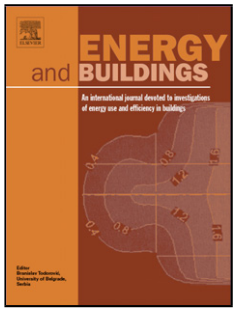

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Building integration of domestic solar combi-systems: the importance of managing the distribution pipework

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Abstract

This paper examines the inextricable link between the performance of solar combi-systems coupled with under-floor radiant heating and the architectural design of buildings where such systems may be used. It focuses on the impact of building fabric, area and rooms' layout on both the system's performance and thermal comfort. The building integration of the distribution pipework is sensitively examined through an experimental analysis of a case study; a residence in South Europe, using dynamic thermal simulation and numerical modeling. It is found that pipe losses - regarded both as energy wastage and heat gains to the space - can be significant but also controlled if the pipe network is carefully planned. The results show that collector loop losses can be comparable to tank losses for most of the year or even higher in some months, and that the management of the collector loop piping length can be more effective in controlling these losses than improving the pipes' insulation. The analysis further shows that there are times when distribution losses have the potential to cause noticeable local overheating e.g. long piping length or piping route passing through narrow spaces like corridors and lobbies.

Keywords

Keywords: solar combi-systems; thermal comfort; underfloor heating; collector loop; heat delivery loop; tank losses; distribution losses; overheating; heat losses;