SOLAR UPDATE

NEWSLETTER OF THE INTERNATIONAL ENERGY AGENCY SOLAR HEATING AND COOLING PROGRAMME • NO. 40 JULY 2003

SHC Solar Award 2003

Torben Esbensen Winner of First SHC Solar Award

The International Energy Agency's Solar Heating & Cooling (SHC) Programmme is committed to proving that solar energy is a viable energy source. To increase the world's attention to solar energy as a source for heating and cooling, the IEA SHC Programme is recognizing the work of those contributing to the expansion of this renewable energy resource.

The first SHC SOLAR AWARD was presented to Torben Esbensen of Esbensen Consultants A/S, Denmark at a special ceremony during the June 2003 ISES World Congress in Göteborg, Sweden.

This award is given to an individual, company, or private/public institution that has shown outstanding leadership or achievements, with links to the IEA SHC Programme, in the field of solar energy at the international level within one or more of the following sectors:

- Technical developments
- Successful transfer to the market
- Information

It is noteworthy that a person so distinguished in the field of solar energy should also have the distinction of being affiliated with the SHC Programme since 1986. Mr. Esbensen's first contribution to the work of the SHC Programme was in the area of passive solar commercial buildings. Since then he has contributed to the Programme's work in a range of areas – solar energy in building renovation, daylighting, solar optimization in large buildings, and solar procurement.

Mr. Esbensen started his solar career in 1972 at the Danish Technical University. One of his first projects was as a team leader for the Danish Zero Energy House in Copenhagen, a house he lived in for a period of time. Mr. Esbensen then moved from academia to the business sector where he established Esbensen Consultants A/S. This company has renewable energy projects in Europe, the Baltic and Africa. One of the most significant projects was the construction of the Brundtland Center in Denmark. In addition to Mr. Esbensen's professional work, he has dedicated time to support the work of the International Solar Energy Society (ISES) as President of ISES Europe from 1997-1999, Chairman of the Scandinavian section of ISES from 1990-1996, and since 1999 as the Treasurer and Vice-President of ISES. ✷

Mr. Fritjof Salvesen, SHC Executive Committee member from Norway presents Mr. Torben Esbensen with the 2003 SHC Solar Award.

SHC Solar Award designed by sculptor Marco Goldenbeld of the Netherlands.

IN THIS ISSUE

Building Energy Analysis Tools – Improving Their Accuracy

A growing number of building energy analysis tools are available, but their accuracy is not always apparent. To assess the accuracy of building energy analysis tools and engineering models for evaluating the performance of solar and low-energy buildings, the IEA Solar Heating and Cooling Programme initiated Task 22, *Building Energy Analysis Tools*.

For seven years, participants from 11 countries focused their work on whole building energy analysis tools, including emerging modular type tools, and widely used solar and low-energy design concepts. The tool evaluation activities included analytical, comparative and empirical methods, with an emphasis given to blind empirical validation using measured data from test

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Public/Private Partnership Gives SWH a Boost in New Zealand

Solar water heating is finding its niche in a country with an energy mix dominated by hydro, geothermal and possibly wind. In October 2002, the Government released its Renewable Energy Target, which focuses on solar water heating in the low temperature heat sector of the Renewable Energy Programme. With an industry goal of 10,000 SWH installations per year, the Government is supporting the Solar Industries Association (SIA) to achieve their target.

Renewables in New Zealand

In September 2001, New Zealand released its first National Energy Efficiency and Conservation Strategy (NEECS). This Strategy was prepared as a means to promote increased energy efficiency and conservation, as well as renewable energy use. The two main targets of the Strategy are 1) at least a 20% improvement in economy-wide energy efficiency by 2012 and 2) an additional 30 Petajoule (PJ) of consumer energy from renewable sources including solar. These are considered *achievable stretch* targets.

