SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

2015 HIGHLIGHTS

SHC Task 52

Solar Heat and Energy Economy in Urban Environments

THE ISSUE

The Task focuses on the analysis of the future role of solar thermal in energy supply systems in urban environments. With fast changing economic boundaries in the energy economic markets and the growing of renewables in the electricity sector a review of the strategic role of solar thermal energy systems for low temperature heating and cooling demand is subject of the task.

OUR WORK

Based on an energy economic analysis - reflecting future changes in the whole energy system - strategies and technical solutions as well as associated chains for energy system analysis will be developed. Further on technically and economically feasible examples of integration of solar thermal systems in urban energy systems will be identified, assessed and documented.

Participating Countries

Austria
Denmark
Germany
Portugal
Switzerland

Task Date	2014-2017
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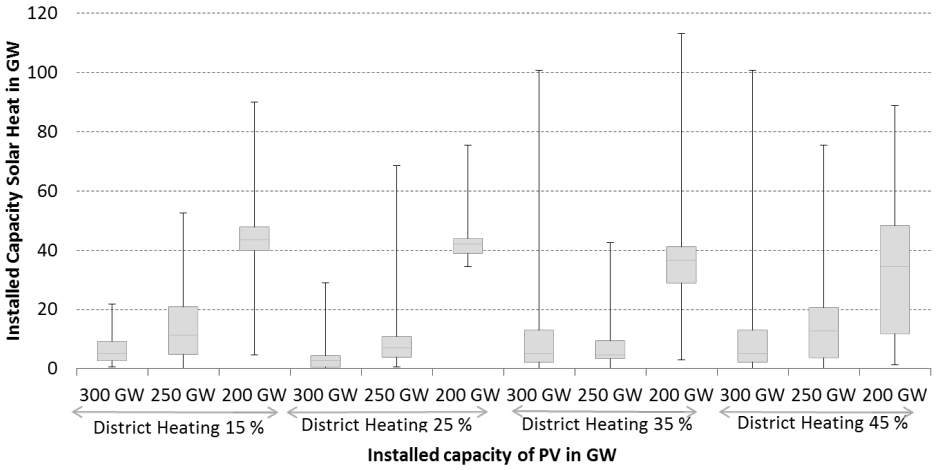
KEY RESULTS OF 2015

Set Up of Energy Analysis Frame Work

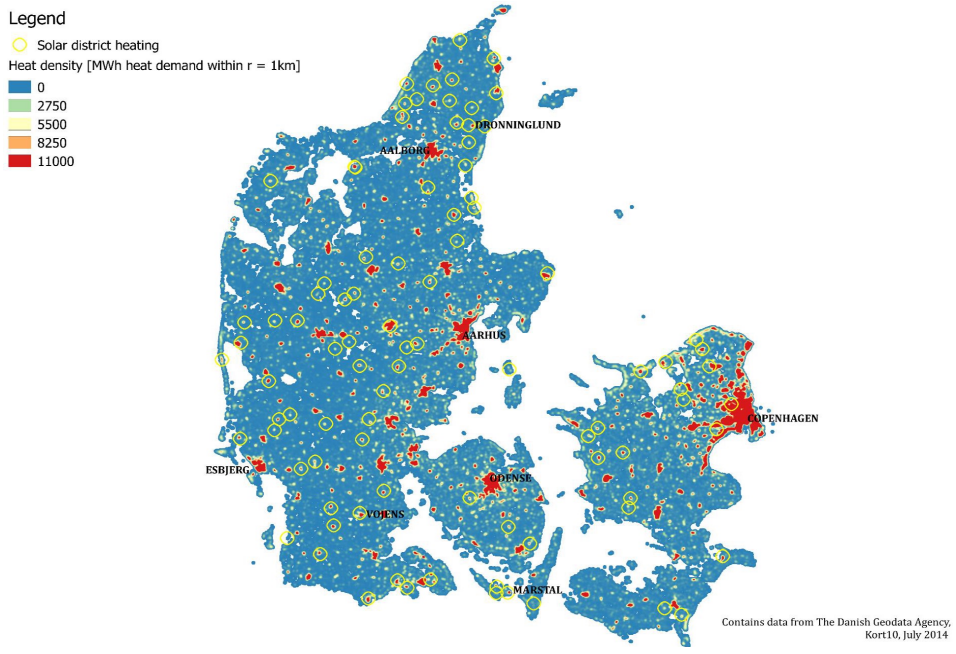
A framework for energy system analysis was set up using different modelling approaches. A detailed analysis for the German situation was done looking for different scenarios for the year 2050. For different shares of district heating and installed photovoltaic capacity potentials for solar heat were calculated using the techno-economic model ReMod-D. First results show that for more or less similar costs for the over-all energy system, solar thermal might play a role when the installed PV-capacity is lower than 200 GW.



