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Concentrated Heat Storage for Solar Heating

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The FP7 sponsored DEARSUN project was initiated in 2008 to develop a solar thermal heating system capable of covering the full-year heat and hot water load of a single family house using high temperature thermal storage. ACE Group with a team of European solar thermal experts, research institutions and industrial partners designed and optimized the system and its components (heat transfer fluid, highly insulated tanks and the control system) with the aim of creating an efficient, affordable and reliable solar thermal solution for small and medium sized building. In 2009, the first prototype system was produced and installed on a pilot home. Actual performance of the prototype system over the 2009-2010 heating period has been closely monitored using web applications and evaluated against simulations and system performance expectations. This paper presents the innovative storage and control concepts behind the DEARSUN system, the initial results of the prototype system performance as well as simulation results and cost analysis which demonstrate the promising potential of this renewable energy solution for homes in south and central Europe.

Solar Space Heating System Using High Efficiency Flat Plate Collectors: Experimental Results

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An experimental solar energy facility has been designed in order to contribute to the coverage of cooling and space heating demand for the typical Spanish housing. This work focuses on the experimental evaluation of this facility working in solar space heating mode during the winter months (December 2008-February 2009). To that purpose a new type of solar vacuum plate collectors with a higher efficiency than conventional ones has been used. The solar facility comprises a solar collector field of 48 m² (40 m² useful area), a plate heat exchanger, a 1500 liters storage tank, an absorption machine and several fan-coils. The facility has been tested while heating an 80 m² building located in Madrid. The results show that the solar facility is able to meet 55% of the space heating demand. As the average floor size of Spanish homes is 80 m², these results can be extrapolated. This research is supported by the PSA INVISO 2007-2008 Research Project (SP3-Sustainable Power Generation for Housing).