



Improvement of the Solar Photoelectric System Installed to Cover 30 Percent of the Electricity Consumption of Administrative Buildings

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ABSTRACT

This article provides information aimed at covering the buildings of ministries and state organizations with solar panels using energy-saving and renewable energy sources and reducing energy consumption in these organizations and it is recommended to use on-grid photoelectric systems to reduce energy consumption.

Keywords:

solar energy, on-grid, photovoltaic system, alternative energy, network, GLOBAL SOLAR ATLAS, installation angle.

As the need for electricity in the world market is increasing, world scientists are looking for cheap sources of electricity. But applying them in real life is another problem for scientists. The cheapest source of energy in the world depends on various factors such as location, availability and infrastructure. However, by 2021, the cheapest energy source globally is generally solar. Implementation of state support mechanisms for the widespread use of renewable energy sources by the population and business entities, provision of electricity and heat energy through these sources, and promotion of efficient use of energy resources in administrative and household buildings and structures In order to support the wide use of renewable energy sources by the state, the following directions have been defined, namely:

- financial incentives for the purchase of renewable energy sources devices by the population and business entities;

- implementation of targeted measures on the use of alternative energy sources in administrative and household buildings and structures, including residential areas and apartments;

- wider attraction of private investments in the sector by increasing the attractiveness of business projects related to the construction of micro and small hydropower plants;

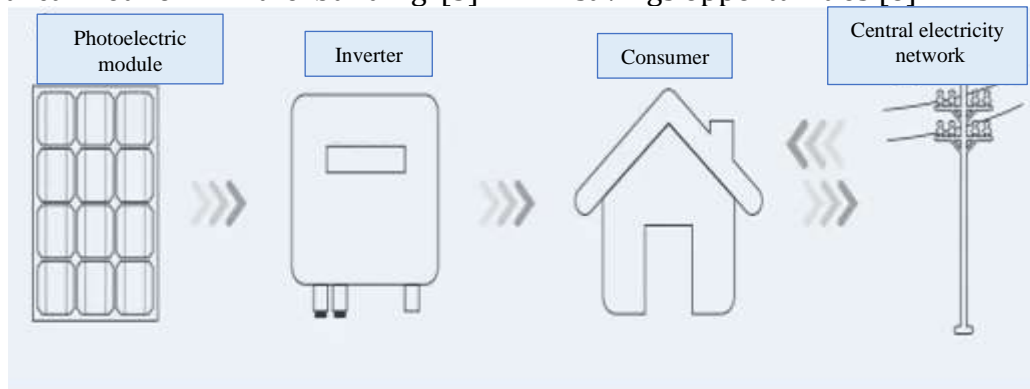
- all-round support for business entities that manufacture devices for solar and wind power plants and small hydropower plants [2].

Paragraph 4 of the decree of the President of the Republic of Uzbekistan "On additional measures for the introduction of energy-saving technologies and the development of small-capacity renewable energy sources" dated September 9, 2022 No. PF-220 the share of alternative energy sources

in the volume of energy consumption in more than 6000 facilities has been determined to reach 30% in the given ministries and departments [1]. Based on this basis, there is a need to calculate the amount of energy consumption of ministry and office buildings.

Going solar has become an increasingly popular choice for homeowners and businesses looking to reduce their carbon footprint and save on energy costs. There are two main types of solar systems: on-grid.

On-grid photoelectric (1 Picture) systems are used to save electricity used in an object. These systems work synchronously with the existing electrical network in the building [3]



