

Perspectives on the Application of Alternative Energy Sources

Abdullaev Elnur

Faculty of Power engineering and Radio electronics
Jizzakh polytechnic institute
Jizzakh city, Uzbekistan
Uchqun8822@gmail.com

Abstract — Currently, traditional energy sources are becoming more and more expensive, and the use of alternative ones is becoming cheaper. Therefore, now we can already talk about the prospects for their mass use, which is relevant in the context of limited reserves of traditional sources and the environmental situation.

Keywords — solar energy, wind energy, traditional energy supplies.

Introduction

The purpose of the article is to consider the prospects for the use of alternative energy sources. For this, the following tasks were set:

- to study the experience of using renewable energy sources in different countries.
- consider the technical characteristics of the main types of generators.
- to analyze the prospects for the massive use of alternative energy sources in Uzbekistan.

The main advantage of renewable sources is their environmental friendliness and unlimited. The energy of the sun, wind, geothermal, tidal energy is unlimited, in contrast to oil and gas reserves. Therefore, sooner or later, the energy supply system of all countries will be forced to switch to renewable sources. But the modern, already established system of economic relations and the energy system, as well as the cost of powerful installations using alternative energy sources, makes this transition very expensive. In addition, generators using certain types of renewable energy (wind, tidal, geothermal) are tied to certain territories, which greatly complicates their widespread use. It is also very important that power plants using alternative energy sources have a relatively low capacity and cannot meet the needs of the industry, which consumes most of the generated electricity. Investments in them do not pay off immediately, therefore, without state programs, the massive introduction of alternative energy sources in our country is practically impossible.

Materials and methods

Solar energy

Most of the territory of our country (more than 90 %) is characterized by an average annual intake of solar radiation from 5.5 to 7.5 kWh / m day. That is, solar panels, for example, in the Navoi will work as efficiently as in the North Caucasus.

Why hasn't solar cells been widely adopted despite the many benefits of using solar energy?

The main advantage of solar energy is that its reserves are endless. As long as the sun is shining it can be used, and when the sun goes out, mankind will no longer need it.

The second advantage is its environmental friendliness. Indeed, when converting solar energy into electrical energy, there is no pollution of the atmosphere and the environment. But the production of silicon - the primary and irreplaceable element in solar cells - is one of the dirtiest on the planet. With the massive use of solar panels, ecology can be damaged at once.

In addition, the use of solar energy is hampered by a number of other difficulties. Although the total amount of this energy is enormous, it dissipates uncontrollably. To obtain large amounts of energy, large collector surfaces are required. In addition, there is a problem of instability in the energy supply: the sun does not always shine. Even in deserts, where cloudless weather prevails, day gives way to night. Therefore, solar energy storage devices are needed. Finally, many solar applications have not yet been well tested and proven to be economically viable.

There are three main uses for solar energy: for heating (including hot water) and air conditioning, for direct conversion to electricity through solar photovoltaic converters, and for large-scale electricity generation based on the thermal cycle.

The total world capacity of autonomous photovoltaic plants has reached 500 MW. Mention should be made here of the Thousand Roofs project in Germany, where 2,250 houses were equipped with photovoltaic installations. In this case, the role of a backup source is played by the power grid, from which the lack of energy is compensated. In the event of an excess of energy, it, in turn, is transferred to the network. It is curious that during the implementation of this project, up to 70% of the cost of installations was paid from the federal and land budgets. The United States has adopted an even more ambitious program "Million of Solar Roofs", calculated until 2025. The federal budget for its implementation will amount to \$ 6.3 billion. Improving the efficiency of solar cells and the quality of materials has made it possible to reduce the costs of their construction by 80% over the past two decades. Now solar cells are being built into roofing tiles, ceramic tiles and window panes, which makes it possible to generate electricity in individual buildings. The total capacity of solar panels in the world increased from 1500 MW in 2005 to 9000 MW by 2018.

Wind energy

Wind energy is the most widely used renewable energy source. This is because the initial investment in this industry is relatively low.

Wind turbines, like solar power plants, are especially effective in small settlements, for autonomous power consumers, remote from centralized power supply systems. For them, wind and solar energy is the most economical source of electricity. The example of Denmark is typical in this respect, scattered on numerous islands that are difficult to unite with a centralized power system. Today there are over 4 thousand wind turbines, which account for about 5% of all electricity generated in the country. Note that energy is not only the most environmentally friendly, but also the cheapest. If in the early 1990s. 1 kWh of it cost one Swedish kronor, but now it is 4 times cheaper. This is significantly less than the same indicator for nuclear and coal-fired power plants, and even competitively cheap Swedish hydropower. Danish wind turbines are in high demand - over half of the global demand for them is met by Danish companies and their licensees. This was the result of the strategic foresight of the state, receptive to innovation and to strategic partnerships with industry, which allowed Denmark to occupy an advantageous position on the eve of a new post-industrial era.

A rotary installation can provide electricity to a private house. The estimated cost of the installation is about \$ 400 per kilowatt.

Discussion

But the noise it makes many people refuse to use them. And to meet the needs of industrial enterprises, large areas are required. And wind farms are effectively located mainly on the coast. This forces the construction of additional power lines. And the transmission of energy to consumers over long distances creates additional losses. In addition, the construction of large wind farms on the coast is damaging the tourism business. And the depreciation costs of large complexes are quite high. But these difficulties are surmountable. Now the cost of wind energy is almost equal to the cost of energy obtained from traditional sources.

Wind power is now considered the most promising sector for investment, but it is rather difficult to make an accurate forecast of its development. Using data and forecasts from various sources suggests that the cost of wind power will be 64-74% in 2021 and about 41-55% in 2025 compared to the industry average price of wind power in 2018. Wind power will become cheaper than electricity. Produced at thermal power plants using fossil fuels already in 2020, and this will serve as one of the factors accelerating the reduction in the cost of electricity in general.

Already, wind power is close to becoming price competitive with traditional power industries. Of particular interest in this case is the existing declining trend in the cost of wind power, which allows wind power prices to compete on an equal footing and even offer more favorable terms compared to the prices of electricity derived from fossil fuels. The latest forecasts obtained from various sources suggest a drop in installation (capital) costs to \$ 300-500 per kilowatt of installed capacity in 2021 and to \$ 250-400 in 2025. The difference in forecasts is partly due to different estimates of the cost of wind energy at the moment by different authors, who are mostly influenced by market interests. Therefore, none of the prices can be used to characterize installation costs or electricity costs. It's about a trend.

Conclusion

Traditional energy supplies are not endless. According to some forecasts, their reserves may critically decrease during my lifetime. Therefore, the transition to renewable energy sources is inevitable. All power plants using alternative energy sources have their pros and cons.

Solar energy can be used efficiently almost everywhere, but it is expensive, requires large areas and huge costs of silicon, the production of which is very harmful to the environment.

Wind power can only be used effectively in certain types of terrain. But the initial investment in this industry is relatively low. In addition, now the cost of electricity from wind farms is almost equal to the cost of energy from a CHP. Therefore, wind energy has great prospects.

Other types of alternative energy sources also have good prospects for mass use.

The common pluses for all are renewability and less environmental damage from the majority. The disadvantages are high cost, attachment to certain types of terrain and relatively low power. Since installations using renewable energy sources are relatively low-powered, tied to certain types of terrain and are quite expensive, so far only a combined use of alternative and traditional ones is really possible. This will reduce the need for oil, coal and gas, reduce or simply stop the growth of their production, which will postpone the energy crisis.

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