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Article

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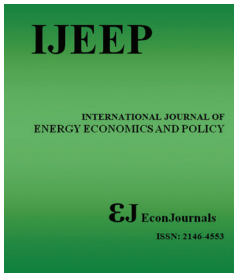

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Issues of Investment Attraction Development in the Energy Sector

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ABSTRACT

Energy is an important branch of any economy. In this paper the authors analyze the investments that are directed to the energy sector. The energy complex of the Republic of Kazakhstan is deeply analyzed. It is determined that the actual capacity of all power plants in Kazakhstan is 15,000 MW. It is established that the territory has the opportunity to use non-traditional renewable energy sources. But because of the low reliability of mechanical systems, the uneven generation of energy is the more common use of traditional energy sources. Therefore, the sector needs to attract investments. It is established that investment in the energy complex until 2025 will be increased. Investments are increasing, on average, by 28% per year.

Keywords: Territorial Differences, Investment, Renewable Energy, Electricity Consumption, Energy Complex
JEL Classifications: O10, O13

1. INTRODUCTION

At present, the priority direction of the state economic policy of Kazakhstan is the industrial and innovative development of the country's regions on the basis of diversification, transformation and modernization of the territorial organization of industry, effective use of natural, industrial and labor resources, increasing productive forces and competitiveness of industrial enterprises. At the same time, the vector aimed at "stimulating diversification and improving the competitiveness of the manufacturing industry" is clearly defined in the State Program for Industrial and Innovative Development of the Republic of Kazakhstan for 2015-2019 (Decree of the President…, 2017).

In accordance with the tasks set, an indispensable condition for industrial and innovative development of the regions of Kazakhstan is to increase the investment attractiveness of industrial enterprises and industries (Aidapkelov, 2016). One of the main factors in diversifying industrial production and increasing the competitiveness of the economy's industrial sector is the investment attractiveness of industrial enterprises and industries. Investments allow increasing production volumes and directly influencing the implementation of competitive advantages of industries and industrial enterprises, which in turn justify investment costs and allow receiving economic benefits in the medium and long term (Adamenko et al., 2017; Kapitonov and Voloshin, 2017; Teleuyev et al., 2017).

Within the framework of the state economic policy in Kazakhstan, a large and systematic work is under way to create the necessary conditions for attracting investments for the development of economy (Pinho et al., 2018). But under the influence of natural and resource, social and demographic, economic and environmental factors, the industry of the regions and administrative districts of Kazakhstan have varying degrees of investment attractiveness. In this regard, it is important and urgent to identify territorial differences in the investment attractiveness of the industry in the regions of Kazakhstan. This will determine the priority areas

and industries, which contributes to the implementation of an effective regional policy in the field of industrial and innovative development of the country's regions (Sivash et al., 2017).

1.1. Allocation of Previously Unresolved Parts of a Common Problem

During the implementation of the second 5-year period of industrial and innovative development of Kazakhstan, an important territorial and branch assessment of the investment attractiveness of industry in each region of the country is an important component in the conduct of an effective regional policy.

Features of investment attractiveness of enterprises and power industry of the Republic of Kazakhstan are poorly studied. This is the evidence of the recent research and publications' analysis.

Therefore, the main goal of the work is to analyze the investments that are received in the energy sector of the Republic of Kazakhstan.

2. FEATURES OF THE ENERGY COMPLEX OF THE REPUBLIC OF KAZAKHSTAN

The total installed capacity of all power plants in Kazakhstan is 20,000 MW, and the actual capacity is 15,000 MW. Kazakhstan produces 91.9 billion kWh of electricity per year (2013 data, compared to 1045 billion kWh in Russia, and 4058 billion kWh hour - the US, 5320 billion kWh - by China), that is, the electric power of Kazakhstan 4.0 MWh per person per year against 6.7 in Russia, 14 in the US, and 3.5 in the PRC. Unfortunately, the development of most power plants does not reach the installed capacity. Only in 2012 Kazakhstan reached the level of electricity generation in 1991 (87.4 billion kWh). Generation by type of power plant is distributed as follows: Thermal power plants (thermal power plants) - 87.7%, including:

- IES (condensing power plants) - 48.9%;
- CHP (combined heat and power plant) - 36.6%;
- GTES (gas turbine power stations) - 2.3%;
- Hydro power plants (hydroelectric power stations) - 12.3%.

