



RESIDENTIAL BUILDINGS ON GRID (FOR CONNECTED), OFF GRID (AUTONOMOUS) AND HYBRID SYSTEMS IMPLEMENTATION TO DO

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Abstract: This article analyzes the operating principles, components, and applications of three main types of solar photovoltaic systems used in residential buildings: on-grid, off-grid, and hybrid systems. The advantages of crystalline silicon-based solar cells, the problem of electricity losses in Uzbekistan, and the importance of mini-photovoltaic plants in this regard are discussed. Schematic diagrams, main components (panels, inverters, controllers, batteries), and their interconnection are described in detail for each type of system. The possibilities of selling excess energy to the grid, tariff systems, and methods for achieving zero energy consumption throughout the year are also presented. In conclusion, on-grid systems are considered the most optimal for high-power consumers, while hybrid systems are considered the most optimal for households and areas with frequent grid outages.

Keywords: solar photovoltaic system, on-grid, off-grid, hybrid system, solar panel, inverter, controller, battery, grid connection, autonomous system, renewable energy, crystalline silicon, electricity losses, mini-photovoltaic plant, sale of excess energy, zero energy consumption.

Introduction. Photoelectric in systems as a main element sun elements service does. The sun elements pn different semiconductor from materials organized . Sun radiation in the structure of a semiconductor material swallowed electron-holes couple harvest does , then pn transition through separated element front and back on the surface metal in contacts is collected . From solar cells photoelectric modules (solar panels) , modules and sun batteries is collected .

Sun elements public accordingly working release for as the main material still crystal silicon is considered . Everyone sun from 80% of the elements based on that prepared from diapers consists of The sun will be radiation good swallowing to the ability has Otherwise, it's different. semiconductor to materials than row to the advantage has :

- 1) Silicon land on the surface silicon oxide in the form of wide spread .
- 2) Silicon harmful and not having an active element for surroundings to the environment damage does not bring .
- 3) Microelectronics in the industry silicon technology good studied .

In Uzbekistan electricity energy transmission and distribution in the process general losses from 20 percent increase organization Therefore , mini photovoltaic electricity from stations energy consumers near install use via , above saying passed losses sharp to reduce achieve possible . Small in size photovoltaic electricity stations replacement convenience , price cheapness and even if installation in apartments as well possible that in terms of very

comfortable is considered . Again renewable energy from sources use this amenities further increases .

Sun energy electricity to the energy in rotation photovoltaic from batteries is being used .

Photovoltaic batteries light light there is just in time electricity energy generates . This disadvantage because of this from systems in use to the network 3 ways to connect working Released : Autonomous sun photovoltaic systems (off-grid), to the grid connected sun photovoltaic systems (on-grid), and hybrid systems . These methods to energy need objects energy with in providing the most convenient is selected .

Autonomous sun photovoltaic systems (off - grid): Autonomous sun photovoltaic systems - this autonomous work mode counting from the network electricity energy can't . That's why for such The system is also known as off-grid . Such system only daytime day electricity energy working is released .

Many from the network outside sun photovoltaic systems during the day known " extra " electricity in the amount energy working release for intended are , they are storage for to batteries will be sent . This on batteries stored from energies system energy working when not taking out , for example , at night or cloudy in the weather use possible .

Additional to batteries has to be continuous energy with provides and this batteries number the system expensive to prices to the cycle reason will be . To the consumer looking at you need since according to more battery buy to take expensive fall possible .

That's why for such system energy consumption high happened permissions for himself unjustly to remain possible .

Such from systems electricity networks arrived not gone in places use to the goal is appropriate . Conclusion as in other words autonomous photovoltaic systems centralized electricity supply networks there is not been in places is applied .

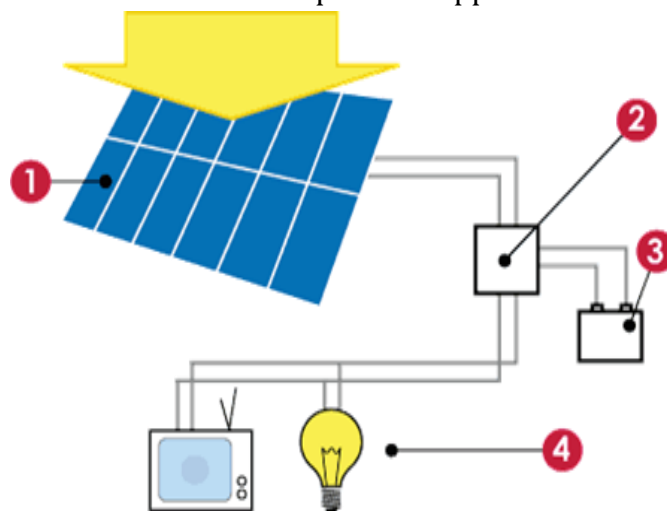


Figure 1. Autonomous photovoltaic system .
1-solar panels ; 2- controller ; 3- battery ; 4- load .

To the network connected sun photovoltaic systems (on-grid). To the network connected sun photovoltaic systems - this network with sun photovoltaic systems together work is the mode . In this system from the network also electricity energy to be taken or network electricity energy to be given possibility for Also known as on-grid .

this system exactly to the network off-grid solar photovoltaic systems like , need for necessary energy 100% of consumption or almost 100 % covering energy working is released . Enough sun panels when connected , at home don't download known one part sun electricity energy with provision possible .

To the network connected photovoltaic systems usually one or one how many panels , inverter, cables , centralized electricity guarantee system and electricity without loading consists of : Inverter solar panels to the network connect for service does .

