

Minutes of the 3<sup>rd</sup> expert meeting of

**Task 48 „Quality assurance and support measures for Solar Cooling  
“**

organized by AEE INTEC on September 10 - 11, 2012 in Gleisdorf, Austria

prepared by:

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Date: November 2012

## 1 Participants of 3<sup>rd</sup> expert meeting

33 experts from 8 countries (Germany, Austria, Australia, Italy, Japan, Spain, USA, France, China) attended the 3<sup>rd</sup> expert meeting.

During the meeting, an update on the different activities since the 2<sup>nd</sup> meeting has been achieved , then a reminder on the first milestones for October 2012 has been presented, followed by workshops to organize the work for all ongoing activities.

The registred participants and attending participants of the 3<sup>rd</sup> expert meeting are listed in Table A1 & A2 in Appendix A.



Picture of the 3<sup>rd</sup> Task 48 expert participant

## 2 General items

### 2.1 Organizational matters for the 3<sup>rd</sup> expert meeting in Gleisdorf

The 3<sup>rd</sup> expert meeting in Gleisdorf was organized by AEE INTEC and hosted in the head Office of this Institute in Gleisdorf. Unanimously, organization of the meeting has been greatly appreciated from the Task 48 experts : thanks a lot to AEE INTEC (particularly, Bettina Nocke and Rosa Stranzl).

The most important items managed during this meeting have been:

- to deal with admin issues (national letters, participations)
- to update the last events related to Task 48 (website, 71th Exco meeting, conférences)
- to present the latest Works done by the participants (plenary workshop)
- to present the ongoing activities status (work done, deviations)
- to keep on working on the ongoing activities (Working groups)
- to make a planning for next steps (4th meeting in March/April 2013)

Important organizational aspect which went out from this meeting: the payment of the Task meeting organization has been only made possible by cash so as to simplify the procedure. **No main issues went out from this process so it has been decided to generalize this rule for next Task 48 meetings**

No **Video conference** has been organized during this meeting contrary to the 2<sup>nd</sup> one, according to Task 48 Annex planning 1 videoconference for each second meeting.

Nevertheless, as planned in the Task 48 Annex, the next 4<sup>th</sup> Task 48 Expert meeting in Newcastle will include a video conference access in April 2013.

Initially, several entities from China should have come to take part to the meeting (Vicot, Shanghai University, Himin) but **important difficulties to access the possibility to have a VISA to come at this period to Austria has made impossible the venue of these entities**. Only one Chinese expert from Shuangliang company could join the meeting. The administrative impossibility was quite difficult to understand and quite independent from the nature of the meeting on solar cooling. Important efforts will be done for next meetings to avoid similar disappointing situation.

## 2.2 Agenda

The agenda of the meeting is attached in the Appendix B of the minutes

## 2.3 Most important items from the previous Task 48 meeting (Milano)

Place : Milano,

\* Date : 27 & 28 March 2012,

\* Organised : OA + POLIMI

\* Side event : Mostra Convegno Fair



38 experts from 9 countries (Germany, Austria, Australia, Italy, Japan, Spain, USA, Canada, France)

- Update on the different activities since the 1st meeting
- Reminder on the consolidated Workplan
- Workshops to organize the work for all ongoing activities.

## 2.4. General and organizational information on IEA Task 48

The Operating Agent (OA) informed shortly about the goals of the meeting and other organizational matters.

Establishing website : A website is available thanks to the very efficient collaboration of Randy L. Martin. It can be found at [www.iea-shc.org/task48](http://www.iea-shc.org/task48)

This website is including all the presentations done during the Marseille and Milano and Gleisdorf Expert meeting. The concerned folder is to be found in the following path: Task 48/Experts meetings/3<sup>rd</sup> expert meeting Gleisdorf



Latest update :

- Special page for our 3rd meeting in Gleisdorf
- Update of the Participants page
- Update of the What's New page

Add in of the 2 Press Releases from SHC on solar cooling as well as the recent SolarThermalWorld article (« Europe/Asia: Solar Cooling Gains Traction »)

An internal protected part reserved for the Task Experts and Exco is available for Task 48 participants. It is available at [www.iea-shc.org/files](http://www.iea-shc.org/files)  
User Access (login + password) are given usable only to regular Task 48 participants (approved by national Exco).

Remark : if Task 48 participants lost their access data, please send an email to [daniel.mugnier@tecsol.fr](mailto:daniel.mugnier@tecsol.fr)

This specific internal website contains all of the presentations of the meeting as well as all the related documents to Task 48 (general documents, expert meeting presentations, exco meeting documents related to T48, presentations related to T48 in Workshops)

Task 48 flyer has been improved and updated (in English, two pages), containing a short presentation of the Task. It can be found in Appendix D.

**The goal is now to make evaluate this flyer** :\_ each participant shall provide a feedback on the content of this flyer to: [daniel.mugnier@tecsol.fr](mailto:daniel.mugnier@tecsol.fr)

Status of participation:

The template of national participation letter has been spread to the Task interested participants since June 2011.

**Latest changes and evolutions since 2<sup>nd</sup> meeting**

- China : NPL for 2 entities : Vicot Air Conditioning (Belen Gong) and Shanghai Jiao Tong University (Yanjun DAI). They could not get visa on time to attend the meeting China has jumped into the Task
- Germany : Fraunhofer Umsicht and Green Chiller OK

Interest as observer from Pink (W. Pink, present), Himin (not present), Shuangliang Eco Energy Systems (Ren Zheng, present), Güssing Energy Technologies (Richard Zweiler), Institute of Electrical Engineering, Chinese Academy of Science of Beijing (Yang Ming),

- France : LASIE (P. Joubert) stopped participation, difficulties for other participating countries (INES, TECSOL, PIMENT)
- Question marks : AEE ? Kawasaki ? NTU Singapore ?

**National participation letters status already received :**

- EURAC/UNIPA/POLIMI/UNICT (Italy)
- EMCG (USA)
- TECSOL/CEA INES/PIMENT (France)
- ISE/ZAE/ILK/Zafh.net/Green Chiller/Umsicht (draft, Germany)

- Vicot/Shanghai Jiao Tong (China)
- CSIRO (Australia)

National participation letters status already to be signed :

Austria (AIT, AEE, UIBK, ASIC, SOLID), Singapore (NTU), Canada (Queens' Uni), Germany, South Africa (?)

A Template for National Participation letter is available in Appendix C. Currently lacking information from: Switzerland

Some countries manifested interest for this Task but investigations are still requested but interested participants (status of observer possible): Israel, Japan, Brazil

=> To do within the next meeting in September in Australia: each Task participant shall inform the national ExCo member about his activities in Task 48 in order to support the submission of the Letter of Participation (LOP) from the ExCo member to the IEA secretary in Paris. The LOP shall also contain/mention/indicate the level of effort of each participant.

A draft version of the LOP can be downloaded from the internal website in the General Documents section.

- Miscellaneous :

\* no Spanish participant is present inside Task 48 in 2012

\* Belgium is no more participating to Task 48

\* Observers from Japan, the company Kawasaki attended the Task 48 meeting in Gleisdorf. Their participation as experts for Japan could be approved within the end of 2012.

\* South Africa, because of lack of official experts having a budget to join Task 48, is not in capacity to participate to Task 48 for the moment but contacts have been established with Stellenbosch University (Billy De Lange, Centre for Renewable and Sustainable Energy Studies, Department of Mechanical and Mechatronic Engineering, UNIVERSITEIT STELLENBOSCH UNIVERSITY, [bdelange@sun.ac.za](mailto:bdelange@sun.ac.za) )

\* Fraunhofer Umsicht from Germany reactivated its participation to the Task

\* Interests as observer from Vaillant (M. Sick), Fisher Group (M. Müller-Holst), Kawasaki (present to the meeting), Ergsol (joining San Francisco Meeting, Wolfgang Weiss), AZTEC Solar (joining San Francisco Meeting, Don Rodes)

## 2.5. Task 48 Communication & activities from last Milano meeting

### \* Training course on solar cooling and Task 48 at World Renewable Energy Forum Denver (USA)

Workshop: Solar Air Conditioning Technology and System Design



DENVER, COLORADO  
MAY 13-17, 2012  
[www.wref2012.org](http://www.wref2012.org)

Wednesday, May 16, 2012, 5/16/2012 8:00am – 5:00pm

The course was led by Dr. Stephen White (CSIRO Solar Cooling Research Leader, ausSCIG Chair, International Energy Agency SHC Task 48 subtask leader). The course was designed as an overview of technical, economic and bigger picture aspects of solar cooling for newcomers to the topic. It enabled participants to identify where solar cooling is applicable and cost effective compared with other alternatives. It also enabled design engineers to confidently specify solar cooling systems through detailed design advice and technical case studies. 23 persons attended this event which was a great success.

