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at Intersolar Trade Fair in Freiburg, Germany on June 21st, 2007

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PRESENTATION OF PROJECT RESULTS

Solar thermal systems can contribute to the protection of the environment and save our natural resources. Even though solar thermal systems are already well-developed at present, further dissemination of this technology requires a continuous development and optimisation. In order to manage this challenge collectively on a European basis, the project "New Generation of Solar Thermal Systems (NEGST)" was initiated.

The project started in July 2004 and has a duration of 36 months. By now the results of 3 years research and development work, investigations and market studies are available.

Industry Workshop

The first presentation of the project results will be given in the "NEGST-workshop" taking place at the **Intersolar Trade Fair in Freiburg, Germany on Thursday, June 21st, 2007.**

The workshop includes the following topics: presentation of a new generation of small solar thermal systems and observed market trends in Europe, different system concepts for large-scale solar thermal systems with the objective to achieve a broader dissemination for larger buildings such as hospitals, hotels and multifamily houses, aesthetic architectural integration of solar thermal systems in buildings, presentation of pre-normative work and the potential of advanced applications like technologies of seawater desalination and cooling systems in different European countries. Further information and registration: <http://www.intersolar.de/530+M52087573ab0.html>

Project Website

All project results including the Final Project Report and several Public Deliverables can be downloaded free of charge at www.swt-technologie.de/html/negst.html in the end of June 2007.

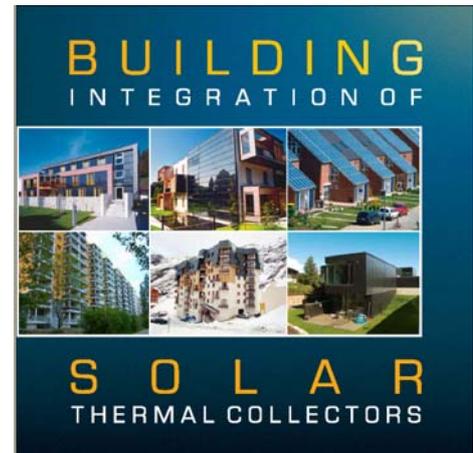
Extract of the topics of latest deliverables

- Design and installation guidelines for the new system generation
- Results of the on-site evaluation for the new system generation
- Technical and organizational guidelines for large-scale solar thermal systems
- Recommendations for uniform European requirements
- Recommendations for the development of easily installable products
- Official proposals to CEN TC312 and WGs
- Design and simulation software
- Feasibility study solar cooling and solar desalination

SUCCESSFUL ARCHITECTURAL INTEGRATION

Brochure

A colourful brochure showing examples of building integration of solar thermal collectors is now available. Six objects from in project participating countries are presented in the booklet with the aim to illustrate how solar thermal collectors can be a part of the building architecture and even give it an extra touch of sustainability, emphasizing the appearance of energy efficiency. The booklet is distributed among architects in Austria, Denmark, France, Germany, Italy, Norway, Sweden and The Netherlands with the goal to motivate them to apply solar thermal technology in buildings and to present creative solutions in existing applications. The booklet can be downloaded, free of charge at <http://www.swt-technologie.de/html/negst.html>.



Articles available for download

“Solar Integration - Five easy ways to incorporate solar thermal into conventional heating system” published in “Renewable Energy World”, issue November-December 2006. Online at

<http://www.swt-technologie.de/html/newsletters.html>

“Built for the sun – Solar thermal collectors as architectural elements” published in “Renewable Energy World”, issue March-April 2007. Online at <http://www.swt-technologie.de/html/newsletters.html>

„Sonnenkollektoren als Elemente der Architektur” published in “erneuerbare energie”, issue 1 2007 Online at <http://www.aee.at>



STANDARDIZED SYSTEM CONCEPTS FOR LARGE SCALE SOLAR THERMAL SYSTEMS

The work package dedicated to **collective solar thermal applications** such as for multi-family houses or tourism facilities resulted in a number of resource documents on the technological and organizational state of affairs in Europe. On one hand the reports serve HVAC professionals with an overview on rewarded hydraulic design, recent innovations in component standardisation and concepts for plant supervision. To serve as benchmarks, promising **standardised system solutions** for large solar thermal systems that have proved their benefit on national markets in the last years have been analyzed for this target group. On the other hand, consultants and policy makers profit from the documentation of **experiences on quality assurance and market enlargement**.

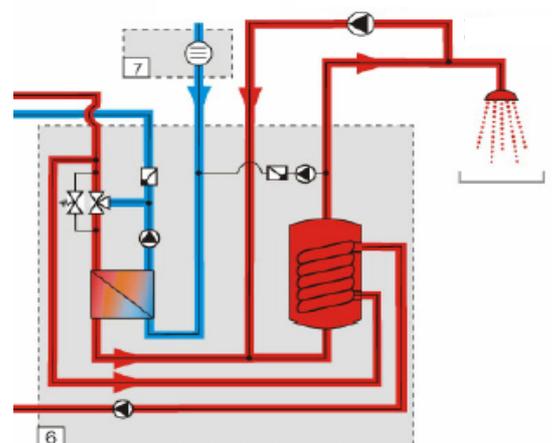


Fig. 1: Fresh water unit for large solar thermal systems. Source: Solvis.

The provided report includes a list of contact persons and publications for the respective issues and are meant to serve as a link to selected national and international expertise in the field of collective solar thermal applications.

THEORETICAL SYSTEM EVALUATION

Nine promising solar thermal system concepts for single family homes were evaluated qualitatively. The aspects included are:

- Cost and savings (installation; maintenance; performance and energy savings, including embodied energy; cost-performance ratio)
- Additional benefits (safety and health; range of application, extra function; environmental friendliness; aesthetics, building integration and space requirement; technical integration)
- Markets and marketing considerations (the potential to open up new and niche markets or expand existing markets)



Fig. 2: one of the evaluated systems: ICS (with flat roof support) Source: ecofys.