Electricity from energy use to the mode looking at the sun photovoltaic system excess energy working release possible . Him from the network outside in the system happened such as to batteries send instead of , to the network you send possible and to you this electricity energy for compensation is given .

Excess electricity energy electricity to networks sell possible . If the sun energy for special increased tariffs if used , two counter installed - one working release for , the second consumption for .

With this together , all electricity energy sun battery by working issued electricity energy electricity to networks high at the price for sale , house electricity to the energy was need and electricity energy from networks simple at the price buy to take through satisfaction also possible .

Thus, not only year during electricity of energy zero spending , but per year zero electricity energy to ensure consumption possible (in summer) electricity to the network excess energy given in winter and sun light if not enough , electricity energy electricity to the network delivery is given).

This mode system to batteries has It won't be . The current on the day big powerful was consumers systems so work in mode connect to the goal is appropriate .

Hybrid connected sun photovoltaic systems - this network with sun photovoltaic systems together also energy reserve system (accumulators) available work is the mode. That is, briefly as in other words autonom sun photovoltaic system (off-grid) and to the network connected sun photovoltaic systems (on-grid) together as is a connection .

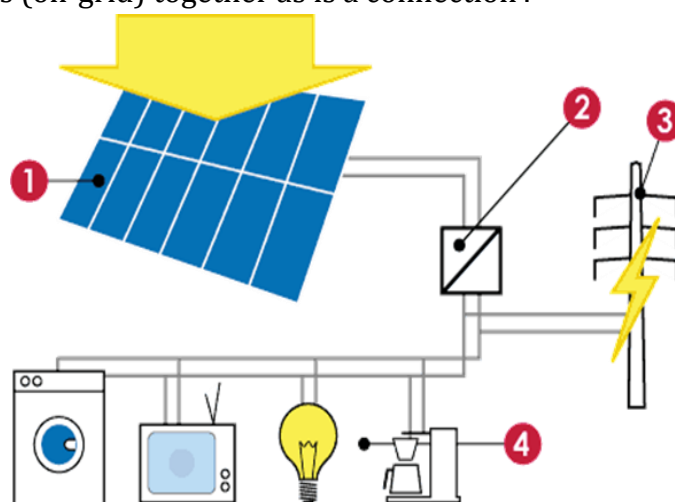


Figure 2. To the network connected sun photovoltaic system .

1-solar panels ; 2-inverter; 3- grid ; 4- load .

this system also from the network also electricity energy to be taken or network electricity energy to be given possible and again to batteries electricity energy backup is done . On the



network also sun on the panel also electricity energy there is unless reserved from energy For example , at night , in the air built when and photovoltaic system electricity energy unable to deliver while remaining reserved from energy is used .

this system exactly to the network off -grid solar photovoltaic systems like , need for necessary energy 100% of consumption or almost 100 % covering energy working is removed . Download necessary feeding for , especially often on the network interruptions was at the time photoelectric system big to power has to be necessary . If the network there is if , the system as usual with him connected without works . System sun panel , controller , battery battery , cables , inverter, load and support from the structure consists of .

Enough sun panels when connected , at home don't download known one part sun electricity energy with provision possible . Hybrid photovoltaic systems usually one or one how many panels , inverter, cables , centralized electricity guarantee system , batteries and electricity without loading consists of : Inverter solar panels to the network connect for service does . Electricity from energy use to the mode looking at the sun photovoltaic system excess energy working release possible .

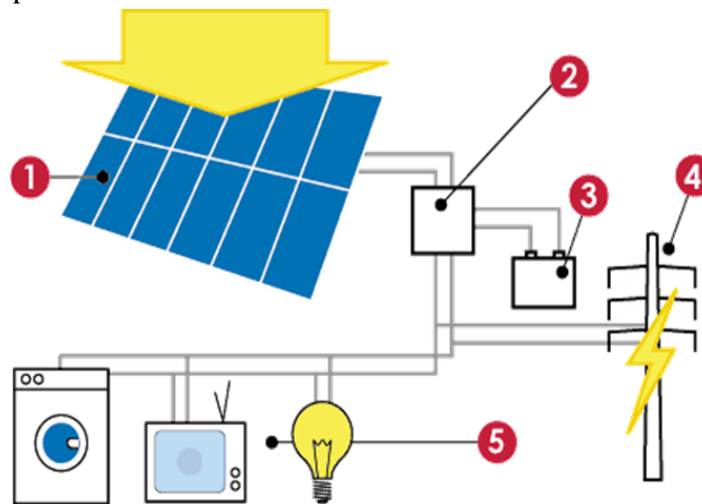


Figure 3. Hybrid sun photovoltaic system .
1-solar panels ; 2-inverter; 3- batteries ; 4- grid ; 5- load .

Him from the network outside in the system happened such as to batteries sends and excess working issued energy to the network you send possible and to you this electricity energy for compensation is given . Excess electricity energy electricity to networks sell possible . If the sun energy for special increased tariffs if used , two counter installed - one working release for , the second consumption for with this together , all electricity energy sun battery by working issued electricity energy electricity to networks high at the price for sale , house electricity to the energy was need and electricity energy from networks simple at the price buy to take through satisfaction also possible .

Thus, not only year during electricity of energy zero spending , but per year zero electricity energy to ensure consumption possible (in summer) electricity to the network excess energy given in winter and sun light if not enough , electricity energy electricity to the network delivery is given). Current on the day apartments for how much big powerful not been systems so work in mode connect to the goal is appropriate



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