### \* 2 Press releases for Task 48 posted in early July (05/07) :

According to the Information Centre of IEA SHC and with the inputs from Subtask D, 2 press releases have been done and published on July 2012.

The 2 press releases below are available in the News releases section of the IEA SHC Website at : <https://www.iea-shc.org/press/>

The 2 topics are :

- Momentum in solar cooling growing: Large industrial corporations entering the field
- Presentations of solar cooling session at Intersolar Europe now available for download

#### PRESS RELEASE



##### Presentations of solar cooling session at Intersolar Europe now available for download

5 July 2012 The IEA Solar Heating and Cooling Programme just released the presentations held at the intersolar Europe fair provided up-to-date information on several key issues of solar cooling. The presentations can now be downloaded from the IEA SHC website.

"With interest in new solar thermal applications increasing and numerous innovative high efficient solar collectors entering the market, solar cooling was more than ever a highlight topic at the recent Intersolar Europe fair in Munich", explains Daniel Mugnier, manager of the IEA SHC project on quality assurance and support measures for solar cooling "Task 48". "At our session alone, some 60 people listened to the latest developments in cooling with solar thermal energy, also known as 'solar cooling'".

The four presentations have now been made available as PDF on the project's website at <http://www.iea-shc.org/task48/press/Intersolar2012/>.

- Solar thermal energy for cooling and refrigeration: status and perspectives  
Dr. Daniel Mugnier, Head of R&D Department, TECOSOL
- Where does solar cooling stand today?  
Dr. Uli Jakob, General Manager, Solem consulting
- An application of solar cooling in the Gulf region  
Shane Caher, Operations Director, Kingspan Renewables
- Solar thermal or photovoltaic cooling?  
Prof. Dr. Ursula Eicker, Director IAF, University of Applied Sciences HFT Stuttgart, Germany

Solar cooling is also a major topic at the first International Conference on Solar Heating and Cooling for Buildings and Industry, which takes place 9-11 July 2012 in San Francisco, USA.

Several presentations and many more posters cover the various aspects of this application (components, systems, best practices) in buildings as well as for refrigeration. The conference is hosted by IEA SHC and takes place in conjunction with Intersolar North America.

##### Further information:

- IEA SHC website: [www.iea-shc.org](http://www.iea-shc.org)
- Project webpage: [www.iea-shc.org/task48/index.html](http://www.iea-shc.org/task48/index.html)
- SHC 2012 conference: [www.shc2012.org](http://www.shc2012.org)
- Intersolar North America: [www.intersolar.us](http://www.intersolar.us)

#### PRESS RELEASE



##### Momentum in solar cooling growing: Large industrial corporations entering the field

5 July 2012. Major industrial corporations from Asia are increasing their stakes in solar cooling. A multi-country research project of the IEA Solar Heating and Cooling Programme is supporting the market and drawing strong interest from these players.

Large industrial corporations like Hitachi (Japan) Technologies and Mitsubishi (Japan) have started to enter the solar cooling market. Already last year, Hitachi announced its aim of achieving a turnover of about 5 Billion Yen (63 Million USD, 50 Million EUR) by 2015 with their solar powered air-conditioning system based on parabolic trough collectors and absorption chillers. And this March, Mitsubishi put their sales target at 3 Billion Yen (36 Million USD, 30 Million EUR) for their new compact absorption chiller series by 2015. Both companies are showing a large interest in the solar cooling business field, which will be supported by research of a multi-country project of the IEA Solar Heating and Cooling Programme titled "Quality Assurance and Support Measures for Solar Cooling Task 48".

"We are thrilled to see that solar cooling is gaining traction in the industry", says Dr. Uli Jakob, who leads the communications efforts in Task 48. "The announcements of major industrial corporations provide additional momentum in the already dynamic solar cooling market".

And interest comes not only from Japan. With China recently joining the IEA SHC, several Chinese companies have indicated their strong interest in participating in the project. Amongst them are Woot Air Conditioning (solar cooling system supplier and absorption chiller manufacturer), Shuanglang (absorption chiller manufacturer), and Hemin Solar (solar collector manufacturer). Even the Changsha Jiao Tong University, a renowned solar cooling institute, has been recently approved by China to officially become an active expert joining the Task 48 group.

Important market players in other countries like Thermax from India have also expressed their keen interest in this project.

The next expert meeting of Task 48 will take place in Gaisdorf (Austria) on 10-11/09/2012 and is expected to confirm that solar cooling is a hot topic especially in Asia.

Solar cooling is also a major topic at the first International Conference on Solar Heating and Cooling for Buildings and Industry, which takes place 9-11 July 2012 in San Francisco, USA.

Several presentations and many more posters cover the various aspects of this application (components, systems, best practices) in buildings as well as for refrigeration. The conference is hosted by IEA SHC and takes place in conjunction with Intersolar North America.

**\* Workshop on solar cooling and Task 48 at INTERSOLAR EUROPE Conference**

München (Germany) – 13/06/2012

A series of 4 presentations given with an audience of nearly 60 people. 3 of the 4 presentations were based on active participants to Task 48

**Solar thermal energy for cooling and refrigeration**

Dr. Daniel Mugnier, Head of R&D Department, TECSOL

**Where does solar cooling stand today?**

Dr. Uli Jakob, General Manager, Solem Consulting

**An application of solar cooling in the Gulf region**

Shane Caher, Operations Director, Kingspan Renewables

**Solar thermal or photovoltaic cooling?**

Prof. Dr. Ursula Eicker, Director IAF, University of Applied Sciences HFT Stuttgart, Germany



**\* Solar cooling at the next SHC Conference**

Place : San Francisco (American Intersolar fair)

Dates : 09-10-11/07/2012

Good success for Task 48 !

229 submitted abstracts

221 abstracts selected for posters and oral presentations

40 abstracts on Solar cooling (not exact number but very close) selected for oral/posters

104 oral presentations



**21 oral presentations on solar cooling i.e 20% of the total oral presentations at the conference**

Particular elected presentations for some members of Task 48 group : POLIMI, AIT ( twice), FhG Umsicht, CEA INES, Uni Queen's, ZAE Bayern, UNIPA, SOLID, Industrial Solar and TECSOL

A special keynote presented by Hans Martin Henning on solar cooling has been presented (presentation available as well as all the presentations from Task 48 are available in the Task 48 public website)



An official announcement have been done during the conference and the ending plenary session for the OTTI 5th International Conference on Solar Air-Conditioning which will take place on Wednesday, September 25th, 2013 - Friday, September 27th, 2013 in Bad Krozingen, Black Forest, Germany (www.solaircon.com )

**\* Informal Meeting at SHC conference : San Francisco 11 July 2012**

This meeting has been organized by OA and present Task 48 participants from 6 to 7pm.  
1/3 of T48 participants present in San Francisco for SHC conference

- 1) SHC conference :
  - successful participation of T48 participants to the SHC conference
  - need to discuss in Gleisdorf on the strategy in Task 48 to structure our participation to both SHC2013 and OTTI conferences
- 2) Gleisdorf meeting : important participation from China expected
- 3) Ongoing work :
  - since Milano meeting, difficulties for the Subtask leaders to highly mobilise the Task participants to progress on the work : need to enhance ou effort within next meeting in September
- 4) Specific focus on some interesting Task 48 work for Northern American continent
  - short presentation on the ongoing work on standards in Australia
  - short presentation of the BIN method by Ivan Malenkovitch
  - offer from Task 48 to give tools to Solar cooling american market players to make progress the technology in the American continent (Don Rodes, W. Weiss, Sasha Mazo for instance) : need for interested bodies to contact me to explore possibilities of exchange.

**\* Solar cooling at the Eurosun 2012 Conference**

Place : Rijeka (Croatia)

Dates : 20/09/2012

Website : <http://www.eurosun2012.org/>

The EUROSUN 2012 conference has given a fruitful opportunity to IEA SHC Task 48 to show its latest results and present the Solar cooling technology.

A specific keynote on solar cooling has been presented and 2 workshops with a total of 15 presentations were present on the topic of solar cooling.

IEA SHC Task 48 was very represented with half of the presentations and the 2 chairman of the sessions (Stephen White (subtask C leader) and Daniel Mugnier (OA))



**\* Solar cooling at the Gleisdorf Solar Conference**

Place : Gleisdorf (Austria)

Dates : 14/09/2012

Website : <http://www.aee-intec-events.org/gs2012/>

The Gleisdorf Solar 2012 conference has given a fruitful opportunity to IEA SHC Task 48 to present the Solar cooling technology and latest developments.



A specific keynote on solar cooling has been presented and 1 workshop with 3 presentations were present on the topic of solar cooling.

