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THE USE OF SOLAR COLLECTORS FOR HEATING A RESIDENTIAL BUILDING IN KRAGUJEVAC (SERBIA)

Abstract: *This paper includes the analysis of the reduction of a heating consumption of a residential building by using solar collectors. Two types of solar collectors from the group of conventional flat-plate solar collectors and the group of vacuum solar collectors were selected for space heating. The highest energy savings (17.63%) are related to the vacuum solar collector of the last generation and the lowest to the vacuum solar collector of the first generation (4.65%). As for the flat-plate solar collectors, the highest achieved energy savings are 8.34%.*
Keywords: *solar collector, space heating, simulation*

1. INTRODUCTION

By ratifying the Treaty establishing the Energy Community, the Republic of Serbia took over the obligations of Directive 2009/28 / EC which obliges the Member States of the European Union that by 2020, among other things, reduce greenhouse gas emissions by 20%. The most common measures taken in order to increase energy efficiency and thereby reduce emissions of greenhouse gases are: insulation of a building, replacement of dilapidated windows and doors, installation of measuring and regulating devices (heat meters and thermostatic valves) as well as application of renewable energy sources. The increasing need for renewable energy sources, specifically solar energy, requires that research be conducted to improve the efficiency of solar systems. The greatest limitations to increasing the use of conventional collectors is their relatively low average efficiency and high investment cost. For this reason, significant research on improving the performance of these collectors has been carried out [1,2]. This paper includes the analysis of the reduction of a heating consumption of a residential building by using solar collectors. Two types of solar collectors from the group of conventional flat-plate solar collectors and the group of vacuum solar collectors were selected and analyzed.

2. MODEL

2.1 Description of the residential building

Isometric view of the analyzed residential building is shown in Fig. 1 (left).

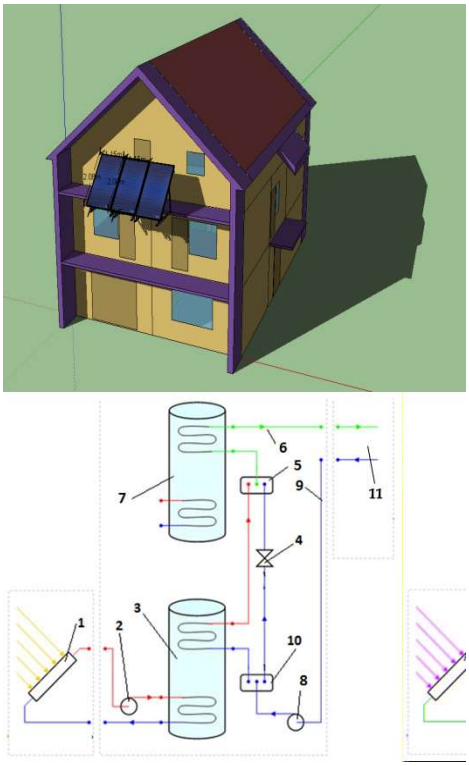

Figure 1. *Isometric view of the analyzed residential building (up) and scheme of central heating system (down) (1-solar collectors, 2-pump, 3-water tank, 4-regulating valve, 5-mixer, 6-wall heaters inlet, 7-water tank with*