Sensitivity of solar thermal capacity potential depending on installed PV capacity and share of district heating.
Source S. Herkel, Fraunhofer ISE

Analysis of Success Factors for Solar Heat Integrated in Urban Energy System

Based on an analysis of the relationship of installed capacity of large solar systems in Denmark and heat density, it was observed that most of the installed systems are near small town urban structures. So both key requirements were fulfilled – a relative high heat density in a distance < 5 km, but free and cheap space available. The following map shows a heat density map of Denmark and installed large solar systems.

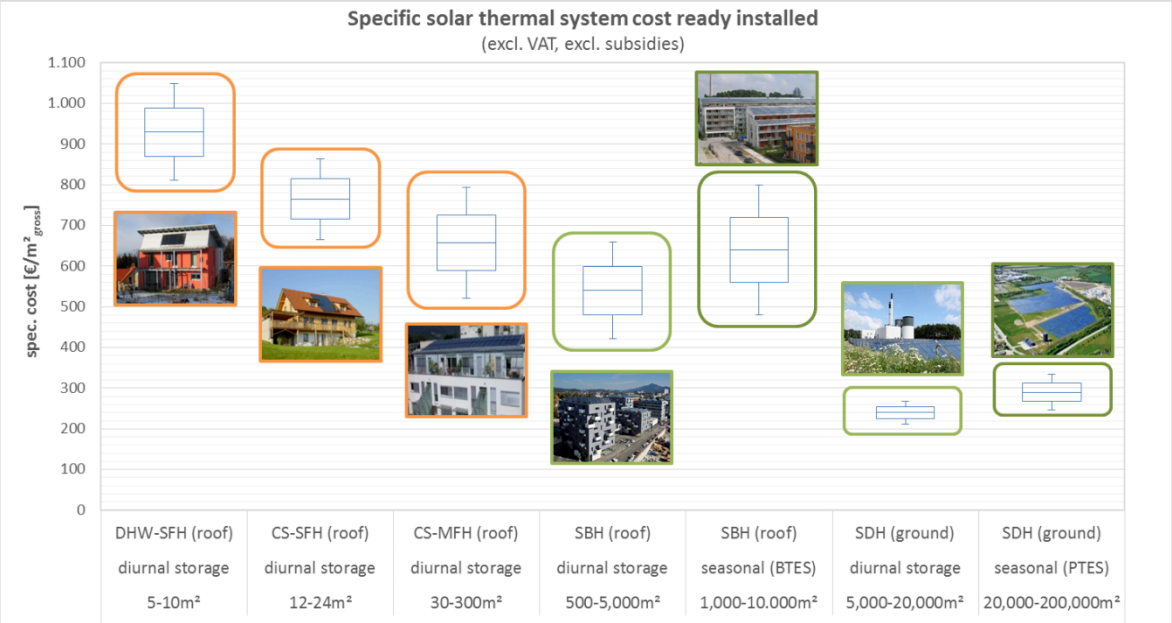


Heat density map of Denmark and installed large solar systems.
Source D. Trier, Planenergi

Cost Analysis of Solar District Heating Plants

A detailed cost analysis of different solar application including domestic hot water solar thermal systems in single family houses (DHW-SFH), solar combi systems in single family houses (COMBI-SFH) as well as solar combi systems in multi-family houses and building blocks (COMBI-MFH) was performed. In addition, solar thermal systems connected to heating networks were analyzed, most notably in Denmark where already exists a commercial market established for solar district heating systems of between 5,000 and 50.000m² collector area (SDH-ground). Also in Austria and Germany several solar assisted heating networks have been realized in the past years. In Austria both solar district heating in larger cities, such as Graz or Wels, may be found as well as solar assisted biomass heating systems (SBH) in around 30 communities. In Germany, ten solar thermal systems together with different kinds of seasonal storages have been realized to supply grid connected building blocks (SBH-BTES).

The cost including storage shows a large variation, especially for the small systems.



Turnkey solar thermal system costs incl. storage [EUR/m²gross], excl. VAT. ***Source: F. Mauthner, AEE Intec.***