SHC SOLARUPDATE VOL.48 | JANUARY 2008

Newsletter of the International Energy Agency Solar Heating and Cooling Programme

Solar Resource Management
providing solar developers with key resource information

Knowledge of solar energy resources is critical when designing and building successful solar water heating systems, concentrating solar power systems, and photovoltaic systems. However, good quality measurements of the solar resource are often expensive and scarce, and are time-consuming and costly to acquire so scientists from around the world are devising ways to assess the solar energy resources using other data sources, such as weather satellite data.

SHC Task 36, Solar Resource Knowledge Management, is devoted to the goal of benchmarking solar energy resource data sets from around the world, developing a web-based portal to provide easier access to these data sets, and investigating key improvements in solar resource assessments and forecasting. The benchmarking activity will eventually provide users of solar resource data sets the means to understand how various approaches in producing the data (such as the type of satellite sensors being used, or methodology employed to convert the satellite-based data to a solar resource estimate) compare with each other. For example, if two different methodologies have been applied to the same region, results from the benchmarking should allow the user to better understand the relative uncertainty of using one method over the other.

Seven countries are participating in this SHC Task, including the European Union (through the European Commission's Joint Research Center in Ispra, Italy), Germany, France, Switzerland, Spain, Canada, and the United States. In addition, Australia is considering joining the Task, and Russia is supporting the work through its global archive of ground-based solar radiation data housed at the World Radiation Data Center in St. Petersburg. Recently about 40 of the Task participants convened at a three-day meeting hosted by SunTechnics GmbH in Hamburg, Germany, to discuss progress on various activities and to review plans for upcoming activities.

The participants presented several interesting results. For example, the US reported on the recent release of an updated National Solar Radiation Data Base (NSRDB). This database provides high-resolution solar resource information for all of the U.S. (including Alaska) using various estimation methods (since very few actual measurement stations exist in the U.S.). One method converts ground-based cloud cover information into solar estimates at over 1,400 stations throughout the US for the period 1991-2005. Another method converts weather satellite data from the Geostationary Operational Environmental Satellites (GOES) positioned over the

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eastern and western U.S. to provide very high resolution (10-km) solar resource estimates for the period 1998-2005. Figure 1 provides examples of the coverage obtained from the solar estimates derived from surface weather stations and from the weather satellites. The solar data are available free of charge at http://rredc.nrel.gov/solar/old_data/nsrdb/.

In another example, the Joint Research Center reported on the PVGIS web site developed to provide users with interactive applications that provide free access to solar resource data for Europe, Africa, and southwestern Asia as well as ambient temperature data for Europe. The PVGIS site also provides tools to query solar radiation for fixed and sun-tracking systems, and to simulate energy output for grid-connected (Europe) and stand-alone PV systems (Africa only). The tools on the web site provide overview information needed by policy makers, project developers, the manufacturing industry, and interested individuals. The applications are based on the Google Maps interface, and provide several different formats of information, including the estimated accuracy of the calculations. Web-based estimates for single sites can be accessed at http://re.jrc.ec.europa.eu/pvgis/apps3/pvest.php.

In addition, gridded data sets (for Europe) at approximately 10-km by 10-km resolution can also be accessed. An example of the PVGIS interface is shown in Figure 2.

These and other products developed by participants working in SHC Task 36 are designed to facilitate the identification of project opportunities and shorten the time required to develop project feasibility assessments. At the end of the Task period (June 2010) a handbook on solar resources will be developed by the participants that will provide the latest information on the state-of-the-art of solar resource assessments, including the availability of solar resource information and the accuracy and completeness of various data sets available either free or by purchase from individual institutions.

This article was contributed by the SHC Task 36 Operating Agent, Dr. David Renné. For more information contact Dr. Renné, david_renne@nrel.gov, and visit the SHC Task 36 page, http://www.iea-shc.org/task36/index.html.

