COMPREHENSIVE ENERGY SAVING MEASURES IN GERMANY AND BRITAIN*

Oleg Vladimirovich Kabanov1**, Stepan Aleksandrovich Panfilov 1, Asya Gevorgovna Sadunova2, Nuryagdy Annagurbanovich Aynaz4, Evgeny Alexandrovich Lyalin5, Mariya Sergeevna Klimenkova6

1National Research Ogarev Mordovia State University, 68 Bolshevistskaya Street, Saransk, 430005, Republic of Mordovia, Russia
2Plekhanov Russian University of Economics, 36 Stremyanny Pereulok, 117997 Moscow, Russia
3Turkmen State Institute of Finances, 48-A, A. Berdyikey Street, Ashgabat, 744000, Turkmenistan
4Plekhanov Russian University of Economics, Institute of Economics, Russian Academy of Sciences (IE RAS), 36 Stremyanny Pereulok, 117997, Moscow, Russia
5Perm State Agro-Technological University named after Academician D.N. Pryanishnikov 23 Petropavlovskaya Street, Perm, 614990, Russia
6MIREA - Russian Technological University, 78 Vernadsky ave., Moscow, Russia

Abstract

In recent years, the issue of energy conservation has gained increasing attention due to concerns over the shortage of fossil fuels and the environment. Wind and solar energies have emerged as the primary clean and efficient alternatives to fossil fuels in various industries. The level of economic development and quality of life of a country's population largely depend on the availability of reserves of fuel and energy resources, as well as their efficient utilization. To address these issues, many countries have implemented national targeted programs aimed at conserving fuel and energy resources. Germany and England have accumulated significant experience in this area, with both countries implementing comprehensive energy-saving measures to reduce dependence on fossil fuels and increase the use of renewable energy sources. This paper examines the energy-saving policies and measures implemented in these countries and evaluates their effectiveness in achieving energy conservation goals.

Keywords: energy consumption, energy saving technologies, energy supply, photovoltaic industry, wind energy

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** Corresponding Author: Vladimirovich.vkabai@gmail.com
1. Introduction

Massive changes in the atmospheric climate, the reduction of fossil energy resources on the planet are forcing the civilized world to concentrate the greatest interest on the efficiency and effectiveness of the use of existing energy resources and increasing the share of renewable sources (Kabanov and Panfilov, 2015; Malinauskaite et al., 2019; Panfilov et al., 2015; Panfilov and Kabanov, 2016). Without exaggeration, we can say that in this sense, Germany today, as they say, is ahead of the rest. Energy saving is a set of measures aimed at the conservation and rational and reasonable use of electricity and heat (Panfilov et al., 2016; 2018).

The use of wind energy to generate electricity is currently the most efficient and productive renewable energy technology in Germany. In 2009, this sector grew by 15%, reaching a capacity of 26,000 MW. The total number of turbines reached 21163 units (Sergeevna et al., 2020a and 2020b).

According to the plans of German power engineers, by 2020 the production of electricity generated by wind turbines will reach 149 billion kWh, with a capacity of 45 GW, which will provide a quarter of the country's total energy consumption. It is assumed that the number of wind turbines will not change, remaining at the level of about 20 thousand units, but the old turbines will be replaced with new and more efficient ones over time, allowing the existing wind farm to produce more electricity with less noise, without increasing the amount of space currently used for them (Vladimirovich et al., 2019a and 2019b).

Wind farms are located mainly in the coastal regions of Germany, but the development of a continental and offshore wind park is in the near future. It is believed that only wind power inland, remote from the sea coast areas, is capable of reaching the installed design capacity of 10 GW by 2020. At the end of April, Alpha Ventus was opened, the first wind farm in the North Sea, 45 km from the coast, at a cost of 250 million euros (Paliwal et al., 2022; Yakovlev and Mikhaylov, 2020).

2. Method

In fact, wind energy is the energy of the sun converted into the kinetic energy of air molecules. So it can be argued that wind energy, like wave energy, is a kind of solar energy, energy that will be available to us for as long as the Sun and our planet exist. In this article, we will give a brief overview of the advantages and disadvantages of wind power generators (Kabanov et al., 2020; Panfilov and Kabanov, 2017; Yakovlev 2020).

You don't necessarily need to go out and buy energy efficient products to reduce energy consumption at home and increase energy efficiency. If you need to buy, you can list all the purchases to be done in one city trip. Do not use a motor vehicle on nearby roads. Saving energy can be as simple as turning off lights or appliances when you don't need them. You can also use less energy-consuming appliances by doing household chores manually, such as hanging clothes out to dry instead of putting them in the dryer or washing dishes by hand. One of the behaviors that have the greatest potential to save electricity is reducing the heat of the home thermostat in the winter and using less air conditioning in the summer. Heating and cooling costs make up almost half of the utility bills of an average home, so with the right coverage at home, you can save the most by reducing the intensity and frequency of heating and cooling.

