IEA SHC Task 53 Kick off meeting

New Generation Solar Cooling & Heating systems (PV or solar thermally driven systems)

Introduction to IEA SHC and to the Task

Daniel MUGNIER – Vienna, 18/03/2014
The main ambitions are:

- To deal with admin issues
- To confirm the content of the Annex & Work plan document
- To have a discussion on the priority targets
- To make a planning for next steps
Administrative issues:

- Registration + invoices at AIT?

- Invoices: VAT or not?
The International Energy Agency

– The International Energy Agency (IEA) is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD)

– It was established in 1974

– It has 26 member countries (Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, the Republic of Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States)

+ the European Commission
Basic aims of the IEA

- To maintain and improve systems for coping with oil supply disruptions
- To promote rational energy policies in a global context through co-operative relations with non-member countries, industry and international organisations
- To operate a permanent information system on the international oil market
- To improve the world’s energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use
- To assist in the integration of environmental and energy policies
International energy technology co-operation

IEA Committee on Energy Research and Technology

Working Parties

- Implementing Agreements (Examples)

CERT

- Fossil Fuels
  - ...

- Renewable Energy
  - ...

- End Use
  - ...

- Fusion Power
  - ...

- Solar Heating & Cooling
- Heat Pumps
- PV Power Systems
- Energy Conservation in Buildings & Community Systems

IEA Task 53 kick off meeting – Vienna 18-19/03/2014
Energy end-use

- Energy end-use: Transportation
- Energy end-use: Industry
- Energy end-use: Buildings
  - Demand Side Management
  - District Heating and Cooling
  - Energy Conservation in Buildings and Community Systems
  - Energy Conservation through Energy Storage
  - Heat Pumping Technologies
- Energy end-use technologies: information centres, systems analysis
Renewable energy

- Bioenergy
- Geothermal Energy Research Technology
- Hydropower Technologies and Programmes
- Ocean Energy Systems
- Photovoltaic Power System (PVPS)
- Production and Utilization of Hydrogen
- Solar Heating and Cooling Systems (SHC)
- Solar Power and Chemical Energy Systems (SolarPACES)
- Wind Turbine Systems
Solar Heating & Cooling Implementing Agreement

- Established in 1976
- Works on technologies that use the energy of the sun to heat, cool, light and power buildings
- 27 countries (Australia, Austria, Belgium, Canada, Denmark, (Finland), France, Germany, Italy, Mexico, the Netherlands, New Zealand, Norway, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, (United Kingdom), United States) + European Commission
- Mission: “To facilitate an environmentally sustainable future through the greater use of solar design and technologies.”
- International co-operation on a Task sharing basis
IEA Solar Heating & Cooling Programme

The Solar Heating and Cooling Programme was established in 1977, one of the first programmes of the International Energy Agency. The Programme’s work is unique in that it is accomplished through the international collaborative effort of experts from Member countries and the European Union.

The benefits of this approach are:

- accelerates the pace of technology development
- promotes standardization
- enhances national R&D programmes
- permits national specialization
- saves time and money
Executive Committee

- Main body to run the programme
- Representatives of all member countries and the EU, typically from funding organisations in the field of energy related R&D
- Two meetings per year
- Tasks
  - Control progress of ongoing tasks (Task Status Reports presented by Operating Agents)
  - Discuss new task proposals
  - Develop programme’s strategy and operation
What is a TASK?

- Collaborative project with limited duration (typically 3...5 years)
- At least 3 participating countries
- Joint work plan
- Participants can be universities, R&D institutes or private companies (manufacturer, system supplier, planning/engineering companies, ...)
- Two expert meetings per year to organize work, monitor progress and join information
- Number of results and deliberables
Rules for participation

- Participants only from countries which are member of the implementing agreement

- Experts from other countries may participate on request in 1-2 meetings as observer

- Also countries who are not IEA members can join the Implementing Agreement
Current Tasks (projects) of the SHC

- **Task 53** - [New Generation Solar Cooling and Heating (PV or Solar Thermally Driven Systems)]
- **Task 52** - [Solar Energy and Energy Economics in Urban Environments]
- **Task 51** - [Solar Energy in Urban Planning]
- **Task 50** - [Advanced Lighting Solutions for Retrofitting Buildings]
- **Task 49** - [Solar Heat Integration in Industrial Processes]
- **Task 47** - [Solar Renovation of Non-Residential Buildings]
- **Task 46** - [Solar Resource Assessment and Forecasting]
- **Task 45** - [Large Scale Solar Heating and Cooling Systems]
- **Task 44** - [Solar and Heat Pump Systems]
- **Task 43** - [Solar Rating & Certification Procedures]
- **Task 42** - [Compact Thermal Energy Storage]
- **Task 40** - [Net Zero Energy Solar Buildings]
- **Task 39** - [Polymeric Materials for Solar Thermal Applications]
What does mean Task sharing?