To meet these targets, New Zealand is fortunate to have a large hydro and significant geothermal resource base. For example, in 2000 the installed capacity of hydro was 61% of the country's electricity system capacity of 7,681MW-1,787MW in the North Island and 3,310MW in the South Island. Geothermal sources in the North Island contributed 439MW (end use energy). And, there remains a large amount of undeveloped hydro and geothermal potential in the country. For hydro, a 1990 report indicated that there is in the order of 2,000MW available in the "attractive/few problems" category and over 5,000MW in the "attractive/significant problems" category. For geothermal, it is estimated that only about 10% of the generation potential has been developed.

Wind has the potential to contribute significantly to electricity generation by generating approximately 7,900GWh per year (2.2PJ/yr). At present, only 0.5% of the electricity supply is obtained from the 36MW of installed wind generation capacity.

Solar power is used in 0.9% of houses, and solar water heating (SWH) technologies are estimated to currently contribute more than 0.144PJ per year (0.1% of New Zealand electricity consumption).

The challenge for solar is to find its place within an energy mix dominated by hydro, geothermal and potentially wind. In a typical year, the amount of solar energy falling on the roof of an average house in New Zealand amounts to 15-30 times all the energy used (33GJ/year) in the house. In the approximately 1.4 million houses in New Zealand, water heating typically accounts for 44% of energy use and electricity is the main source of heat for 72% of the houses. A well-designed SWH systems can achieve, on average, water heating savings of 65%. If we assume that one third of the houses are not well suited to the placement of SWH and only install SWH in the other 665,000 electrically heated houses, then the potential contribution of this technology alone is 6.2PJ or 5% of New Zealand's electricity use.

2002-2003 GOVERNMENT R&D EXPENDITURES

Type of Project	Value in Euro	%
Solar + Conservation (1)	179,600	6%
Hydrogen	831,000	30%
Conservation	93,400	3%
Geothermal	565,600	20%
Biomass	232,500	8%
PV	359,300	13%
Batteries	449,000	16%
Thermal Storage	79,600	3%
TOTAL	2,790,000	100%

(1) The Solar + Conservation heading is in fact for one project: the Zero and Low Energy House (ZALEH) project run by the Building research Association of New Zealand which is contributing to SHC Task 28, *Sustainable Solar Housing*. The "Conservation" work is being undertaken in conjunction with studies on the use of Biomass as an energy source for houses.

Solar Water Heating

In October 2002, the Government released its Renewable Energy Target, which focuses on solar water heating in the low temperature heat sector of the Renewable Energy Programme. The goal is "market transformation" – reducing barriers and transforming a relatively small-scale industry and marketplace into a commercially viable, mass-market product. A range of support measures has been developed to give effect to the medium-term industry target of 10,000

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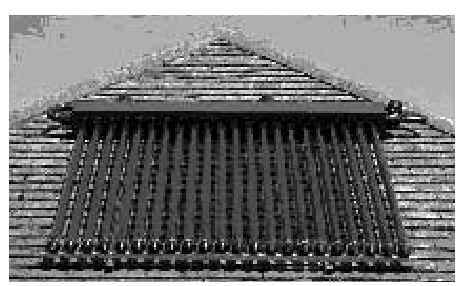
Thermosiphon Flat Plate System

Insitu Pumped Flat Plate System collector



Evacuated Tube Collector

Solar Combisystems – A Promising Solution

In 1997, there was no method for finding the "best" combisystem (combination solar water and heating system) design for a given situation, and a large number of designs still needed to be analyzed and reviewed. As the task of system standardization and performance improvement was too large for any one country to want to undertake alone, the IEA Solar Heating and Cooling Programme initiated work to review, analyze, test, compare, optimize, and improve designs and solutions for residential solar combisystems.

After four years of work and the participation of 10 countries, SHC Task 26, *Solar Combisystems*, has achieved significant results, all of which are documented in reports (see sidebar). The main achievements included pre-normative work, the development of tools for characterization, comparison and assessment of prototypes and products, and the optimization of systems.

Pre-Normative Work

This work began by defining criteria for the analysis of solar combisystems, which resulted in a classification scheme for solar combisystems based on their hydraulic design. The results of this pre-normative work have been passed to the Technical Committee CEN/TC312, which is in charge of European solar heating systems standards.

