

Task 38 Follow up Definition Workshop
New IEA Task on Solar Cooling/Air Conditioning

STATUS OF NEW TASK PROPOSAL



Daniel MUGNIER – Paris, 28/03/2011



www.tecsol.fr

IEA Task 38 follow up preparation meeting – Paris 28-29/03/2011

History

IEA SHC Task 25 (from 1999 to 2004)
⇒ Creation of an **outlook** of the technology and initiate industrial and mature developments.

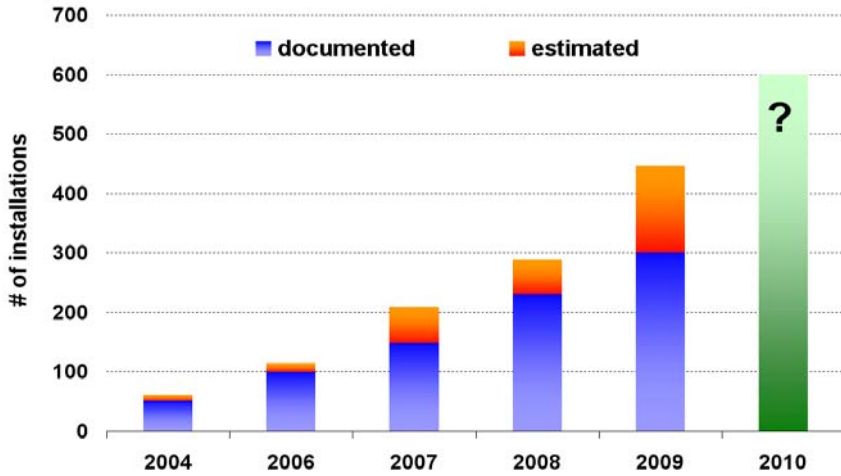
IEA SHC Task 38 (2006-2010),
=> Creation of **tools and methods** to help the market introduction of the emerging technology and analyse the efficiency and reliability of the new generation of solar cooling systems now available for demonstration and pilot installations as well as first commercial market deployment.

Wide scope of technologies & buiding applications
+ mostly technically oriented



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Situation in 2011

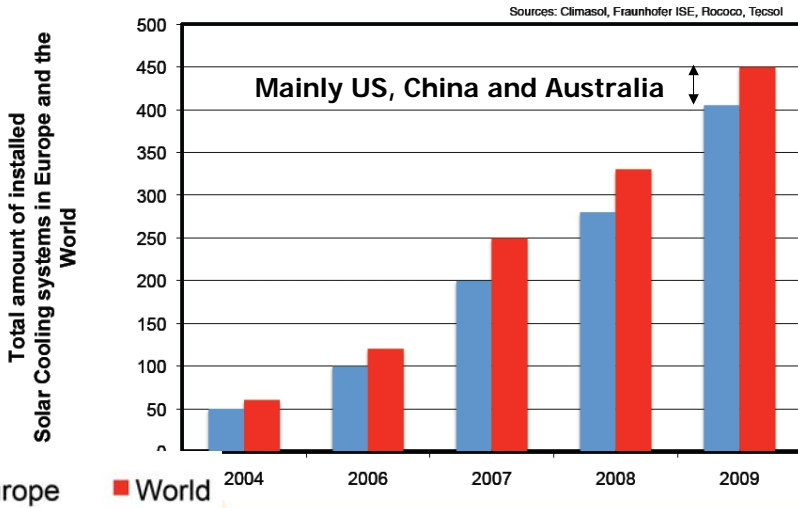


Source: climasol Fraunhofer ISE Rococo TECSOL TECSOL estimate



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Market analysis : Europe / World



Sources: Climasol, Fraunhofer ISE, Rococo, Tecsol



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Trend : large and very large installations (examples)



CGD Bank Headquarter
Lisbon, Portugal
1560 m² collector area
400 kW absorption chiller

Source: SOLID, Graz/Austria



FESTO Factory
Berkheim, Germany
1218 m² collector area
1.05 MW (3 adsorption chillers)

Source: Paradigma, Festo



United World College (UWC) (in planning)
Singapore
3900 m² collector area
1.47 MW absorption chiller

