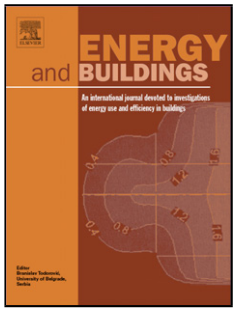

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Author: J.G. Rogers M. McManus S. Cooper

PII: S0378-7788(13)00419-2
DOI: http://dx.doi.org/doi:10.1016/j.enbuild.2013.07.031
Reference: ENB 4386

To appear in: *ENB*

Received date: 4-12-2012
Accepted date: 10-7-2013

Please cite this article as: J.G. Rogers, M. McManus, S. Cooper, Potential for reliance on solar water heating throughout the summer in northern cloudy climates, *Energy and Buildings* (2013), http://dx.doi.org/10.1016/j.enbuild.2013.07.031

Potential for reliance on solar water heating throughout the summer in northern cloudy climates

J G Rogers[1], M McManus, S Cooper

Sustainable Energy Research Team, Department of Mechanical Engineering, University of Bath, Bath, BA2 7AY

Abstract

In latitudes between 50° and 60°north domestic hot water is frequently provided by the house's central heating boiler. These are run for short periods in the summer just to provide hot water, this tends to be inefficient. In places with a constant solar climate it should be possible to rely on solar energy to provide domestic hot water, however many northern cities have a large daily variation in solar radiation. The potential of solar water heaters to meet the hot water demand of a household throughout the summer period in a wide range of cities was investigated. Hourly solar irradiation and air temperature values for a typical year are used to calculate the efficiency of a commercially available solar panel and estimate the energy collected each hour. The hot water is stored with daily extraction varied to correspond to different levels of occupants. The heat loss from the store is also calculated and used to find the optimum area of solar collector for a given store size. It was found that it should be possible to provide domestic hot water by solar panels for the period when space heating is not required in all location considered.

Keywords

solar water heating; domestic hot water; northern climate; summertime usage; thermal stores

1 Introduction

The practicality of using solar water heating to augment existing water heating systems in Northerly latitudes (50° and above) has been established. This normally involves the use of an auxiliary water heater to boost the temperature on cloudy days [1,2] or the running of central heating boilers for very short times to top up the temperature in the domestic hot water tank to supplement the solar heating on dull days [3]. Although some gas boilers and electric heaters can work efficiently for short duration runs the same is not true for low carbon heat sources like biomass fired boilers or micro CHP units. This leads to the conclusion that solar water heaters cannot be used efficiently in combination with low carbon heating systems. Consequently a different implementation strategy should be employed when using solar water heaters in combination with low carbon heat sources. It has been show previously [4] that it is possible for a typical solar water heater to provide adequate

[1] corresponding author e mail J.G.Rogers@bath.ac.uk phone +44 1225 385366