UDC 621.3:620.96

COMBINED ENERGY SYSTEM CONSUMERS USING TRADITIONAL AND ALTERNATIVE ENERGY SOURCES AND BATTERIES

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The possibility of creating energy-efficient system, power supply of consumers using solar energy and battery power. The necessity of the use of heat accumulators, which works on phase transitions heat accumulating material in the composition of these systems.

Key words: the combined system, energy storage, renewable energy sources, energy supply.

In the last decade, considerable attention is paid to the development and creation of "hybrid" (combination) systems for energy consumers using traditional and / or renewable energy sources. However, in order to improve energy security and given the characteristics of renewable energy, there is a need to include in their composition or the accumulation of reserve energy [1-3]. For example, accumulation of excess solar energy during the period of his greatest activity, and its consumption at night the day. Another option - the possibility of accumulation of electricity at night, with further using it during the daytime period. Thus, the cost of such energy, the use of multi-energy meters, considerably reduced.

The purpose of research - the creation of environmentally friendly, energy-efficient consumers of energy systems using solar energy and battery power types.

Materials and methods of research. It is well known that in industrialized countries, the consumption of energy in the daytime when running most businesses and public transport, significantly higher than its consumption at night. That is why, long ago created standalone installer [4] and the energy supply system based on both liquid (not necessarily water) and battery of heat paved accumulating

material [5], which are equipped with (preferably, but not necessarily electric) heaters.

Such systems can store excess energy at night and spend it at another time, which is especially advantageous in countries with well-developed thermal and / or nuclear generation, where night tariff for electricity differentiated by the hour of day and is significantly lower than the daytime rate [6].

Another, possible use as a power generation system is installed on a renewable or alternative energy sources. Through the use of energy in their batteries provided with not only a stable and continuous power supply but also increases utilization of renewable power because of the accumulation of excess and low potential energy that can not be used directly by consumers. Thus, not only smooth out fluctuations in the grid, but it is possible to convert one form of energy to another, depending on customer needs.

Results. Summarizing the results of a number of scientific research [7-9] and practical experiments, both domestic and foreign researchers have developed a new system of combined energy consumers, based on the use of solar energy and / or electricity network with the possibility of accumulation of excess in the batteries of electric and heat energy. This system is designed to meet the electrical and thermal load of the consumer with increased economic efficiency of heating and / or hot water through solar energy and battery heat.

A combined solar-network system with battery power consists of three main blocks: BGE - The generation of electricity, BB - block batteries and BGH - The generation of heat, which include: photovoltaic cells (PV), which convert solar energy into electricity to cover the load (L) electric grid (EG) connection which occurs in periods when the power generated by solar cells is not enough to cover L, with the full discharge block batteries (battery).

In a separate unit dedicated group of consumers (circulation pumps, backup heating source carrier) that make up the load on site (LS) of the developed system.

As part of this system also provides automatic adjustable ballast load (BL), which is designed for a possible disposal of surplus power generated by solar cells.

As BL act except block battery, optional multilevel heating system heat transfer surface heat accumulator (HA) new design. Connecting the latter allows not only to intensify the process of accumulation, but also make the accumulation of excess electricity generated therein, thus turning it into heat, followed by long-term use during changes in the flow of energy from renewable sources. However, if high clouds or heavy use of thermal energy generated by solar collectors (SC), which, through buffer capacity (beats) goes for hot water (HW) customers, as well as transitional and heating periods possible lack of excess energy systems work then switches to its consumption, not generation. In this case, cover the deficit of thermal energy at the expense of the inclusion of such a system of solid fuel boilers (SFB) and electric - from the network.

Depending on the conditions adopted by the developed system, the latter can operate in several key ways:

1. Excess as electrical and thermal energy.
2. The surplus electricity and heat energy deficit, and vice versa.
3. Deficit as electrical and thermal energy.

Using the developed system mainly expected in places where photovoltaic cells and solar collectors serve as the main energy source, and the electrical network and solid boiler - subsidiary. Thus, the inclusion of such a system power supply batteries heat and power not only increases energy and economic efficiency of its work, but also significantly enhances its use for different regions of our country.

Conclusions

Summarizing the results of the literary and patent analysis to improve the energy efficiency of energy consumers, including, of renewable energy, developed a new system of combined energy consumers using traditional and alternative energy sources and batteries. The new system combines different principles as accumulation (Capacitor accumulation and accumulation heat using phase transition) and the use of multiple sources of primary energy, namely, thermal and

electrical sources. This technical solution significantly expands the scope of the practical implementation of such systems of combined energy and absence of mechanical assemblies consisting developed system significantly increases the overall reliability of the process of energy consumers in general.

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