In this area, SHC Task participants also focused on the stagnation behaviour of solar collectors, collector arrays and solar combisystems. Significant advances were made in the area of durability and reliability for solar heating systems with large collector areas, and design principles were defined for collectors, collector arrays and collector loops.

Another aspect that was addressed was the architectural integration of collector arrays into roofs and facades, which is needed if this technology is to have a large impact in the market.

Tools and Test Methods

The SHC Task work on the development of tools for characterization, comparison and assessment of prototypes and products has contributed significantly to the improvement of this technology. SHC Task participants designed and evaluated test procedures for predicting the thermal performance of combisystems with specific attention given to simplifying the testing process. As a result, two new test methods were developed—the AC/DC test method and the Direct Characterisation (DC) test method. Another test method that was developed is the 12-day Concise Cycle Test (CCT) method. Each of these methods have specific characteristics with respect to accuracy, reproducibility, and the possibility of extrapolating test results to other operational conditions and system sizes.

To address the comfort aspect of solar combisystems, a simple hot water comfort test method was developed, and three combisystem heat stores have successfully been tested using this procedure.

In parallel with the development of test methods, test facilities for solar combisystems were designed and built. Test facilities are now available and will soon be ready in five European countries (France, Germany, Netherlands, Sweden and Switzerland). Tests so far have been restricted to comparison testing with CTSS, but soon DC and CCT tests will be carried out.

35% of hot water and space heating met by the solar combisystem in this 62-apartment housing estate in Salzburg, Austria.

System Optimization

After modeling nine systems in detail, one conclusion drawn is that it is very difficult and time consuming to find common reference conditions for the different solar combisystems. Nevertheless, the detailed system reports prepared (see *Report on Solar Combisystems Modeled in Task 26*) provide a good overview on which parameters have high and which have low significance for fractional savings. The main parameters seem to be collector area, azimuth and slope, storage volume, control strategy and settings, and hydraulics.

The optimization of systems is, of course, a multi-dimensional effort and therefore again complicated. First results show that the optimized systems that perform well take into account 1) minimum store volumes for the auxiliary heater, 2) prevent water from being mixed to lower temperatures (second thermodynamic law), 3) operate the collector at low temperature, and 4) use as few pumps as possible. The final conclusions will be included in the report, *Elements and Examples of "Dream Systems" of Solar*

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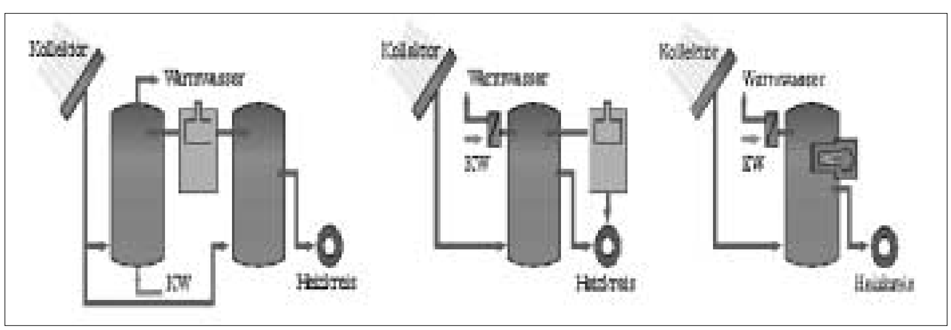

Figure 1. The integration of all components into one device (Source: SOLVIS).

Solar Combisystems *from page 3*

Combisystems. This report will be available in October 2003 on the IEA SHC web site.

Figure 1 illustrates how a system was optimized. In this case, it was possible to optimize the system in several steps and to make it very compact. The optimized system has reduced the number of pipe connections required by a plumber from 17 to 8; reduced the space requirement from 4.8 m^2 to 2.2 m^2; and reduced the weight of the unit from 250 kg. to 160 kg.

The benefits of a compact design, include:

- Simplified hydraulic schemes,
- Simplified controller,
- Reduced space demand,
- Lower weight,
- Hygienic domestic hot water preparation without standby losses, and
- An increase in the performance of the solar combisystem.