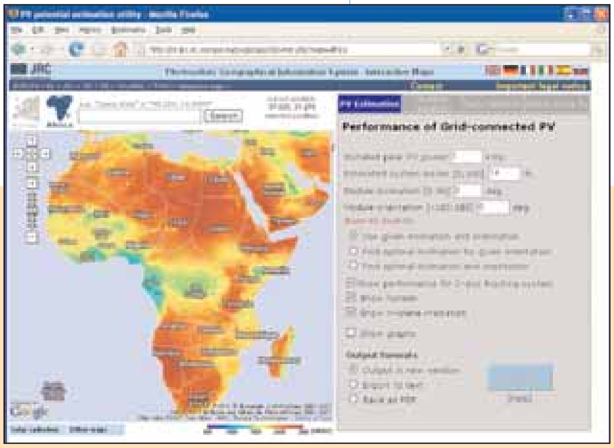
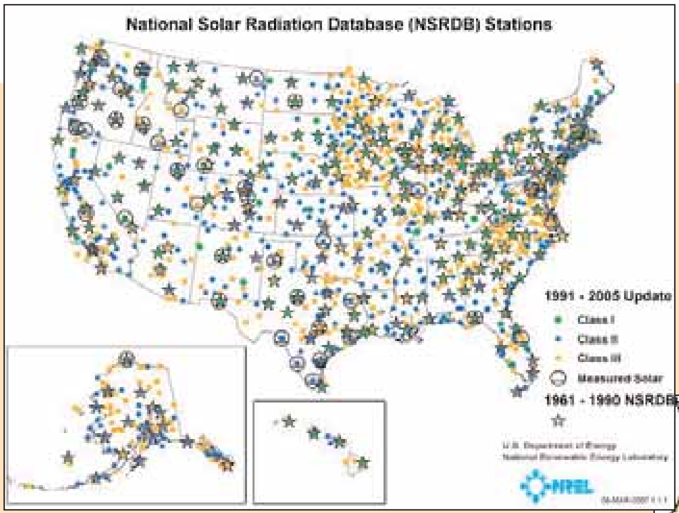


Figure 2. Example page from the PVGIS web site. *(Courtesy of Thomas Huld, Marcel Súri, and Tomás Cebecauer of the Joint Research Centre, Ispra, Italy)*



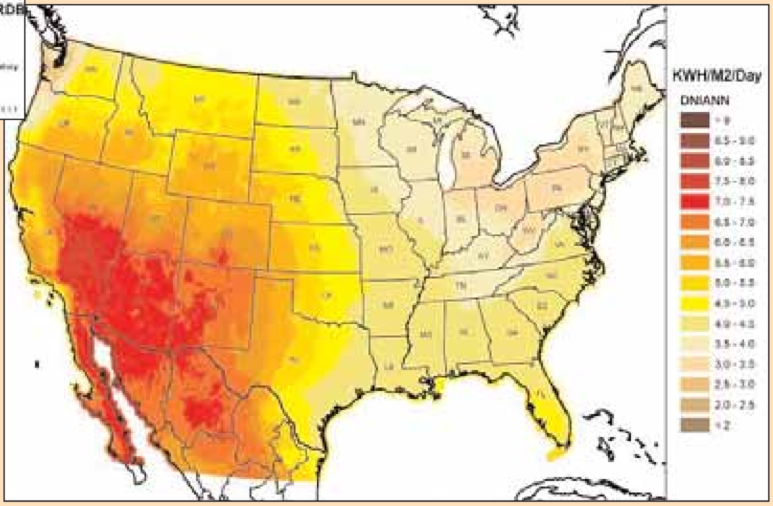


Figure 1. Locations of the National Solar Radiation Data Base station data (left side), and a depiction of the gridded satellite-derived solar data (right side) included in the National Renewable Energy Laboratory's (NREL's) Updated National Solar Radiation Data Base. *(Courtesy of Steve Wilcox, NREL and Richard Perez, SUNY/Albany)*

solar air-conditioning

no cool down in sight for this technology

Ten years of collaborative R&D, about 250 solar air-conditioning systems installed, and 12 MW of chilling power. This is where we are now, but ten years from now will be a completely different story. Understanding the potential of solar air-conditioning is central to the Solar Heating & Cooling Programme's continued collaborative work in this area. SHC Task 38, Solar Air-Conditioning and Refrigeration, is in its second year with 11 countries participating and strong involvement from industrial companies and engineering offices.

Today, solar assisted cooling is most promising for large buildings with central air-conditioning systems. However, a new market is growing in the residential and small commercial sectors. The sectors are pushing technology developments so that solar collectors that can provide heat year round—heating in the winter, cooling in the summer, and hot water the entire year. So called "pre-engineered" systems are emerging as a solution for this application range.

