Ensuring energy security: global trends and Russian practice

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Abstract. The article describes the latest global trends in the field of energy security and energy efficiency. The experience of developed countries in energy efficiency, as well as experience and dynamics in the Russian Federation, are analyzed.

1. Introduction
Now, energy is able to meet the demand that humanity imposes on it, but the ever-growing need for energy resources, accompanied by rising energy costs, environmental degradation and geopolitical instability, are pushing countries to switch to energy-saving technologies and energy efficiency. Success in this area varies depending on the area and country. In general, statistics suggest that if no energy saving programs were implemented, the world economy would use 12% more energy during the period from 2000 to 2016, which is comparable to the total demand of the European Union countries [1, 3].

The International Energy Agency believes that improving energy efficiency is one of the key reasons for reducing greenhouse gas emissions into the atmosphere. The transition to renewable energy and alternative fuels managed to outweigh the negative effect of economic growth on greenhouse gas emissions.

2. Materials and Methods
A methodical approach to the development of proposals for the implementation of energy efficiency policies based on the optimization of production capabilities and market requirements of the region is used in the work. The studies are based on an understanding of the development trends of the international energy system and the determination of the parameters of the problem sectors of the energy-saving technologies market. They are based on conducting a comprehensive analysis of the state of the international energy security system, identifying existing problems and developing proposals for optimizing production capabilities and taking into account the needs of the energy market in the region.

3. Results
The introduction of energy-saving technologies had a positive effect not only on the environment. In terms of energy security, many countries have significantly improved their positions. Countries such as Germany and the UK are now reporting a higher ability to cope with peak loads on the grid and less dependence on energy imports [2].

On average in the world, consumers also benefited from improved energy efficiency. Households now save between 10% and 30% of energy costs, and this effect is noticeable not only in developed but also in developing countries, such as China, where this indicator is 25%.
The industrial sector of the economy throughout the world is actively adapting innovative approaches to energy management and introducing them into production. From 2000 to 2016, energy use per unit of economic output has decreased by 20%. Moreover, a further decrease in this indicator is projected as the introduction of new production facilities that meet energy efficiency standards occurs, and old plants and factories drop out. The combined use of financial incentives and government coercion has led to large-scale adaptation of energy management systems, which have helped enterprises save about 10% of their energy costs.

The field of construction and housing and communal services also began to change after other sectors of the economy. New buildings are equipped with technologies to reduce their consumption of energy resources. However, in this area, energy efficiency has not yet been able to overcome the growth of space. And there is great potential for improving the situation through the introduction of new and tightening of existing construction standards.

The automotive market is on the verge of significant change. For many years, government policy in this market focused exclusively on passenger cars, however, now, a policy of encouraging more efficient use of fuel in trucks is being developed. There is an increase in sales of electric cars in the car market. Despite the slowdown in 2016, this growth gives hope for the gradual ousting of gasoline engines by electric ones, although this trend is under threat. Because more often, consumer demand is growing for less energy-efficient car models: large passenger cars and SUVs.

The development of energy-saving technologies continues to experience an increasing inflow of investments from year to year. The leaders in investment growth are China (24%) and European countries (30%) [4].

Energy service companies continue to demonstrate their expansion in the market. The market for their services was estimated at $ 26.8 billion in 2016. 60% of which are in China with Europe and the USA, they are in second and third place with shares of 20% and 10% respectively.

Regulators are gradually finding new ways to create a market mechanism for the efficient allocation of energy efficient technologies, which increases the investment attractiveness of the industry and increases competition in it.

4. Discussion

Despite these positive changes in energy efficiency, there are a number of factors causing concern to regulators and international organizations. Thus, 68% of total energy use is not subject to energy efficiency programs. The share of energy resources used outside of these programs is growing annually, but in recent years, this growth is achieved more by continuing to comply with existing standards than introducing new ones. The tightening of standards is also slowing, although some states, such as Denmark and Germany, continue to raise energy efficiency standards at a stated rate. Overall, the energy efficiency improvement program index of the International Energy Agency showed the following. There is a slowdown in the improvement and dissemination of government energy efficiency programs: its growth in 2016 was below the average over the previous 15 years [5].

In Russia, the dynamics in the field of energy efficiency is significantly different from the world. Russian Ministries and Enterprises use in their reports indicators that are very different from those used in the member countries of the International Energy Agency. So, in Russia, just the specific use of the final energy per conventional unit of production is estimated, whereas in world practice, the final use of energy per unit of gross value added is taken to be measured. In some areas of the economy, the relevant agencies have announced plans for the transition to global measurement standards, but this has not happened yet. In Russia, at the moment, a number of extremely important economic indicators for calculating the energy efficiency of the industry / sub-sector of the economy do not have accounting indicators. As an example, we can cite the fact that in the field of transport there is no information on the consumption of energy resources by cars, measurements are carried out only on regular bus transport of people and freight traffic. The data cited by the Ministry of Energy of the Russian Federation with reference to experts indicate that in the Russian Federation there is a decrease in the consumption of energy resources due to modernization and a slowdown in the decline in GDP [6].
On the one hand, a comparison between world and Russian practice is not possible due to the use of different indicators and units of measurement. On the other hand, we can look at the components of the state policy of the Russian Federation in the field of energy efficiency. Since 2012, work on creating an effective management system in this area has been underway. The result of this work was the inclusion of energy efficiency indicators in 5 of 13 sectoral government programs [7]. At the level of subjects, 63% of targeted state programs contain energy efficiency indicators, and each region has at least one such program. The state information system “Energy Saving” was installed at 94% of budget institutions to assess energy consumption. A system of financial incentives for the development and implementation of energy-saving technologies, including simplified access to financial resources and tax incentives, was created. The Ministry of Energy has resorted to cooperation with the Ministry of Culture and partners from the private sector to hold the festival #VmesteYarche, to increase public awareness of energy saving methods and available technological solutions in this area.

5. Conclusion

Russia is actively developing international cooperation on energy efficiency, in particular, the country became a member of the Global Construction Alliance initiative held in the framework of the Paris Climate Conference in 2015. The Ministry of Energy identifies the following areas for further work on energy efficiency:

1. Continuing the practice of decommissioning inefficient heat generating capacities with specific fuel consumption well above average;
2. The introduction of effective mechanisms to regulate the heat market, aimed at encouraging an increase in the share of heat sources operating in the combined generation mode in heat load;
3. The introduction of advanced energy-efficient technologies in construction and overhaul in the public and residential sectors, as well as a large-scale transition to energy-efficient LED lighting in both internal and external lighting.

Both in Russia and in the world, work on improving energy efficiency is carried out in three key sectors: in industry, construction and housing and utilities, as well as in transport.

To measure industrial energy efficiency, the International Energy Agency uses two indicators: energy intensity and energy performance. The first indicator is calculated as the final energy consumption per unit of gross value added, and the second as value added per unit of energy consumed. Thus, the transition to energy efficient production is the task of maximizing energy performance, accompanied by minimizing the energy intensity of production.

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