Dissemination Activities of Subtask A of the IEA SHC Task 44 / HPP Annex 38
A technical report of subtask A – Report A3

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IEA Solar Heating and Cooling Programme

The International Energy Agency (IEA) is an autonomous body within the framework of the Organization for Economic Co-operation and Development (OECD) based in Paris. Established in 1974 after the first “oil shock,” the IEA is committed to carrying out a comprehensive program of energy cooperation among its members and the Commission of the European Communities.

The IEA provides a legal framework, through IEA Implementing Agreements such as the Solar Heating and Cooling Agreement, for international collaboration in energy technology research and development (R&D) and deployment. This IEA experience has proved that such collaboration contributes significantly to faster technological progress, while reducing costs; to eliminating technological risks and duplication of efforts; and to creating numerous other benefits, such as swifter expansion of the knowledge base and easier harmonization of standards.

The Solar Heating and Cooling Programme was one of the first IEA Implementing Agreements to be established. Since 1977, its members have been collaborating to advance active solar and passive solar and their application in buildings and other areas, such as agriculture and industry. Current members are:

Australia       Finland       Singapore
Austria         France        South Africa
Belgium         Italy          Spain
Canada          Mexico        Sweden
Denmark         Netherlands   Switzerland
European Commission Norway United States
Germany         Portugal

A total of 49 Tasks have been initiated, 35 of which have been completed. Each Task is managed by an Operating Agent from one of the participating countries. Overall control of the program rests with an Executive Committee comprised of one representative from each contracting party to the Implementing Agreement. In addition to the Task work, a number of special activities—Memorandum of Understanding with solar thermal trade organizations, statistics collection and analysis, conferences and workshops—have been undertaken.

Visit the Solar Heating and Cooling Programme website - www.iea-shc.org - to find more publications and to learn about the SHC Programme.
Current Tasks & Working Group:

Task 36  Solar Resource Knowledge Management
Task 39  Polymeric Materials for Solar Thermal Applications
Task 40  Towards Net Zero Energy Solar Buildings
Task 41  Solar Energy and Architecture
Task 42  Compact Thermal Energy Storage
Task 43  Solar Rating and Certification Procedures
Task 44  Solar and Heat Pump Systems
Task 45  Large Systems: Solar Heating/Cooling Systems, Seasonal Storages, Heat Pumps
Task 46  Solar Resource Assessment and Forecasting
Task 47  Renovation of Non-Residential Buildings Towards Sustainable Standards
Task 48  Quality Assurance and Support Measures for Solar Cooling
Task 49  Solar Process Heat for Production and Advanced Applications

Completed Tasks:

Task 1  Investigation of the Performance of Solar Heating and Cooling Systems
Task 2  Coordination of Solar Heating and Cooling R&D
Task 3  Performance Testing of Solar Collectors
Task 4  Development of an Insolation Handbook and Instrument Package
Task 5  Use of Existing Meteorological Information for Solar Energy Application
Task 6  Performance of Solar Systems Using Evacuated Collectors
Task 7  Central Solar Heating Plants with Seasonal Storage
Task 8  Passive and Hybrid Solar Low Energy Buildings
Task 9  Solar Radiation and Pyranometry Studies
Task 10  Solar Materials R&D
Task 11  Passive and Hybrid Solar Commercial Buildings
Task 12  Building Energy Analysis and Design Tools for Solar Applications
Task 13  Advanced Solar Low Energy Buildings
Task 14  Advanced Active Solar Energy Systems
Task 16  Photovoltaics in Buildings
Task 17  Measuring and Modeling Spectral Radiation
Task 18  Advanced Glazing and Associated Materials for Solar and Building Applications
Task 19  Solar Air Systems
Task 20  Solar Energy in Building Renovation
Task 21  Daylight in Buildings
Task 22  Building Energy Analysis Tools
Task 23  Optimization of Solar Energy Use in Large Buildings
Task 24  Solar Procurement
Task 25  Solar Assisted Air Conditioning of Buildings
Task 26  Solar Combinations
Task 27  Performance of Solar Facade Components
Task 28  Solar Sustainable Housing
Task 29  Solar Crop Drying
Task 31  Daylighting Buildings in the 21st Century
Task 32  Advanced Storage Concepts for Solar and Low Energy Buildings
Task 33  Solar Heat for Industrial Processes
Task 34  Testing and Validation of Building Energy Simulation Tools
Task 35  PV/Thermal Solar Systems
Task 37  Advanced Housing Renovation with Solar & Conservation
Task 38  Solar Thermal Cooling and Air Conditioning

Completed Working Groups:
CSHPSS; ISOLDE; Materials in Solar Thermal Collectors; Evaluation of Task 13 Houses; Daylight Research
IEA Heat Pump Programme

This project was carried out within the Solar Heating and Cooling Programme and also within the Heat Pump Programme, HPP which is an Implementing agreement within the International Energy Agency, IEA. This project is called Task 44 in the Solar Heating and Cooling Programme and Annex 38 in the Heat pump Programme.

The Implementing Agreement for a Programme of Research, Development, Demonstration and Promotion of Heat Pumping Technologies (IA) forms the legal basis for the IEA Heat Pump Programme. Signatories of the IA are either governments or organizations designated by their respective governments to conduct programmes in the field of energy conservation.

Under the IA collaborative tasks or “Annexes” in the field of heat pumps are undertaken. These tasks are conducted on a cost-sharing and/or task-sharing basis by the participating countries. An Annex is in general coordinated by one country which acts as the Operating Agent (manager). Annexes have specific topics and work plans and operate for a specified period, usually several years. The objectives vary from information exchange to the development and implementation of technology. This report presents the results of one Annex. The Programme is governed by an Executive Committee, which monitors existing projects and identifies new areas where collaborative effort may be beneficial.