IEA SHC Task 48 was very represented into the keynote and the 3 following presentations :

- **EvASoLk –Perspectives of Solar Thermal and Photovoltaic Cooling** (Björn Nienborg, Fraunhofer Institute for Solar Energy Systems, Freiburg, DE)
- **Operation experiences with two Solar Heating and Cooling, Systems in Gleisdorf** (Martin Vukits, AEE INTEC, Gleisdorf, AT)
- **Innovative and energy efficient Concept for Solar Cooling** (Romain Sire, TECSOL SA, Perpignan, FR)

**\* Workshop Solar heating for air conditioning and industrial process heat at the Klimaenergy Fair**

Place : Bolzano (Italy)

Dates : 21/09/2012

Website : <http://www.eurac.edu/en/newsevents/events/newsdetails.html?entryid=123709>

EURAC Research presented September 21, 2012, during the Fair Klimaenergy in Bolzano, two workshops open to the public, during which international experts will compare their experiences to give life to a discussion that develop strategic visions for the solar thermal sector, with particular interest to solar heating & cooling - air conditioning of buildings

Managed by Task 48 OA Daniel Mugnier, the workshop on solar cooling (both in German and Italian language) permitted to share with 30 people on the topic of solar cooling, especially for the Italian context with the presence of the following panel

- Ing. Francesco Fontana - Kloben
- Maurizio De Lucia - Università di Firenze
- Wolfram Sparber – Eurac
- Uli Jakob - Green Chiller Association.



**\* 7<sup>th</sup> International DERBI conference on Renewable Energy**

Place : Perpignan (France)

Dates : 16/10/2012

Website : <http://www.conference-derbi.com/en/the-programme>

During the DERBI conference, on specific workshop called "Hybridization of uses in the building sector : solar thermal or photovoltaic" has been organized.



This workshop on solar heating and especially cooling has permit to show the IEA SHC Task 48 ongoing activities and to try to answer to the following questions: what are the latest advances in air conditioning / heating and solar thermal can be envisaged in the long term profitability of this technology in certain niche markets? IS Photovoltaic risking dominating solar thermal in building thermal applications? What is the future potential of PV + air conditioning?

Speakers:

Philippe PAPILLON - Research Engineer - CEA-INES

Richard LOYEN - General Secretary - ENERPLAN

Daniel MUGNIER – IEA SHC Task 48 Operating Agent - TECSOL

Julien DUMAS - BE Engineer R & D – CLIPSOL

**\* Common internal Workshop with Task 45 & Task 49 on Large solar systems (district heating and cooling) :**

Location : Hotel Paradies - Straßganger Straße 380  
b - 8054 Graz – Straßgang [www.hotelparadies.at](http://www.hotelparadies.at)

Program : *Latest developments, examples, common potential work and links*

Target audience: Task 45, Task 48 and Task 49 experts

- Introduction, Nielsen OA Task 45, Mugnier OA Task 48
- Presentation of Task 48 status, Mugnier and subtask leaders
- Presentation of Task 45 status, Nielsen and Subtask leaders



- Presentation of Task 49 status, Brunner OA Task 49
- Presentations of latest developments in the following activities:
  - Table of existing available chillers compatible with solar on the market and review of relevant incentive schemes on solar cooling, Daniel Mugnier / Stephen White Task 48
  - Large solar heating and cooling database : Sabine Putz, Task 45
  - Solar process heat in the agro food industry : Christoph Brunner, Task 49

Discussion with all participants on what are the common work done between the 3 tasks on the 3 topics, on how to strengthen cooperation between T45, T48 and T49

**Very interesting common workshop permitting to exchange between experts from the 3 Tasks 45, 48 and 49. Presentations and program can be found in Task 48 internal and public website.**

## ***2.6. Operating Agent and Subtask Leaders***

### **Subtask A : Quality procedure on component**

Marco Calderoni  
Politecnico di Milano  
Dep. Energy - Via Lambruschini 4  
Milano 20156, Italy

**Remark :** Prof. Mario Motta informed participants in Milano he would **progressively delegate the responsibility of the Subtask A management to his colleague Marco Calderoni**. This information has been confirmed in Gleisdorf.

### **Subtask B : Quality procedure on system level**

Dr. Alexander Morgenstern  
Fraunhofer ISE  
Heidenhofstraße 2  
Freiburg 79110, Germany

### **Subtask C : Market support measures**

Dr. Stephen White  
CSIRO  
PO Box 330  
Newcastle, NSW 2300, Australia

### **Subtask D : Dissemination and policy advice**

Dr. Uli Jakob  
Green Chiller Association - Verband für Sorptionskälte e.V.  
Stendaler Str. 4 -10559 Berlin, Germany

**Remark : M. Jakob has been confirmed to be Subtask D leader by German Exco in June 2012.**

## 2.6. Next meetings

- **Meeting 4: Newcastle, 9 & 10 April 2011**, organized by OA and a Task 48 participant, CSIRO, this choice to be able to attend to a specific AIRAH conference on solar cooling to be organized by CSIRO in Sydney on 12/04/2013.

The choice for Australia was decided so as to permit to promising countries such as China, Singapore and India to have the possibility to join the meeting and the Task 48 conference on solar cooling. Another reason and motivation is the possibility there to access the CSIRO Laboratory and testing facilities for a visit as well as 2 solar cooling installations: a DEC solar air conditioning for kitchen and a double effect absorption chiller with parabolic troughs installation for a retail mall, both in Newcastle.

*This next meeting, as agreed in the Task Annex will be organized so that Participants from countries out of Europe will be able to join the meeting by teleconference (all the sessions will be filmed and available through Internet and a Professional way)*

- **Meeting 5: Freiburg, September 30 and October 01 2013**, organized by OA and Fraunhofer ISE, another Task 48 participant.

The choice for this date and place is due to the presence the week before of both very important events for Task 48 :

SHC 2013 on 23-25/09/2013; <http://www.shc2013.org/cms/welcome.html>

OTTI SAC on 25-27/09/2013 ; [www.otti.eu/pdf/SAC\\_Exhibitor\\_4137.pdf](http://www.otti.eu/pdf/SAC_Exhibitor_4137.pdf)

These 2 events will give opportunities to disseminate the consolidated results from Task 48.

## 2.6. Latest developments & results

In the beginning of the meeting, a full session has been dedicated to the presentation of a selection of latest developments and results among Task 48 experts. Presentations are available in the Internal meeting section website.

- Latest stage of development on Pink Chiller, Werner Pink, PINK
- MEGAPICS calculation tool, Romain Siré, TECSOL
- Draft Design Guide for Solar Cooling with Double/Triple Effect Absorption Chillers, Stephen White, CSIRO
- Latest developments on UWC Singapore project, Christian Holter, SOLID
- Review of relevant international standards rating and incentive schemes, Dan Rowe, CSIRO
- Measurement and verification procedures, Daniel Mugnier, TECSOL
- First results of the EVASOLK project, Bjorn Nienborg, FhG ISE

### 3. Subtask A: Quality procedure on component

Concentrates on developing tools and deliverables permitting to show the level of quality of the most critical components of the solar cooling and heating system (i.e., chiller, the heat rejection device, the pumps and the solar collectors)

- A1: Chiller characterization
- A2: Life cycle analysis at component level **Merges with B3** (see Subtask B status)
- A3: Heat rejection
- A4: Pumps efficiency and adaptability
- A5: Conventional solar collection **to be started**
- A6: State of the art on new collector & characterization

#### A1. Chiller characterization

**Workgroup chaired by Marcello Aprile**

#### **Participating entities:**

FHG-ISE (Björn Nienborg), CISRO (Sergio Pintaldi), EMCG, Kawasaki, FHG-Umsicht, ZAE (Manuel Riepl), EURAC + UNIPA, SOLEM, INES

#### **Deliverable and deadlines (September 2012 = M11) :**

Template for report on thermally driven chillers available on the market	(M6)
Data on thermally driven chillers available on the market retrieved	(M9 )
Draft of (MA 1.1) test methods, (MA 1.2) test conditions and (MA 1.3) seasonal performance calculation	(M18 )
Draft report on MA1.1, MA1.2 and MA 1.3 (characterization methods for chiller's behaviour characterisation over the entire operating range that is typical for solar cooling)	M24
MA 1.3 Chillers testing activities running (sample chillers)	M30
MA 1.4 Report final: Experimental activities on chillers characterisation for solar cooling	M36

**Status of the work already done:**

- Survey of market available chillers (upload end October 2012)
- Survey of existing standards (upload Mid November 2012)

**Ongoing activities:** Development of possible test procedure approaches

**Next steps:**

- Nomenclature: EER (from electrical standards) will replace COP. For energy fluxes nomenclature at system level will be used.
- Electrical efficiency will be introduced as “auxiliary energy factor” to make a distinction with EER of compression chiller.
- Electricity consumption of peripheral devices, such as pump/fan, will be included in the calculation of energy output and chiller efficiency.
- No further test conditions for driving temperature but only indication of a range.
- Off-design test conditions have been agreed : 4 points at generator, 2 points at condenser, 2 points at evaporator.
- Part load test conditions, part load test procedures will be defined after EURAC provides the test data on his chiller related to different test methods and condition.
- Polimi will send out a document with suggestions for test conditions and test procedure within the next months.