The Future of Solar Combisystems

In 2001, the total collector area installed for solar combisystems in eight European countries was 340,000 m^2. Assuming that the average collector area for a combisystem is 15 m^2, this means that about 22,600 solar combisystems were installed in these eight countries alone in 2001.

Mr. Werner Weiss, the Task Operating Agent, notes "it is realistic to assume that in the next ten years, a minimum of 20% of the collector area installed annually at middle and northern European latitudes will be used for solar combisystems. What this means then is that if the goals set in the European Commission's "White Paper" to install 100 million square metres of collectors are to be met then around 120,000 solar combisystems with 1.9 million m^2 of collectors need to be installed per year in the EU countries.

To multiply the installed collector area by a factor 10 over ten years is a major challenge, but can be achieved if there is strong and steady support, both politically and financially, from the member countries." ✷

Solar Combisystem Publications

These reports can be downloaded from www.iea-shc.org/task26.

- Stagnation Behaviour of Solar Thermal Systems
- Validation and Background Information on the FSC Procedure
- A Calculation Model for Assessment of Reliability in Solar Combisystems
- Changes on the Market since Task Beginning
- Library of References on Solar Combisystems
- European Test Facilities for Solar Combisystems and Heat Stores
- Hot Water Performance of Solar Combistores
- Direct Characterisation Test Procedure for Solar Combisystems
- Combitest – Initial Development of the AC/DC Test Method
- Development of the Direct Characterisation Test Procedure for Solar Combisystems
- The Concise Cycle Test Method - a Twelve Day System Test
- Validation of the CTSS Test Procedure by In-situ Measurements
- Performance Testing of Solar Combisystems - Comparison of the CTSS with the AC/DC Procedure
- A Solar Collector Model for TRNSYS Simulation and System Testing
- Structure of the Reference Buildings of Task 26
- Report on Solar Combisystems Modelled in Task 26
- Industry Newsletters 1-3
- Industry Workshop Proceedings

The book, *Solar Heating Systems for Houses – A Design Handbook for Solar Combisystems* will be available in October 2003 for US$75 from James & James (Science Publishers) Ltd. at www.jxjbookshop.co.uk.

Thanks To...

Michael Holtz, who gave his final farewell after 21 years with the SHC Programme. He began his work as Operating Agent for Task 8, *Passive and Hybrid Solar Low Energy Buildings*, and then led the work of Task 12, *Solar Building Design and Analysis Tools*. His last contribution has been as Operating Agent for Task 22, *Building Energy Analysis Tools*. The Executive Committee thanks Michael for his contributions and dedication to the international collaborative work of this Programme.

Werner Weiss, the Operating Agent for Task 26, *Solar Combisystems*. To the Executive Committee's good fortune, Werner will serve as the Operating Agent for the new Task 33, *Solar Heat for Industrial Processes*.

Earle Perera, the representative from the United Kingdom, who served on the Executive Committee for eight years.

Welcome To...

Pietro Menna, the new Executive Committee representative for the European Commission.

David Strong, of BRE, who is the new Executive Committee representative for the United Kingdom.

Ron Judkoff, of the National Renewable Energy Lab, who on behalf of the U.S. Department of Energy is the new Operating Agent for Task 34 on the testing and validation of building energy simulation tools.

SWH installations per year. The main means for achieving this target is an industry Action Plan developed as a partnership between the Solar Industries Association (SIA) and the Government. Possible Government support for this partnership is a SWH purchase program.

The SIA aim is to establish a quality-based industry, building on sales to the residential mass market, to significantly increase the volume of SWH commercial/ industrial installations. A key target of the strategy is to secure installations in facilities owned by government agencies.

During the first year of the Action Plan in 2002, the work focused on quality issues. SIA and EECA (Energy Efficiency and Conservation Authority) jointly reviewed relevant quality standards and established an accreditation program. In 2003, the Action Plan has focused on strengthening the knowledge and experience of building professionals and starting a residential mass-market promotion program. In 2004, the focus will be on promotion programs and solar water heating for large-volume applications, that is large commercial/industrial applications.

