HIGH TEMPERATURE SOLAR CONCENTRATORS

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Introduction. This article examines the technology, advantages and disadvantages of high-temperature concentrators that concentrate sunlight.

Keywords: Technology and Working Principle, Advantages and Limitations of High Temperature Solar Concentrators, Recent Developments and Future Prognosis, Parabolic Cylindrical Concentrator.

The latest innovations in the field of energy include many technological solutions, but some of them are high-temperature solar concentrators in the field of solar energy, as well as other innovative technologies. The latest innovations in the field of solar energy are being created in various forms such as solar concentrators, improved and efficient solar panel devices, solar energy recycling technologies and the possibility of using other alternative energy sources. These innovations are designed to ease energy challenges, interconnections and energy storage.

High-temperature solar concentrators in the field of solar energy are one of the innovative technologies with high efficiency in converting solar energy into energy sources. They are used to bring the sun to a high temperature by focusing it in an optical line. These concentrators include their importance in solving severe energy problems and as clean and efficient energy sources in the energy supply sector [1-3].

At the same time, the use of other alternative energy sources is one of the latest innovations in the field of energy. These technologies include, for example, intensive heating, wind and water energy, biogas, gel-gas and other highly efficient and clean energy sources.

The technology of high-temperature solar concentrators is one of the innovative technologies used to bring solar energy to high temperatures. They are based on bringing the sun to a high temperature by focusing or concentrating it in an optical line. These concentrators are used to concentrate solar energy and process energy.

The working principle of high temperature solar concentrators involves harvesting energy by focusing and concentrating the sun. In this technology, in the process of concentrating the sun, optical elements and devices are used to concentrate the light energy of the sun. Optical elements are similar to solar panels that are important in focusing and concentrating the sun.

The working principle is that the optical lines intercept the sun from its surface and bring it to a high temperature of its combined focusing. Optical lines are used to concentrate the sun, extract energy from long distances, or create heat. Proper selection and alignment of optical systems, as well as the geometry of the concentrator, are important to ensure good performance and efficient energy harvesting [4-6].

The main principle of the technology of high-temperature solar concentrators is to increase the energy mask, concentrate the sun and ensure its efficient use. Concentrators created on the basis of these principles have high efficiency in transferring solar energy to energy sources and help to solve problems in the energy sector.

1 - Figure parabolosylindrical concentrator

As one of the huge constructions built using parabolosylindrical concentrators, it is possible to show the water discharge device of Schuman-Boys in 1913 (Egypt). The surface of the mirror collector in the device is 1277 m^2, it consists of 5 large parabola cylindrical concentrators with a length of 62.5 meters and a width of 4.1 meters.

High-temperature solar concentrators have several advantages in the field of energy, but they also have limitations. The advantages of solar concentrators include the ability to process solar energy more efficiently and accurately, but their limitations, such as weather conditions, inconsistencies in technology, or problems in the process of conducting experiments, are firmly established. should be shown [7-8].

Advantages:

Efficiency: One of the advantages of high temperature solar concentrators is efficiency. The optical elements and technologies used in them ensure a high level of efficiency in concentrating solar energy.

Clean energy source: These concentrators are a clean energy source because they harness solar energy by focusing it. As a result, the energy obtained through concentrators is clean and ecological.

Various fields of application: The advantages of high-temperature solar concentrators are distinguished by a wide range of applications compared to other energy sources. They can be successfully used in electricity, heat, water heating and other fields.

Low costs: Through the use of high-temperature solar concentrators, the costs of obtaining energy are light, because they use the cancellation of the sun, and it is light on the input part of the energy supply, and does not require light limited service personalities to serve them.

Limitations:

Weather conditions: Weather conditions in the design and operation of solar concentrators can be an important limitation. Water, clouds, cleanliness and other weather conditions can affect the performance of concentrators.

Technological mismatch: Another limitation of high temperature solar concentrators can be technological mismatch. These technologies are still developing and may require experimentation and technological solutions at their operational locations.

Location problem: There is also a problem with location of solar concentrators. During their development and installation, location issues may arise, such as the geographic location of the location and the orientation of the sun's location against the full day.

Land requirement: Land may be required for installation of solar concentrators. Their effectiveness may depend on the conditions needed on the ground to install the concentrators.

As these develop further, the advantages and limitations of solar concentrators are expected to increase.

