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THE USE OF SOLAR ENERGY AS A HEAT SOURCE AND HEAT ENERGY CONSERVATION ISSUES

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ABSTRACT

In pursuit of the careful use of fuel resources accumulated by nature over millions of years, the heating equipment industry is consistently following the paths, allowing the responsible use of fuel and energy reserves. A rational way to implement such a policy is the direct use of solar energy by collectors.

Keywords: solar energy, capital investments, collectors, solar radiation, industry, energy efficiency, collector panel, gel collector.

АННОТАЦИЯ

В стремлении к бережному расходованию топливных ресурсов, накопленных природой за миллионы лет, промышленность, выпускающая отопительную технику, последовательно идет путями, позволяющими ответственно пользоваться топливоэнергетическими запасами. Рациональным способом реализации такой политики является непосредственное использование солнечной энергии коллекторами.

Ключевые слова: солнечная энергия, капиталовложения, коллекторы, солнечное излучение, промышленность, энергоотдачи, коллекторной панели, гелеоприемник.

INTRODUCTION

Sustainable development means understanding the potential of the environment, that is, the availability of available natural resources and the availability of all resources necessary for the development of society, maintaining a balance between them not only at the present stage, but also in the future. One of the leading areas of environmental protection work is a detailed study of sources and processes of air pollution. Distinguish between natural and artificial (anthropogenic) sources of atmospheric pollution [2, c.250]. The following is a brief overview of the relationship between community development and natural resources, its changing trends and expected impacts. Despite, that water belongs to renewable natural resources, the relationship between its useful part and consumer demand, that is, the balance, is negative from year to year [12, c.15]. More than 200 types of ingredients are formed in motor vehicles alone when fuel is burned. Of these, non-toxic elements that are considered: nitrogen, oxygen, water vapor and carbon dioxide (CO_2 anhydride carbonate). From the list of toxic waste, we will mainly provide 3 ingredients that are: carbon monoxide (CO), hydrocarbons that do not have time to completely combustion C_nH_m, nitrogen oxides NO_x [1, p.50].

Man has been using the warmth of the sun since time immemorial. In the summer it heats our buildings directly, in the winter we use the accumulated solar energy in the form of wood, coal, oil and gas for heating and preparing hot water.

In striving for the careful use of fuel resources accumulated by nature over millions of years, the industry that produces heating equipment is consistently following the paths that allow the responsible use of fuel and energy reserves.

A rational way to implement such a policy is the direct use of solar energy by collectors. High-quality collectors from a technical point of view and a common engineering communication system coordinated with them make it possible to consider the economic use of solar energy no longer as a matter of the future, but as a reality tested in everyday practice. Considering that fuel prices will continue to rise in the future, the investment in a solar plant can be considered a true investment in the future.

Solar radiation is a flow of energy uniformly emitted by the Sun in all directions. Part of this flow with a capacity of 1.36 kW / m2 constantly enters the outer atmosphere of the earth - the so-called. solar constant. Passing through the earth's atmosphere, solar radiation is attenuated by reflection, scattering and absorption by dust particles and gas molecules. That part of the radiation that freely passes through the atmosphere and falls directly on the surface of the Earth is called direct solar radiation. Part of the solar radiation, which is reflected or absorbed by dust particles and gas molecules, then re-emitted and hits the Earth's surface without having a specific direction, is called scattered solar radiation. The total radiation reaching the Earth's surface is the total solar radiation Eg: the total radiation is direct radiation + scattered radiation.

In our latitudes, the total radiation in optimal conditions (cloudless, clear sky, middle of the day) is max. 1000 W/m^2. Solar collectors, depending on their type, allow you to use up to 75% of the total radiation. The influence of orientation, tilt and dimming influences the energy efficiency of the solar collector.

