

SOLAR POWER STATIONS

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Annotation. A solar power plant is a device that converts solar radiation into electricity in a photoelectric way. There is a growing interest in generating electricity from solar energy around the world. The main task of scientists today is to increase the efficiency of existing technologies.

Key words. Power Stations (QES), QES Tower Type, QES Plate Type, QES Using Photoelectric Batteries, Combined QES, Aerostatic Solar Power Stations, Heliostat.

Introduction. Types of solar power plants. Solar power plants convert sunlight into electricity in two different ways:

1. Photoelectric - converts solar energy directly into electricity using a photoelectric generator.

2. Thermodynamics - converts solar energy into heat and then electricity; the capacity of thermodynamic solar power plants is higher than the capacity of photovoltaic stations.

All solar power plants (QES) are divided into several types:

- QES tower type
- QES plate type
- QES using photovoltaic batteries
- QES using parabolic concentrators
- Combined QES

- Aerostatic solar power plants

QES tower type. These types of power plants are based on the principle of generating water vapor using solar energy. In the center of the station there is a tower with a height of 18 to 24 meters (depending on the capacity and other parameters, the height can be more or less), on top of which there is a water tank. This container will be painted black to absorb thermal radiation. The tower also has pumps that supply steam to a turbogenerator located outside the tower.

A heliostat is a window with an area of several square meters, mounted on a base and connected to a common positioning system. That is, depending on the position of the sun, the window changes direction in space. The main and time-consuming task is to place all the mirrors of the station, so that the reflected light falls on the water tank at any time.

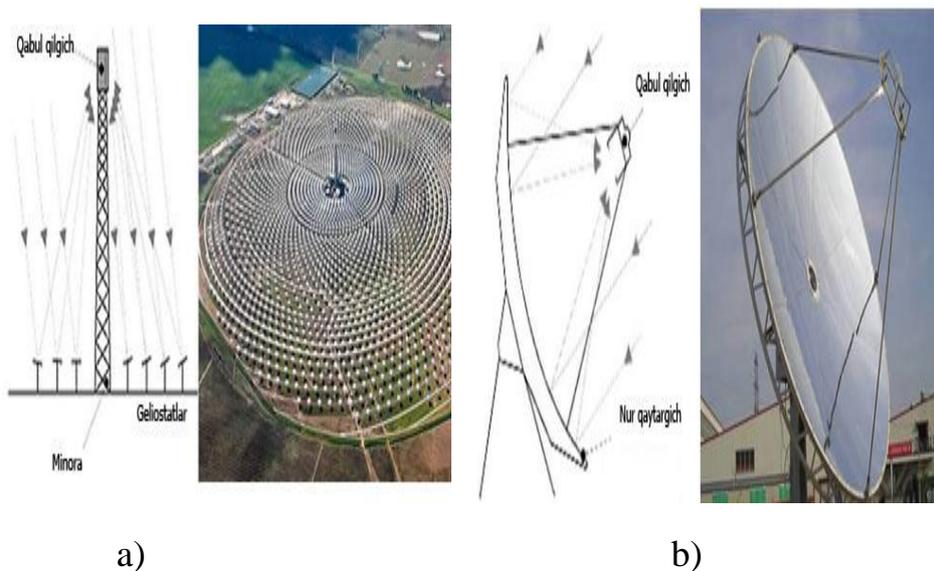


Figure 1. a) Solar power plant tower type. b) Solar power plate type

In sunny clear weather, the temperature in the pot can reach 700 degrees. Such temperature parameters are used in most conventional thermal power plants, so standard turbines are used to generate energy. In fact, these types of stations can produce relatively high efficiency FIC (about 20%) and high capacity. Tower solar power plants will need to be installed in desert and field areas. The main disadvantages of tower solar power plants are their high body cost and the fact that they occupy a large area. 200 hectares are required to house 100 MW solar power plants, while only 50 hectares are required for 1000 MW nuclear power plants.

QES plate type. This type of QES tower uses the same principle of generating electricity as a solar power plant, but there are differences in the design of the station. The station consists of separate modules. The module consists of a receiver and a reflective rod attached to a grid support. The receiver is located at a certain distance from the reflector, where the sun's rays are concentrated. The reflector is made of plate-shaped glass. The mirrors have a diameter of 2 m, and their number can reach several dozen windows (depending on the power of the module). Such stations can consist of a single module (independent) or several dozen (run in parallel with the network). The liquid in the receiver heats up to 1000 ° C and a small device consisting of a motor and a generator connected directly to the receiver is used to generate electricity. The receiver is connected to a small turbogenerator that generates electricity. One such module is enough for autonomous power supply of a small summer house, summer residence, auxiliary farm, and even several small houses. Hundreds and thousands of such modules are included in the general network for the industrial use of this type of power plants, which allows us to get enough power to power industrial enterprises, small towns.

QES using photovoltaic batteries. This type of GES is very common today, because in general, these GESs consist of many separate modules (photocells) with different capacitance and output parameters. This GES is widely used to power small and large facilities (private cottages, boarding houses, motels, industrial buildings, etc.). Photoelectric batteries can be installed almost anywhere, on the roof and outside of the building, in designated areas.

QES using parabolic cylinders. The principle of operation of GESs using parabolic cylinders is to heat the cooling unit to the parameters suitable for use in a turbogenerator. Construction of QES using parabolic cylinders: a large parabolic-cylindrical window is installed to determine the

length, and a tube is placed in the center of the parabola, through which the cooling water flows.

The heat carrier along the tube heats up and heats the water in the heat exchangers, where it evaporates and enters the turbogenerator.



a)

b)

Figure 2.a) QESs using photovoltaic batteries. b) QES using parabolic cylinders.

Combined QES. Often, various GESs are additionally equipped with heat exchangers for hot water production, which are used both for technical needs and for hot water supply and heating. This means a combined QES. It can also be considered as a combined QES of concentrators and photocells.

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