- The Solar Heating & Cooling Programme has only a small common fund (≈10 000 US$ per participating country per year) to run a secretary, cover expenses of the programmes chairman and run dissemination activities.

- Projects (Tasks) are carried out based on an Annex Text and Work Plan on which the participating countries agreed.

- Each country covers costs of the experts:
  - national funding agencies responsible for the SHC
  - own resources (e.g. universities)
  - other national resources
  - other resources (e.g. European Commission)
Typical Life Cycle of an IEA Task

- **Concept Phase**
  - a concept paper is developed and proposed by a country
  - the concept paper has to be approved by the ExCo

- **Task Definition Phase**
  - 1-2 workshops are carried out with participation of experts from the interested countries
  - an Annex Text is produced and has to be approved by the ExCo
  - the Annex Text is the legal document in which the basic work and goals are described and commitments of the participating parties are defined
Life Cycle of an IEA Task (cont’d)

- a Work Plan is produced and has to be approved by the ExCo
- the Work Plan is the main document which describes the structure of the Task and the detailed lay-out of the Work and its distribution among participants
- the Work Plan has to contain an Information Plan in which dissemination activities are outlined

• **Task Work**
  - the Task can start after official approval of the Annex and Work Plan by the ExCo
  - two expert meetings per year
Context: Status of Solar cooling in 2014

Solar thermal cooling has **difficulty to emerge as a economically competitive solution**

Main reasons:
- **Technical**: Limit on adaptability due to hydraulics, complexity
- **Economical**: Investment cost, especially for small systems
- Still need intensive R&D for quality improvement and best solution selection

**However, for large systems, solar thermal cooling has very interesting perspectives (UWC Singapore) because:**
- Economy of scale
- Specialised engineering and control
- Energy sales
Raising interest from EU on competitive Solar cooling

Secure, clean and efficient energy

VERSION 8 OCTOBER 2013

WORK PROGRAMME 2014 – 2015

10. Energy Challenge

INFORMAL DRAFT DISCUSSION DOCUMENT

Important notice:
The present document is meant to facilitate the discussions towards the preparation of the work programme 2014 – 2015. It does not at this stage cover all relevant aspects and it does not prejudge the outcome of the on-going inter-institutional negotiations on Horizon 2020 or internal work on cross-cutting aspects. Hence, it remains subject to change.
Basic concept

Controller / Inverter

PV

Air conditioner / Heat Pump

OPTIONAL

GRID

Water storage (chilled water / hot water / DHW)

LOAD

Master

Slave
New Task on Solar cooling status: Work Plan and Annex

TASK 53

New generation solar cooling & heating systems
(PV or solar thermally driven systems)

Task description and Work plan
November 2013
This text has been produced by
Daniel Magnier (TECSOL, France)
With the support of
Jean Christophe Hadorn (Ex. Consultant, Switzerland)

Annex
October 2013
This text has been produced by
Daniel Magnier (TECSOL, France)
With the support of
Jean Christophe Hadorn (Ex. Consultant, Switzerland)

.. But let’s explain the Task more into details...
Proposed Task Goals

(1) to analyze the interest of new generation solar cooling & heating concepts systems for buildings in all climates and select best solutions which lead to highly reliable, durable, efficient and robust solar cooling and heating (ambient + DHW) systems

(2) to contribute to market entry of the technology and identify most promising market areas in terms of cost competitiveness and value of electricity.
Scope of the Task

System: solar driven systems for cooling and heating
* Solar thermal driven innovative compact cooling + heating systems
* Photovoltaïc + air conditioning system (Compression air conditioning / heat pump (if heating as well); food conservation not included)