Source: SOLID, Graz/Austria



Task 38

Duration: 09/2006 – 12/2010

Subtask A

Pre-engineered systems for residential and small commercial applications

AEE INTEC (Austria): Dagmar Jähnig

Subtask B

Custom-made systems for large non-residential buildings and industrial applications

EURAC (Italy): Wolfram Sparber

Subtask C

Modeling and fundamental analysis

INES (France): Etienne Wurtz

Subtask D

Market transfer activities

Politecnico di Milano (Italy): Mario Motta



Subtask A - Pre-engineered systems for residential and small commercial applications

WP	Work Package Name	Deliverables
A-1	Market overview	State-of-the-art report describing market available equipment in the desired capacity range
A-2	Selection of system designs and control schemes	Collection of selected systems schemes (generic systems)
A-3	Field test monitoring including results	Technical report on the implemented experimental and monitoring activities
A-5	Installation and maintenance guidelines	Installation and maintenance guidelines for pre-engineered systems

Subtask B - Custom-made systems for large non-residential buildings and industrial applications

WP	Work Package Name	Deliverables
B-1	Market overview	State of the art on existing solar heating and cooling systems
B-2	Selection of system designs and control	Solar Cooling System Design and Control
B-3	Monitoring of demo projects and pro-posal for evaluation procedures	Monitoring results of large scale installations
		Monitoring procedure (technical report describing the methodology including performance figurs and performance evaluation)

Subtask B - Custom-made systems for large non-residential buildings and industrial applications (cont'd)

WP	Work Package Name	Deliverables
B-4	Method for fast pre-design of successful projects	Soft tool package for the fast pre-design assessment of successful projects Fast pre-design (technical report)
B-5	Guidelines for installation and call for tender	Installation and commissioning guidelines (technical report + checklist in ExCel)

Subtask C - Modelling and fundamental analysis

WP	Work Package Name	Deliverables
C-1	State of the art – Survey on new solar cooling developments	State of the art – Survey on new solar cooling developments (update for Task 38 end)
C-2	Simulation tools	Description of simulation tools used in solar cooling Benchmarks for comparison of system simulation: absorption systems Benchmarks for comparison of system simulation: desiccant systems
C-3	Thermodynamic / Exergy analysis	Exergy Analysis of Solar Cooling Systems
C-5	Heat rejection	Technical report on heat rejection techniques

Subtask D - Market transfer activities

WP	Work Package Name	Deliverables
D-3	Life cycle analysis	Technical report about the results of the Life Cycle Analysis of Solar Cooling systems
D-4	New edition "Handbook for Planners"	„Solar Air-Conditioning and Refrigeration – Handbook for Planners“
D-5	Dissemination of results	Policy paper
		Training material (joint activity with EU-project SolAir)
		(National) workshops
		Electronic newsletter
		Solar cooling position paper

Task Workshops / Conferences

Meeting #	Place	Date
Conference „Solar Air-Conditioning and Refrigeration“	Bolzano, Italy	October 18, 2006
Workshop „Solar Cooling“	Aix-les-Bains, France	April 25, 2007
Workshop for Industry	Barcelona, Spain	October 15, 2007
2 nd Int. Conf. „Solar Air-Conditioning“	Tarragona, Spain	October 18-19, 2007
Workshop and Rococco Conference	Vienna, Austria	March 31, 2008
EUROSUN 2008	Lisbon, Portugal	October 8-10, 2008
Workshop with Annex 34 of HPP	Freiburg, Germany	April 27, 2008
3. Int. Conf. Solar Air-Conditioning	Palermo, Italy	Sept. 30 – Oct. 2, 2009
Task 38 Workshop linked to ASHRAE Trade Show	Orlando, Florida, USA	Jan. 23-27, 2010
Workshop „Solar driven cooling and air-conditioning“ with presentations given by Danish and Task 38 experts	Aarhus, Denmark	April 28, 2010
EUROSUN 2010	Graz, Austria	Oct. 2-4, 2010
Task 38 Workshop linked to AHR	Las Vegas, Nevada, USA	Feb. 2-3, 2011

Cross cutting feedbacks from Task 38 experience

(no claim for completeness and veracity)

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A lot of ambitious outputs planned (deliverables)

Interesting monitoring data collection (but difficulties to valorise it)