The dynamics of production and consumption of energy resources in the Republic of Kazakhstan is shown in Figure 1.

The electrical networks of the Republic of Kazakhstan are a set of substations, switchgears and connecting 0.4-1150 kV transmission lines intended for transmission and/or distribution of electric power (Sereno and Efthimiadis, 2018).

The role of the backbone network in the Unified Energy System of the Republic of Kazakhstan is performed by the national electric grid (NES), which provides electrical connections between the regions of the republic and the energy systems of neighboring countries (the Russian Federation, the Kyrgyz Republic and the Republic of Uzbekistan), as well as electric power transmission and transmission to wholesale consumers. Substations, switchgears, interregional and (or) interstate power transmission lines and power transmission lines that carry out the electric power generation of power plants with a voltage of 220 kV and higher that are part of the NES are on the balance sheet of JSC "KEGOS."

Kazakhstan is the world leader in the production of uranium (Figure 2). At the moment, nuclear energy is not used in Kazakhstan, despite the fact that the reserves (according to the IAEA) of uranium in the country are estimated at 900,000 tons. The main deposits are in the south of Kazakhstan (SKO and Kyzylorda oblast), west to Mangystau, in the north of Kazakhstan (the Semizbai field). (Information on investments…, 2009).

In Kazakhstan, in addition to traditional sources of energy and to a small extent, unconventional sources are used. The share of renewable energy resources does not exceed 0.2% of the total power generation. Wind energy in Kazakhstan is not developed, despite the fact that there are suitable natural conditions for this. For example, in the area of the Dzungar gate and the Chilik corridor, where the average wind speed is from 5 to 9 m/s. In general, technologically available potential reserves of wind power in Kazakhstan exceed the capacity of the currently produced electricity in the country by many orders of magnitude.

Figure 1: Dynamics of energy production and consumption in the Republic of Kazakhstan for 2000 - 2020 years (Agency of the Republic of Kazakhstan on…, 2014)

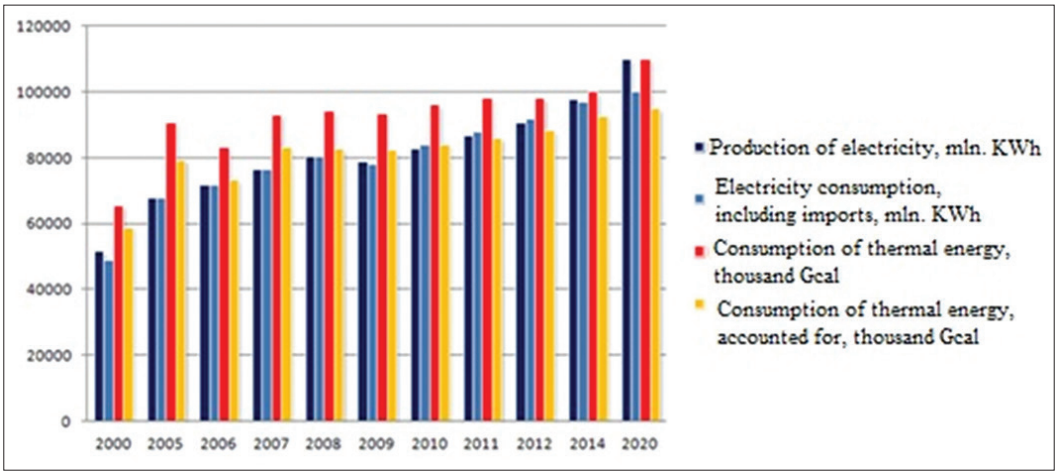
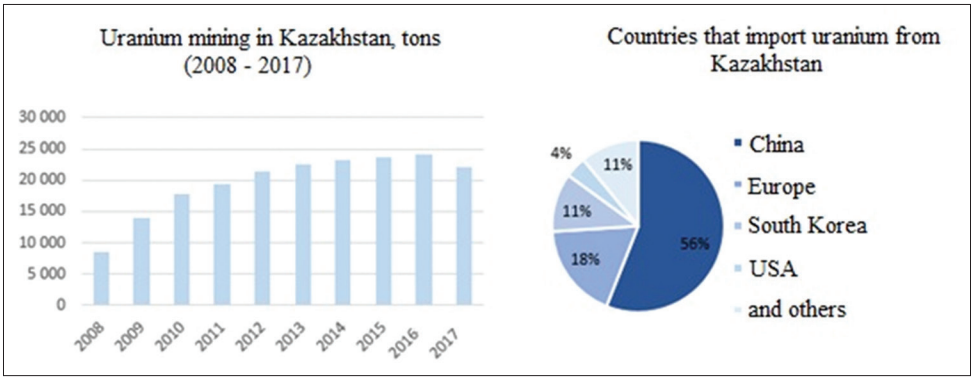