EECA has funded these activities to encourage the growth of the SWH industry. In early 2003 the EnergyWise SWH Grants Scheme, a trial tender scheme was implemented. Under this program, SWH suppliers bid for portions of the fund to help them offer discounts, interest-free loans or other ways to make the systems more affordable. This activity has provided support for five solar water heating projects, amounting to 225 new systems. An additional NZ$ 200,000 (EUR 102,600) has been announced to encourage the uptake of solar water heating in 2003/2004.

Policies to promote renewable energy also are being implemented as part of the Government's Climate Change Policy Package released in October 2002. Unlike many other mitigation proposals, SWH can make an immediate approximate 1kg/kWh contribution to CO_2 reduction (assuming that the water would otherwise be heated by thermally generated electricity).

The Market

A typical New Zealand household uses about 40-60 litres of hot water per person per day. The energy needed to heat the water, maintain its temperature during storage, and overcome distribution losses around the house usually amounts to 8-20 kWh per day. In an all-electric house this represents about 40-45% of the annual electricity consumption. It is estimated that annual average savings from the installation of a SWH system would be 65%.

The cost of a solar water heating system can vary considerably depending on the size and type of system. Typical costs range from EUR 1,020-2,300 (NZ$ 2000- 4,500) more than a simple electric or gas hot water system that would otherwise be required. Most evaluations of residential installations give simple payback times of 4-10 years in Auckland and 6-12 years in Wellington and Christchurch.

Currently, there are 16 suppliers of SWH systems in New Zealand, 12 are accredited suppliers and 3 are New Zealand based manufacturers. Other suppliers import products from elsewhere, with the majority coming from Australia.

Table 1. Typical values of total yearly global energy per square meter for several sites in Australia, New Zealand and Europe. Two units have been used. (1kWh = 3.6 MJ).

	Latitude	$MJ/m^2/yr$	$kWh/m^2/yr$
Sydney, AU	33° 52'S	6150.3	1708.4
Melbourne, AU	37° 49'S	5301.6	1472.7
Kaitaia, NZ	35° 07'S	5288.1	1469.0
Paraparaumu, NZ	41° S	5035.1	1402.6
Gisborne, NZ	38° 40' S	5385.9	1497.1
Christchurch, NZ	43° 32' S	4898.0	1360.5
Invercargill, NZ	46° 24'S	4651.9	1292.2
Germany	~52° N	3609.0	1002.5

By the end of 2001, 20,000 systems had been installed, and at the start of this Programme approximately 1,200 (3MW) additional systems were being installed each year. The 2003 number of SWH installations has doubled to an estimated 2,800 installations. The majority of systems being installed are in residential homes and most are flat plate systems, however, the number of evacuated tube suppliers has recently increased.

The industry target of 10,000 new solar water heating system installations per year is a major increase in the current number of installations and will be a stretch for the industry. However, this very large increase in current installations represents less than half the number of new homes constructed each year, and is considered to be consistent with the achievable challenge principle of the Renewable Energy Programme.

To reach the industry target, the main barrier to be removed is a lack of market information, not system performance. Therefore, programs and activities are focusing on improving the knowledge and public perception of SWH systems through information, training and examples of SWH installations.

The Future

A comparison of total yearly energy available per square meter is shown in Table 1 for New Zealand and Australian sites and a typical site in Germany (52° north). The data clearly demonstrates the nature of New Zealand's temperate climate. With $30MJ/m^2$ per day in January decreasing to a maximum value in winter of about $8\text{-}12MJ/m^2$ per day for all sites, there is ample solar radiation available all year. Combined with mild winter and summer temperatures this high solar availability suggests a promising future for solar water heating, particularly as nearly twice as much (solar) energy falls on the roofs of New Zealand houses than is currently consumed in the whole consumer energy market for agricultural, industrial, domestic, commercial and transport purposes. ✷

For more information contact Michael Donn of the Centre for Building Performance Research (CBPR) and the New Zealand SHC Executive Committee representative at fax: +64/4 463 6204, e-mail: Michael.donn@vuw.ac.nz or Brian Cox of Solar Industries Association +64 4 385 3397, e-mail: info@solarindustries.org.nz

Analysis Tools *from page 1*

rooms or full-scale buildings.