Applications: Off grid & grid connected buildings
(houses, small multi-family buildings, offices, shops, commercial center, hotels)

Power range: from 1 kW cooling to several tens kW cooling/heating

Limit: Need to have a direct coupling between solar and cold production machine. The coupling can be partial or total (for the PV-machine one especially)

Proposal of Fhg ISE: direct coupling between solar and cold production machine or considering special configurations and control strategies, to allow a maximised use of PV power direct for heating/cooling even without direct coupling
Topics to be covered by the Task

- Interaction PV/solar thermal (ST) production – Cooling/heating/DHW demand
- Storage or no storage (thermal or electric)
- Electrical storage or water cold/hot storage
- Control strategy (peak demand management, full comfort or solar only, etc..)
- Value of electricity and value of cold including LCA analysis (embodied energy)
- Partial grid connection or stand alone
- New solutions for compressors, DC or AC and new solution for optimised compact sorption cooling kits
- Efficiency of existing compressors connected with PV DC or AC input ?
- Use of PV/ST to manage other heating or cooling devices (appliances, DHW, etc...)
- Size limit ? optimisation ?
- Standards and tests methods (for REC’s, EU Ecodesign directive for instance)
- Best cost : high tech or low cost ? Sensibility to conventional energy cost ?
- Best suited PV/ST technology (cost vs performance)
- Integrated solutions BIPV/BIST to cool distribution devices
Outcome

- Investigation on new small to medium size solar cooling systems (thermal and PV) and develop best suited cooling & heating systems technology focusing on reliability, adaptability and quality

- Proof of cost effectiveness of new solar cooling & heating systems

- Investigation on life cycle performances on energy & environmental terms (LCA) of different options

- Assistance for market deployment of new solar cooling & heating systems for buildings worldwide

- Increase of energy supply safety and influence the virtuous demand side management behaviors

Time Schedule

- 40 months
- From end 2014 to end 2017
Proposed Task Structure

Subtask A
Components, Systems & Quality

Subtask B
Control, Simulation & Design

Subtask C
Testing and demonstration projects

Subtask D
Dissemination & market deployment
Participating countries

.. at least 8 countries

France
Austria
Spain
Italy
Sweden
Australia
Switzerland
China

Turkey ?
Germany ?
Algeria ? Korea ?

Israel: no more
## Contributors/participants

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### Time schedule

#### Task definitions

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#### Kick off meeting

Vienna 18th-19th March 2014

**Time schedule**

1. **Management (overview)**
   - Task 1: Reference sites (IR & heating/cooling)
   - Task 2: New generation system configurations
   - Task 3: Storage systems and management

2. **Systems integration with building envelopes**
   - Task 4: SRA and interconnection components infrastructure systems

3. **Performance conditions**
   - Task 5: Operational conditions and building management analysis

4. **Control strategy overview & options**
   - Task 6: Systems overview

5. **Monitoring equipment and data collection**
   - Task 7: Monitoring equipment and data collection

6. **Development of the Task**
   - Task 8: Handbook and standardisation

7. **Preparation and follow-up actions**
   - Task 9: Peer review

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**SCH**
Solar Heating Cooling International Energy Agency

**TECSOL**
## Subtask A: Components, Systems & Quality

### Participants Interest:

- **high**
- **moderate**
- **leadership**

### Table of Participants' Interest:

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## Subtask B: Control, Simulation and Design

### Participants Interest:

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### Subtask B: Control, Simulation & Design

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## Subtask C: Testing and demonstration projects

### Participants Interest:

- **High**
- **Moderate**
- **Leadership**

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Administrative issues:

National participation letters

NATIONAL PARTICIPATION LETTER

Date: 01/03/2014

To Operating Agent
Daniel MUIGNER
TECSOL SA
105 av Alfred Keeler - BP 60434
66 004 PERPIGNAN Cedex - FRANCE
E-mail: daniel.muigner@tecsol.fr

National Participation Commitment Letter for

Task 53: New generation solar cooling & heating systems (PV or solar thermally driven systems) of the IEA Solar Heating and Cooling Programme

Task Start Date: 1/03/2014 Completion Date: 30/06/2017

This letter confirms and acknowledges the commitment of the undersigned Contracting Party, which is a Participant in the abovementioned Task, to:

1. fulfil the minimum participation requirements specified in Annex Text, Task 53, October 2013, which is a minimum of 0.2 person year per annum
2. to abide by the Task Research Work Plan prepared by the Participants and approved by the Executive Committee, and
3. to ensure that their national representatives are funded to attend all Task experts meetings (physically or by videoconference at least).