SHC Task 38 is working on pre-engineered systems with small capacities as well as custom-made systems with large capacities. To help accelerate the market introduction of these technologies, Task experts are focused on improving components and system concepts in the following four areas:

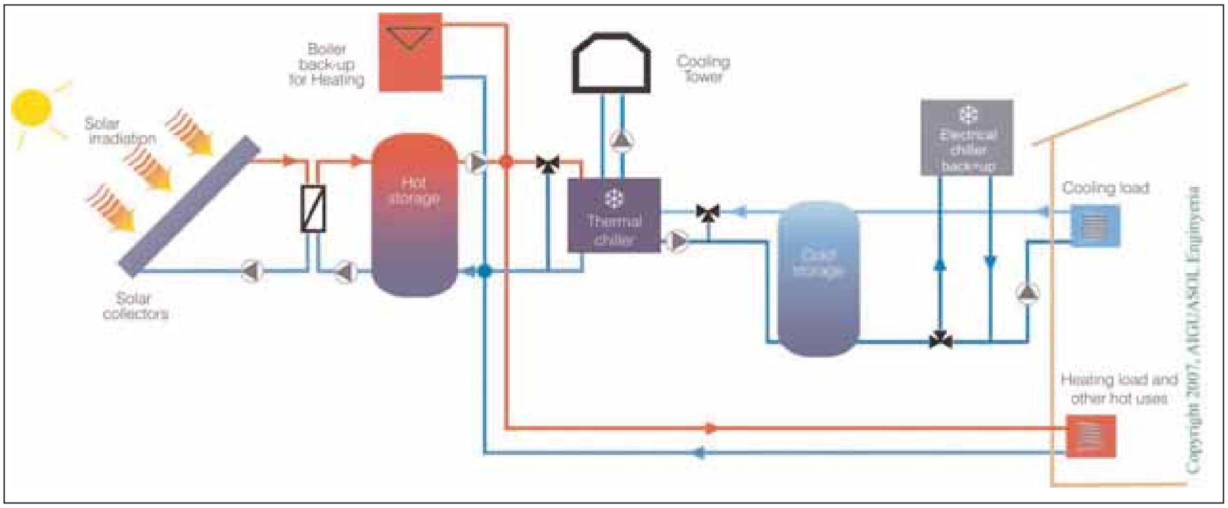
Pre-engineered Systems for Small Residential and Small Commercial Applications
There is currently strong market interest in this area. An important milestone is the development of package solutions for small- and medium-size systems (cooling power < 20 kW) that do not need too much additional planning and can be handled by the installer or plumber. The challenge for the Task experts is to develop optimized and standardized schemes and guidelines to reduce the extra effort needed to extend a solar combisystem into a pre-engineered solar heating and cooling system ("solar combi+ system"). Today, additional efforts are needed to design the heat rejection system (cooling tower or similar), optimize the hydraulic design, and develop proper overall control.

Work in this Subtask is being done in direct collaboration with manufacturers. As part of this work, 18 systems have been identified to monitor and evaluate.

To support the market introduction of pre-engineered systems, experts are preparing a market overview of small thermally driven chillers (<20 kW), suitable heat rejection systems, cold storages, and solar combisystems for DHW and space heating. These market introduced solar combisystems will serve as the starting point in the development of generic solar heating and cooling system concepts.

"The use of solar air-conditioning systems is still extremely limited and a long way from what would be desirable. …. We trust that in the near future these technologies will fully develop and consolidate as an alternative to conventional technology particularly as far as cost and reliability are concerned."

OPENING REMARKS OF PROFESSOR ALBERTO CORONAS FROM UNIVERSITY TARRAGONA AS CHAIRMAN OF THE 2ND INTERNATIONAL CONFERENCE "SOLAR AIR-CONDITIONING", TARRAGONA, SPAIN, OCTOBER 2007.



A schematic of a solar combi+system. *(Source: AIGUASOL)*

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A Look at the Different Technologies

Closed Cold Water Systems – chilled water systems

Absorption Chiller

These machines have a cooling capacity above 100kW and are available commercially from many manufacturers worldwide. The first system on the market using solar driven absorption cooling was the Japanese Yazaki WFC10 with a cooling capacity of 35 kW. Now more systems with cooling capacities below 25 kW are available from various manufacturers. These small machines are a good starting point for solar cooling applications in the small capacity range. Almost all installations to date use single-effect absorption chillers, require driving temperatures lower than 100°C, and make use of commercially available flat plate collectors or evacuated tube collectors. However, an increasing number of pilot systems are and will be installed using double-effect absorption chillers coupled to high temperature solar collectors. These systems are a promising choice for large-scale applications in regions that have year-round cooling needs and high solar radiation availability.

Adsorption Chiller

Machines developed by two Japanese manufacturers are available with a minimum capacity of 40 kW. Despite their high cost, several have been installed as pilot installations because of their comparatively low driving temperatures (starting at about 60°C) and their wide range of cooling water temperatures. New developments in this field are now available with a cooling capacity in the range of 7 to10 kW.