Figure 2: The volume of uranium mining and import from Kazakhstan



The complexity of designing efficient wind farms is determined by many problems: Wind energy is absent and sporadic; extreme uneven generation of energy, making it unsuitable to use wind power stations without power damping systems, that is, accumulating stations; sporadic occurrence of hurricanes and ice sheets, destroying aerodynamic devices of wind power stations; low reliability of mechanical systems, which requires the maintenance of repair and recovery brigades.

A comparative analysis of the use of wind energy is shown in Figure 3.

The use of solar energy in Kazakhstan is also insignificant, despite the fact that the annual duration of sunlight is 2200-3000 h/year, and the average power is 130-180 W/m^2. This situation is due to the fact that the cost of electricity and energy in Kazakhstan is relatively low, and therefore it is difficult for solar power plants to compete with thermal and diesel ones; In Kazakhstan there is no own production of solar cells and batteries, there is no real state assistance to the development of this industry. Therefore, it is necessary to attract investment technologies to the energy sector.

3. WAYS TO DETERMINE THE INVESTMENT ATTRACTIVENESS OF AN ENERGY COMPANY

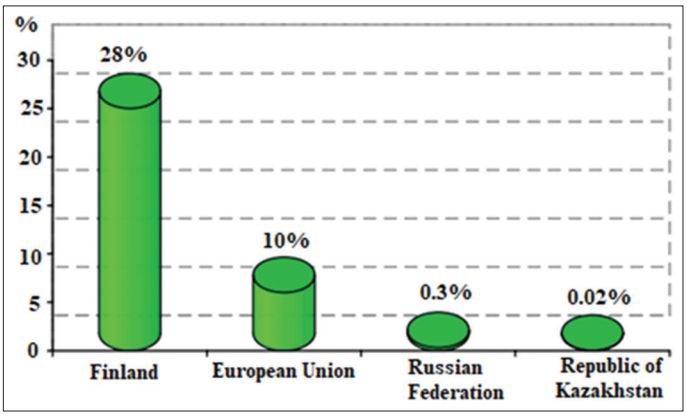
Using the calculation of the index of industrial development of the territory (I_i) was determined the level of industry's development in each administrative district of the Republic of Kazakhstan, which is determined by the formula:

$$I_i = \frac{V}{\sqrt{N \times S}} \quad (1)$$

This integral indicator correlates the following indicators: V - the volume of industrial products' production (goods and services) ($ million); N - population size (thousand people); S - area of the territory (thousand km^2).

To carry out the typology of the WKR's administrative districts in terms of the favorable conditions for attracting investments in the industry, was chosen the method of grading and scoring the

Figure 3: Share of use of alternative energy sources from total energy consumption (%)



social and economic development of the region, developed by the Ministry of Economic Development of the Russian Federation. This method allows you to combine different indicators and obtain an integral value on the basis of which it is possible to conduct a typology and to reveal territorial differentiation or similarities at the level of different territorial administrative units.

