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CONVERSION OF SOLAR ENERGY INTO ELECTRIC ENERGY USING SPHERICAL MIRRORS

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Abstract. The article is based on a method for increasing the efficiency of photovoltaic batteries (PVB) in the hot and dry climate of Uzbekistan. A new project for generating electricity using spherical mirrors has been developed. Using spherical mirrors with an area of 1 m^2, it is scientifically justified to obtain on average $9.9 \cdot 10^8$ J of energy per day and, on average, provides a house with electricity for two days.
Keywords: Solar energy, electrical energy, thermal energy, renewable energy, fossil energy, solar radiation, photovoltaic technology, spherical mirrors, lenses, reflector.

Today, the world's population's need for energy is growing every day. The main reason for this is the rapid growth of the world's population. The need for energy is growing, including in Uzbekistan. Today, our country has developed programs for the use of environmentally friendly energy sources to fully meet energy needs.
Uzbekistan is one of the countries with great potential for using renewable energy sources. The country is especially distinguished by the size of its solar energy potential.
The geographical and climatic conditions of Uzbekistan create the possibility of active use of solar energy in the production of electrical and thermal energy on an industrial scale.
Solar energy is an efficient, renewable energy that is easy and simple to use.
The total potential of solar energy in Uzbekistan is about 51 billion. If so, the technical feasibility is 177 million rubles. toe, and this is three times more than the extracted energy fossils. The territory of Uzbekistan has effective solar radiation, and power plants based on the latest photovoltaic technologies expand the possibilities of using renewable energy sources in the country's energy sector. By 2031, more than 20% of all energy is planned to be produced using renewable energy sources, including solar energy.
Decrees of the First President of the Republic of Uzbekistan "On measures - measures for the further development of alternative energy sources" dated 01.03.2013 PQ-4512 and "On the establishment of the International Institute of Solar Energy" dated 01.03.2013 PQ-. 1929 - the Institute of Solar Energy was created on the basis of the scientific and production association "Physics - Sun". was done [1]. Also, the Resolution of the President of the Republic of Uzbekistan dated May 26, 2017 No. PQ-3012 "On the program of measures for the development of renewable energy for 2017-2021, measures to improve energy efficiency in the sectors of the economy and the social sphere." sphere" and Uzbekistan Law of the Republic of Kazakhstan O'RQ-539 "Renewable Energy Sources" dated May 25, 2019. A number of tasks related to the use of alternative energy sources are defined in the networks.
It should be noted that Uzbekistan is the most favorable region in terms of the scale and duration of use of alternative energy sources. The potential of solar energy alone in our country Serkuyosh is 95 billion. equivalent to tons of conventional fuel. If our republic fully utilizes the technical potential of solar energy, the annual demand for all types of energy will be covered 4 times more. This, in turn, means that along with the enrichment of the country's energy reserves, broad opportunities will open up for the export of extracted energy resources.
And we are thinking about one way to get another kind of energy using solar energy. A large amount of energy can be generated by optical devices that collect energy coming to the Earth from the Sun: spherical mirrors, lenses and reflective flat mirrors.

A spherical mirror is a smooth mirror bounded by the surface of a sphere, which is divided into two types. We use a convex spherical mirror. To estimate the energy that we can collect through a spherical mirror, we will consider the following problems.

Let us derive the following formula for a hemispherical spherical mirror. For this, if the surface of the convex spherical mirror used for the device is equal to S, the radius of the sphere is equal to R, and the energy w *falls on the surface* in time t, then the intensity of the luminous flux arriving at the mirror

$J = \frac{w}{S \cdot t}(1)$

will be equal to Since the mirror is a hemisphere

$S = \frac{4\pi R^2}{2} = 2\pi R^2$

then formula (1) will take the form:

$J = \frac{w}{2\pi \cdot R^2 \cdot t}(2)$

If the surface of the region where the light is collected is S_0, the intensity is J_0, *and we calculate the energy* w_0 *collected in this region*. Since the beam current density does not change

JJ =0 (3)

