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РЕСПУБЛИКИ КАЗАХСТАН

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OF THE REPUBLIC OF KAZAKHSTAN

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**POWER SUPPLY OF KAZAKHSTAN
AGRO-INDUSTRIAL COMPLEX WITH WIND TURBINES USE**

Abstract. Analysis of the dynamics of world energy development and energy forecasts organizations indicate that currently there are processes to reduce energy intensity of production, consumption of exhaustible resources and increasing the share of renewable energy in the total energy balance.

Keywords: wind speed, power of the wind flow, the energy of the wind flow, wind cadastre, reception of electric energy.

Introduction. Currently, under the influence of innovation processes, a new structure of the world energy. This trend reflects the typical characteristics of an emerging post-industrial society, which is characterized by the growth and spread of information technology and the reduction of energy consumption and resource intensity in the material production sectors. Unlike the industrial economy, new technological solutions do not require the same amount of non-renewable natural resources and energy. There is a tendency to halt the growth of energy consumption per capita in developed countries. In the last 30 years, per capita energy consumption in them left-moose virtually unchanged.

With regard to the basic energy carrier for the post-industrial economy was a unique situation that is different from similar transients when changing technological structures in the industrial economy, where the gradual substitution of one energy source by another, qualitatively the best.

Research methods. As research methods and sources of information have been taken: the analysis of the primary data; Expert interviews; Media monitoring; specialized databases; monitoring of official statistics; special and trade publications; conference proceedings; their own knowledge base and research.

Introduction. At present, we can say that in the next decade the main geographical picture of the world of energy is the fact that the global energy balance between the main energy is parity - for each, and coal, oil, natural gas will account for roughly equal shares.

If the global renewable energy will grow at the same rate, the share of renewable energy of 30% by 2030, such as the head of the United Nations Industrial Development Organization (UNIDO) Kande Yumkellae. Really costs to estimate the share of 20%, which is already in the global energy balance will be comparable with the basic energy (Figure 1).

Today, the whole sphere of alternative power generation, including wind energy, is actively developing in the world. New global challenges such as rising fuel prices, energy security and a marked climate change, caused the need to find new sources of energy, which would meet the modern requirements of the industry. Already by 2010, with the wind power help has been obtained of 152 GW. Wind power - one of the most promising and fastest growing segments of the whole alternative power.

Formulation of the problem. One option for energy supply of agricultural production at the present stage is the widespread use of renewable energy sources.

In the world market of alternative energy in 2009 is marked as one of the worst in the history of the world economy. The main efforts of companies around the world focused on survival rather than development, and the government measures aimed at keeping the economies of even greater falls.

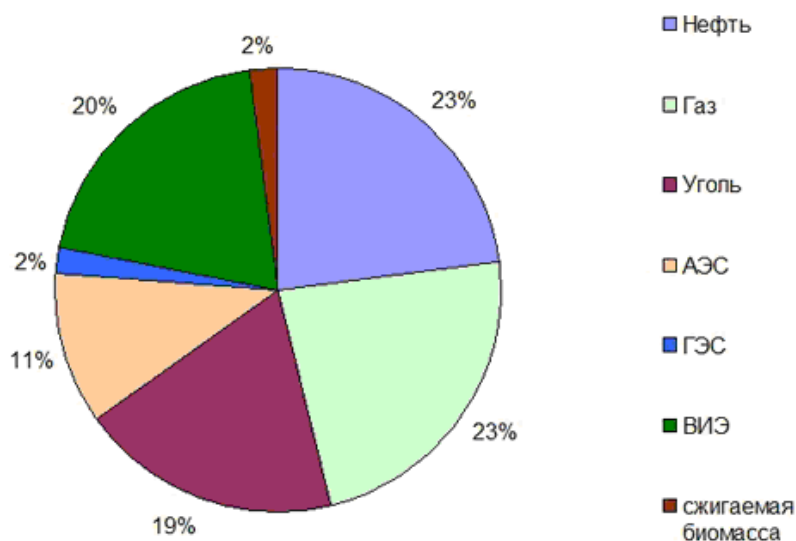


Figure 1 – Assessment of the energy balance of the world structure 2030 (%)

Despite the widespread reduction markets, clean technology sector continues active development worldwide.