The target audience for the Task's results is building energy analysis tool developers and energy standards development organizations (i.e., ASHRAE and CEN). However, tool users, such as architects, engineers, energy consultants, product manufacturers, and building owners and managers are the ultimate beneficiaries of the research.

Tool Development

The tool development research focused on a class of building energy simulation tools using modular, object-oriented techniques. This class of tools relies on a software architecture consisting of a solver (energy kernel) supported by numerous engineering models (algorithms) of various mass and energy flow phenomena assembled by the user in a manner to reflect the design conditions of interest.

While each of the solvers has a unique format for assembling and submitting the building/system model to the energy solver portion of the tool, these tools can use a translator to reformat the algorithmic expression from a common format into unique, code-specific format. The preferred common format is the Neutral Model Format (NMF). The NMF has a standard protocol and approach to expressing engineering algorithms that allows translators to be developed for code-specific use of algorithms.

The goal of SHC Task 22 was to identify and expand the number of engineering algorithms documented in the NMF, thus supporting the further development and use of object-oriented building energy simulation tools, such as TRNSYS, IDA and CLIM 2000. SHC Task 22 experts documented 40 engineering models in the NMF. To evaluate the success in documenting these engineering models in NMF, translators were developed and tested for IDA, TRNSYS, and CLIM2000. The translators were used to create code-specific models for the tools so that various energy models based on the NMF documented engineering algorithms could be run.

Iowa Energy Resource Center, one of three locations where empirical validations were performed.

The creation of the NMF library of building energy engineering models has provided a useful starting point for object-oriented simulation environment tool developers and has helped this innovative tool architecture to receive greater attention and credibility in the international marketplace.

Tool Evaluation

A second goal of this work was to create formal building energy analysis tool evaluation process to ensure the accuracy and validity of these tools so that researchers, consultants and designers can use them confidently.

The tool evaluation framework of Analytical Tests, Comparative Evaluation and Empirical Evaluation was used as the basis for the tool evaluation work. In

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Building Energy Anaysis Tools Publications

The following SHC Task 22 reports can be downloaded from www.iea-shc.org/task22.

- IEA Building Energy Simulation Test and Diagnostic Method for HVAC Equipment Models (HVAC BESTEST), Volume 1: Cases E100-E200 and Volume 2: Cases E300-E545
- Using Parameters Space Analysis Techniques for Diagnostic Purposes in the Framework of Empirical Model Validation
- Models for Building Indoor Climate and Energy Simulation
- Building Energy Simulation Test and Diagnostic Method for Heating, Ventilation, and Air-Conditioning Equipment Models (HVAC BESTEST): Fuel-Fired Furnace Test Cases
- RADTEST-Radiant Heating and Cooling Test Cases
- Empirical Validation of Iowa Energy Resource Station Building Energy Analysis Simulation Models
- Empirical Validation of EDF, ETNA, GENEC Test-Cell Models
- International Energy Agency Building Energy Simulation Test (BESTEST) and Diagnostic Method NREL/TP-472-6132

These reports will be available on the SHC web site in September 2003.

- Daylight – HVAC Interaction Empirical Validation Tests
- Economizer Control Empirical Validation Tests

Analysis Tools *from page 6*

addition, work from two earlier SHC Tasks was used as a means to address the major gaps in the types of evaluation tests. An important result is the development of a powerful new validation technique by Task participant Elena Palomo. This technique – Parameters Space Analysis – was successfully applied to several empirical validation test exercises and promises to be an efficient method for isolating those building energy analysis model functions causing deviation from the empirical data.

Mr. Michael Holtz, the Task Operating Agent, states that "the real benefit of the Task's accomplishments is the creation of a workable (enforceable) performance-based building energy efficiency code compliance method, which promotes and encourages the use of renewable energy technology to achieve the required minimum energy performance level." He adds that, "when innovative solar and energy efficiency technologies are not blocked from the marketplace due to restrictive prescriptive energy codes and standards, these sustainable, renewable energy technologies will hopefully flourish in the marketplace."