Steamjet Ejector Chiller

Steamjet ejector technology is used only in large-scale industrial applications at this time. Research projects are working on coupling these systems with parabolic trough collectors and for use in small capacity units with a cooling capacity range below 20 kW. The advantages of this technology are the potentially high efficiency values, particularly in part load operation, and the simple construction of the chiller. A disadvantage is the high required driving temperature (approximately 150-200°C).

Desiccant and Evaporative Cooling Assisted Air-Conditioning

Solid Sorption

The central component of an open solar assisted air-conditioning system is the dehumidification unit, which is available from several suppliers in the form of a desiccant wheel for different air volume flows. All the other system components are commonly used in standard air-conditioning applications that use an air handling unit.The majority of the solar assisted desiccant air-conditioning systems use desiccant wheels for air dehumidification.The heat required for the regeneration of the sorption wheel can be provided at a low temperature level (in the range of 45-90°C) and so solar air heating collectors, in principle, are applicable.

Liquid Sorption

First prototypes of desiccant systems are in operation that use a hygroscopic liquid for air dehumidification. These systems work by dehumidifying the input air through contact with a salt solution (e.g., water/lithium chloride solution). The diluted solution is then re-concentrated using low temperature heat from solar thermal collectors. The advantage of this method is the loss-free storage ability by storing the concentrated salt solution, which allows energy storage at a high energy density. The required regeneration temperature is similarly low as in the case of the solid sorption and the potential efficiency is quite high.

Medium and Large Scale Custom-Made Systems for Non-Residential Buildings and Industrial Applications.

Large systems will always need an individual design for the particular building or industrial application. Therefore, it will not be possible to implement package solutions and professionals such as planers will be needed in the system design. Nevertheless, standardized hydraulic schemes and combinations of major components (solar collector field, thermally driven cooling machine, heat rejection system) are needed as well as standardized control concepts in order to reduce the effort for future installations.

The primary work in this Subtask is to assess a selection of existing and new large air-conditioning and refrigeration systems—11 systems in 9 countries have been studied in this comprehensive way thus far. These systems are in large office and non-residential buildings, hotels, and factories where the complexity of the system justifies customized planning activities and operation control. Based on these investigations, standardized concepts will be developed to provide planners guidance on designing optimized overall installations with reduced planning effort.

Modeling and Fundamental Analysis

Development of technically advanced systems includes advancements also on the component level. There are a number of promising developments in the field of thermally driven cooling technology, particularly in the field of open cycles, mainly using liquid desiccant technology. In order to understand their application potential and highlight possible advantages, a common methodology for a full thermodynamic comparison was developed using the exergy method. A first study has been carried out to understand the exergy flows in an open desiccant system using rotating wheel technology. Overall, the analysis of new concepts with special emphasis on thermodynamic and exergy approaches will lead to their theoretical and technical assessment.

A second major part is modeling work. Mathematical-physical models of new components will contribute to the modeling and simulation activities for system design and evaluation.

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SHC new publications

Advanced Storage

These reports can be downloaded for free from the SHC web site, http://www.iea-shc.org/task32/publications/index.html

Chemical and Sorption Storage: Selection of Concepts

Edited by Chris Bales

This report is a result of the SHC Task 32 work focused on solutions for storage based on adsoprtion or absorption processes and on thermochemical reactions. The report describes the five projects that were selected for investigation in Austria, Germany, Netherlands, Sweden and Switzerland.

Thermal Properties of Materials for Thermo-chemical Storage of Solar Heat

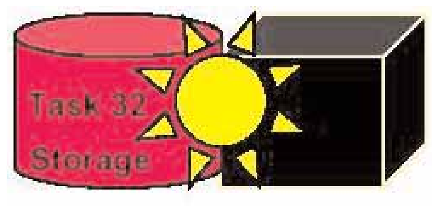
Edited by Chris Bales

The report presents the work performed in SHC Task 32 as a first step to choose and gather information on the thermal properties of various materials suitable for storing heat in the range of 0-100°C. This work was important because knowledge of the materials is a prerequisite to designing storage units, exchangers, and finally thermal solar installations including dense storage.

Storage Based on Phase Change Materials (PCM): Selection of Concepts

Edited by Wolfgang Streicher

This report is a result of the SHC Task 32



work focused on solutions for storage based on phase change materials or PCMs. The topic of PCMs is not completely new for solar energy storage but the way it has been handled in SHC Task 32 is new. The process was application oriented from the material to the system and then to simulation. The report presents the five PCM projects investigated in Austria, Denmark, Germany, Spain and Switzerland.