Sector support at the state level. Thus, approximately \$100 billion of the 787 billion US investment in maintaining and stimulating the economy will be submitted to the cleantech; South Korea to invest in "green program" of about \$ 84 billion; Chinese program involves the allocation from 440 to \$660 billion in clean-tech sector for 10 years [1, 2].

In 2010, the alternative energy market has become much more diversified in terms of technology. If in 2005 the main options for obtaining alternative energy were reduced to hydropower and biomass, it is now the key sources were considered to be the wind and sun. These areas most actively developed in the past few years.

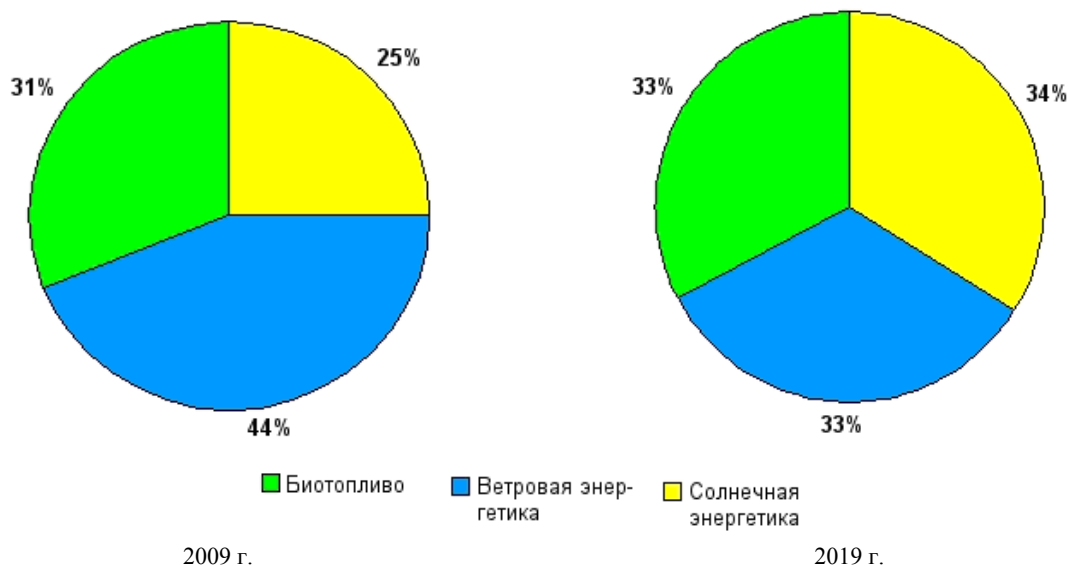


Figure 2 – Structure of the alternative energy market in the world

In particular, wind power in 2011, has become one of the fastest growing industries in the world. Thus, according to the World Wind Energy Association (WWEA), the total power produced by wind power plants in 2010 amounted to 196 GW, while in 2011 - already 213 GW. In practice, this means that about 10% of electricity in Germany is already produced wind turbine. For Denmark, the figure is closer to 23%.

In the world industry of solar, wind energy and bio-fuels increased by 15.8%, reaching US \$144.5 billion. However, the growth showed only a sector of wind and bioenergy, while the volume of the solar energy market has declined.

Nevertheless, by 2019 it is expected to increase in the basic sectors of the renewable energy market (figure 2, 3). It is expected that the industry as a whole will add 137% by 2019, and the largest share will belong to the solar energy, which will show the highest growth rate, an increase in 10 years by 127% [3].

