Development Of "Green" Energy

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Abstract: Wind farms are one of the key components of the "green" energy system and are gaining significant recognition as a sustainable and environmentally friendly solution to our ever-growing energy needs. This article provides information on the main features, advantages and future prospects of wind and solar power plants. Using information about green energy has been shown to increase the content and effectiveness of higher education. The understanding that the transition to renewable energy sources, "Green" energy is the need of the hour has been strengthened.
Key words: wind, energy, solar, station, renewable energy source, photo effect, wind speed, wind power plant, Savonius

Introduction: Current global per capita energy consumption is on average 2-4 kWh*. But this amount is not enough for a comfortable life, and it should be equal to 8-10 kWh [1-2]. In the present conditions, in which the amount of fuel sources such as oil, gas, coal, and peat is decreasing year by year, and the cost is increasing, the main problem facing the world community is to fully satisfy the energy needs of the population, to bring energy consumption to the level of demand. it is. The only way to solve this problem is to use alternative renewable energy sources.

The main part: The above-mentioned problems were reflected in the decision of the President of the Republic of Uzbekistan Sh. Mirziyoyev dated February 16, 2023 "On measures to accelerate the introduction of renewable energy sources and energy-saving technologies". Meetings and various exhibitions dedicated to the implementation of the tasks defined in this PQ showed that renewable energies are ecologically pure energy, as well as high efficiency, and the tasks of measures for the development of this sector were defined. In particular, the construction of a solar FES with a capacity of 220 MW has begun in the "Kokbulok" QFY area of the Gallaorol district of the Jizzakh region. It is a 150 million dollar facility and will be located on 600 hectares of land. The investor of the project is the UAE company "Masdar". FES will be launched in 2024 and 100 jobs will be created. In Uzbekistan, QTE sources with a total capacity of 4300 MW are installed in buildings and structures of social sector objects, business entities. The potential of renewable alternative energy sources in our country is 173.4 million t.n.e. [3-4], which is three times more than the value of annual energy consumption. 98.8% of this energy is solar energy. Because our country is a sunny country, the Sun shines 270-300 days a year, and 1100 watts of energy is transmitted to each square meter of land. Solar photoelectric plants are used in Jizzakh Polytechnic Institute (100 kW) and in social facilities and schools. These days, QFES are being installed in the electricity supply of many social facilities. Making a windmill using air currents was done in northern Europe at the beginning of the 8th century. The first wind power plants were built in Denmark in 1885. In 1918, more than 120 wind power plants were used in Denmark. The capacity of each of them was 10-20 kilowatts. Between 1880 and 1930, more than 6 million wind farms were used in the United States [2]. The speed of the wind increases as it rises. If the wind speed on the ground is equal to 3 m/s, the wind speed will be twice as high at 10 meters. With the help of wind generators installed at a height of 40-80 meters, it is possible to generate more than 25-50 kilowatts of electricity. In 2020, it is planned to cover 80% of the energy consumed in the countries of the European Union at the expense of wind and solar energy [5-6]. For this, 3.8 million wind power generators, 90 thousand large and 1.7 billion small solar power plants should be built on our planet within 20 years. Germany (45 GW) is the leader in terms of the amount of electricity obtained through the use of wind energy. Wind power stations, also called wind farms or wind turbines, generate electricity by harnessing the inherent power of the wind. These infrastructures consist of

several large wind turbines located in areas prone to constant and strong wind currents. The movement of the wind rotates the blades of the turbine and converts the kinetic energy into electrical energy through the generator (Fig. 1). This clean and renewable energy source has shown tremendous potential to reduce carbon emissions and reduce dependence on fossil fuels.

Advantages of wind power plants:

1. Renewable and clean energy: Wind energy is an unlimited resource because wind currents are constantly generated by natural weather conditions. Unlike fossil fuels, wind energy does not emit harmful emissions such as carbon dioxide, nitrogen oxides or sulfur oxides, making it an environmentally friendly option;
2. Climate Change Mitigation: Wind power generation helps reduce dependence on fossil fuels, thereby significantly reducing greenhouse gas emissions. Wind energy plays an important role in combating the pressing issue of climate change by limiting global warming and seeking a sustainable future;
3. Wind farms can be built in many parts of the world, both onshore and offshore, opening up power generation opportunities regardless of geographic limitations. This widespread availability makes wind power an excellent energy source for developing regions seeking to increase their electricity supply;
4. Economic benefits: In addition to environmental benefits, wind farms also provide economic benefits. Wind energy supports the local economy by creating jobs in manufacturing, construction and maintenance, and promotes the growth of renewable energy sectors;
5. Remote power generation: Wind farms are often built in remote or rural areas, allowing power to be generated close to the point of consumption, thus reducing transmission losses and stress on the power grid.

