ENERGY GENERATION SYSTEM FOR AUTONOMOUS POWER SUPPLY

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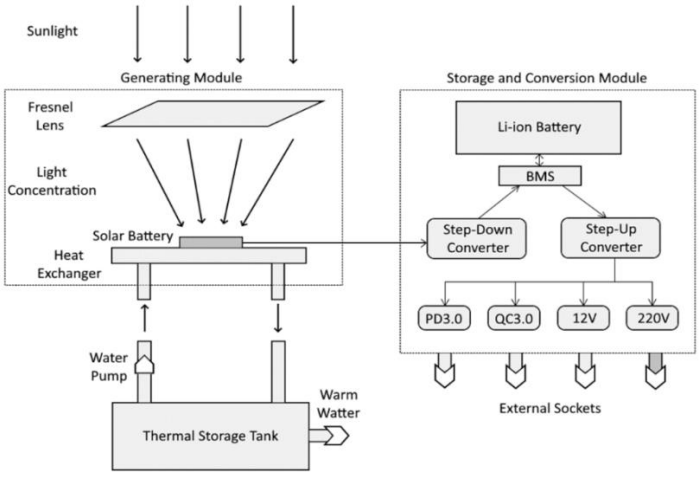
In recent years, there has been a steady trend among photovoltaic system researchers to introduce mass production of photovoltaic systems that use concentrated solar radiation, and one of the most obvious advantages of such systems is usually a radical improvement due to a reduction in the weight and size of the system. The implementation of such developments became possible thanks to the introduction into mass production the highly efficient solar cells (SC) based on GaAs, capable of working in conditions of concentrated solar radiation, the efficiency of the best samples among which exceeds 40 %. The reduced size of the solar battery from such SC significantly simplifies the solution to the problem of efficient heat transfer from the SC to the heat exchanger, in particular, the contact of such elements can be made by soldering. It is assumed that with such design, the long-wave component of solar radiation passes through the SC practically without loss and is absorbed directly in the heat-receiving unit, thereby reducing the operating temperature of the SC without losing the efficiency of thermal energy collection.

As can be seen from figure, by using repeated solar energy conversion units of about 0.16 square meters each, we have the ability to vary the size of the deployed array of these units to provide the required volume of electrical and thermal energy production. The proposed surface area of this solar energy system will be comparable to typical silicon-based solar panels. Such a result can be achieved by using Fresnel lenses, which are characterized by a small focal length, at the level of the diameter of the lens itself, to concentrate solar radiation.



As a result of the research work, the design conception of a high mobility energy generation and storage system with intelligent energy conversion and storage systems is proposed for use in military and civilian purposes in regions with damaged infrastructure, where access to electricity and hot water is limited or threatened due to man-made actions or natural damage. For Ukrainian civilian and military users in our country, the damage to the energy infrastructure caused by the war has limited the reliable supply of electricity and hot water.