**Activity leadership:** POLIMI

A2: Life cycle analysis at component level :

**Activity leadership :** This activity is fusionned with B3 and UNIPA is leader of this new activity

A3: Heat rejection :

**Workgroup chaired by Roberto Fedrizzi (EURAC)**

**Participants:**

EURAC, FH-ISE (Björn Nienborg, Mathias Schicktanz), ASiC, Tecsol (Romain Sirè), AIT (Anita Preisler), ILK, UIBK (Daniel Neyer, Alex Thuer), Pink, EMCG, ZAE (Martin Helm, Christian Schweigler), ZAFH-Net, FHG Umsicht (Clemens Pollerberg), Industrial Solar, CISRO (Sergio Pintaldi) + SOLID

**Deliverable and deadlines (September 2012 = M11):**

MA 3.1 Template for report on heat rejection devices available on the market	(M18)
Template for report on installed heat rejection devices monitoring data	(M18)
Data on heat rejection devices available on the market retrieved	(M18)
Monitoring data on installed heat rejection devices retrieved	(M18)
MA 3.2 Draft Technical Report on heat rejection ready	(M24)
MA 3.3 Final Technical Report on heat rejection ready	(M18)

**Work already done:**

- Market data collection template available distributed and discussed
- Standards data collection template distributed and commitment obtained
- Report structure agreed and responsibilities stated
- Table of contents of final deliverable (Tecsol and ZAE commented)

**Next steps:**

- Monitoring data collection template concerning to be agreed and distributed
- Market available devices to be categorized
- Standards to be described
- Report to be started

**Activity leadership** : EURAC



A4: Pumps efficiency and adaptability:

Leaded by Martin Helm (ZAE)

**Participants:**

FHG-ISE (Björn Nienborg), ZAFH.Net (Dirk Petruschka), ASIC (Focke Hilbert), ILK (Safarik Mathias), AIT (Anita Preisler), EMCG (Khalid Nagidi) + TECSOL, AEE-INTEC, UIBK, SOLID, (SOLEM), CISRO, SEES

**Deliverable and deadlines (September 2012 = M11):**

Check synergies with TASK45 A3 and TASK48 A3	(M9)
Contact WILO and Grundfos about future developments	(M9)
Assessment of existing hydraulic design criteria	(M12)
Sensitivity analysis concerning pumps efficiency and costs in SHC Systems	(M12)
DRAFT: Structure of the Technical report of A4	(M12)
Definition of Guidelines for pump selection	(M15)
MA 4.1 Template for report on pumping systems	(M18)
MA 4.2 Draft report on pumping systems	(M24)
MA 4.3 Final report on pumping systems	(M30)

**Work already done:**

- Gathered information about the hydraulics of monitored systems
- Definition of Auxiliary Power Consumption Ratios APCR for hydraulic subsystems to compare hydraulic efficiency of different installations
- Overview about the European “Electricity Using Products“ Directive (EuP) & Electricity Efficiency Index (EEI)

**Next steps:**

- Search for further directives concerning pump efficiency (e.g. EuP) in other markets USA, Asia, Australia etc. Input from the Audience ?
- Prepare a APCR matrix for the different hydraulic loops of best practice systems (Solar system, Driving Heat, Cooling water and chilled water loop, Standby, Chiller)

**Activity leadership : ZAE**

A5: Conventional solar collection :

**Participants:** AEE Intec, support from Polimi

**Deliverable and deadlines (September 2012 = M11):**

MA 5.1 Template for report on best practices on solar collection components	M18
MA 5.2 Draft report on best practices on solar collection components for quality, reliability and cost effectiveness	M24
MA 5.3 Final version: report on best practices on solar collection components for quality, reliability and cost effectiveness	M30

**Work already done: none**

**Next steps:**

Co-operation with T45 just started

Working group at next meeting!

**Activity Leadership :** AEE INTEC

A6: State of the art on new collector & characterization :

**Participants:**

Industrial Solar, Polimi, AEE Intec, FHG-ISE (Jochen Doell), SOLEM, AIT (Anita and Tim)

**Deliverable and deadlines (September 2012 = M11)**

MA 6.1 Start extensive market overview of concentrating collectors	M12
MA 6.2 Creation of the database on market available concentrating technologies	M18
MA 6.3 Updated version of the database	M30
MA 6.4 Final version of the database on concentrating collectors	M42

**Work already done:**

- Draft collector database

**Next steps:**

- Update collector database
- Update presentation about certification process of medium temperature collectors at the next meeting

**Activity leadership : Industrial Solar**

Deliverables :

- D-A1: Technical report on the characterization method(s) for chillers include a database of characterization values from existing and tested chillers
- D-A2: Data base of life cycle inventories for components for LCA method tool (see D-B2)
- D-A3: Technical report on heat rejection: including market available products, costs, efficiency criteria ranking and performance characterization.
- D-A4: Technical report on best practices for pumping systems: including both efficiency and adaptability in solar cooling systems
- D-A5: Report on best practices on solar collection components for quality, reliability and cost effectiveness
- D-A6: Database of commercial products database for concentrating solar collectors: build up and periodic update (1 per year) including certification process status

Topics of discussions pending until next Meeting in Austria :

- Activities are more or less on schedule
- In general more contributions would be very welcome
  - A1: chiller testing
  - A3: heat rejection
  - A5: co-operation with Task45, collection of mathematical collector models and of best practices, investigation on cost reduction potential
  - A6: review of collector list

## 4. Subtask B: Quality procedure on system

Presentation of the Subtask made by Alexander Morgenstern on Day1 and discussion on the results of the workshops and follow up of the subtask on Day2.

Objective : Development of tools and deliverables to show the level of quality of solar cooling and heating systems

- First step: development of a procedure to extend the quality characteristics from component level to system level
- Second step: extension of the procedure from single stationary states to allow performance prediction for whole year operation  
→ close link to results of subtask A

### B1: System/Subsystem characterization & field performance assessment :

**Status :** Agreement on

- Target groups
- Prescriptions on sizing
- Performance figures to be used

**Next steps :**

- Differentiation of information between:
  - Custom made  $\leftrightarrow$  Plug and play systems
  - Large  $\leftrightarrow$  small
  - Before  $\leftrightarrow$  after installation
- Critical analysis of test methods for seasonal performance definition
- Share info with SPF, SERC and INES

**Partners:** EURAC, CEA-INES, ISE, CSIRO, ZAE, ASIC, UIBK, POLIMI, UMSICHT, TECSOL, AEE Intec

<b>Activity leadership :</b> EURAC leader with support from ISE and INES
--

### B2: Good practice for DEC design and installation :

**Status**

- Definition of “good/best practice” DEC system ongoing
- Overview on existing systems ongoing

**Next steps**

- Update and improve list of existing systems (feedback from participants required)

- Draft report
- Simplified design guidelines
- Literature review on degradation of desiccant wheels/materials
- Review on labels of SDEC system components
- Reactivate interested partners

**Partners:** AIT, zafhnet, ISE, POLIMI, (CSIRO, UIT de La Rochelle, UNIPA)  
Invite Prof. Dai from Shanghai University

**Activity leadership :** AIT

B3: Life cycle analysis at system level :

**Status**

- No working group because of no participants

**Next steps**

- Action of Marco Beccali needed until next meeting
- Need to improve the Life Cycle Inventory LCI component data base
- Participants should initiate contact with manufacturers
- 

**Partners:** AIT, (UNIPA, ISE, AIT, UNI Catania, SOLID, Kawasaki)

**Activity leadership :** UNIPA

B4: Simplified design tool used as a reference calculation tool :

**Status**

- MeGaPICS tool finished
- Load generator from ISE available
- Cooling load calculator from Umsicht available

**Next steps**

- Adaption of ISE load generator possible?
- Implement heating and DHW calculation in the Umsicht tool?
- Gather data of ab/adsorption chillers to increase database of MeGaPICS tool
- Validation of the tool
  - Need for input data/values
  - Need for results data/values

**Partners/observers:** TECSOL, POLIMI, Kawasaki, Umsicht, CSIRO, ISE, (ZAE, UNI Catania, UIBK)

**Activity leadership :** TECSOL

B5: Quality procedure document/check lists:

