the regional electric power industry, the implementation of new projects on renewable energy sources is carried out on the basis of national legislation (Figure 3).

As can be seen from Figure 3, in practice, the implementation of renewable energy projects in the Kyzylorda region is carried out under the supervision of government agencies and with the involvement of private investors. For example, Article 7 of the Law of the Republic of Kazakhstan "On Support of the Use of Renewable Energy Sources" states that land plots for the construction of renewable energy installations are reserved and provided in accordance with the land legislation of the Republic of Kazakhstan; the Concept for the Transition of the Republic of Kazakhstan to a "Green Economy" notes a priority area – the development of solar and wind energy in the southern and western regions, including the Kyzylorda region. Thus, Hypothesis 3 is confirmed.

A content analysis of Kazakhstan's regulatory legal acts in the electric power sector revealed that the regulatory framework places greater emphasis on strengthening the connection between the Unified Energy System and regional systems. Several regulatory legal acts outline strategic goals and objectives for the development of renewable energy sources, decarbonization, and smart grids. At the same time, the analysis revealed that state support measures for the Kyzylorda region focus on providing opportunities for the implementation of renewable energy projects and combined-cycle power plants, as well as the reconstruction of power facilities. However, a comprehensive program or plan for the development of the region's electric power industry is lacking. Regulatory legal acts aimed at innovative development of the industry also lack measures specific to the Kyzylorda region. Furthermore, the analysis revealed that insufficient attention has been paid to regional energy security in its comprehensive sense at the national level.

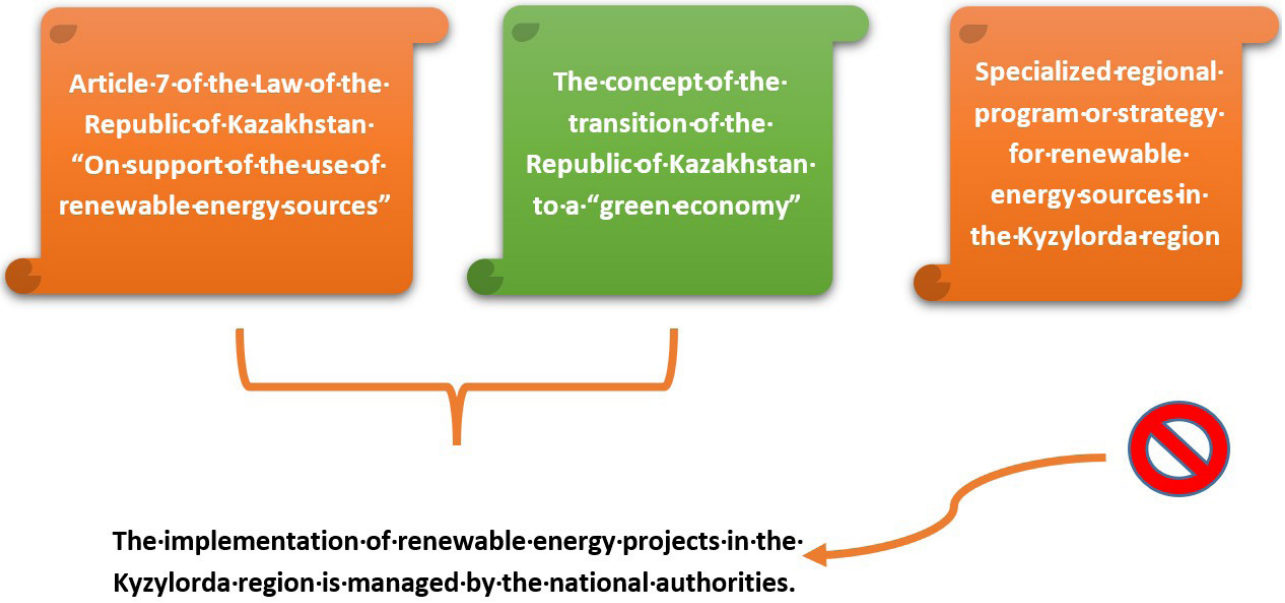

Figure 3 – Features of the implementation of renewable energy projects in the Kyzylorda region
Note – compiled by the authors based on their own research