We propose a system of basic indicators for determining the degree of favorable conditions for attracting investments in the industry, including the following indicators:

1. Population density (per km^2);
2. Territorial density of infrastructure facilities on the balance sheet value (net of depreciation) of fixed assets ($ million per 1,000 km^2);
3. Level of industrial development (index of industrial development of the territory);
4. The number of functioning industries.

In accordance with the methodology of the rank-and-score assessment, the integral indicator is calculated step-by-step. At the first stage, for each of the 5 basic indicators, the rank of each specific administrative region is determined, starting with the best (first place) and ending with the worst value (last place); the rank of the average regional index value is also determined. At the second stage, a score is calculated for each of the indicators of each administrative district $(Ball(Ind)^i_1$. The formula has the following form:

$$Ball\ (Ind)_1^i = Range\ (Ind)_1^R - Range\ (Ind)_1^i \quad (2)$$

where, *ange (Ind)*$_1^R$ is the rank of the average regional value in the general ranking series; *Range (Ind)*$_1^i$ is the rank of the *i*-th administrative district in the general ranking series. At the final, third stage, for each administrative district of the region, the scores given are summarized by the aggregate of all 5 accountable basic indicators, followed by dividing by 5:

$$ComplexBall(Ind)_1^i = \frac{\sum_{i=1}^{5} Ball\ (Ind)_1^i}{5} \quad (3)$$

Thus, it is possible to identify the influence of the main factors that determine the degree of favorable conditions for attracting investments in the industry of the RK administrative districts.

The territorial differences in the investment attractiveness of the RK industry were determined using the following indicators: The volume of investment in fixed assets by types of economic activity of industry; the volume of investment in the fixed capital of industry per capita; index of the investment attractiveness of the territory's industry.

The index of investment attractiveness of the territory's industry was determined by us on the basis of the following formula:

$$I_i = \frac{I}{\sqrt{N \times S}} \quad (4)$$

Where *I* is the volume of investments in the fixed capital of industry ($ thousand); *N* is the population number (thousand people); *S* is the area of the territory (thousand km^2).

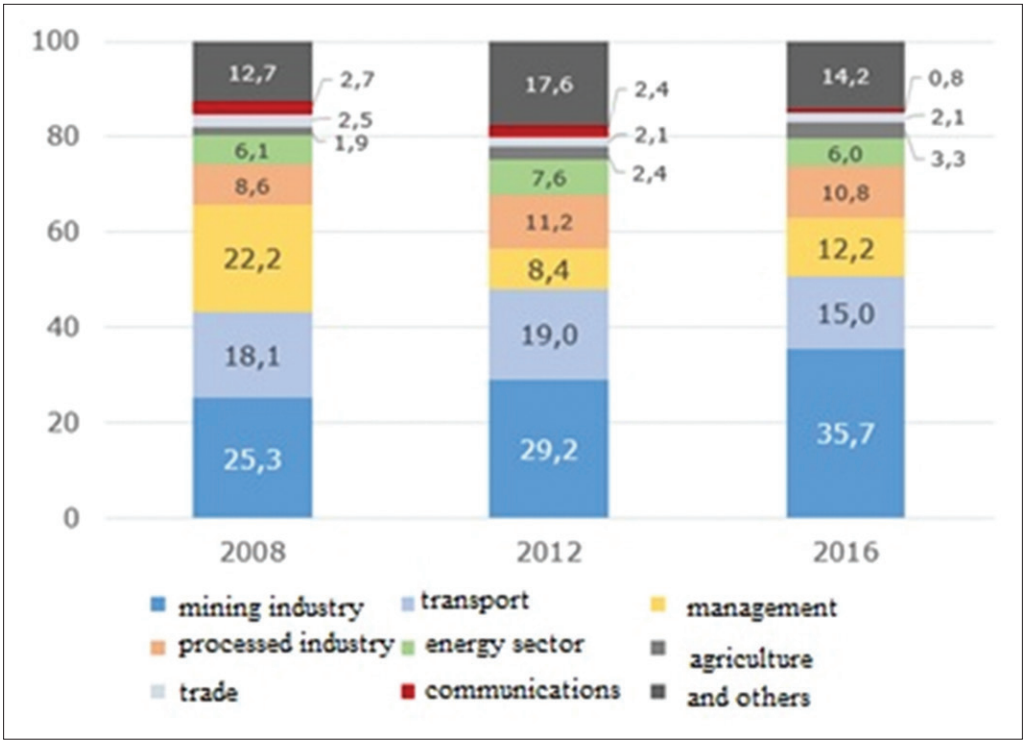
The use of the above research methods and indicators allowed us to identify territorial differences in the investment attractiveness of the industry.