Inventory of Phase Change Materials

Edited by Wolfgang Streicher

This report screens many Phase Change Materials and analyzes the current knowledge of the fundamentals associated with PCM behavior. The report provides a thorough survey of PCMs and was written by European experts in the field of solar heat storage. The report also includes an extensive list of references. This work served as the basis of the SHC Task 32 work on selecting suitable materials for storing solar heat around 50-80°C.

Simulation and Optimization of the MaxLean System

Written by Robert Haberl and Peter Vogelsanger

This report presents a new concept of a combisystem with water storage that tries to reduce initial cost of investment and operating costs, while enhancing the overall performance of the system. The concept is called the "MaxLean" system and was studied and optimized in great detail by the SPF of Switzerland under SHC Task 32.

The Extended FSC Procedure for Larger Storage Sizes

Edited by Thomas Letz

An extension of the Fraction Solar Consumption (FSC) method developed in SHC Task 26 has been extended in SHC Task 32. The method has been extended for solar combisystems using larger energy storages. A new definition for the FSC is given and simulation results for solar combisystems equipped either with water storages or chemical storages are presented.

Solar Air Conditioning Experts Gathered in Spain

On October 18-19, 2007 experts from SHC Task 38, *Solar Air-Conditioning and Refrigeration* presented their work at the 2nd international conference, "Solar Air-Conditioning." Over 260 experts attended from air conditioning manufacturing companies, solar energy companies, construction companies as well as planners and those working in the R&D sector at research institutes and universities. The conference covered all the topics critical for the successful market growth of solar air-conditioning technology, including system technology and design, new component developments, practical field experience, and simulation and modeling work. More than 100 papers and posters were presented, of which about one third were either related to the work of SHC Task 38 or given by SHC Task 38 experts.

For more information on the Task's work contact the Operating Agent, Hans-Martin Henning, email: Hans-Martin.Henning@ise.fraunhofer.de.

austria

a solar thermal success story

Austria *may only be the 115th largest country in the world, but it ranks 3rd in the world for installed solar thermal collectors per inhabitant. It trails only behind Israel and Cyprus. One wonders why this northern climate country decided to rely on the sun for power. One of the reasons is that the Austrian government—since a referendum against nuclear power in 1978—set a clear renewable energy policy as part of its broader energy policy. As a result of this policy, 23% of Austria's total energy demand is covered by renewables, primarily by hydropower, biomass, and solar thermal.*

The numbers tell the story of solar thermal in Austria. The worldwide market for solar thermal systems has grown between 10 - 20% every year since 1999. Compared to this, the IT-market, which is said to be very dynamic, reached a relatively low annual growth rate of only 2 - 5%. At this time, 87% of the world's solar thermal market is located in China and in some countries of the European Union. In Europe, the largest markets, in absolute numbers, are located in Germany, Austria and Greece, where 67% of the European flat plate and evacuated tube collectors are installed. Although solar heat is not yet a big economic force, a market volume of only 2 billion Euros in 2005, its use is expanding beyond the small systems for hot water production.

Different Applications

A key factor in the success of solar in Austria is that its use goes beyond small systems for hot water production or swimming pool systems. Compared to other countries, Austria has been using solar combisystems (systems for space heating and hot water production) in single family houses and multi-family houses for years (see Figure 2). Also, solar applications have not been limited to houses, but are used in the hotel, tourism, large-scale district heating and business sectors.

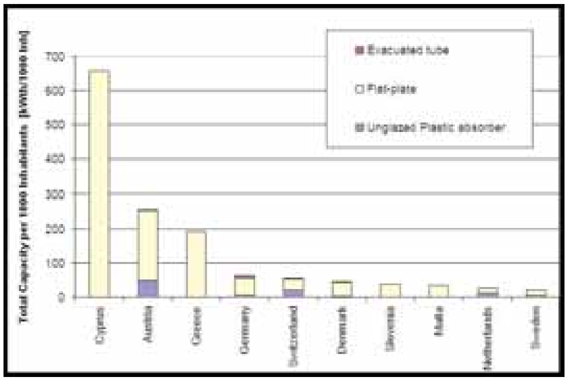


Figure 1. Installed capacity of solar thermal collectors per 1,000 inhabitants in Europe in the year 2005. *(Source: Weiss, Bergmann, Faninger: Solar Heat Worldwide, IEA SHC, 2007)*