The future of wind power plants is promising and full of potential. Technological advances have made wind turbines more efficient, quieter and less disruptive to the environment. The emergence of offshore wind farms, which take advantage of the constant and stronger winds in the sea, opens up vast opportunities for large-scale energy production. In addition, the integration of wind energy with other renewable energy sources such as solar and hydropower is increasing. This hybrid approach helps to stabilize the electricity supply, maximize energy production and solve the fluctuation problems associated with wind power alone.

As governments, businesses and communities around the world increasingly recognize the importance of transitioning to sustainable energy sources, wind farms have an important role to play. Investments in research and development, as well as policy support, are essential to further unlock the potential of wind power and accelerate the transition to a carbon-free future. Therefore, wind power plants are a powerful alternative to traditional energy sources, and offer many benefits at the environmental and economic level. As technology improves and costs decrease, wind power is becoming an integral part of the global energy landscape. Government enterprises and individuals must continue to embrace wind power as an important pillar of a sustainable energy mix, ultimately reducing carbon emissions and paving the way for a greener and cleaner future. A tender for the construction of a 100 MW wind power plant in Karakalpakstan was announced with the technical support of the European Bank for Reconstruction and Development, and 70 companies and consortia expressed interest in it. Saudi Arabia's "ACWA Power" company, which offered the lowest tariff for wind energy - 2.56 cents for 1 kilowatt hour of electricity, was declared the winner of this tender. The station will be commissioned in 2 years, i.e. in 2024. When it comes into operation, it will produce 350 million kilowatt-hours of electricity per year and provide alternative energy to more than 120,000 households.

As a result of the commissioning of the station, 106 million cubic meters of natural gas will be saved per year, and 160 thousand tons of harmful waste will be prevented from being released into the atmosphere. With this amount of saved gas, 35,000 households can be supplied with natural gas for 1 year.

Another important aspect is that 400 workers are working in the construction of the station. Once it is operational, 30 skilled engineers and technicians will be provided with high-paying permanent jobs.

According to the project, 25 wind turbines will be installed. A 20-km 220-kilovolt power transmission overhead network will be built, and these capacities will be fully connected to the country's unified energy system.

"ACWA Power" company has a total capacity of 2,600 MW in Uzbekistan. is participating in the construction of thermal and wind power plants. In particular, 2 wind power plants with a capacity of 500

MW each will be built in the Peshku and Gijduvan districts of the Bukhara region, and it is planned to be put into operation at the beginning of 2024. At the same time, the company has installed a capacity of 1,500 MW in the city of Shirin of the Syrdarya region. The thermal power plant is under construction and it is planned to start operation in the fourth quarter of 2023.

The effectiveness of these works is inextricably linked to the scientific competence of electric power specialists. Therefore, it is appropriate to enrich the material and technical base of the departments that prepare electrical engineering specialists in higher educational institutions, to establish test sites and scientific laboratories equipped with special devices for researching wind and solar energy, biogas energy production methods (Fig. 1 ,2). In order to ensure the implementation of the decision of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan "On measures to enrich the material and technical support of higher and secondary special educational institutions", Jizzakh Polytechnic Institute "Physics" and "Electric Power" "Laboratory equipment worth 350,000 euros of 42 names was brought from Germany to the departments. In 2023, 19 state-of-the-art laboratory equipment of 8 names produced in Russia by the Asian Development Bank (in association with Zarnitsa LLC) were brought to the Physics laboratories and installed and put into operation. Research on alternative energy sources - wind power generators, solar photoelectric sources is being carried out in the newly established technological park on the territory of Jizzakh Polytechnic Institute. Currently, practical work on improving this technological park and educational laboratories, enriching and equipping the material and technical base [6-8] is being carried out intensively.

Conclusion: By using the information presented above about alternative energy sources, which are inextricably linked with everyday life, the content and effectiveness of education will increase. The understanding that the transition to renewable energy sources, "Green" energy is the need of the hour will be strengthened.

Picture-1.

Picture-2.

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