4. FEATURES OF INVESTMENT IN THE ENERGY

The Ministry of Energy of Kazakhstan expects investments in energy in 2017-2025 over 17.5 trillion tenge. At the same time, it is planned to invest 14.5 trillion tenge of private funds in the oil and gas industry (82.6% of the total volume of investments); in oil refining - 10.5 billion tenge of private funds (0.06% of the total volume of investments); in atomic energy and industry - KZT28.3 bn. of private funds (0.16% of total investments); in oil and gas chemistry - 2.53 trillion tenge of private funds and 488 billion tenge from the budget (17.17% of total investment).

There is an increase in investments in fixed assets in all types of industry's economic activity. In terms of volume, the fixed assets are dominated by a group of mining industries, whose share in the structure of the region's industrial sector investment attractiveness has dropped to 86.6%. During the period under review, the share of the manufacturing industries' group in the total volume of investment in the industry's fixed capital increased from 2.2% to 7.2%. There is an increase in the share of electricity, gas, steam and air conditioning, as well as water supply, sewerage, control over waste discharge and distribution. The total share of investments in the industry of Kazakhstan is shown in Figure 4. As can be seen from the figure, investments in the energy sector are not included in the top five investments.

Figure 4: Sectoral structure of investment in fixed assets in the Republic of Kazakhstan, %



The territorial differentiation of the industry's investment attractiveness is a consequence of the influence of many factors, among which one can single out the population density, the territorial development of the production and transport infrastructure, and the level of the territory's industrial development. The number of investments, by years, in renewable energy sources (RES) is shown in Figure 5.

For a decade, the structure of investments in research and development for various types of renewable energy has also changed significantly. If the share of investments in wind energy remained almost unchanged (about 40%), then the share of solar energy grew from 22% to 56%. To date, this is the most promising direction of R & D in this area (Mallick et al., 2018).

Since the start of the "tariff-for-investment" program in 2009, in the Republic of Kazakhstan (the program was limited to the electric power segment and is being completed this year), the volume of investments in the energy sector grew >2½ times (264%).

At the end of 2014, the volume of investments reached 541.2 billion tenge. The total volume of investments in the energy sector over the past 6 years amounted to 2.23 trillion tenge (about 14 billion dollars, taking into account the average exchange rates for each year in this period) (Table 1).

Figure 5: Global investment in renewable energy sources research and development

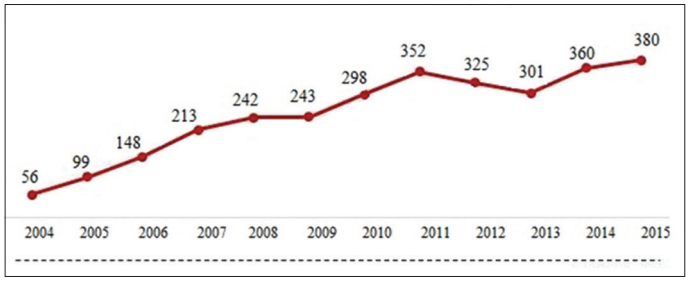


Table 1: Structure of investments in the energy sector of the Republic of Kazakhstan (billion tons)

???	Total		Growth to total		Share of total volume	
	2016	2009	2016		2016	2009
Total	541.2	205.3	263.6%	335.9	100.0%	100.0%
Own	235.5	72.9	323.0%	162.6	43.5%	35.5%
Budgetary	226.9	88.0	257.8%	138.9	41.9%	42.9%
Borrowed *	47.3	19.4	243.8%	27.9	8.7%	9.4%
Foreign **	13.5	25.0	54.0%	-11.5	2.5%	12.2%

*In 2016: Without loans from foreign banks. **In 2016: Including loans from foreign banks

In the structure of the sources of investment in the fixed capital of the companies of the sector, two types are singled out, which in the end provided 87% of the investments in the energy complex: Own funds of market participants and money from the budget.