The systems evaluated are very different. They range from integrated collector store to complete solar combisystems, from ideas to (meanwhile) successfully marketed systems. However, there are specific features which are common to several of the systems. The features include:

- **Standardization** (create possibilities for larger production quantities. For example: a design that allows slight variations but has standardised core components; a design that can be successful in several markets; a modular design, which allows for larger production numbers of core components; or a concept with a large market potential). The objective is to lower product production cost.
- **Prefabrication** (design which allows as much factory assembly as possible). The objective is to reduce installation cost and effort, and to reduce the risk of improper installation.
- **Simplification** and reduction (improve the system in such a way that it requires a small number of components. To do this, several functions may have to be combined in one component). The objective is to reduce the cost for production or installation.
- **Adaptation** of an existing system concept to a new market or country by adaptation of components, optimization of sizing, etc. for the system to suit another climate or to be compatible with different standards or regulations.

The system concepts evaluated demonstrate that a generation of new systems is being studied, in development, in the process of market introduction or already successfully marketed, which is expected to have a significant effect on:

- the enhancement of solar thermal system technology and
- the positive development of solar thermal energy utilization.

A report which summarizes the theoretical evaluation of nine system concepts is available at the NEGST website. It includes a brief description of the systems. The work in WP1 has been completed. A public report on the field evaluation of some of the systems will be available in June 2007.

LIST OF STANDARDISATION TOPICS PROPOSED TO TC312

The following topics have been proposed to CEN TC312:

- a) clarification of the application of the present standards to tracking and/or concentrating collectors,
- b) unglazed collectors: refined performance test conditions and prediction, improved sky temperature measurement,
- c) collector components - requirements and test methods,
- d) quality tests for evacuated tubes,
- e) improved exposure - accelerated ageing test of collectors,
- f) annual collector energy output.

Reference: **CEN/TC 312 N 333 E**, "Resolutions of the CEN/TC312 meeting in GRAN CANARIA, SPAIN, 2006-04-03 & 04 - RESOLUTION 10"

SOLAR COOLING DESIGN TOOL / SOFTWARE

One of the objectives of NEGST is to assess the potential of solar thermal systems for advanced applications, such as cooling and desalination.

After an overview of all cooling and desalination technologies (WP5.D1), which can in theory be powered by solar thermal systems, and an investigation about the suitability of different collector technologies for solar cooling and desalination (WP5.D2), a feasibility study was carried out in order to identify the solar cooling and desalination technologies having the best potential of application in the different European regions.

Based upon the results of the above-mentioned investigation and considering the fact that in most European areas cooling and heating are both needed, the techno-economic evaluation is performed on solar-assisted air-conditioning systems capable to fulfil both requirements. In particular, the study is limited to those cooling technologies that can be driven by low temperature collectors, such as single-effect H₂O/LiBr absorption chillers and desiccant and evaporative cooling systems. Since a good development outlook is attributed to collectors for

medium temperature applications, double-effect H₂O/LiBr and NH₃/H₂O absorption chillers are considered also.

Several case studies are taken into account for each selected solar cooling system according to both: type and location of application. The feasibility of each case study is expressed in terms of the solar collector area required to achieve a given overall primary energy saving with respect to the reference conventional cooling system, which is assumed as a compression heat pump with a

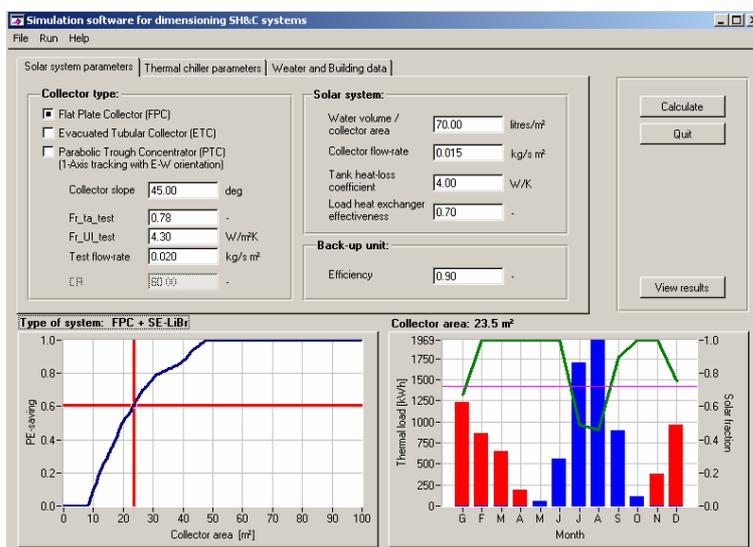


Fig. 3: Graphical user interface of the solar cooling design tool

typical heating/cooling COP.

The calculations are made by means of a suitable **design software** (developed by ENEA), whose main characteristics are summarized below:

- annual solar fraction for heating and cooling is calculated starting from monthly-based average meteorological data and building loads (to be provided as input data)
- solar fraction for heating and cooling is calculated on a monthly basis by means of *PHIBAR-f Chart* method
- the solar thermal system is mainly characterized by the efficiency curve parameters of solar collector, the performance of the back-up unit, the main features of the solar tank and heat-exchanger
- the thermal air-conditioning system is characterized by its cooling COP (and heating if reversible) and its driving temperature (both assumed constant during the working period)
- the result is a curve which gives the variation, as a function of collectors area, of the primary energy saved with respect to a reference conventional vapour compression heat pump with a given heating/cooling COP.

This software tool will be soon available on the project website (<http://www.swt-technologie.de/html/wp5.html>).