Nominated experts for this Task are:*

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<th>Address/Area of Expertise</th>
<th>Level of Effort: x person month per year</th>
<th>Funding source (contingent on funding from the specified source)</th>
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Other contributions to the Task (facilities, equipment, project, etc.)**

Contracting Party & Country** __________________________________________

Signature of ExCo Member** __________________________________________  Date** __________

Approved by Operating Agent (after the letter is returned) __________________________

* To be filled in by Operating Agent before letter is sent to ExCo members
** To be filled in by ExCo member
New Generation Solar Cooling & Heating Systems (PV or solar thermally driven systems)

Overview

The main objective of this Task is to assist a strong and sustainable market development of solar PV or new innovative thermal cooling systems. It is focusing on solar driven systems for both cooling (ambient and food conservation) and heating (ambient and domestic hot water).

The scope of the Task are the technologies for production of cold/hot water or conditioned air by means of solar heat or solar electricity, i.e., the subject which is covered by the Task starts with the solar radiation reaching the collector or the PV modules and ends with the chilled/hot water and/or conditioned air transferred to the application. However, although the distribution system, the building and the interaction of both with the technical equipment are not the main topics of the Task this interaction will be considered where necessary.

http://task53.iea-shc.org/
Task 53 Flyer ('see below the Task 48 one..')

IEA SHC TASK 48
Quality assurance and support measures for Solar Cooling
www.iea-shc.org/task48

CONTEXT: A tremendous business opportunity is offered by the growing interest in solar cooling as an alternative to air-conditioning. The Task 53 is complementary to Task 48 the conclusions of which are the basis for this Task. The Task 48 declared a challenge for solar cooling, particularly in northern regions.

OBJECTIVES: The proposed project is intended to find solutions to make the solar-thermally driven heating and cooling systems a cost-effective and realizable. The three major objectives should be reached towards the above:  
1) Development of tools and procedures to make the characteristic of the main components of SHC systems.  
2) Creation of a standardized and validated procedure, adopted to specific heat technical configurations.  
3) Development of a cost-justified and competitive system.

TASK 48: The scope of the Task is the technologies for production of cold water or conditioned air by means of solar means. The objective is to improve the Task outcomes with the implementation of the collector and with the chilled water and air-conditioned air transferred to the application. However, through the distribution system, the building and the interaction with the other technical equipment are not the main topics within Task 48 this interaction will be considered where necessary.

STRUCTURE: The project starts in October 2011 and is divided into subtasks:
- Subtask A: Market support measures
- Subtask B: Quality assurance and support measures
- Subtask C: Performance measurement

PARTICIPATING COUNTRIES (status in October 2011):
- Austria, Australia, Belgium, France, Germany, Italy, Portugal, South Africa, Spain and USA

PARTICIPATING MANUFACTURERS AND COMPANIES (status in October 2011):
- Alguacil, Climatext, Industrial Solar GmbH, Inventor, Soritech, SOLEUM, SOUID, TEC2OL, Thermopool

SOLAR HEATING AND COOLING PROGRAMME
The Solar Heating and Cooling Programme was established in 1977, one of the first programmes of the International Energy Agency. The Programme's work is unique in that its is accomplished through the international collaborative effort of experts from member countries and the European Union.

OPERATING AGENT
Daniel Mugnier
TEC2OL SA
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Tel: +33 4 68 55 46 46
Mobile: +33 6 67 52 41 06
Fax: +33 4 68 55 46 46
E-mail: daniel.mugnier@tec2ol.fr

RELATED SITES
- www.iea-sps.org
- www.iea-sps-handbook.org

TASK 48
Task 53 Logo ??
Task 53 Communication

* TO COME..
Task 53 next meetings

2nd Task 53 meeting:

Proposal for Sweden on 07-08-09/10/2014

+ Side event with Climatewell innovative workshop

3rd Task 53 meeting:

Spring 2015... Ideas ???
More information

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daniel.mugnier@tecsol.fr
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