Although by 2014 investments of market participants exceeded state investments (44% against 42%), at the initial stage (2009-2010) it was the budget that assumed the role of the accelerating investment process. At the same time, the state's investment activity is growing throughout the entire period: If in 2009 the budget allocated 88 billion tenge for energy, then in 2014 - 227 million (Lundgren *al.*, 2018).

Energy - a sector of sustainable reinvestment: Since 2009, companies have invested 955.4 billion tenge in their development, increasing investments by an average of 28% per year.

For example, the largest energy-generating state holding Samruk-Energo in 2009-2014 invested 413.5 billion tenge under the program "tariff in exchange for investment." Two production assets of TsAEK (Pavlodarenergo and Sevkazenergo) during this period invested 102.6 billion tenge in the modernization of their generating assets. A pair of the largest energy projects of the Eurasian Group (implemented in the Aksu Electric Power Plant) are pulled at KZT 65 billion. AES invests 41 billion tenge in its Kazakhstan assets in 2013-2015. "KazTransGas" has carried out capital investments in 2009 with a volume of about 245 billion tenge (Bakke et al., 2016).

Borrowed funds accounted for only 10% of investments in the sector in 6 years. Growth in the use of bank loans in the sector is not observed. The national banking system has not yet been able to take the place of a significant source of funds in the sector that needs long and cheap money.

The relative share of the territories in the remaining 10 regions was 1.6%. The features of the territorial differentiation of the investment attractiveness of the WKR industry are shown in Figure 6 (Imashev and Safiullin, 2015; Imashev, 2016; Imashev and Begeyeva, 2018).

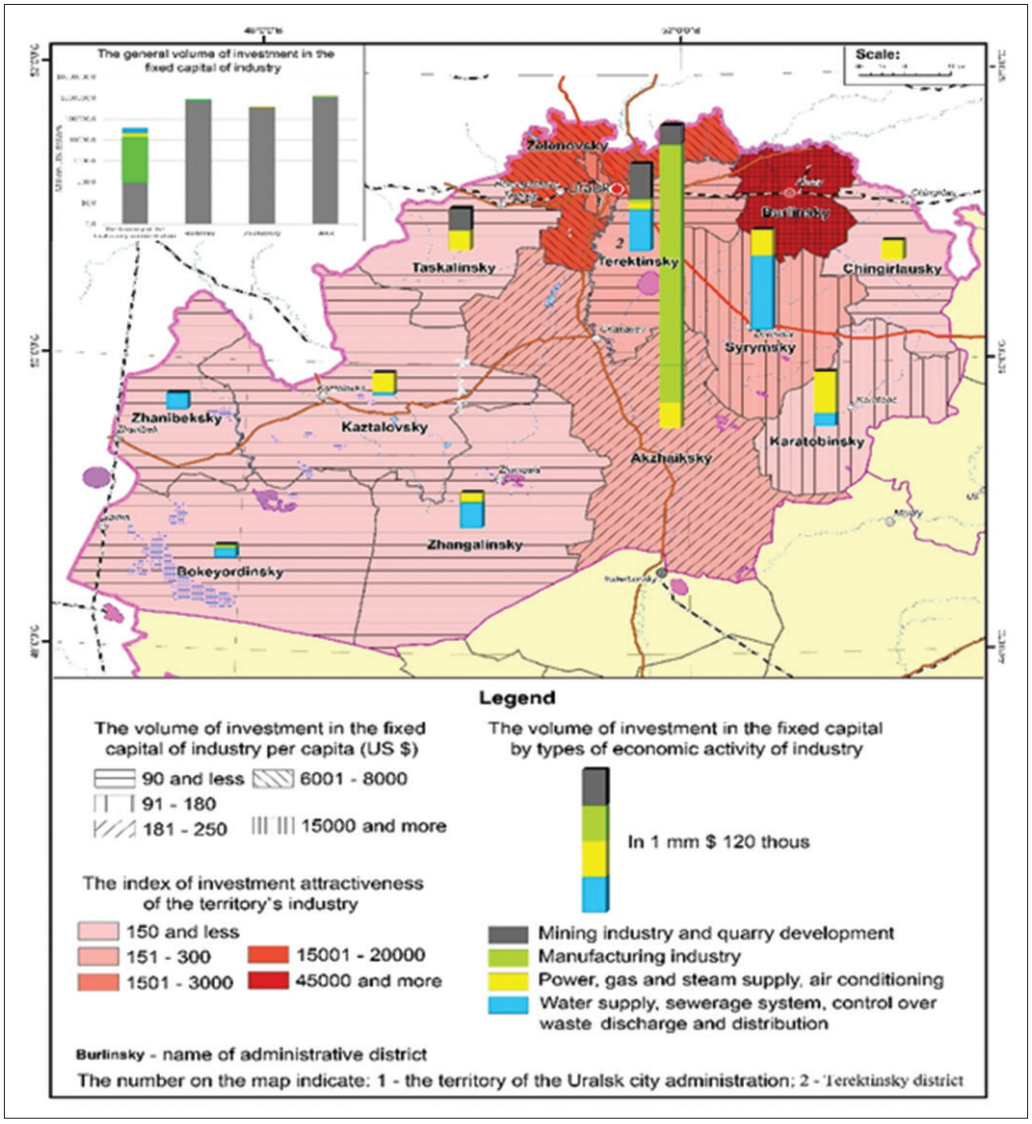
On the territory of the WKR, as of 2015, the oil-extracting industry and the gas industry were characterized by the highest indices of investment attractiveness, with a relative share of 86.6%, which were developed in the Burlinsky and Zelenovsky districts. Using the formulas (1) - (5), a ranking index was determined in the West Kazakhstan region of the Republic of Kazakhstan (Table 2).