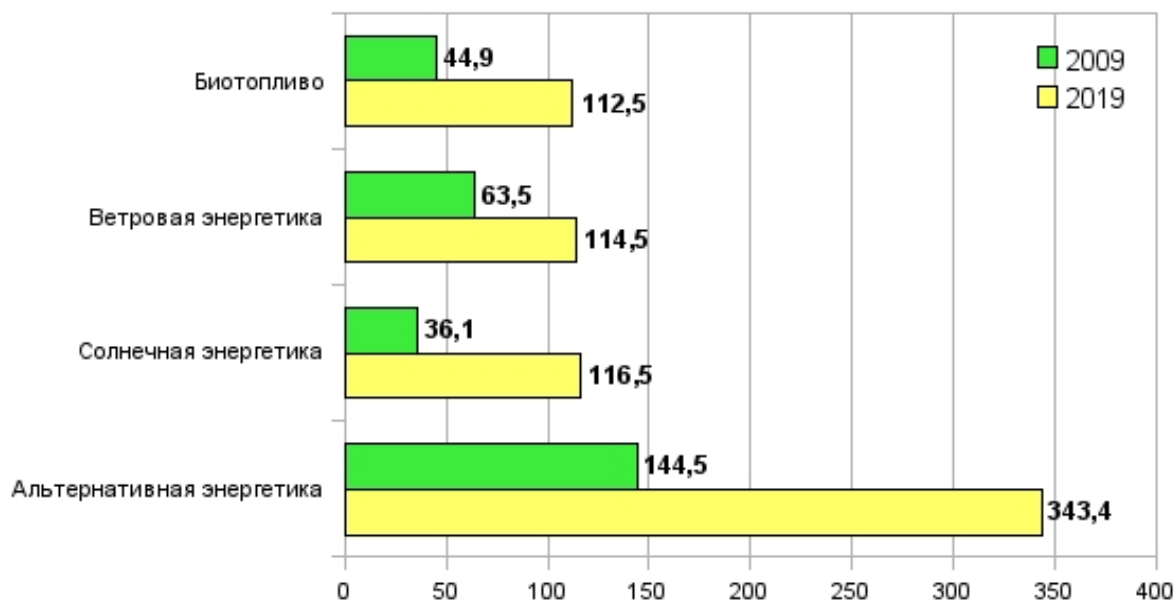


Figure 3 – The dynamics of the global renewable energy market in 2009-2019, billion \$

It may be noted the following trends in the development of alternative energy:

- The global market for biofuels (bioethanol and biodiesel) reached \$44.9 billion. In 2009 and, according to experts, will increase to \$112.5 billion in 2019. The total volume of bioethanol and biodiesel in the world amounted to \$23.6 billion in 2009.

- Wind energy market, which refers to the volume of new installations in 2009 was estimated at \$63.5 billion., Adding a record 37,500 MW. Prospects for growth in 2019 - US \$114.5 billion global leader in wind power is China, which accounts for a third of all global installations.

- The solar energy industry, including solar segments and installations was estimated in 2009 at \$36.1 billion., It was established more than 7 GW of new batteries. Regarding the 2008 solar energy market decreased by 6% in 2009. Fell the price of solar panels with \$7 per watt to 5.12 dollars per watt of installed capacity. By 2019, according to forecasts, the solar power will reach US \$116.5 billion.

It is well known that the economic efficiency of wind power plants is obtained when the average wind speed will exceed 4.5-5 m/s, and the time of use exceeds the nominal power of wind turbines 2000-2500 hours per year. According to these indicators, the most prospects in the Northern and Western regions [4].

Results. Wind energy, in our opinion, should be developed in two directions [5]:

- wind energy system;
- stand-alone wind turbines low and medium power.

For example, Australia has set a target to achieve by 2020 the annual electricity production in the amount of 45.000 GW·h at the expense of renewable energy sources. As expected, the industry division of the system and autonomous sector will attract new investment and accelerate the pace of growth of the national wind energy.

In case of absence or poor development of distribution networks, the key role should belong to small, decentralized and stand-alone wind energy systems, in combination with other renewable energy sources.

When considering the possible sources of renewable energy, it is necessary first of all to consider those sources that are found in the Republic of Kazakhstan, and in our case, in the Northern region.

Wind Atlas of Kazakhstan is a map information, which includes long-term wind map of wind speed in the territory of the Republic of Kazakhstan, the administrative map of the Republic of Kazakhstan with the distribution of long-term wind speed, energy infrastructure map of the Republic of Kazakhstan.

Wind map is a map of the area with the distribution of long-term wind speed at a height of 80 meters above the ground in accordance with the scale of wind speed.

Wind Atlas developed by the specialists of "PB Power" companies and «Windlab Systems» (Australia) in a joint «UNDP/GEF» project and the Ministry of Energy and Mineral Resources of the Republic of Kazakhstan "Kazakhstan - the initiative of the market development of wind power." Wind Energy Development Program provides:

Stage 1. Of 2009-2010. Development of regulatory and technical documents, the creation of scientific-technical and information base, research work.