$\omega_0 = \frac{w}{2\pi \cdot R^2} \cdot S_0(4)$

The novelty of the device and its difference from other similar devices. (Fig. 3.1) The main goal of the project is to use a set of devices based on the production of electricity using solar energy. Today's modern solar reactors are designed to collect heat. The device we offer is a form of converting this thermal energy into electrical energy that meets new modern requirements. The device collects solar radiation using spherical mirrors and converts it into electrical energy. The difference from other devices of this type is that to increase the FIK, the reactor is fixed and one water pump is used to ensure the circulation of the cycle. Instead of a secondary water pump, adjacent tanks were used. If the device is assembled in this way, the FIK will increase by 10-20%. Results achieved. Considering that the average annual solar radiation in Uzbekistan is 11 10^4 W, and the average duration of sunny days is 300 days, assuming that the average day will be 10 hours of sunny days (the useful efficiency of the device is 20-25% on average). Using a spherical mirror with an area of 1 m^2, we obtain the following results:

1) Duration of solar radiation (annual average):

$t = 300 \cdot 10 \cdot 3600 = 108 \cdot 10^5$ With

2) solar radiation during time *t:*

$A = P \cdot T = 11 \cdot 10^4 \cdot 108 \cdot 10^5 = 11880 \cdot 10^8 J$

3) Average annual energy:

If the device operates at 25% FIC, then

$\eta = \frac{A_{foydali}}{A_{umumiy}} \cdot 100\%(5)$

(5) according to the formula

$A_{foydali} = \frac{1}{4} A_{butun} = 297 \cdot 10^9$ J

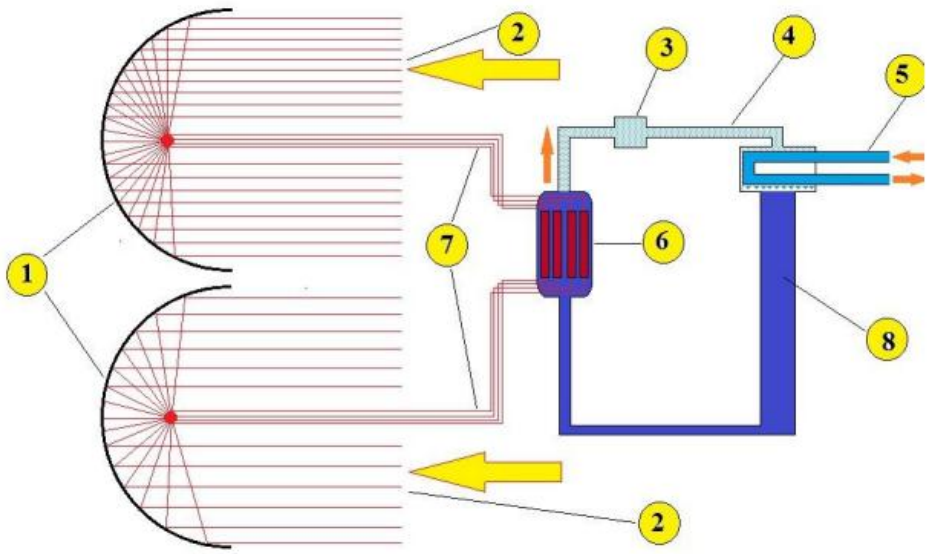
4) Electrical energy per day obtained using one spherical mirror with an area of 1 m2 :

$A_0 = \frac{A_{foydali}}{300} = \frac{297 \cdot 10^9}{300} = 9{,}9 \cdot 10^8$J

5) The average household consumes about 5-10 kWh of energy per day, i.e.

A=0.18·10^8 -0.36·10^8 J

will be equal



1 - Picture. Model new scheme of obtaining electric power using solar energy with the use of spherical mirrors of hemispherical shape.

1-Hemi-spherical mirrors; The beam is parallel to the main optical axis of the 2nd mirror; 3-generator blade; 4-high-energy water vapor; 5- cold water; 6-high-energy reactor; 7- analog that transmits thermal energy; Boiling water with a temperature of 8-900C – 1000C.

When producing electricity, the device receives completely environmentally friendly energy. Equipment required for the device.

- Controller: Outback FLEX max 60 (48 V, 60 A).
- Battery: Delta GX 12200 (12 V, 200 A hours) – 4 pcs.
- Spherical mirror with an area of 1 m2.
- One-piece heat storage reactor.
- One generator.
- Connecting pipes.

A project for generating electricity using spherical mirrors has been developed. Thus, the daily electrical energy obtained using one spherical mirror with an area of 1 m2 is equal to $9.9 \cdot 10^{8}$ J and provides an average household with two daily electrical energy. So, in conclusion, it can be said that this type of energy-generating devices is important for providing electricity to remote rural areas.

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