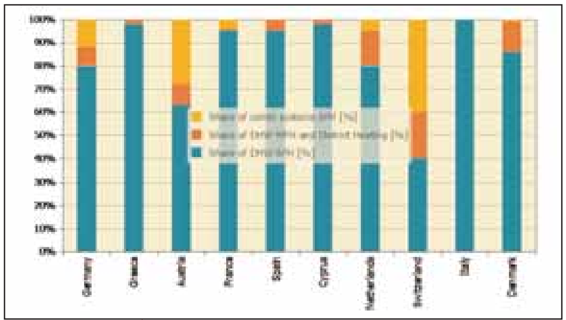


Figure 2. Distribution of different applications in European countries in 2005. Besides the solar hot water systems for single family houses (DHW-SFH) Austria shows a considerable share of large-scale systems for multi-family houses and district heating (DHW-MFH) as well as for combisystems (systems for hot water preparation and space heating). *(Source: Weiss, Bergmann, Faninger: Solar Heat Worldwide, IEA SHC, 2007)*

Facade integrated collectors are becoming more important in the Austrian solar thermal market. *(Photo: AKS Doma)*

In Austria

- 3.4 million m² of solar thermal collectors were installed by the end of the year 2006.
- 3.4 million m² = installed capacity of 2.4 GWth.
- In the world - an installed capacity of 205 kWth per 1,000 inhabitants puts Austria third behind Israel (500 kWth) and Cyprus (660 kWth).
- In Europe - Austria is second only behind Cyprus

Solar Combisystems

In Austria, the collector area of solar combisystems for hot water production and space heating is between 12 - 20 m² for a single family house. In a well insulated house these systems cover about 40% of the total heat demand. However, there are also buildings with considerably larger collector areas and storage capacity. These systems are able to cover 50 - 70% of the total heat requirement or even provide 100% solar supply. The average size of these installed systems and the correlating solar fraction are continuously growing.

Export Trade

Austria has a robust export business of both solar components and complete systems. Due to its strong domestic market, Austrian companies were able to establish themselves in the international market. In 1996, an active trade balance on the collector market could be achieved for the first time. In 2006 about 76% of all collectors produced in Austria were exported (see Figure 3).

Research and Development

Besides very successful governmental support programs, such as subsidies for nearly every type of application, long-term training and awareness campaigns as well as continuous research and development projects are contributing to the growth of the domestic and export markets.

Government supported R&D activities have made Austria a leader in solar thermal technology – integration of solar heat in large-scale housing, district heating systems, industrial processes and systems for solar cooling. This includes support from programs of the Austrian Ministry for Transport, Innovation and Technology (BMVIT) and Austrian cooperation in EU and IEA SHC projects.

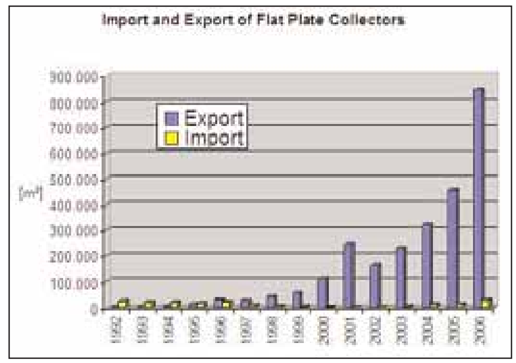


Figure 3. Production, export and import of solar thermal collectors. *(Source: G. Faninger)*

The Future

Over the next 5-10 years, besides the further development of building integrated systems for solar thermal collectors, future activities will focus on the development of "solar only systems." These are systems that are able to provide 100% of the heating and cooling demand of houses using solar energy. To reach this ambitious goal, R&D will need to focus on high density thermal storage and new materials, such as polymeric materials, for solar thermal components.

This article was contributed by Werner Weiss of AEE INTEC and the Task 33 Operating Agent and by Gerhard Faninger of University of Klagenfurt, IFF and the Austrian Executive Committee member. For more information contact Prof. Faninger at gerhard.faninger@uni-klu.ac.at or Mr. Weiss at w.weiss@aee.at.

Solar thermal system on a multi-family house.