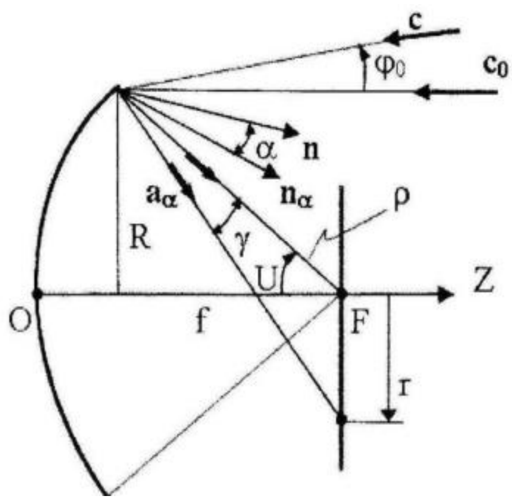

Fig. 2 is a paraboloid concentrator located at the focal point of a flat beam absorber

Let the sun's rays fall parallel to the optical axis of the parabola φ_o=16'. It is known that the Sun is a light source with an angular radius for the Earth.

Concentrators can be paraboloidal, parabola cylindrical, ellipsoidal and conical according to the geometrical structure of the sun's reflecting surface. However, in practice, paraboloid and parabola cylindrical concentrators have a larger scale. The surface of the mirrors is made of highly polished glass covered with a thin layer of silver or aluminum, A95 pure aluminum and even polymer materials through thermal, mechanical and chemical processing. The reflection coefficient of such mirrors is around ρ=0.85÷0.90. Solar radiation concentrators can be divided into single-mirror and multi-mirror types depending on the number of mirrors. Optical schemes typical for the use of single-mirror concentrators are shown in Fig. 3 [9-12].

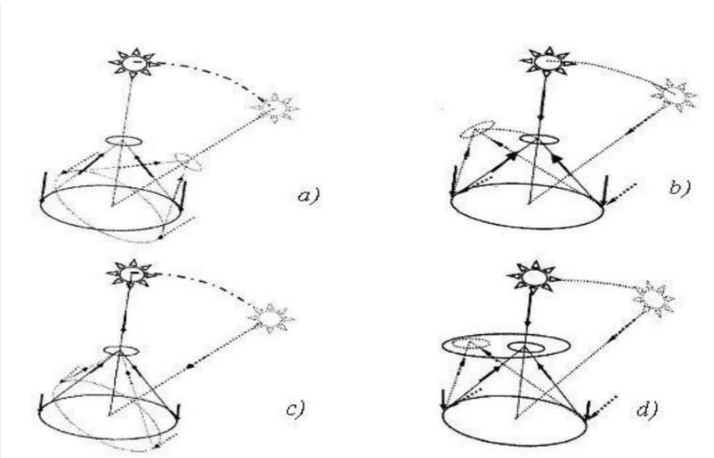

Figure 3. The optical scheme of single-mirror solar radiation concentrators: a)- the concentrator and the absorber are interconnected and move according to the

visible movement of the sun; b- concentrator is fixed, light absorber is mobile; c) – the concentrator is movable, the absorber is fixed; d) - concentrator and light absorber are fixed.

Recent developments and future prognostications can be an example of a time frame regarding the challenges and prospects of high-temperature solar concentrator technology. Recent developments and future prognostications of solar concentrators are concerned with the interrelationships and limitations of using solar energy with more efficient and improved solar concentrators. A study of the recent developments and future prognostications of solar concentrators teaches that solar energy will play a major role in the energy supply.

Materials and Technologies: Recent developments have focused on the materials and technologies used in solar concentrator technology. New materials and technologies are used to achieve high efficiency and simplify production processes, to provide more efficient development of the solar panels needed for energy collection, and also to improve the improvement of energy production obtained by concentrators.

Efficiency: In the future, increasing the efficiency of solar concentrators and the use of appropriate materials and technologies will be required. This is essential for improving efficiency, ease of converting solar energy into energy sources, and reforming manufacturing processes.

Clean and Renewable Energy: Recent developments seek to increase the use of solar concentrators as sources of clean and renewable energy. In the future, the energy obtained with the help of solar concentrators should be more efficient, clean and ecological. For this, concentrators and their used materials must be properly selected and adjusted [13-15].

Energy Supply and Consumption Ways: In the future, the energy supply and usage areas of solar concentrators will expand. This is due to the expansion of their wide use in the supply of electricity, heat energy, water consumption and other areas.

Future prognostication shows the importance of solar concentrators in the energy sector. Their good development and widespread use play an important role in solving energy problems and ensuring the use of environmentally clean energy sources.

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