Collection of methods to improve systems but difficulties to aggregate them



Cross cutting feedbacks from Task 38 experience

(no claim for completeness and veracity)

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Participants : a lot of entities attending the meetings & workshops with 3 levels :

- 1) Passive attendance : „Spectators“
- 2) Punctual participation : „Witnesses“
- 3) Organised participation base on national/EU financed projects : „Players“

Geographical paradox : active countries are not the midd/long term customers

- 1) Europe-oriented : lack of other continents
- 2) Lack of Southern countries, even in Europe



Lessons learnt for a Task Follow up

(no claim for completeness and veracity)

Clearly divide the Task into 2 parts :

- expert meetings and Task contributions (work)
- industry workshops (presentation + exchanges/brainstormings)

Country contributions only with justifications of R&D contracts (at least expert meeting attendance but not only probably..)

Reduction of deliverables and results

Should be based on detailed R&D programs and clear participating entities (institutes/companies)

Stimulation for New participants implication

Increase of exchanges with America, South Africa and Australia
Possibilities of video sequences on expert meetings



Situation in 2011

Solar Air Conditioning facing 2 main challenges :

- (1) **general lack of economic competitiveness**
(as it is still the case for many renewable energies unless incentives are in place)
- (2) **secure long term energy performance and reliability.**



Proposed Task Goals

(1) **to develop and provide various measures** which lead to highly reliable, durable, efficient and robust solar cooling (and heating) systems

(2) **to contribute to further cost reduction** on all levels of the chain and identify most promising market areas in terms of cost competitiveness.

New Task Concept



Selection of the **best markets** + systems

Complete **quality procedure** (calculation tool, system design, installation and operation)

Certification or labelling process => certificates/contracting

Dissemination of the results + **lobbying** roadmapping

New Task Concept (detailed)

- 1) a **rigorous selection** of the best niche markets (building, applications) and most efficient STDHC systems (performance versus global annualised cost)
- 2) the **development of a complete quality procedure** for system design, installation and operation to give the best chance for solar cooling projects to lead to reliability and good performance on the long term
- 3) the **creation of a complete set of quality criteria** which can be transformed into a certification or labelling process leading to a conceptual equivalent of a "Solar Cooling Keymark"; this may perhaps limit the field of systems and applications but guarantee system quality worldwide and thus assure a sustainable market development in the long term.
- 4) the **dissemination of the results** of the 3 above mentioned activities at the level of policy makers and key stakeholders of the solar cooling technology field: planners, designers, installers, O&M company and, possibly, ESCOs.

New Task Concept

Subtask D

Dissemination,
training
and market
support

Subtask A

Best markets and systems

Subtask B

Quality procedures and tools

Subtask C

Certification and contracting

Subtask A : Best market and systems

(market analysis leading to specific best buildings,
selected efficient systems leading to cost reduction)

Objectives : identifying and evaluating the technical and economical potential of system configuration versus application.

Results :

- critical technical and economical analysis of best principle schemes leading to a limited number of best schemes (simplified schemes, efficient but cost effective heat rejection systems)
- market analysis of niche markets leading
- state of the art of custom made packaged systems (integrated solutions for buildings)
- projection of the technical potential of solar cooling technologies with regard to emerging building standards

Subtask B : Quality procedure

(simplified design tool, detailed design and commissioning procedure, support so as to package systems, monitoring/O&M procedures)

Objectives : Upgrading existing results from T38, to create a practical and unified procedure, adapted to specific best technical configurations. This should permit to create a practical way towards 100% quality management.

Results :

- simplified design tool used as a reference calculation tool : design facilitator
- quality procedure document/check lists
- quality criteria for components and systems

Procedure => proposal for a set of EN standards and/or for a voluntary procedure adopted by the biggest manufacturer, installer and stakeholders, associations (RHEVA, ASHRAE, Green chiller Association, Australian Group of interest).