**Activity shifted and fusionned with C3 due to the lack of involved entities**

B6: Self detection on monitoring procedure:

**Status :** Work has just started

- Collection and characterization of typical system errors for absorption, adsorption and DEC systems
- Existing error detection systems / ongoing development

**Next steps**

- Collection and classification of typical system errors
- Evaluation of detection methods for different error types
- First draft on integration methods of different fault detection systems
- First draft of minimum monitoring requirements for different types of error detection methods

**Partners:** zafh.net, ILK, ISE, AIT, EMCG, ZAE, (TECSOL, POLIMI, CEA-INES)

**Activity leadership : ZAFHNET**

B7: Quantitative quality and cost competitiveness criteria for systems :

**Status**

- Two phone conferences with focus on C2 methodology and general discussion on aims of B7/C2
- Starting collection of tools and methods on performance figures and costs

**Next steps**

- Discussion paper with existing methods/tools for performance/costs (Milestone)
- Update/further collection of existing methods/tools
- Work on discussion paper with performance figures/costs figures → conclusion for small/large systems

**Partners:** UIBK, ISE, EURAC, CSIRO, TECSOL, ZAE, (CEA-INES)

**Activity leadership : Univ Innsbruck**

B8: Application for validation of preselected best practice examples :

Hidden until autumn 2012

Commitments of contribution or at least interest required

Main interests by: TECSOL, Eurac

<b>Activity leadership</b> : No leader for the moment
---

## 5. Subtask C: Market support measures

Presentation of the Subtask was made by Stephen White on Day1 and discussion on the results of the workshops and follow up of the Subtask activities on Day2.

### Objective

Sub-Task C “Market Support Measures” aims to produce the evidence base and tools necessary to underpin a range of likely market mechanisms, which could support the future development and growth of the solar cooling industry. Market support measures are expected to follow three approaches being

- (i) rating of measured energy savings performance against benchmarks for rewarding large systems once operational and performance can be measured,
  - (ii) compliance with engineering quality guidelines for large systems prior to or after construction, and
  - (iii) generalized product based certification and default energy savings estimation for small systems
- C5 : Needs input from C2 before it can be finalized
  - C6 : ESCO contract has been prepared
  - Draft Australian solar cooling standard (for creating “Default Savings Factors”) to be completed by Christmas

C1: Review of relevant international standards rating and incentive schemes : Daniel Rowe presented the status of work on the Activity in the plenary session. No specific working group was held during the meeting

Status:

- A template for categorizing relevant market support measures was agreed at the Milano meeting. A spreadsheet has been created and the spreadsheet has been populated with information on support mechanisms from 5 countries (approximately half of the countries represented in the Task)
- Delivery Report planned for April 2013: review of relevant international standards rating and incentive schemes

**Activity leadership** : Leadership carried by Daniel Rowe, CSIRO

**Partners** : ASIC, TECSOL, Greenchiller, Fraunhofer ISE, EURAC, Kawasaki, Energy Management and Consulting Group, NTU

C2: Methodology for performance assessment, rating and benchmarking and C7: Certification process definition for small systems :

Working groups were held jointly with working groups for B1, B7 and C7

- Factors to consider
  - Harmonization with support mechanisms (needs of the market)
    - Fit with three approaches
    - Before and after construction
  - Harmonization with reference system
  - Size (large and small systems)
- C7 focus on smaller plug and play systems
  - PER selected as appropriate figure of merit with aim to harmonize with labels used for vapour compression
  - Review on different methods (BIN, CTSS, etc) was discussed
- Need to reform C2 with focus on larger systems and the need to benchmark measured performance of operating systems. New Activity leader arrangements were decided

Status:

- Teleconference discussions have been held outside of the expert meetings and a draft assessment principles document has been distributed. A greater level of consensus is starting to emerge around the differences between the needs of small and large systems.
- The discussions held during the Gleisdorf meeting need to be consolidated and built upon to deliver M-C2.1 Template for Methodology for performance assessment, rating and benchmarking, due for the next meeting in Newcastle, Australia
- A draft review of standards was distributed (from Activity B1) which informs the C7 activity to develop default performance assessment techniques



- Australia is expected to issue an interim CTSS standard for calculating default energy savings from small solar cooling products around February 2013.
- Milestone M-C7.1 Template report structure on certification process definition for small systems is not due until the Freiburg meeting in 12 months

**Activity leadership for C2** : Stephen White CSIRO  
**Activity leadership for C7** : Jochen Doll and Matthias Schicktanz ISE

C3: Selection and standardisation of best practice solutions :

- Talked about differentiation between the “solar airconditioning handbook”, “example libraries” and the “design guides”
  - Standardization to prescribed engineered solutions is a focus
  - Compendium book to the solar airconditioning handbook
- Two guides to be prepared initially (more possible after review)
  - Large, hot climate, solar cooling with multi-effect absorption chillers with gas backup in a greenhouse intensive electricity system (CSIRO)
  - Small/medium solar heating, cooling and DHW using a single effect absorption chiller and backup vapour-compression airconditioner (TECSOL)
  -
- Review (ISE & ZAE) and input from sub-Task A required
- Checklist to be prepared for next task meeting

Status

- A draft design guide for solar cooling with multi-effect absorption chillers has been produced by CSIRO. It is being revised in consultation with the Activity partners
- The design guide was used as a basis for a draft of milestone M-C3.1 A draft Template for Selection and standardisation of best practice solutions, which was presented at Gleisdorf. Agreement on this template is required, to enable delivery of this Milestone in at the next expert meeting in Newcastle, in April 2013
- A contents page needs to be prepared for the proposed book to enable discussion with the EXCO and with the publisher

**Activity leadership** : Romain Sire, TECSOL

**Partners** : CSIRO, Fraunhofer ISE, ZAE, Industrial Solar, SOLID

C4: Measurement and verification procedures :

Daniel Mugnier presented the work of MeGaPICS which provides a key input to this Activity. No specific working group during the meeting as Francois Boudehenn, CEA INES was unable to attend the meeting

Status

- The MeGaPICS measurement and verification report has been translated from French into English
- CSIRO is adapting this report to incorporate increased focus on M&V protocols for ESCOs based on international guidelines
- Milestone MC3.2 Delivery Report: measurement and verification procedure planned for April 2013

**Activity leadership** : Francois Boudehenn, CEA INES

**Partners** : CSIRO, TECSOL, SOLID, Industrial Solar

C5: Labelling possibilities investigation :

- **Work package initiated**
- **Plans to**
  - Review existing labelling schemes (compression chillers and heat pumps)
  - Examine how to harmonize solar cooling with these labels

Status

- No milestone due until September 2013

**Activity leadership** : Green Chiller

C6: Collaboration with T45 for contracting models :

- IEA Task48 Directory has been populated with information on the ESCO model and associated procedures
- Presentation on ESCO was given at the meeting
- Plan to receive comment on the materials and adapt/ finalise

Status

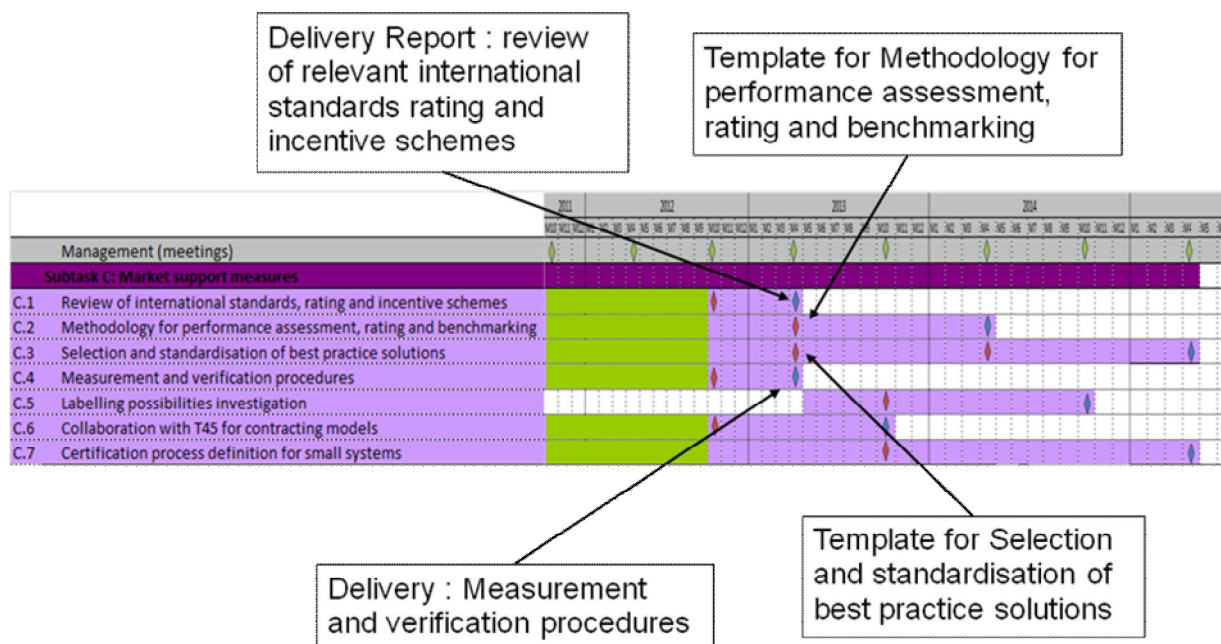
- Milestone M-C6.1 Status on existing work in T45 on contracting models to be delivered November 2012

