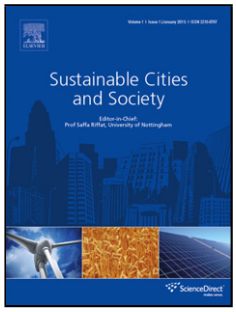

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PII: S2210-6707(17)30238-X
DOI: http://dx.doi.org/doi:10.1016/j.scs.2017.05.020
Reference: SCS 666

To appear in:

Received date: 6-3-2017
Revised date: 10-4-2017
Accepted date: 28-5-2017

Please cite this article as: Bellos, Evangelos., & Tzivanidis, Christos., Energetic and financial sustainability of solar assisted heat pump heating systems in Europe.*Sustainable Cities and Society* http://dx.doi.org/10.1016/j.scs.2017.05.020

Energetic and financial sustainability of solar assisted heat pump heating systems in Europe

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Highlights

- The use of solar assisted heat pump heating system (SAHP) in Europe is examined.
- Low and high insulated buildings are examined for twenty cities in Europe.
- The SAHP is compared with the air source heat pump heating system (ASHP).
- About 35% electricity savings are found with SAHP because of the higher COP.
- SAHP is the best choice for Athens, Istanbul, Madrid, Napoli, Rome and Thessaloniki.

Abstract

The objective of this study is to compare energetically and financially a solar assisted heat pump heating system powered by flat plate collectors with a conventional air source heat pump system for twenty European cities. The examined buildings have 100m^2 floor area and they are identical among the examined cases in order to perform a comparison under the same terms. Only the insulation thickness varies, examining two insulation scenarios with 4cm and 8cm insulation layer thickness. According to the final results, the electricity savings using the solar assisted heat pump system are ranged from 30% to 40%, indicating great sustainability in both insulation scenarios. The COP in the solar assisted systems is found close to 4 and for the conventional air source systems close to 2.5. The solar assisted heating system is proved to be also the financially optimum solution for the majority of the examined cities and especially in low insulation cases. More specifically, this system is proved to be ideal for cities with