1-Picture. On-grid photovoltaic system

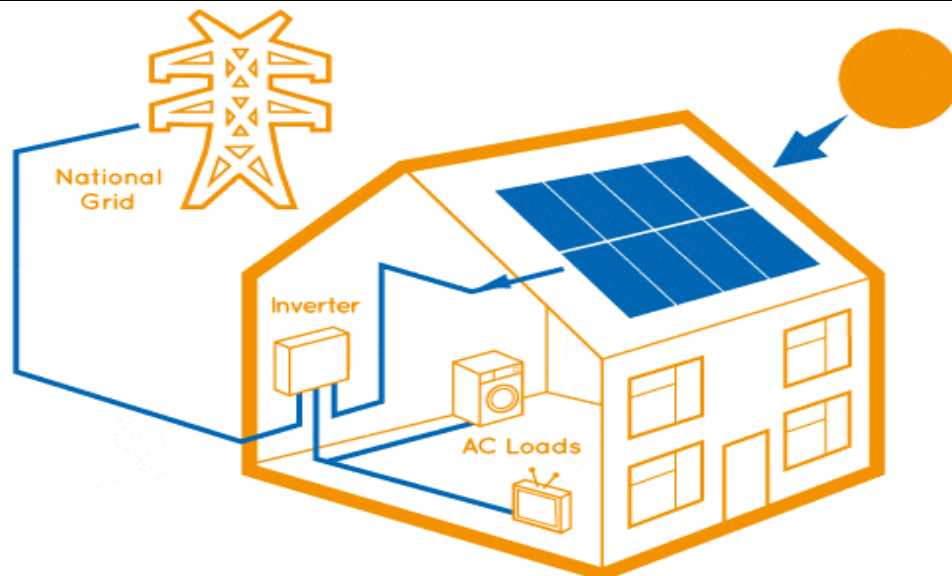
On-Grid photovoltaic system is connected to the existing electricity grid. The electricity produced by the photovoltaic system is used first, which reduces the use of electricity from the general grid. If the system produces more energy than it consumes, the excess energy is "exported", and if electricity is needed, it is "imported" from the grid. As a result, the payment for electricity is reduced to zero or significantly. The On-Grid system does not require the use of batteries and is not designed for direct connection. In the event of a power

and save electricity consumption. On-grid photovoltaic solar panels are useful when they do not produce enough energy or when the batteries that store unused solar energy run out and need time to recharge.

The charging process requires inverters that convert direct current electricity from solar panels into alternating current for use in corporate buildings or at home. Inverters are also responsible for feeding excess energy back into the grid through a process called "reverse power flow". Grid-connected systems provide a reliable source of electricity, while allowing for accurate calculation of electricity bills and savings opportunities [6].

outage in the grid, the grid inverter supplies electricity until the public grid is out of power. immediately stops production. This is one of the main requirements of electrical safety, taking into account the protection of workers in the electrical network when working with electrical networks [6].

The On-Grid system is connected to the existing power grid (2 Picture). The generated electricity is consumed directly and the unused surplus is "exported" to the supplier's network via a bidirectional meter [6].



2 Picture. On-grid. The photoelectric system and the state of being connected to the electrical grid

The annual amount of electricity produced by the installed photoelectric system should be 30% of the annual consumption of the building. This will require the annual electricity consumption of the selected building. For example, the selected building is located in Toyloq district of Samarkand region and the electricity consumption is equal to 19767 kWh. 30 percent of energy consumption is equal to 5930,1 kW/h. Then it is necessary to calculate how much electricity a 1 kW photoelectric system will produce at the location of this building. For this, you can use the free platform “GLOBAL SOLAR ATLAS”

created under the auspices of the World Bank [4]. For this, the following information must be entered into the platform:

- The location information of the building is 39.586828°, 067.120445°;
- Installation angle of photoelectric modules - 320°;
- Azimuth of photoelectric modules - 180°;
- Installed system power - 1 kW.

After entering these data, the site can see the annual production capacity of a 1 kW system installed on the roof of the building, as shown in 2 Picture.



3 Picture. Annual production capacity of a 1 kW photovoltaic system installed on the roof of a building

Then we will have 30% of the annual electricity consumption of the building with the annual production capacity of 1 kW system.

$$5930,1 / 1526 = 3,89 \text{ kWh}$$

Taking into account the energy losses of the system, if 4 kW or 5 kW with a reserve is installed, the annual power of the system will cover 30 percent of the electricity needs of the selected building.

Summary. On-grid photovoltaic systems can be built as an auxiliary system in places where there is no problem with electricity, for example in cities, industrial zones and thermal power plants. Organizations with an annual limit on electricity will benefit if they are set up to compensate for electricity beyond the limit. Allows you to participate in accurate metering of on-grid solar systems and save on electricity bills. In contrast, off-grid solar systems offer complete energy independence from aging infrastructure and protection from power outages.

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