<b>Activity leadership : SOLID</b>
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**Updated Work packages responsibilities:**

	<b>Activity</b>	<b>Activity Leader</b>
C1	Review of relevant international standards, rating and incentive systems	<b>Daniel Rowe</b>
C2	Methodology for performance assessment, rating and benchmarking	<b>Stephen White</b>
C3	Selection and standardisation of best practice solutions	Romain Sire
C4	Measurement and verification procedures	Francois Boudehenn
C5	Labelling possibilities investigation	Uli Jakob
C6	Contracting models	Moritz Schubert
C7	Certification process definition for small systems	<b>Jochen Döll/ Matthias Schicktanz</b>

**Updated planning with Subtask C milestones :**



## 6. Subtask D: Market support measures

D1: Web site : (Joint working group D1/D5 Tuesday, block 2)

### Participating persons:

- POLIMI
- Green Chiller
- AiT
- FhG UMSICHT
- TECSOL

### Status of work done:

- Draft listing of interesting web links

### Deviation:

- None

### Next Steps:

- Ask potential accurate web links in the following countries : China (Ren), Japan (Makita), South Africa (Billy de Lange), Australia (White), Greece (Aris), India (Thermax), Spain (Carrera), Singapore (NTU), Canada (Harrison)
- Ask Randy Martin statistics on website (to be presented next meeting)
- Put on the public website the latest developments presentations from Milano and Gleisdorf (after having agreement from presenters)

- Include snapshots and one describing sentence for each web link
- Add a new subpage (inspired and benchmarked from SDH take-off EU project) in the website inviting new contribution to the Task
- Social network groups (Linkdin, Facebook, twitter)
- Send the updated listing within 15/10/2012

**Activity leadership : TECSOL**

D2: Best Practices brochure (no working group in Gleisdorf):

**Participating persons:**

- None

**Status of work done:**

- Working plan presented during last meeting in Milano.
- This activity follows on from Activity C3 and starts after month 12.

**Deviation:**

- None

**Next Steps:**

- Follow the results of C3
- Organize budget for professional layout (designer)?

**Activity leadership : Green Chiller**

D3: Simplified short brochure (no working group in Gleisdorf)::

**Participating persons:**

- None

**Status of work done:**

- No work-plan has been developed for this activity yet (activity has strong link to D2).
- No further actions are required at present, because the work is not scheduled to start until month 24.

**Deviation:**

- None
-

**Next Steps:**

- Organize budget for professional layout (designer)?

WP-Leader should prepare draft content for brochure

**Activity leadership** : NEW WP-Leader: Moritz Schubert, SOLID

D4: Guidelines for Roadmaps on Solar cooling : (Joint WG D4/D6 Tuesday, block 3)

**Participating persons:**

- AiT
- Green Chiller
- TECSOL
- Contributions mentioned during the working group: Shuangliang, CSIRO, POLIMI
- Interested entities: Industrial Solar, Pink, Kawasaki, Industrial Solar, zafh.net, ILK

**Status of work done:**

- Draft list of existing roadmaps on solar cooling and related studies available
- Start of brainstorming to content of guidelines for roadmaps on solar cooling

**Deviation:**

- None

**Next Steps:**

- Other national roadmaps on solar cooling available or in preparation? → Draft list of existing roadmaps on solar cooling and related studies available will be sent out to all Task 48 members to be completed
- Status of Renewable Energy Roadmap China: contact to Prof. Yanjun DAI (Shanghai University), Prof He Tao (CABR) and Tony Ren Shuangliang Eco-Energy Systems
- Start draft document for guidelines of roadmaps by AiT, sent out by 12/2012 to working group participants
- send the updated listing within 15/10/2012

**Activity leadership** : Anita Preisler, AiT

D5: Updated specific training seminars adapted to the Quality procedure : (Joint WP D1/D5, Tue, bl. 2)

**Participating persons:**

- POLIMI
- Green Chiller

- AiT
- FhG UMSICHT
- TECSOL

**Status of work done:**

- 3 sets of slides available (Solair, TECSOL, CISRO)
- Template in preparation
- 3 table of contents available (engineers, installers, decision makers)
- 

**Deviation:**

- None

**Next Steps:**

- Collect slides in ppt
- Collect further material from other projects and Green Chiller manufacturers
- Update slides

**Activity leadership : POLIMI**

D6: Outreach report : (Joint workshop D4/D6, Tuesday, block 3)

**Participating persons:** Working groups D4 + C5

**Status of work done:**

- Solar Cooling Session at Intersolar Europe 2012 Conference in Munich on 13.06.2012 (4 presentations, nearly 60 participants).
- SHC Conference 2012 in San Francisco, USA on 09.-11.07.2012 (20 presentations).
- Two IEA press releases in July 2012 published
- Three e-newsletters published by GSTEC in July/Sept. 2012

**Deviation:** None

**Next Steps:**

- Further press releases with news from the Gleisdorf meeting
- Further e-newsletters together with GSTEC (Bärbel Epp)
- Start preparation of half day national industry workshops: Australia, China, France, *Germany*, Italy, USA
- Start preparation of customer and policy maker workshops (once a year)

**Activity leadership : Green Chiller**

**Overview of first Milestones and Deliverables (month 18)**

D-D1 Website dedicated to the Task

D-D6.1,2,3 Workshops & Newsletter

	2011			2012												2013												2014												2014			
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4												
D.1 Website	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█											
D.2 Best Practice Brochure																																											
D.3 Simplified short brochure																																											
D.4 Guidelines for Roadmaps on Solar Cooling	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█											
D.5 Updated specific training seminars	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█											
D.6 Outreach report																																											



## 7. Conclusions of the Gleisdorf meeting :

- **General items:**
- **Several first working groups and actions are kept on.** All running activities have activity leaders. Subtask leaders confident in the management (only Activities B8 provisory suspended, A5/A6 have leaders now with AEE & POLIMI, same for D3 with SOLID)
- **Important milestones and deadlines for October 2012.** No significant deviation with the planning

### Subtask A:

- MA2-1 : creation of assemblies related to plant components & materials
- MA6-1: Start extensive market overview on Conc. collectors.

### Subtask B:

- MB2-1: 1st status on good practice for DÉC design & installation
- MB7-1: method to collect criteria to qualify quality & cost competitiveness of SAC

### Subtask C:

- MC1-1: template for review of relevant int. Standards rating & incentive schemes
- MC4-1: draft of measurement and verification procedure
- MC6-1: status on existing work in T45 on contraction models

### Subtask D:

- MD1-1: existing websites on SAC
- MD4-1: existing roadmaps
- MD5-1: existing training material

- **Some important achievements :**

- Subtask A : activities progressing well. A5 just starts
- Subtask B : 2 milestones for Exco will be achieved, big overlap between activities. Big challenge on how to split overlapping activities
- Subtask C : better disposal and organisation on activities
- Subtask D : new activity leader D3, start guidelines for roadmaps and website