As recommendations for filling the gaps in the regulatory legal acts of the Republic of Kazakhstan and the Kyzylorda region in the field of electric power industry identified during the content analysis, the following are proposed: consolidation of the concept of "regional energy security" taking into account the territorial features of the regions of Kazakhstan; consolidation of the terms "microgeneration", "local generation", "distributed generation", "Internet of things", "smart grid" in the context of the current state of the electric power industry of the Republic of Kazakhstan; it is necessary to develop a separate regional program for the development of the electric power industry of the Kyzylorda region in the context of the energy transition and digitalization of the industry.

In our opinion, an exhaustive definition of regional energy security can be formulated as follows: such a state of the regional energy system, in which, based on the natural resource, climatic, transport, infrastructure, and socio-economic conditions of the regions of the country, resistance to external and internal threats is achieved and reliable, uninterrupted and economically viable energy supply is ensured with the efficient use of local energy resources and modern digital technologies, which minimizes dependence on external factors.

The electric power industry is an environment conducive to the implementation of digital technologies and innovations. Such technological advances as AI-based analytics, microgeneration, smart meters, smart grids, the Internet of Things, etc. are used in countries with advanced electric power sectors. The implementation of digital technologies and ICT requires attracting a large amount of investment funds. Given that more than half of the thermal power plants in Kazakhstan are state-owned, and the electricity distribution and transmission sector is a natural monopoly of state-owned companies, the most suitable mechanism for digitalization is a public-private partnership (PPP). Digitalization requires significant amounts of initial investment, testing and scaling of new products, which can be achieved through joint efforts of the private and public sectors. There is an opportunity to use budget funds and private investment, which allows financing larger network upgrades. In our opinion, PPP can be used to implement solutions that require direct government participation, such as a monitoring system in power grids, smart meters, platforms for integrating renewable energy sources, etc. According to the Concept of Digital Transformation, Development of the Information and Communication Technologies and Cybersecurity Industry for 2023-2029, Kazakhstan ranks 79th in the Global Innovation Index for 2022, however, the venture investment market is projected to grow in the coming years.

International experience in government regulation of the electricity sector demonstrates that in most developed countries, the electricity industry is regulated through comprehensive regulatory mechanisms, including investment promotion and tariff regulation. Due to the monopolistic nature of the industry, in the EU and the US, the electricity sector is viewed as strategically important, requiring active support mechanisms. Energy transition and carbon emission reduction are important aspects of international government policy. For example, EU climate policy includes regulations on the emission of harmful substances. To prevent companies in energy-intensive industries from relocating their production facilities outside the EU, the European Commission has authorized compensation to cover the costs of complying with emission regulations. Thus, states compensate for the additional costs of electricity production due to carbon prices [58]. In the Republic of Kazakhstan, the introduction of carbon quotas to diversify energy sources is currently hampered by the high share of traditional energy sources.

For the Republic of Kazakhstan, it is extremely important to maintain and improve the competitiveness of the energy sector on the world stage, which requires the introduction of innovative methods of electricity production and transmission adapted to the realities of the country, a gradual transition from traditional energy sources to renewable ones, as well as increasing the efficiency of monitoring the energy system to warn and prevent emergency situations. The implementation of the above methods for achieving sustainable energy security is impossible without updating the regulatory framework of the electric power industry.

CONCLUSION

Based on a critical review of the literature of foreign and Kazakhstani researchers and practitioners, using the content analysis method, the laws and regulations of the Republic of Kazakhstan and the Kyzylorda region in the field of electric power industry were independently analyzed for compliance with modern challenges associated with technological progress and energy transition. A search was made by keywords that reflect the main aspects of these phenomena.

A theoretical positioning for the study was provided, and methodological limitations were identified. The theoretical justification consists of an analysis of state support measures for the electric power industry of Kazakhstan and the Kyzylorda region, specifically to identify the structure, areas, and instruments of support. This is achieved through a content analysis of the regulatory legal acts of Kazakhstan, which are drafted by the state. Methodological limitations include the criteria for selecting regulatory legal acts for content analysis, the qualitative nature of the analysis, and the selection of one specific region for the analysis of state support measures at the regional level.