3. Results

Solar energy is one of the fastest growing sectors of the German industry, constantly fueled by large government subsidies, which amount to almost 9 billion euros annually. Last year alone, solar panels with a total capacity of more than 5,000 MW were installed in Germany. At the same time, the total capacity of the batteries used today is about 14,000 MW. The production of electrical energy with the help of sunlight, otherwise called photovoltaics or photovoltaics, should increase.
Comprehensive energy saving measures in Germany and Britain

almost tenfold in Germany by 2020 (Yakovlev, 2021). If the current volume of electricity generation by using photosensitive elements to convert solar energy into electricity in Germany is estimated at 4.3 billion kWh, then in a decade this figure should be almost 40 billion kWh with a power of 39.5 GW.

Thus, solar energy, along with geothermal and wind power, is one of the fastest growing sectors in the field of green energy. It is believed that by 2020 it will provide about 7% of all power generated by power plants. The reasons for this growth are explained by the gradual development of technology and the increase in the efficiency of solar panels with a simultaneous decrease in their cost, which should bring this sector to self-sufficiency in the middle of the next decade. In simple terms, for the end consumer, installing a solar panel will be a cheaper option than buying electricity coming through the power grid.

Meanwhile, not everything here is so unequivocally positive: today the government requires the large German energy companies to buy solar energy at prices several times higher than its market value. So the subsidized sector has quickly become a profitable business: in 2009, more than half of the world's solar panels were installed in Germany, and their owners now receive billions in subsidies. German companies have come out on top in the global solar energy market, but despite large-scale investments, solar energy still accounts for less than 1% of the total German energy structure.

The share of energy exported by Germany is currently about 80%. Virtually no other energy source makes it as dependent on foreign exporters as gas. Only 16% of the consumed gas is produced in Germany, the remaining 84% is supplied from Norway, Holland and, above all, Russia. Germany is trying to solve the problem of energy security by saving energy and maintaining a stable system of mixed energy supply. Germany is the country that most actively applies innovative technological processes for energy saving and other energy sources. Germany is a leader in the field of wind energy, there are 20,000 wind turbines operating in the country with a total capacity of 24,000 MW, which is one third of all electricity generated throughout the country. on the efficiency and effectiveness of the use of existing energy resources and increasing the share of renewable sources. Without exaggeration, we can say that in this sense, Germany today, as they say, is ahead of the rest. What is energy saving is a set of measures aimed at the conservation and rational and reasonable use of electricity and heat. The share of energy exported by Germany is currently about 80%. Virtually no other energy source makes it as dependent on foreign exporters as gas. Only 16% of the consumed gas is produced in Germany, the remaining 84% is supplied from Norway, Holland and, above all, Russia. Germany is trying to solve the problem of energy security by saving energy and maintaining a stable system of mixed energy supply. Germany is the country that most actively applies innovative technological processes for energy saving and other energy sources. Germany is a leader in the field of wind energy, with 20,000 wind turbines operating in the country, with a total capacity of 24,000 MW, which is one third of all electricity generated throughout the country.

The United Kingdom owns certain reserves of its oil and natural gas, sufficient to supply its own needs for fuel and energy resources, and only in connection with the level of field development and production volumes in different years, the position of the state changes from an energy importing country to an exporting country and vice versa. In 2016, the UK was the European leader in terms of investment in renewable energy, the government signed a number of international agreements, according to which the state undertakes to increase the number of renewable energy sources in energy consumption by up to 15% by 2020 to achieve global issues in curbing atmospheric climate change, and in 2017 the UK Department of Business, Energy and Industrial Strategy proposed a project to change the country's energy concept, providing for a complex of a single energy system and private energy storage devices, which makes it possible to flexibly manage energy resources. The leadership of the United Kingdom sees the development of energy conservation technologies as the main condition for an increasing amount of energy from private renewable sources to be able to enter the public grid. Solar energy should become cheaper than coal in the country by 2021. The UK is a country in whose territory 30% of the wind resources of the

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European Union are located. This country, along with Germany, is considered the world leader in wind generation. The seabed off the coast of Scotland is estimated to hold approximately 25% of Europe's total tidal marine energy potential. Possible means of offshore energy is 10 GW. The UK Gas and Electricity Markets Service is the government regulator of the market for electricity generation and the use of natural gas.

4. Conclusions

The Ministry of Business, Energy and Industrial Strategy of Great Britain was organized in the country as a result of the merger of the Department of Energy and Atmospheric Climate Change and the Department of Business and Innovation. The department's areas of responsibility include a strategy associated with the development of energy and the prevention of atmospheric climate change. Energy conservation is considered to be a significant rate of energy saving, which is achieved by almost 50% due to savings in electric lighting. Since 2009, the country has banned the use of incandescent lamps. The United Kingdom was the first to require its citizens at the legislative level to change incandescent lamps to energy-saving lamps. It is assumed that the consumption of electricity will decrease, because such lamps consume 5 times less energy than simple ones, and their service life is tens of times longer.

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