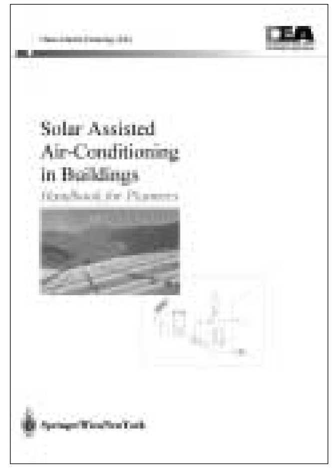
As to what remains to be done, the answer is more. The number and scope of the current analytical, comparative and empirical test cases are limited. A basic set of test cases has been created, but additional tests must be developed to ensure a balanced, comprehensive approach to evaluating the accuracy of building energy analysis tools in predicting the energy use, cost and performance (comfort, etc.) of residential and non-residential buildings, especially those using innovative active and passive solar techniques for space conditioning, water heating, and daylighting.

To continue the work in this important area, the SHC Programme and IEA Energy Conservation in Buildings and Community Systems Programme will collaborate on a new 3-year Task on tool evaluation. ✷

IN BRIEF

NEW PUBLICATIONS

Solar Assisted Air Conditioning in Buildings



Ongoing Research Relevant to Solar Assisted Cooling. A technical report on national and international R&D work on new components and systems for solar cooling. It can be downloaded from the outcomes page at http://www.iea-shc.org/task25.

Solar Assisted Air Conditioning in Buildings – Handbook for Planners. A book to help planners design a solar assisted air conditioning system. The applications covered are closed cycle and desiccant cooling technologies. It will be available in September 2003 for EUR 49 from Springer at www.springer.at.

Sustainable Solar Buildings

ISIS Demonstration Housing Project. A brochure on a passive solar apartment building built in Frieburg, Germany. It can be downloaded from the outcomes page at http://www.iea-shc.org/task28.

NEW WORK

Building Energy Analysis Tools

A joint Task with the IEA Energy Conservation in Buildings and Community Systems Programme on the testing and validation of building energy analysis tools will begin in September 2003. This work is a continuation of earlier SHC Tasks, including the recently completed SHC Task 22, *Building Energy Analysis Tools*, (see article in this issue). The goal of this work is to perform pre-normative research to develop a comprehensive and integrated suite of building energy analysis tool tests involving analytical, comparative and empirical methods.

For more information contact the Operating Agent Ron Judkoff, of the National Renewable Energy Lab in the USA, fax: +1/303 384 7540, e-mail: ron_judkoff@nrel.gov.

Satellite-Based Solar Resource Management

A collaborative Task with the IEA SolarPACES and Photovoltaic Power Systems Programmes on solar resource knowledge management based on satellite data was proposed as a means to compile more comprehensive information with international intercomparability. The proposed work would focus on standardizing solar resource products, developing a common structure for archiving, processing and accessing solar resource information, and leading R&D to create new, more versatile products.

For more information contact Richard Meyer of DLR in Germany, fax: +49/81 53 28 1841, e-mail: Richard.meyer@dlr.de.

IEA Solar Heating and Cooling 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 21 members of the IEA Solar Heating and Cooling Agreement have initiated a total of 32 R&D projects (known as Tasks) to advance solar technologies for buildings. The overall program is managed by an Executive Committee while the individual Tasks are led by Operating Agents.

SHC Web Site

Visit the SHC web site next time you're on the Internet. You will find Programme information, details on Task activities, publications, names of Programme contacts and other useful information.

www.iea-shc.org

Current Tasks and Operating Agents

Task 24: Active Solar Procurement
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Task 25: SolarAssisted Air Conditioning of Buildings
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Task 27: Performance of Solar Facade Components
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Task 29: Solar Crop Drying
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Task 31: Daylighting Buildings in the 21st Century
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Task 32: Advanced Storage Concepts for Solar Buildings
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Task 33: Solar Heat for Industrial Processes
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SHC Task 34/ ECBCS Annex 43
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SOLAR UPDATE

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