Subtask C : Certification and contracting

(standard elaboration of a "Solar cooling Quality Label"),
contracting protocol (energy sales), guarantee of results)

Objectives : Quality requirements defined in two different ways:

- a prescriptive approach: manufacturers declare minimum performance level of the components => **LABEL**
- a performance-based approach: installers/providers of STDHC (systems ready to run) have the possibility to declare energy saving goals and to guarantee for it => **CONTRACTING**

Results :

- Label definition document
- Contracting guidelines adapted to STDHC systems
- Training package elaboration on the Quality Label for target audiences (engineering companies, installers, decision makers/building owners/contractors)
- Guidelines and procedures for the audit process



Subtask D : Dissemination and market support measures

(international label to disseminate, policy advice, lobbying to EU , support to implement national programs, tools to create in interested countries roadmapping)

Objectives : To give tools to promote STDHC systems

Results :

- Web site (Task results presentation, special dedicated page to the Quality Label) and a draft of a public database of labelled products)
- Tailored policy advice and strategy paper on national levels document
- Guidelines for Roadmaps on Solar cooling (recommendations for policy options to develop the industry)
- Updated specific training seminars adapted to the Quality procedure (different levels : one set for engineering companies, one for installers and one for building owner/contractor/utility/decision makers)
- Outreach report (conference, seminars, workshops, lobbying actions)



Related national R&D projects and initiatives

AUSTRALIA : AusSCIG, DEC developpments, certification

AUSTRIA : SolarCoolingOpt, SolarCoolingMonitor, Roadmap

FRANCE : Emergence program, MEGAPICS project

GERMANY : Solarthermie2000+ follow up, R&D projects with industry partners

ITALY : ENEA Odyssee tools developpment + regional incentive programs based on quality

US+Canada : Creation of a Solar Cooling Association in May 2011 (ASES) grouping entities (such as Thermosol, Jonhson Controls, York, etc..)

+ **OTHERS**...(Singapor ? Japan ?)



Related EU projects

QAIST (www.qaist.org) :
Quality Assurance in Solar Heating and Cooling Technology(QAIST)
Involved entities : ISE, AIT

SDH TakeOff (<http://www.solar-district-heating.eu>) :
Solar Distric Heating Take Off (SDH Take Off)
Involved entities : ISE, AIT ?

Biosolesco (www.biosolesco.org) :
Expanding biomass and solar heating in public and private buildings
via the energy services approach (Bio-Sol-ESCO)
Involved entities : SOLID



Related IEA SHC ongoing Tasks

- Task 43 (Advanced Solar Thermal Testing and Characterization for Certification of Collectors and Systems): there is a strong link with this starting Task aimed at certifying solar systems. The present task could be an extension on that side for solar cooling
- Task 40 (Towards net zero solar energy buildings): the proposed project could provide technical solutions to Task40 for solar cooling in specific buildings
- Task 41 (Solar Architecture): results of Task 41 on placing solar thermal collectors in the building envelope have to be analyzed regarding their impact on the solar heating and cooling system
- Task 44: (Systems Using Solar Thermal Energy in Combination with Heat Pumps) (2010-2013)
- Task 45 (Large systems) : in particular issues related to contracting as a business model which are part of the proposed Subtask D of Task 45 would be very helpful also for STDHC systems

Focus on Task 45 : Large Systems

(Large solar heating/cooling systems, seasonal storages, heat pumps)

Subtask A: Collectors (DTU, DK)

Subtask B: Storages (SOLITES, DE)

Subtask C: Systems (SOLID, AT)

Subtask C includes systems with heat pumps and chillers – so use of HPs and chillers in systems will/could be investigated / demonstrated

Mabe exclusion of the R&D work on HPs and chillers at the component level (so no quality assurance measures / pre-standardisation work on chillers included)

Proposal of coordination between T45 and T38fu

(from T45 operating agent : JE Nielsen)

Task 45 deals with / focus on solar heating and cooling systems with more than 0.5 MW thermal input (> 700 m²):

Sub task A (no/low risk of overlap)

Collectors suited for large collector fields
Large collector fields
Guaranteed performance of large collector fields

Subtask B (no/low risk of overlap)

Large storages (short term storage to long term storage)
Guaranteed performance of large storages – if possible?

Subtask C (risk of overlap)

Large systems (mainly for district heating and cooling)
ESCo arrangements (risk of overlap – to be coordinated by SOLID!))
Guaranteed performance of large solar systems – if possible? (risk of overlap – start work in task 45 – take over refine in task 38fu)



Proposal of coordination between T45 and T38fu

(from T45 operating agent : JE Nielsen)

Task 38fu deals with / focus on thermally driven cooling systems with less than 0.5 MW thermal input (< 700 m²):

Sub task A (risk of overlap)

No limits should be given a priori for system size in these market analysis – but focus could be on systems attached to buildings. The risk is of course that you find that only solar cooling systems more than 700 m² are feasible => risk?

