

PROSPECTS FOR THE USE OF RENEWABLE ENERGY SOURCES

Berdiyev Usan ,

Tashkent State Transport University, Tashkent, Uzbekistan

Matqosimov Mahammadsodiq ,

assistant of the department "Electrical engineering,
electromechanics and electrotechnologies

Andijan Machine-Building Institute



Annotation The article considers examples of the use of alternative energy sources, in particular solar, wind and nuclear energy, as the most suitable for the regions of Central Asia. The article provides examples of the use of solar energy in the industrial and economic zones of Uzbekistan, the use of wind energy and other non-traditional energy sources.

Key words: Solar energy, wind energy, nuclear energy, renewable energy, clean energy, energy concentration, energy consumption, energy producing equipment , secondary energy carrier, solar radiation concentrator , solar furnaces , thermodynamic efficiency, heliochemistry, wind energy, wind turbine , energy hybrids.

At the end of the last century, mankind started talking about the problems of energy, that the reserves of fossil fuels are not unlimited, that with the current energy "appetite" oil will last for about 40-50 years, gas - for 20-30 years, coal - 100- 200 years.

Currently, it is expected that 70% of the world's energy production will be provided by alternative sources - solar, wind, geothermal and other types of energy obtained through the use of the forces of nature. These energy sources, firstly, have practically unlimited resources. The amount of solar energy coming only to the surface of the earth is 15-20 thousand times higher than today's world energy consumption. According to preliminary calculations, in the earth's crust at a depth of 7-10 km accessible to modern technology, heat has been accumulated, the total

amount of which is 5 thousand times greater than the calorific value of all types of fossil fuels on the planet. The reserves of energy embedded in the wind are also expressed in astronomical figures. [one]

Secondly, the energy generated by the forces of the continuous processes of nature is practically inexhaustible. It is constantly renewed, being, in essence, eternal.

Thirdly, the energy of these sources is environmentally friendly, the impact of its use on the environment can be minimal.

All energy consumers can reasonably be divided into four main groups: industry, agriculture, transport and household sector. We can assume that the energy needs of each group are approximately equal. At the same time, their requirements for energy quality are not the same. Industry, as a rule, is based on high-capacity energy. The necessary concentration of energy for it can be provided, along with traditional energy sources, only by nuclear and thermonuclear energy. But three other groups of consumers, which account for up to three-quarters of all energy consumption, can largely meet their needs at the expense of low-capacity energy, that is, energy from renewable sources.

The main disadvantages of renewable sources that prevent their widespread use are the low density of energy flows, or the small amount of energy removed from a unit surface of energy-producing equipment, the inability to use most of them constantly. Thus, the density of solar radiation on the Earth's surface does not exceed a kilowatt per square meter. The amount of solar energy depends on the time of day and season, as well as on weather conditions. Winds also blow at different times with different strengths. The choice of certain methods of energy supply determines economic calculations, with the aim of finding the best options for each specific consumer.

It is fundamentally impossible to increase the density of solar radiation. Therefore, the main problems are associated with increasing the collection and

efficiency of converting solar radiation into the required form of energy - heat, electricity, mechanical movement. By increasing efficiency, it is possible to reduce the area of installations and reduce their cost by using more economical materials, technology, etc.

The difficulties associated with the irregular supply of solar energy can be eliminated by radically solving the problem of energy storage, that is, by storing a product obtained or processed with the help of solar energy and capable of playing the role of a secondary energy carrier - for example, water raised to a certain height, hydrogen, synthetic liquid fuel.

The use of solar energy, as a rule, is considered appropriate in sparsely populated - desert, mountain, forest - areas where it is not economically profitable to build power lines and heat supply networks. But nevertheless, modern autonomous installations of low power, for supplying small consumers of thermal, electrical and mechanical energy, are successfully used for heating homes, growing vegetables in solar greenhouses, drying agricultural products, raising water, etc. In areas of Central Asia, where during the summer season buildings overheat from excess solar heat for 50-120 days, air conditioning systems based on solar energy are used. In semi-desert and desert areas, where there are sufficient food supplies, solar water desalination plants are already operating. On-site desalination is also beneficial than laying water pipes.

Residential and public buildings equipped with solar heating systems are being built in many cities. Water-heating solar plants with an area of 300 m² or more are built into existing heating systems and take over the entire heat load in summer, and are used for pre-heating water in boiler rooms in winter. These solar attachments save about a third of the annual fuel consumption. Applications of water heaters only for hot water supply can release 15-20 million tons of reference fuel per year. [one]

It is possible to increase the temperature of the coolant and thereby increase the thermodynamic efficiency with the help of solar radiation concentrators. Sufficiently

large concentrates allow a very high temperature to be obtained at the focus. On the basis of such concentrators, the so-called solar furnaces are built. Operating temperatures from 2500 °C to 4000 °C are reached in solar furnaces in Tashkent and are successfully applied in new areas of science and technology - heliochemistry and heliometallurgy. Solar ovens have a number of significant advantages over conventional ones. Firstly, the temperature in them changes abruptly, the rate of "thermal shock" exceeds 1000 °C per second. Secondly, the molten substance does not come into contact with either the fuel or the carbon electrodes, that is, a pure product is obtained. But the most promising is the use of solar energy to generate electricity.

In Uzbekistan, the sun shines 320 days a year, which is much more than in some countries of the world. According to the conclusion of the World Bank and the Asian Development Bank, the solar energy resources of Uzbekistan amount to more than 51 billion tons of oil equivalent. The Samarkand solar photovoltaic plant is designed for 100 MW, in the Angren special economic zone, together with the Korean company Shindong Enerkom operates a silicon production plant using solar energy with an annual capacity of 5,000 tons. The production of photovoltaic panels with an initial capacity of 50 MW has been launched in the Navoi Free Industrial Economic Zone, and an enterprise for the production of solar thermal collectors with a capacity of 50,000 units per year is operating in the Jizzakh special industrial zone.[3]

Man made a successful attempt to use the wind many centuries ago: sea sailing ships, windmills. The average wind power on earth is huge - 4.4 trillion. kW, that is, 500 times more than the current energy consumption on the entire planet. Therefore, the power of the wind is considered as a wide help in the energy sector of many countries. Wind energy is widely involved in the energy industry of leading countries: Russia, USA, Sweden, Denmark, France, Japan, etc.[2]

The power of wind turbines is insignificant in itself, but a large number of them together can create a significant energy flow. The main task of modern wind energy is to supply numerous potential consumers with perfect wind turbines. In some cases, the wind as a source of energy has no competitors, for example, land reclamation, windmills are simply irreplaceable, in particular for vertical drainage, soil desalinization. For the needs of oasis irrigation, they can raise water from open reservoirs, wells and wells and, if necessary, desalinate it.

Modern wind power plants are equipped with automatic systems that orient the impellers in the direction of the wind, stabilize the rotation of the rotor, and regulate its power. For the efficient operation of wind turbines, it is desirable that the wind has a constant speed, but it is not constant and therefore all wind turbines are designed to produce the maximum amount of energy at certain wind speeds. Particular difficulties with the accumulation of wind energy. The simplest and most economical way is to pack wind energy in processed products: for example, in industrial energy carriers (hydrogen, synthesis gas, etc.) or in raised water, which can be used as needed. More complicated and more expensive ways of accumulating wind energy to generate electricity. For this, electrochemical batteries, flywheels with a large inertial mass, various thermal, hydraulic and other devices are used. There is another option - energy hybrids from wind and conventional thermal power plants. [3]

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