SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

2014 HIGHLIGHTS

SHC Task 49
Solar Heat Integration in Industrial Processes

THE ISSUE

Solar Heat for Industrial Processes (SHIP) is currently at the early stages of development, but is considered to have huge potential for solar thermal applications. Currently, 120 operating solar thermal systems for process heat are reported worldwide, with a total capacity of about 88 MWth (125,000 m^2). The first applications have been experimental and relatively small scale. In recent years, significantly bigger solar thermal fields have been applied and are currently in the project pipeline. There is great potential for this market and technological developments, as 28% of the overall energy demand in the EU27 countries originates in the industrial sector, and the majority of this is heat of below 250°C.

In several specific industry sectors, such as food, wine and beverages, transport equipment, machinery, textiles, pulp and paper, the share of heat demand at low and medium temperatures (below 250°C) is around 60%. Tapping into this potential would provide a significant solar contribution to industrial energy requirements.

Participating Countries

Australia
Austria
China
Denmark
France
Germany
India
Japan
Italy
Mexico
Netherlands
New Zealand
Poland
Portugal
Slovenia
Spain
South Africa
Sweden
Switzerland
Tunis
United Kingdom
United States

OUR WORK

The work of SHC Task 49/SolarPACES IV is dedicated to three main areas: process heat collectors, process integration and process intensification and design guidelines. Improved solar thermal collectors and solar thermal system integration for production processes will be reached through advanced heat integration and storage management and advanced methodology for decisions on integration place and integration types.

Within the Task new developments of the advanced pinch analysis for heat exchanger and storage design will be reached as well as the identification of the increasing potentials of process intensification and new applications, such as solar water detoxification, solar water disinfection and solar driven reactions. The Task will prepare a worldwide overview of SHIP results and experiences (including completed and ongoing demonstration system installations using monitoring data, as well as carrying out economic analyses) in order to lower the barriers for market deployment and to disseminate the knowledge to the main target groups.

This is a 4-year collaborative project with the IEA SolarPACES Programme's Task IV.

Task Date 2012-2016
Task Leader Christoph Brunner
AEE INTEC, Austria
Email c.brunner@aee.at
Website http://www.iea-shc.org/task49

KEY RESULTS OF 2014

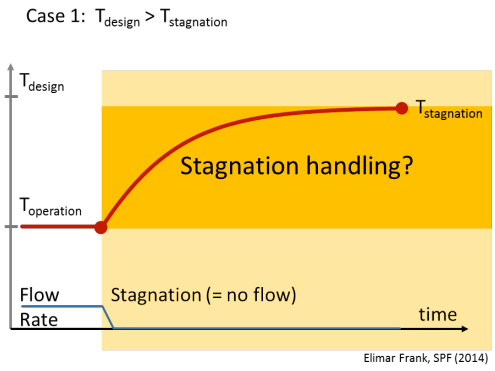
Launch of The SHIP Database on Existing Solar Process Heat Installations Worldwide

The Solar Heat for Industrial Processes (SHIP) database was launched mid 2014 (www.ship-plants.info). This online database contains a worldwide overview of existing solar thermal plants that provide thermal energy for production processes in different industry sectors. Each plant description includes information on the size of the collector field, collector technology and integration point in the production process. An initial survey was developed and sent out to different solar companies by AEE INTEC (www.aee-intec.at). The returned data has been collected, structured and integrated into the database. All the programming work for the database's structure and design has been done by PSE (www.pse.de).

The user of the database now has the possibility to extract detailed information from all identified solar thermal plants and create statistics like the share of collector technologies, size of the collector field per country or industry sector and cost per square meter. The SHIP database is a living platform and will continuously grow.

Report on Overheating Prevention and Stagnation Handling

At the end of 2014 a comprehensive report on stagnation and overheating of large-scale solar thermal plants was published. Stagnation describes the state of a solar thermal system in which the flow in the collector loop is interrupted and solar radiation is further absorbed by the solar thermal collector and thus heats the fluid in the solar thermal collector up to a temperature where the absorbed energy equals the losses. Compared to conventional heat supply technologies this means that in case of technical defects, power blackouts or simply due to a lack of heat demand (i.e., temporarily no available heat sink) some solar thermal collector fields cannot be simply shut down.



The report gives an overview of topics related to stagnation and overheating in general, and specifically of solar assisted process heat applications. There will be technical solutions of overheating prevention and control measures, measures for solar process heat applications with non-concentrating collectors, special challenges for concentrating and tracked collectors as well as good-practice examples of implemented measures. The report can be downloaded from the SHC Task 49 webpage.