A natural process is the contribution of the own funds of industrial enterprises to the development of their field of activity. Public

Table 2: Typology of the WKR administrative districts by the degree of favorable conditions for attracting investments in the industry as of 2015

Degree of favorable conditions	Name of administrative districts	Indices of rank-and-score assessment
Favorable	Territory of the Uralsk city administration, Burlinsky, Zelenovsky	from 0.6 to 1.8
Less favorable	Terektinsky, Chingirlausky, Taskalinsky, Akzhaiksky	from 0 to−3
Unfavorable	Kaztalovsky, Zhanibeksky, Karatobinsky, Syrymsky, Bokeyordinsky, Zhangalinsky	from−4 to−6,8

Figure 6: Territorial differentiation of the investment attractiveness of the WKR industry in 2015 (Pavlinov, 2003)



funds went to the development of industrial enterprises that provide water, electricity, gas, steam and work related to their maintenance.

5. CONCLUSIONS

It is known that Kazakhstan possesses large reserves of energy resources (oil, gas, coal, uranium) and is an energy power. But for the development of these industries, it is necessary to attract investment. Innovations of the energy plan are implemented by different countries in the most actively used industries, and also borrow from each other. The investment cycle in the energy sector takes an average of at least 3 years. Thus, the period 2009-2014 can be conditionally divided into at least two investment cycles. Investors' activity was constrained by crisis phenomena in the domestic economy. The second cycle was more productive: Own investments doubled (207%), budgetary - by 59%. Market participants were able to attract 12% less borrowed funds and 54% less foreign investments. In the energy sector of Kazakhstan is expected to increase investment in the period 2017-2025. Thus, under the influence of development factors, the investment attractiveness of the industry is characterized by the features of territorial and sectoral differentiation.

As for nuclear energy, new technologies bring it to a special category and allow such energy production at the border with RES. Moreover, in the future nuclear power can become the basis. Perhaps in Kazakhstan in the future RES will be used along with traditional ones. In Kazakhstan, such diversification will allow, on the one hand, to make full use of the country's richest resource potential, and on the other hand, it will protect against excessive carbon and hydrocarbon dependence.

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