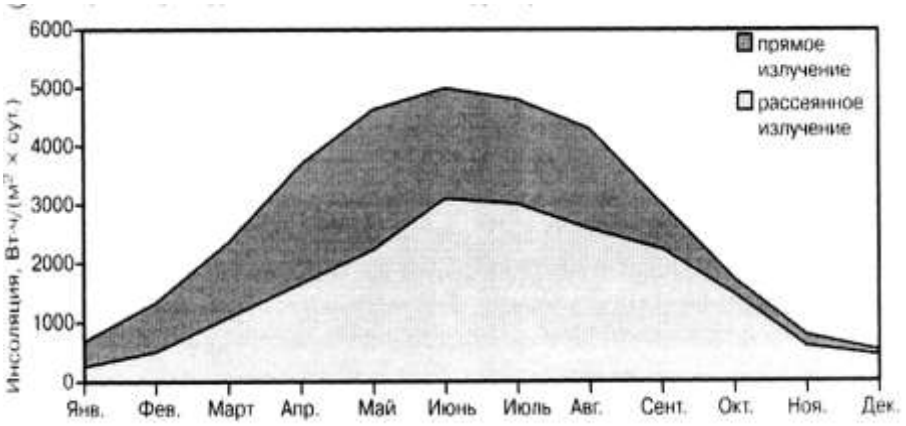

Fig 1. Schedule of annual energy consumption per year

Therefore, it is necessary to find the optimal orientation and inclination of the gel collector, which depends on the time of year and the hours of the day. The figure shows how to install the solar collector in order to receive as much solar energy as possible. The highest energy efficiency of a solar installation in a year can be achieved when it is located in the southern direction with an inclination of 30 - 35 degrees to the horizontal. But even with a significant deviation from these conditions (from the southwest to the southeast, with an inclination of 25 to 55 degrees)

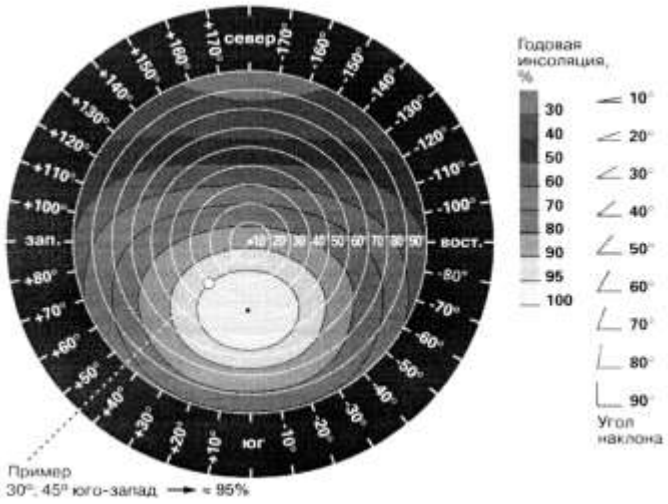

Fig 2. Yearly insolation and tilt

it is advisable to install a thermal solar installation. Figure (3) clearly demonstrates the loss of energy output in the event that the collector panel is not optimally located. Figure (3) shows that a smaller slope is more effective if the reservoir area cannot be oriented to the south.

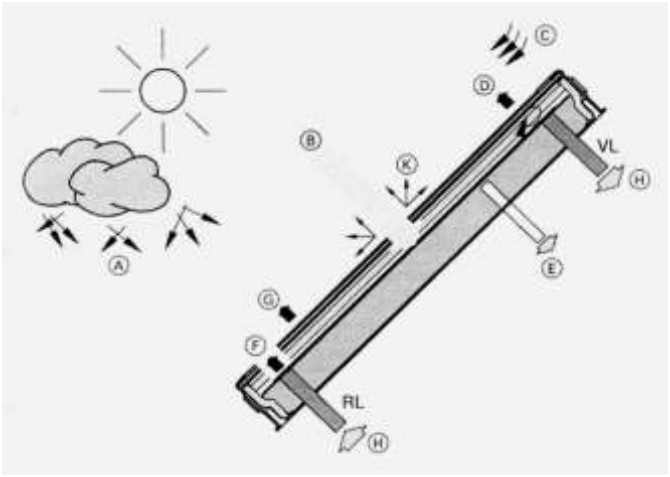

Fig 3. Scheme and principle of operation of the solar collector

(A) Scattered radiation of the sky
(B) Direct solar radiation
(C) Wind, rain, snow, convection
(D) Convection loss
(E) Conduction loss
(F) Radiant heat absorber
(G) Thermal radiation of glass cover
(N) Net collector power
(K) Reflection

For example, a thermal collector installation with a slope of 30 °, even at 45 ° in the southwest direction, still provides almost 95% of the optimal energy efficiency. Even with the orientation

of the solar installation in an east or west direction, you can still count on 85% of the return if the roof slope is 25 ° - 40 °.

In winter, a steeper angle would be more efficient, but the solar installation gives two-thirds of the energy output in the summer half of the year. An angle of attack of less than 20 degrees, on the other hand, should be avoided, as this increases the degree of contamination of the collector. If the collector area is to be distributed over different roof areas, then labor-intensive hydraulic connection of the collector areas is required. Each panel should be equipped with a collector temperature sensor and have a separate pumping unit. The resulting high energy efficiency significantly degrades the cost-benefit ratio.

The results of the study found that when installing the collector panel and determining its dimensions should be performed in such a way, that the impact of nearby buildings, trees, power lines, etc. shading is negligible. It should be borne in mind that over the next twenty years, neighboring land plots may be built up or planted with plants.

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