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## PROSPECTS AND DISADVANTAGES OF USING THE SOLAR ENERGY IN KAZAKHSTAN

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The 21st century is a time of progress and evolution in the world of technology. Thousands of power plants operate on our planet every day, thereby using and spending all the necessary resources for this. Humanity needs and its consumption is increasing every year. With all this, the reserves of traditional sources (coal, oil, gas, etc.) will sooner or later run out. There are also reserves of such energy sources as uranium and thorium on the planet, but they are also finite in the end. The reserves of thermonuclear fuel-hydrogen are endless, but so far controlled thermonuclear reactions are not fully mastered, and we cannot know when they will be used to obtain energy in its pure form without the participation of fission reactors in this process. Therefore, mankind is faced with the question of alternative nontraditional energy resources, such as solar, wind, geothermal energy and energy-saving technologies. [1]

Nowadays, scientists are trying to solve the problem of fuel in different ways, but let's think about how much the sun gives us? Its warmth warms us, its radiation supports life in us and in all life on this planet. Then how can we not use its "life-giving" energy, its warmth.

Although if you look back into the centuries of human development, you can find more than one evidence of the use of solar energy. Here are just a few of them. According to legend, the great Greek scientist Archimedes, when his hometown of Seracuse was besieged by the enemy fleet, burned this fleet using a system of incendiary mirrors. Another historical fact is that about 3000 years ago, the Sultan's palace in Turkey was heated with water heated by solar energy. The ancient inhabitants of Africa, Asia and the Mediterranean received table salt by evaporating sea water, and there are many such examples. What is a solar cell? [2]

Solar cells are sets of interconnected and framed solar cells (solar cells), which are small semiconductor devices that convert light energy into electrical energy. This phenomenon was discovered in 1839 by the French physicist Edmond Becquerel, later called the "photovoltaic effect". In 1967, solar panels were first used on the Soyuz-1 manned spacecraft. Photovoltaic technologies have been actively studied in different countries and especially in the space powers of the USA and the USSR. The energy crisis of the 1970s pushed work in this area, but the production of solar panels remained quite expensive for a long time .[2]

Using solar energy to generate electricity has a number of advantages:

1. Does not require fuel.
2. Works constantly.
3. Silence.
4. Long term of trouble-free service.
5. Reliability.
6. General availability.
7. Possibility of arbitrary change of system power.
8. Environmental friendliness.

Of course, so far there are no ideal systems and they have and restrictions:

- In winter, the performance of solar panels decreases in one and a half to two times.
- Low efficiency for use in heating systems.
- The need for high energy efficiency.
- The need for sufficient light intensity.

Monocrystalline silicon cells are one of the most effective and common panels for general consumption. For the manufacture of such elements, silicon is purified, melted and crystallized in ingots, from which thin layers are cut. Externally, monocrystalline elements LOOK as a solid dark blue or almost black surface. A grid of metal electrodes passes through the silicon. The efficiency of such an element ranges from 16 to 19% under standard testing conditions (direct sunlight, +25 ° C). The performance of such solar panels for every 20-25 years of service gradually decreases, according to some data, by half a percent per year, and the total declared service life of such panels from good manufacturers is usually 40-50 years, and most solar panels used today did not work 50 years. Thus, today, monocrystalline solar panels are the most reliable source of electricity from the sun.[2]

In Kazakhstan, it is necessary to expand and reduce the cost of production of this type of modern solar modules. Which will inevitably lead to a wider use of this alternative energy source. The greater the share of ecological and renewable energy sources, the less will be the amount of emissions into the atmosphere, the amount of waste filling our planet will sharply decrease.[3]

Life on the planet is impossible without energy. The physical law of conservation of energy says that energy cannot arise from nothing and does not disappear without a trace. It can be obtained from natural resources such as coal, natural gas or uranium, and converted into forms that are convenient for us, such as heat or light. In the world around us, we can find various forms of energy storage, but the most important for a person is the energy that the sun's rays give - solar energy.

Solar energy refers to renewable energy sources, that is, it is restored without human intervention, in a natural way. It is one of the environmentally friendly energy sources that does not pollute the environment. The possibilities of using solar energy are almost unlimited, and scientists around the world are working to develop systems that expand the possibilities for using solar energy. [3]

One square meter of the Sun emits 62,900 kW of energy. This roughly corresponds to the power of 1 million electric lamps. Such a figure is impressive - the Sun gives the Earth 80 thousand billion kWh every second, that is, several times more than all the power plants in the world. The challenge facing modern science is to learn to use the energy of the Sun most fully and effectively, as the safest. Scientists believe that the widespread use of solar energy is the future of humanity.

The main reason for the slow development of the market for the sale and use of solar systems is, firstly, their high initial cost, and secondly, the lack of information about the capabilities of solar systems, advanced technologies for their use, about the developers and manufacturers of solar systems. All this cannot provide an opportunity to correctly assess the effectiveness of the use of solar energy systems.[4]

Summing up, I would like to ask two questions:

- Do we study renewable energy sources, including solar energy, at the Faculty of Energy?

- The structure of the Faculty of Power Engineering is built in such a way that everything that is in power engineering is presented at one or another educational level: bachelor's, master's or postgraduate studies. We have a well-developed study of traditional energy: power plants, networks, power supply systems. There is a master's degree program in which we train specialists in alternative energy. We also have serious scientific groundwork in this direction, including those carried out jointly with American scientists. We mainly work in wind energy, solar, biogas and hydrogen energy.

- What is the future of solar energy?

- The energy sector is following the path of integrated development. It is impossible to focus on one type of energy. Energy can be stable and reliable when it uses a variety of energy sources. It is absolutely unreasonable, having such a developed, cost-effective hydrocarbon infrastructure, to destroy it or use it ineffectively. As the hydrocarbons are depleted, it will gradually lose its role, but this will happen, according to the Minister of Energy of the Russian Federation Alexander Novak, no earlier than in 100 years. At the same time, traditional energy sources will be replaced by alternative energy sources and nuclear energy. A bright future awaits solar energy, but for this it is necessary to solve many more scientific and engineering problems. The Faculty of Energy is actively involved in this area.

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