The IEA Heat Pump Centre

A central role within the IEA Heat Pump Programme is played by the IEA Heat Pump Centre (HPC). Consistent with the overall objective of the IA the HPC seeks to advance and disseminate knowledge about heat pumps, and promote their use wherever appropriate. Activities of the HPC include the production of a quarterly newsletter and the webpage, the organization of workshops, an inquiry service and a promotion programme. The HPC also publishes selected results from other Annexes, and this publication is one result of this activity.

For further information about the IEA Heat Pump Programme and for inquiries on heat pump issues in general contact the IEA Heat Pump Centre at the following address:

IEA Heat Pump Centre
Box 857
SE-501 15 BORÅS
Sweden
Phone: +46 10 16 55 12
Fax: +46 33 13 19 79

Visit the Heat Pump Programme website - http://www.heatpumpcentre.org/ - to find more publications and to learn about the HPP Programme.

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Executive Summary

In Subtask A of the joint IEA Solar Heating and Cooling Programme Task 44 and Heat Pump Programme Annex 38, different concepts for solar and heat pump heating systems are evaluated based on annual system simulations.

This report gives an overview on dissemination activities in relation to Subtask A "Solutions and Generic Systems". These dissemination activities include:

- 19 conference papers
- 5 reports
- 6 undergraduate theses
- 8 (reviewed and non-reviewed) journal papers
- 10 presentations that were not connected to a conference / conference paper
1 Task Reports

The technical reports of Subtask A are:
A2 – Reporting Field Test Results
A3 – Dissemination Activities of Subtask A of the IEA SHC Task 44 / HPP Annex 38

Table 1 shows more detailed information, including their status.

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2</td>
<td>Reporting Field Test Results</td>
<td>Sebastian Herkel and Jörn Ruschenburg with contributions from Erik Bertram, Carolina Fraga, Pierre Hollmuller, Floriane Mermoud, Andreas Palzer, Peter Pärisch and Bernard Thissen</td>
<td>22 October 2013</td>
<td>Started</td>
</tr>
<tr>
<td>A3</td>
<td>Dissemination Activities of Subtask A of the IEA SHC Task 44 / HPP Annex 38</td>
<td>Sebastian Herkel and Jörn Ruschenburg</td>
<td>25 February 2014</td>
<td>Draft</td>
</tr>
</tbody>
</table>
2 Conference Papers

The following is a list of conference papers that have been published in connection with the work of the Subtask A of the IEA SHC Task 44 / HPP Annex 38. Not included are:

- publications prior to the start of the Task/Annex
- publications in the field of solar and heat pump systems that did not have any connection with the Task
- publications not analysing solar and heat pump systems, theoretically or market-related, or not presenting field trial activities


3 Reports


4 Theses


5 Journal Articles


## 6 Presentations

Table 2 lists presentations of Subtask A work in addition to the presentations that were given at conferences listed in Section 2.

**Table 2: Presentations held on Subtask A topics with dissemination beyond the task members.**

<table>
<thead>
<tr>
<th>Event, Date &amp; Place</th>
<th>Title</th>
<th>Presenter &amp; Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Workshop of the IEA SHC Task 44 / HPP Annex 38, 30 April 2010, Bolzano, Italy</td>
<td>Systemintegration Solar + Wärme Pompe</td>
<td>S. Herkel, M. Miara, F. Kagerer</td>
</tr>
<tr>
<td>see above</td>
<td>Speichersysteme und geothermische Sonden zur Verwendung in solarthermischen Systemen</td>
<td>F. Thole</td>
</tr>
<tr>
<td>see above</td>
<td>Market overview and financial issues</td>
<td>C. Stadler</td>
</tr>
<tr>
<td>Industry Workshop of the IEA SHC Task 44 / HPP Annex 38, 28 October 2010, Vienna, Austria</td>
<td>Subtask A: Classification</td>
<td>S. Herkel</td>
</tr>
<tr>
<td>VDI-Fachkonferenz Wärme Pompe, 7 June 2011</td>
<td>Solare Wärme pompensysteme – Aktivitäten des Task 44 des IEA SHC</td>
<td>J. Ruschenburg, S. Herkel</td>
</tr>
<tr>
<td>Industry Workshop of the IEA SHC Task 44 / HPP Annex 38, 2 May 2012, Póvoa de Varzim, Portugal</td>
<td>Solar heat pump systems</td>
<td>S. Herkel, J. Ruschenburg</td>
</tr>
<tr>
<td>see above</td>
<td>Research project WPSol and former Solar + HP related activities at the ITW</td>
<td>A. Loose</td>
</tr>
<tr>
<td>Industry Workshop of the IEA SHC Task 44 / HPP Annex 38, 8 October 2012, Copenhagen, Danmark</td>
<td>Monitoring of Danish HP/solar thermal projects</td>
<td>K. Elliewage</td>
</tr>
<tr>
<td>see above</td>
<td>Solar heat pump systems</td>
<td>S. Herkel, J. Ruschenburg</td>
</tr>
<tr>
<td>see above</td>
<td>Overview of solar thermal / heat pump systems on the Danish Market</td>
<td>I. Katic</td>
</tr>
<tr>
<td>Industry Workshop of the IEA SHC Task 44 / HPP Annex 38, 8 April 2013, Mechelen, Belgium</td>
<td>A comparative analysis of market available solar thermal heat pump systems</td>
<td>J. Ruschenburg, S. Herkel</td>
</tr>
</tbody>
</table>
7 Handbook Project

The content of Chapter 2 (System Description, Categorisation and Comparison) and chapter 6 (Monitoring) has been elaborated.