Solar thermal systems in the hotel and tourism sectors are a success story. This is a plant at a ski resort in the Austrian Alps. *(Source: Foto Mayer)*

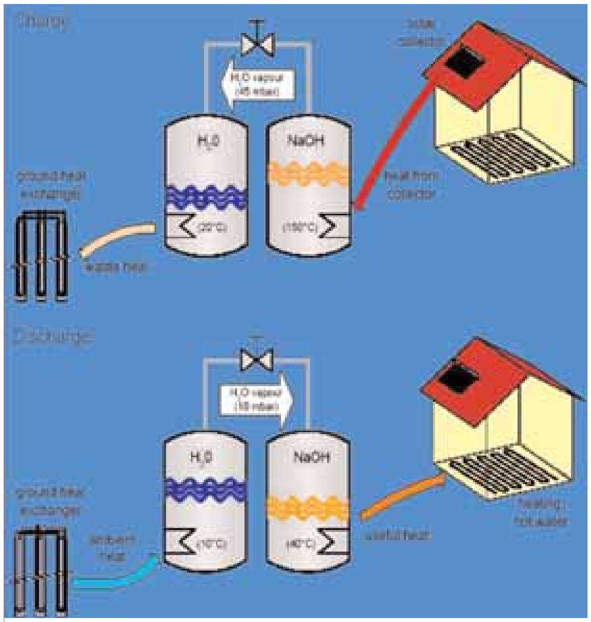
Solar district heating plant in the city of Graz with an installed capacity of 1 MWth (1400 m² collector area). *(Source: S.O.L.I.D.)*

solar marketplace

The Solar Heating and Cooling Programme is not only making strides in R&D, but also impacting the building sector. This section of the newsletter highlights solar technologies that have been developed or conceptualized in a SHC Task and are now being commercially manufactured, marketed or used.

Advances in Storage

One area of work in SHC Task 32, *Advanced Storage Concepts for Solar and Low Energy Buildings*, deals with storage concepts that are furthest from being introduced in the market. Through international collaboration experts are expecting to move the most promising technologies closer to the market. Sorption stores are in a more advanced stage of development than chemical heat stores, and a couple of prototype stores have been built and tested as part of SHC Task 32. Sorption can be split into three types: adsorption, absorption, and solid/gas reaction.



A schematic of NaOH storage.

Some conclusions are:

- ***Absorption storage*** is best used in combined applications for heating and cooling. It is mainly a short-term storage. A commercial application from the company Climatewell of Sweden is now on the Spanish market.
- ***Adsorption storage*** also has been studied within SHC Task 32. A significant conclusion from the work is that silicagel and zeolite in beds are not suited to seasonal storage due to the low temperature lift they provide. As result, new materials are needed.
- ***Chemical storage*** has several promising techniques that were examined in laboratory studies in SHC Task 32 including storage using either sodium hydroxide (NaOH) or magnesium sulfate (MgSO4). Preliminary results show that these techniques might open the way to dense seasonal storage for single family houses.

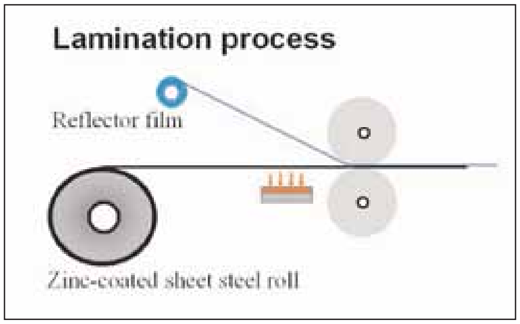
Other types of storage that have been studied within SHC Task 32 include:

- Storage based on ***Phase Change Materials***, which show limited power, but in proper combination with water storage enhancements then storage efficiency can be found.
- ***Water tank based solutions*** remain primarily state-of-the-art, but there is room for further optimization regarding the thermal stratification in the tank or the global system design for better performance and lower investment costs.

Advances in PV/T Technology

Participants in SHC Task 35, *PV/Thermal Solar Systems*, from Arontis Solar Solutions have tested a PV/T system using a lamination process that can laminate a reflector film together with a steel sheet. This reflector was tested on a PV/T system at Lund University as part of Task 35. The material has a long history of research and is ready for sale in a protected environment (under glass), and is currently being tested for outdoor use. Arontis is now offering test installations of their first PV/T system, Solar8, which uses this reflector. Arontis is an active partener in SHC Task 35 and is responsible for market analysis work and involved in the testing of PV/T systems.

Solar8 trough in Energy and Building Design Laboratory at Lund Univeristy.



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ANSI/ASHRAE Continue to Adapt IEA SHC Work

The American National Standards Institute (ANSI) and the American Society of Heating, Refrigeration, and Air Conditioning (ASHRAE) continue to adopt SHC work into their standards.

Standard 140-2007, scheduled for publication in December 2007, includes adaptations of earlier SHC work (posted at http://www.iea-shc.org/task22/index.html):

- IEA Building Energy Simulation Test and Diagnostic Method (BESTEST) – developed by National Renewable Energy Laboratory (NREL), US, in joint *SHC Task 12 / ECBCS Annex 21, Solar Building Analysis Tools*[1]
- HVAC BESTEST Volume 1 – developed by NREL in SHC Task 22, Building Energy Analysis Tools[2]
- Furnace BESTEST – developed by Natural Resources Canada in SHC Task 22[3]
- HVAC BESTEST Volume 2 – developed by NREL in SHC Task 22[4].