The scientific contribution of the study lies in the methodological substantiation of the content analysis of the regulatory legal acts of the Republic of Kazakhstan for the study of measures of state support for the electric power industry, the classification of public policy instruments, and the substantiation of the significance of assessing measures of state support for the industry at the regional level.

The novelty of this study lies in the content analysis of current regulatory legal acts of the Republic of Kazakhstan and the Kyzylorda region to structure and systematize state support measures for the electric power industry. MAXQDA Analytics Pro was used to fill the research gap and identify the key instruments and areas of state support for the industry. The specific features of state regulation of the electric power industry and renewable energy sources at the regional level are identified using the Kyzylorda region as an example. The main threats to Kazakhstan's energy security are identified and classified.

The analytical section of the article is based on statistical data obtained during a content analysis of regulatory legal acts of the Republic of Kazakhstan in the field of electric power. Fourteen regulatory legal acts were examined. A graph was compiled showing the frequency of keywords in these regulatory legal acts related to the digitalization of the electric power industry and the energy transition.

In today's rapidly changing world, the importance of renewable energy sources and energy stability has increased, and energy transition issues on a national or regional scale are becoming especially relevant. An important emphasis in the study was placed on the role of digital technologies and the importance of digitalization in the electric power system of the country and the region.

The study identified gaps in the field of energy security in Kazakhstan and the Kyzylorda region. Using content analysis, insufficient mention of terms related to the energy transition and innovative development of the electric power industry was revealed. It is noted that there is no comprehensive definition of regional energy security that takes into account the sectoral, territorial and economic characteristics of the country and individual regions. A proprietary interpretation of "regional energy security" is proposed from the perspective of the territorial characteristics of the regions of Kazakhstan and modern challenges. In the Kyzylorda region, there are currently no specialized regional programs, strategies, plans aimed at medium-term and long-term planning and development of electric power industry and renewable energy sources. National legislation provides for broad state support for renewable energy sources, including in the form of financial, administrative and land preferences. There is no local legal framework in the Kyzylorda region, but a regional program for the development of the electric power industry of the Kyzylorda region until 2033 is currently being developed. The development of a medium-term and long-term plan for the development of the industry in the region from the perspective of the use of digital technologies and taking into account the challenges of the energy transition will contribute to a more targeted strengthening of the region's electric power industry and reduce the gap with regions that have a developed electric power sector.

The practical recommendations provided in the article are tailored to both the conditions of the Republic of Kazakhstan and specific regional conditions. For example, the introduction of a comprehensive definition of regional energy security is valid on a national scale. At the same time, recommendations for incorporating concepts related to the digitalization of the electric power industry and energy transition into regional regulatory legal acts are specific to the Kyzylorda region, a region with significant potential for the development of renewable energy and green energy.

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ҚАЗАҚСТАННЫҢ ЭЛЕКТР ЭНЕРГЕТИКАСЫ САЛАСЫН МЕМЛЕКЕТТІК ҚОЛДАУДЫ ДАМЫТУ (ТАЛДАУ) (ҚЫЗЫЛОРДА ОБЛЫСЫ МЫСАЛЫНДА)

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АҢДАТПА

Зерттеу мақсаты – технологиялық прогресс пен энергетикалық ауысу жағдайында мемлекеттің ұлттық және өңірлік деңгейлерде энергетикалық қауіпсіздікті (ЭҚ) қамтамасыз етудегі олқылықтарды анықтау үшін Қазақстан мен Қызылорда облысының электр энергетикасы саласындағы нормативтік құқықтық актілерді талдау.

Әдіснамасы – бұл зерттеуде құжаттарда көрсетілген анықталған заңдылықтарды, фактілер мен тенденцияларды кейіннен мазмұнды түсіндіру мақсатында мәтіндік массивтердің формасы мен мазмұнына мазмұндық талдау қолданылды. Қазақстан Республикасының заңнамасына контент-талдау энергетика саласын құқықтық реттеуді зерделеу және мемлекеттік саясаттың негізгі бағыттарын анықтау мақсатында жүргізілді. Талдау MAXQDA бағдарламасын қолдану арқылы жүргізілді.