Subtask B (low risk of overlap)

Tools etc. for thermally driven cooling systems (no risk of overlap)
Commissioning, monitoring, operating / maintenance procedures (risk of overlap) – exchange documents and inspire each other.

Subtask C (low risk of overlap)

Standardisation / certification (no risk of overlap) – this subtask can be done by task 38fu participants together with CEN / ISO work group people
Guaranteed results (no risk of overlap): Results from the SDH-TO project will be incorporated in the task 45 – Proposal task 38fu put work on guaranteed results in a late phase of the task – in order to be able to utilise what has been



Remarks on T38fu Concept Paper

(from T45 operating agent : JE Nielsen)

Title

Title : **Quality assurance measures for solar thermally driven heating and cooling systems** indicates an extremely wide scope – in fact it takes in all solar thermal systems you could imagine – is this the intension?

If this is a follow up on task 25 “Solar Assisted Air Conditioning of Buildings” and task 38 “Task 38 - Solar Air-Conditioning and Refrigeration”, it seems more logical to me to omit the “heating and” in the title; my proposal for a title (and scope) would be:

Quality assurance measures for solar thermally driven cooling systems.



Remarks on T38fu Concept Paper

(from T45 operating agent : JE Nielsen)

Scope for certification

Another argument : – on the product level – quality assurance measures already in place for “solar thermally driven heating systems”

ISO and EN standards for household size solar water heating systems
=>Solar Keymark, SRCC and other certification schemes for these systems
+ Task 43 and QAIST project working on this issue.

EN standards for solar heating systems for space heating and also large systems are just about to be approved – and Solar Keymark will most probably be available for these systems next year.



Remarks on T38fu Concept Paper

(from T45 operating agent : JE Nielsen)

Subtask C: Certification and contracting

KEYMARK

To have Keymark on a product, need of an European Standard for the product. To make European standards within 3 years is ambitious – Keymark on top of the Standard + approx. one year.

prEN 12977-1:2010 - Thermal solar systems and components — Custom built systems — Part 1: General requirements for solar water heaters and combisystems actually have “cooling systems” in the scope:

1 Scope

This European Standard specifies requirements on durability, reliability and safety of small and large custom built solar heating and cooling systems with liquid heat transfer medium in the collector loop for residential buildings and similar applications. This document contains also requirements on the design process of large custom built systems.

Remarks on T38fu Concept Paper

(from T45 operating agent : JE Nielsen)

Subtask C: Certification and contracting

Recommendation to do the subtask i very close co-operation with the people in CEN/TC 180 WG3 (convenor is Sebastian Laipple, SPF)

Also an ISO standard corresponding to the EN 12977 series is underway from US.

GUARANTEE OF RESULTS

Work ongoing for the large systems in the SDH-TO project – an advanced draft has been presented at the project workshop in Graz 17/3 – something similar could maybe be made for the cooling (part of the) systems.

So far the guarantees are still on “component level” – the ambition is to try to go to system level – but we will see if this is possible/convenient.

Task38fu Planning

Preparation phase : nearly six months from November 2010 to May 2011

- 1) **Approval by Exco** in Cape Down of the Task38fu principle (11/2010)
- 2) **Concept paper** including a first general proposal of a Task work plan elaborated until end of January 2011.
- 3) **Draft document** disseminated on 01/02/2011 to interested institutes and companies to be reviewed and completed and serves as a basis for Task definition Workshop taking place in end of March 2011.
- 4) **Discussion in Task definition** Workshop leading to a final draft
- 5) **Final version of the consolidated Task work plan** (structure, scope and content) will be produced in May 2011 to be presented to the Exco meeting in June 2011 for final approval.



Task38fu Planning

The working phase

Project aimed at starting (in case of approval of the Task work plan by the Exco) in October 2011 for a duration of 3 years within September 2014.

ESTEC conference in Marseille (October 20-21, 2011) could be a very accurate place for the Kick-Off meeting.

=> Possibility to organise it on 18 and 19/10 in Marseille