There is a time lag of several years between development of new test suites and their incorporation into ASHRAE standards because of the ANSI/ASHRAE consensus standards process. Future revisions of Standard 140 will consider adaptation of additional test suites, including those recently developed under joint SHC Task 34 / ECBCS Annex 43, Testing and Validation of Building Energy Simulation Tools. Six new test suites, scheduled for completion during 2008, were developed under this Task with 24 computer simulation tools tested. Field trials of these new test suites have resulted in many simulation model improvements. Approximately 60 corrections to software errors have been documented so far.

1 Judkoff, R., and J. Neymark. (1995). International Energy Agency Building Energy Simulation Test (BESTEST) and Diagnostic Method. NREL/TP-472-6231. Golden, CO: National Renewable Energy Laboratory. www.nrel.gov/docs/legosti/old/6231.pdf

2 Neymark, J., and R. Judkoff. (2002). International Energy Agency Building Energy Simulation Test and Diagnostic Method for Heating, Ventilating, and Air-Conditioning Equipment Models (HVAC BESTEST) Volume 1: Cases E100-E200. NREL/TP-550-30152. Golden, CO: National Renewable Energy Laboratory. www.nrel.gov/docs/fy02osti/30152.pdf

3 Purdy, J. and I.Beausoleil-Morrison. (2002). Building Energy Simulation Test for Heating, Ventilating, and Air-Conditioning Equipment Models (HVAC BESTEST), IEA Fuel-Fired Furnace. Ottawa, ON: CANMET Energy Technology Centre, Natural Resources Canada. www.iea-shc.org/task22/index.html

4 Neymark, J, and R. Judkoff. (2004). International Energy Agency Building Energy Simulation Test and Diagnostic Method for Heating, Ventilating, and Air-Conditioning Equipment Models (HVAC BESTEST), Volume 2: Cases E300-E545. NREL/TP-550-36754. Golden, Colorado, US: National Renewable Energy Laboratory. www.nrel.gov/docs/fy05osti/36754.pdf

For more information contact the SHC Task 34 Operating Agent, Ron Judkoff, National Renewable Energy Laboratory, ron_judkoff@nrel.gov.

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To date, a database of new solar cooling developments has been created and a summary report prepared on the new developments for simulation tools. A working group also has been established to work specifically on heat rejection as the rejection of the medium temperature heat ("waste heat") has proven to be a crucial issue in the overall performance of solar cooling systems.

Market Transfer and Market Stimulation Activities

This work is dedicated to disseminating Task results, organizing workshops, preparing training materials, and publishing a completely revised edition of the popular "Solar Assisted Air-Conditioning in Buildings Handbook" written as part of SHC Task 25, Solar Assisted Air-Conditioning of Buildings. The market analysis work will cover the "demand" side of the solar air-conditioning market and the barriers, both technical and non-technical, that may exist and are preventing market penetration.

The first workshops for industries and professionals were held in conjunction with Task expert meetings in Italy (Bolzano, October 2006), France (Aix-les-Bains, April 2007) and Spain (Barcelona, October 2007). The next workshop will be organized in collaboration with the project ROCOCO (EU-funded project, "Reduction of costs of solar cooling systems") in Vienna, Austria on March 31, 2008. The work of Task 38 also will be highlighted at EuroSun 2008: 1st International Conference on Solar Heating, Cooling and Buildings in Lisbon, Portugal on October 7-10, 2008.

This article was contributed by the SHC Task 38 Operating Agent, Dr. Hans-Martin Henning. For more information contact Dr. Henning, Hans-Martin.Henning@ise.fraunhofer.de, and visit the SHC Task 38 page, http://www.iea-shc.org/task38/index.html.

IEA SHC programme

The International Energy Agency was formed in 1974 within the framework of the Organization for Economic Cooperation and Development (OECD) to implement a program of international energy cooperation among its member countries, including collaborative research, development and demonstration projects in new energy technologies. The members of the IEA Solar Heating and Cooling Agreement have initiated a total of 39 R&D projects (known as Tasks) to advance solar technologies for buildings. The overall Programme is managed by an Executive Committee while the individual Tasks are led by Operating Agents.

Current Tasks and Operating Agents

Advanced Storage Concepts for Solar and Low Energy Buildings
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