APPENDIX A : Participant list with signatures

Table A1 : Participant list with contact details registered for the meeting

	First Name	Last Name	Organization	Address	Town	Country
1	Anita	Preisler	AIT Austrian Institute of Technology	Giefinggasse 2, 1210	Vienna	Austria
2	Tim	Selke	AIT Austrian Institute of Technology	Giefinggasse 2, 1210	Vienna	Austria
3	Daniel	Neyer	University Innsbruck	Technikerstr. 13	Innsbruck	Austria
4	Alexander	Thür	University Innsbruck	Technikerstr. 13	Innsbruck	Austria
5	Marco	Calderoni	Polimi	via Lambruschini 4	20156 Milano	Italy
6	Patrizia	Melograno	Polimi	via Lambruschini 4	20156 Milano	Italy
7	Martin	Helm	ZAE Bayern	Walther-Meissner-Strasse 6	Garching	Germany
8	Manuel	Riepl	ZAE Bayern	Walther-Meissner-Strasse 6	Garching	Germany
9	Werner	Pink	PINK GmbH	Bahnhofstrasse 22	Langenwang	Austria
10	Roberto	Fedrizzi	EURAC	viale Druso, 1	Bolzano	Italy
11	Clemens	Pollerberg	Fraunhofer UMSICHT	Osterfelder Straße 3	Oberhausen	Germany
12	Michael	Joemann	Fraunhofer UMSICHT	Osterfelder Straße 3	Oberhausen	Germany
13	Zheng	Ren	Shuangliang Eco-Energy Systems Co.	Xili Road 88#	Ligang Town, Jianguyin	China
14	Bettina	Nocke	AEE INTEC	Feldgasse 19	Gleisdorf	Austria
15	Daniel	Mugnier	TECSOL SA	105 av Alfred Kastler - Tecnosu	Perpignan	France
16	Khalid	Nagidi	Energy Management Consulting Gro	844 Oakfield Ave, Suite 101	Wantagh	USA
17	Uli	Jakob	Green Chiller	Stendaler Str. 4	Berlin	Germany
18	Björn	Nienborg	Fraunhofer ISE	Heidenhofstraße 2	79110 Freiburg	Germany
19	Jochen	Döll	Fraunhofer ISE	Heidenhofstraße 3	79110 Freiburg	Germany
20	Alexander	Morgenstern	Fraunhofer ISE	Heidenhofstraße 4	79110 Freiburg	Germany
21	Antoine	Frein	Polimi	via Lambruschini 4	20156 Milano	Italy
22	Romain	Siré	TECSOL	105 av Alfred Kastler - Tecnosu	Perpignan	France
23	Kazuyuki	Makita	Kawasaki Thermal Engineering	1000, Aoji-cho	kusatsu-city, Shiga	Japan
24	Hilbert	Focke	ASIC	Roseggerstr. 12	Wels	Austria
25	Mathias	Safarik	ILK Dresden	Bertolt-Brecht-Allee 20	Dresden	Germany
26	Stephen	White	CSIRO	PO Box 330	Newcastle	Australia
27	Dirk	Pietruschka	zafh.net	Schellingstraße 24	70174 Stuttgart	Germany
28	Christian	Zahler	Industrial Solar GmbH	Emmy-Noether-Straße 2	79110 Freiburg	Germany
29	Matthias	Schicktanz	Fraunhofer ISE	Heidenhofstr. 2	79110 Freiburg	Germany
30	Dan	Rowe	CSIRO	PO Box 330	Newcastle	Australia
31	Moritz	Schübert	SOLID	Puchstr. 85	Graz	Austria
32	Sergio	Pintaldi	CSIRO-University of Trieste	via marcantoni 9	Conegliano	Italy
33	Christian	Schweigler	ZAE Bayern	Walther-Meissner-Strasse 6	Garching	Germany

Table A2 : Participant list with signatures

	First Name	Last Name	Organization	Email Address	Signature
1	Anita	Preisler	AIT	anita.preisler@ait.ac.at	Anita Preisler
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25	Mathias	Safarik	ILK Dresden	mathias.safarik@ilkdresden.de	Mathias Safarik
26	Stephen	White	CSIRO	stephen.d.white@csiro.au	Stephen White
27	Dirk	Pietruschka	zafh.net	dirk.pietruschka@hft-stuttgart.de	Dirk Pietruschka
28	Christian	Zahler	Industrial Solar GmbH	christian.zahler@industrial-solar.de	Christian Zahler
29	Matthias	Schickanz	Fraunhofer ISE	matthias.schickanz@ise.fraunhofer.de	Matthias Schickanz
30	Dan	Rowe	CSIRO	stephen.d.white@csiro.au	Dan Rowe
31	Moritz	Schubert	SOLID	m.schubert@solid.at	Moritz Schubert
32	Sergio	Pintaldi	CSIRO-University of Trieste	sergio.pintaldi@gmail.com	Sergio Pintaldi
33	Christian	Schweigler	ZAE Bayern	schweigler@muc.zae-bayern.de	Christian Schweigler

APPENDIX B: Program of the 3<sup>rd</sup> Expert meeting

**IEA SHC Task 48 3<sup>rd</sup> meeting**

**Quality assurance and support measures for Solar Cooling**

Meeting Room AEE - Institut für Nachhaltige Technologien  
8200 Gleisdorf, Feldgasse 19 - Austria  
Tel.: +43 (0)3112 5886-127 - E-Mail: r.stranzl@aee.at

**Meeting Agenda – final version**

September 10, 2012, 9:00 – 17:30 & September 11, 2012, 8:30 – 16:00

**Task 48 website :** <http://www.iea-shc.org/task48/index.html>

**Participation fee:**

The participation fee is 170 €\* all inclusive and it will only be possible to pay cash when registering in Gleisdorf.

The fee will include lunches and coffee breaks (Monday and Tuesday) and dinner on Monday 10<sup>th</sup> September (including transport, dinner, soft drinks and also solar brewed beer, wine, snaps).

\* Participation fee detail :

- 120,- EUR for 2 meeting days (incl. 2 breaks, lunch, water, coffee and juice) + Together Dinner
- Option 1 : 30,- EUR for the Buffet on 11/09 incl. all sandwich/drinks in Graz (after T48/T45 workshop)
- Option 2 : 10,- EUR for the Bus transport to Graz and Hotel Paradies if all members use it (5,90 EUR for public transport one way Gleisdorf-Graz)

**Get Together optional dinner on Sunday 9<sup>th</sup> :**

Irish Pub Red Baron - Adresse : Franz-Josef-Straße 10 -8200 Gleisdorf  
Meeting point: In front of the Pub at 18h30

## Agenda for Monday September 10<sup>th</sup>, 2012 (9:00pm-17:30pm)

### **Plenary**

9.00-9.15	Welcome and Organisational issues	Daniel Mugnier	TECSOL
9.15-9.40	Welcome, Introduction, IEA, Infos, Structure of the meeting, Participation letters	Daniel Mugnier	TECSOL
9.40-10.20	Presentations of new participants/observers (5-7min/each)		New entities

### **1<sup>st</sup> block : Subtask Planning & status update**

10.20-10:50	Subtask A : Structures, status, deliverables	Marco Calderoni	POLIMI
10.50-11:20	Subtask B : Structures, status, deliverables	Alex Morgenstern	FhG ISE
<b>11:20- 11:40</b>	<b>Coffee Break</b>		
11.40-12:10	Subtask C : Structures, status, deliverables	Stephen White	CSIRO
12.10-12:30	Subtask D : Structures, status, deliverables	Uli Jakob	Green Chiller

**12.30-13:30 Lunch Break at AEE INTEC in a room beside the meeting room**

### **2<sup>nd</sup> block : Latest developments & results session**

13.30-13:40	Latest stage of development on Pink Chiller	Werner Pink	PINK
13.40-14.00	MEGAPICS calculation tool	Romain Siré	TECSOL
14.00-14:20	Draft Design Guide for Solar Cooling with Double/Triple Effect Absorption Chillers	Stephen White	CSIRO
14.20-14.40	Latest developments on UWC Singapore project	Christian Holter	SOLID
14.40-15.00	Review of relevant international standards rating and incentive schemes	Dan Rowe	CSIRO
15.00-15.25	Measurement and verification procedures <b>Discussion on this procedure</b>	Daniel Mugnier	TECSOL
15.25-15.40	First results of the EVASOLK project	Bjorn Nienborg	FhG ISE

**15:40- 16:00 Coffee Break**

**Working groups : block1**

16:00-16:10 Organization of Group discussions on Work Package level (5-6people max per item) Daniel Mugnier TECSOL

16:10-17:30 Meeting in parallel on Work Package level; Suggested topics for working groups are:

\* **B4** : Simplified design tool used as a reference calculation tool : design facilitator (Activity leader : Romain Siré, TECSOL)

\* **A2/B3** : Life Cycle analysis on component/system (Activity Leader : Marco Beccali (UNIPA) and Tim Selke (AIT))

\* **B7/C2** : Quantitative quality and cost competitiveness criteria for systems / Methodology for performance assessment, rating and benchmarking (Activity Leader : J. Döll / M. Schicktanz (ISE))

\* **B6 / A4**: Pumps efficiency and adaptability / Self detection on monitoring procedure (Activity leaders : Martin Helm (ZAE) & Dirk Pietruschka, Zafh.net)

**End of the working Day 1**

**Gala Dinner on Monday:**

"Erlebnisbrauerei Heustadt!":

<http://www.steirischursprung.at/>

Brodersdorfstraße 85

8200 Brodingberg

Tel: 03117/51 71, Fax DW: 17

Mail: [info@steirischursprung.at](mailto:info@steirischursprung.at)