2nd stage. For 2011-2015. Implementation of projects: the construction of wind farms with total capacity of 250 MW.

3rd stage. 2016-2030 gg. Input capacity at wind farms - 1750 MW.

Only the development of the wind energy system will not solve all the problems with the energy supply of the Republic of Kazakhstan population, as difficulties with control of power systems, if wind power stations connected capacity exceeds 10% of the capacity of the system is, firstly, and secondly, there are problems with the transfer of energy generated by consumers. It makes no sense to generate electricity when it is difficult to convey or transfer will be accompanied by large losses due to the depreciation of distribution networks. Especially it concerns the agro-industrial sector and in rural areas, where nearly half the population of our country.

It should be added that if the production of the wind turbine system we have in Kazakhstan will be great difficulties, the production of stand-alone wind turbine capacity from 1 to 10 kW is much easier to organize.

In recent years, there has been a trend in the development of wind energy in Kazakhstan. National program for the development of wind power by 2015 with a view to 2024, prepared under the joint project of the Ministry of Energy and Mineral Resources of Kazakhstan and the United Nations Development Programme "Kazakhstan - Wind Power Market Development Initiative".

Kazakhstan has developed machine building complex, which makes it possible in the future to create a production of wind turbines on local enterprises. This will reduce the cost of building wind farms and, consequently, the cost of electricity from wind farms. The development of modern technology wind energy building contribute to industrialization and socio-economic development of the country.

There is no doubt that with an increase in production volumes decreased and the most important technical and economic indicators - the cost of 1 kW of installed capacity. Comprehensive indicator of the effectiveness of wind energy is the price of electricity generated by wind turbines.

The high price of electricity due to higher specific capital costs of wind farms - 3000-4000 \$/kW vs. 2000-2200 \$/kW for coal-fired plant and 1600-1800 \$/kW for gas turbine-term.

However, with an increase in the production of wind turbines their cost is falling, while the price of fossil fuels in the medium term rising. According to forecasts, the price of kW·h, produced by wind turbines, will be equal to the price of kW·h, produced from fossil fuels by 2025.

Thus, this clean and renewable form of energy in the near future will become one of the main sources of the energy needs of the world community.

Due to the low energy density streams of renewable power plants, they are effective at low energy from their centers unit power consumers and distance. It is in the first place - agricultural production [6].

The use of renewable energy resources, as experience has shown, faster economic development of rural areas, and this power by virtue of their specificity corresponds to the rural way of life, rather than the city.

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**ҚАЗАҚСТАННЫҢ АӨК-ні ҚОЛДАНУ ЖЕЛ
ЭНЕРГЕТИКАЛЫҚ ҚОНДЫРҒЫЛАРЫН ЭНЕРГИЯМЕН ҚАМТАМАСЫЗ ЕТУ**

Аннотация. Әлемдік энергетиканың дамуының динамикасы мен энергетиканы ұйымдастыру қазіргі уақытта энергетика өнеркәсібінде энергетика сыйымдылығының төмендеуі, энергетикалық ресурстарды тұтынудың азаюы және дәстүрлі емес энергия көздерінің жалпы энергетикалық баланста артуының дәлелі болып табылады.

Түйін сөздер: жел жылдамдығы, жел ағынының қуаты, жел ағынының энергиясы, жел кадастры, электр энергиясын алу.

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**ЭНЕРГООБЕСПЕЧЕНИЕ АПК КАЗАХСТАНА
ПРИМЕНЕНИЕМ ВЕТРОЭНЕРГЕТИЧЕСКИХ УСТАНОВОК**

Аннотация. Анализ динамики развития мировой энергетики и прогнозы энергетических организаций свидетельствуют о том, что в настоящее время происходят процессы снижения энергоемкости производства, энергопотребления истощаемых ресурсов и увеличение доли возобновляемых источников энергии в общем энергетическом балансе.

Ключевые слова: скорость ветра, мощность ветрового потока, энергия ветрового потока, ветровой кадастр, получение электрической энергии.

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