Зерттеудің бірегейлігі / құндылығы – өзектілігі Қазақстанның әлеуметтік-экономикалық дамуының негізгі элементі ретінде энергетикалық қауіпсіздіктің айрықша маңыздылығында жатыр. Қызылорда облысы географиялық ерекшеліктеріне байланысты жаңартылатын энергетиканы дамыту үшін зор әлеуетке ие. Мемлекет энергетикалық саясатты заңдар, бағдарламалар, стратегиялар мен тұжырымдамалар арқылы жүзеге асырады. Белгісіздік жағдайындағы энергетикалық саясат энергетикалық қауіпсіздікті қамтамасыз етуде шешуші рөл атқарады, бұл энергетикалық жүйенің сыртқы және ішкі қауіптеріне төзімділікті білдіреді. Зерттеудің ғылыми жаңалығы Қазақстанның электр энергетикасын мемлекеттік қолдау шараларын жүйелеу және олардың контент-талдау көмегімен ұлттық және өңірлік деңгейлердегі қазіргі заманғы сын-қатерлерге сәйкестігін анықтау болып табылады.

Зерттеу нәтижелері – Қазақстанның аумақтық ерекшеліктерін ескеретін өңірлік электр энергетикасын кешенді айқындаудың жоқтығы анықталды. Заңнамада «микрогенерация», «ақылды желілер», «заттар интернеті» ұғымдарының анықтамалары жоқ екендігі атап өтілді. Қызылорда облысында электр энергетикасы саласын дамытуға бағытталған өңірлік бағдарламалар мен стратегиялар жоқ.

Түйін сөздер – электр энергетикасы, мемлекеттік басқару, аймақтық энергетикалық қауіпсіздік, мазмұнды талдау, нормативтік-құқықтық актілер.

РАЗВИТИЕ (АНАЛИЗ) ГОСУДАРСТВЕННОЙ ПОДДЕРЖКИ ЭЛЕКТРОЭНЕРГЕТИЧЕСКОЙ ОТРАСЛИ КАЗАХСТАНА (НА ПРИМЕРЕ КЫЗЫЛОРДИНСКОЙ ОБЛАСТИ)

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АННОТАЦИЯ

Цель исследования – анализ нормативных правовых актов в сфере электроэнергетики Казахстана и Кызылординской области для выявления пробелов в обеспечении государством энергетической безопасности (ЭБ) на национальном и региональном уровнях в условиях технологического прогресса и энергетического перехода.

Методология – в данном исследовании использовался контент-анализ формы и содержания текстовых массивов с целью последующей содержательной интерпретации выявленных закономерностей, фактов и тенденций, отраженных в документах. Контент-анализ законодательства Республики Казахстан проводился с целью изучения правового регулирования энергетической отрасли и выявления ключевых направлений государственной политики. Анализ проводился с использованием программы MAXQDA.

Уникальность/ценность исследования – актуальность заключается в исключительной важности энергетической безопасности как ключевого элемента социально-экономического развития Казахстана. Кызылординская область обладает огромным потенциалом для развития возобновляемой энергетики в силу географических особенностей. Государство реализует энергетическую политику посредством законов, программ, стратегий и концепций. Энергетическая политика в условиях неопределенности играет ключевую роль в обеспечении энергетической безопасности, что подразумевает устойчивость к внешним и внутренним угрозам энергетической системы. Научная новизна исследования заключается в систематизации мер государственной поддержки электроэнергетики Казахстана и выявления их соответствия современным вызовам на национальном и региональном уровнях, с помощью контент-анализа.

Выводы: выявлено отсутствие комплексного определения региональной электроэнергетики, учитывающего территориальные особенности Казахстана. Отмечено, что в законодательстве отсутствуют определения понятий «микрогенерация», «умные сети», «интернет вещей». В Кызылординской области отсутствуют региональные программы и стратегии, направленные на развитие электроэнергетической отрасли.

Ключевые слова – электроэнергетика, государственное управление, региональная энергетическая безопасность, контент-анализ, нормативно-правовые акты.

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