Venue : <http://www.steirischursprung.at/index.php?id=10>

Three meeting points to reach together the restaurant:

- AEE Intec Office at 19:00
- Hotel Brauner Hirsch Office Desk at 19:15  
Fürstenfelder Straße 5-7  
Phone: +43-3112-2401  
Fax: +43-3112-2401-20  
E-mail: [office@hotel-brauner-hirsch.at](mailto:office@hotel-brauner-hirsch.at)
- In front of the restaurant "Erlebnisbrauerei Heustadt!" at 20:00 (see Annex for more details)

**Agenda for Tuesday September 11<sup>th</sup> (8:30am-4:00pm)**

**Working groups : block2**

- |             |   |                |        |
|-------------|---|----------------|--------|
| 08:30-08:40 | Organization of Group discussions on Work Package level (5-6people max per item)                            | Daniel Mugnier | TECSOL |
| 08:40-10:00 | Meeting in parallel on Work Package level; Suggested topics for working groups are:                         |                |        |
|             | * <b>C6</b> : Collaboration with T45 for contracting models (Activity Leader : Moritz Schubert, SOLID)      |                |        |
|             | * <b>A3</b> : Heat Rejection (Activity leader : Roberto Fedrizzi (EURAC))                                   |                |        |
|             | * <b>D1/ D5</b> : Website / Updated specific training seminars (Activity Leader : Marco Calderoni (POLIMI)) |                |        |

**10:00- 10:20 Coffee Break**

**Working groups : block3**

- |             |   |  |  |
|-------------|---|--|--|
| 10:20-11:40 | Meeting in parallel on Work Package level; Suggested topics for working groups are:   |  |  |
|             | * <b>C5</b> : Labeling possibilities investigations (Activity Leader : Uli Jakob (Green Chiller))   |  |  |
|             | * <b>D4/D6</b> : Guidelines for Roadmaps on Solar cooling / Outreach Report (Activity Leader : Uli Jakob, Green Chiller & Anita Preisler (AIT))                                     |  |  |
|             | * <b>B1/C7</b> : System-Subsystem characterization & field performance assessment / Certification process definition for small systems (Activity Leader : Roberto Fedrizzi (EURAC)) |  |  |

**Working groups : block4**

- |             |   |  |  |
|-------------|---|--|--|
| 11:40-13:00 | Meeting in parallel on Work Package level; Suggested topics for working groups are:                                     |  |  |
|             | * <b>B2</b> : Good practice for DEC design and installation (Activity Leader : Tim Selke (AIT))                         |  |  |
|             | * <b>A1/A6</b> : Chiller characterization / State of the art on new collector & certification (Activity leader: POLIMI) |  |  |
|             | * <b>C3</b> : Selection & standardization of best practice solutions (Activity Leader : Romain Siré (TECSOL))           |  |  |

**13:00 -14:00 Lunch Break at AEE Intec in a room beside the meeting room**

**14.00 – 16.00 Plenary & overall**

- |             |   |                  |               |
|-------------|---|------------------|---------------|
| 14.00-14.20 | Subtask A : Report on working group items; planning of next steps; distribution of work; action items | Marco Calderoni  | POLIMI        |
| 14.10-14.40 | Subtask B : Report on working group items; planning of next steps; distribution of work; action items | Alex Morgenstern | FhG ISE       |
| 14.40-15.00 | Subtask C : Report on working group items; planning of next steps; distribution of work; action items | Stephen White    | CSIRO         |
| 15.00-15.20 | Subtask D : Report on working group items; planning of next steps; distribution of work; action items | Uli Jakob        | Green Chiller |
| 15.20-16.00 | General items, next meetings, miscellaneous   | Daniel Mugnier   | TECSOL        |

16 :00 End of Task 3<sup>rd</sup> expert meeting

**Common internal Workshop with Task 45 & Task 49 on Large solar systems (district heating and cooling) : draft program see annex**

**16.00-17.30 Transfer from Gleisdorf to city of Graz by bus/car/taxi  
(Bus available in option to go from Gleisdorf to Graz)**

**17.30-19.30 Join Discussion with IEA SHC Task 45 / Task 49 (in Graz, Hotel Paradies):**  
Common discussion on Large heating and cooling database, Contracting models & Cross cutting applications (district/process/cooling).

Location :

Hotel Paradies (not close to the train station)  
Straßganger Straße 380 b  
8054 Graz - Straßgang  
Tel.: 0043 (0) 316/28 21 56-0  
Fax: 0043 (0) 316/28 21 56-6  
info@hotelparadies.at  
www.hotelparadies.at

**Agenda for Wednesday-Thursday-Friday September 12-13-14<sup>th</sup>**

- **Gleisdorf Solar conference**

The conference languages are English and German with simultaneous translation.  
The presentations are followed by a technical and a poster exhibition.

**As Task 48 member we can offer you to participate with a reduced conference fee as an AEE member.**

For registration and more information please click here: [www.aee-intec-events.org](http://www.aee-intec-events.org)

See keynote summary in annex and program online in Task 48 website at <https://www.iea-shc.org/task48/events/meeting-03/index.html>



APPENDIX C: Template for National Participation letter



**NATIONAL PARTICIPATION LETTER**

Date 11/07 2011

To Operating Agent  
Daniel MUGNIER  
TECSOL SA.  
105 av Alfred Kastler - BP 90434  
66 004 PERPIGNAN Cedex - FRANCE  
E-mail : daniel.mugnier@tecsol.fr

**National Participation Commitment Letter for**

Task 48: *Quality assurance and support measures for Solar Cooling* - of the IEA Solar Heating and Cooling Programme

Task Start Date 1/10 2011    Completion Date 31/03 2015

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 48, July 2011](#), which is a minimum of 0.3 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 visioconference mean at least).

Nominated experts for this Task are:\*\*

Name	Address/ Area of Expertise	Level of Effort: x person month per year	Funding Source (contingent on funding from the specified source)	Dates Funding is Guaranteed

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

APPENDIX D: Task 48 flyer -2 pages



Solar cooling installation for a wine cellar in South of France (Source : TECSOL)



Fresnel collector field adapted for solar cooling (Source : Industrial Solar GmbH)



Solar cooling installation using DEC technology and air collectors in Central Europe (Source : Fraunhofer ISE)



Solar cooling installation for a Tertiary building in Tropical climate (Source : TECSOL)

## IEA SHC TASK 48

### Quality assurance and support measures for Solar Cooling

[www.iea-shc.org/task48](http://www.iea-shc.org/task48)

**CONTEXT :** A tremendous increase in the market for air-conditioning can be observed worldwide especially in developing countries. The results of the past IEA SHC Tasks and works on solar cooling (ex : Task 38 Solar Air-Conditioning and Refrigeration) on the one hand showed the great potential of this technology for building air-conditioning, particularly in sunny regions. On the other hand, it has been shown that further work is necessary in order to achieve economically competitive systems and which presents solid long term energy performance and reliability.

**OBJECTIVES :** The proposed project is intended to find solutions to make the solar thermally driven heating and cooling systems at the same time efficient, reliable and cost competitive. This three major targets should be reached thanks to four levels of activities:

- 1) Development of tools and procedure to make the characterization of the main components of SAC systems
- 2) Creation of a practical and unified procedure, adapted to specific best technical configurations.
- 3) Development of three quality requirements targets : prescriptive and performance based
- 4) Production of tools to promote Solar Thermally Driven Cooling and Heating systems

**SCOPE :** The scope of the Task are the technologies for production of cold water or conditioned air by means of solar heat, i.e., the subject which is covered by the Task starts with the solar radiation reaching the collector and ends with the chilled 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 topic of the Task this interaction will be considered where necessary.

**STRUCTURE :** The project, starting in October 2011 for 3.5 years duration, is divided into 4 subtasks :

**Subtask A:** Quality procedure on component level

- A1: Chiller characterization
- A2: Life cycle analysis at component level
- A3: Heat rejection
- A4: Pumps efficiency and adaptability
- A5: Conventional solar collection
- A6: State of the art on new collector & characterization

**Subtask B:** Quality procedure on system level

- B1: System/Subsystem characterization & field performance assessment
- B2: Good practice for DEC design and installation
- B3: Life cycle analysis at system level
- B4: Simplified design tool used as a reference calculation tool : design facilitator
- B5: Quality procedure document/check lists
- B6: Self detection on monitoring procedure
- B7: Quantitative quality and cost competitiveness criteria for systems
- B8: Application for validation of preselected best practice examples

**Subtask C:** Market support measures

- C1: Review of relevant international standards rating and incentive schemes
- C2: Methodology for performance assessment, rating and benchmarking
- C3: Selection and standardisation of best practice solutions
- C4: Measurement and verification procedures
- C5: Labelling possibilities investigation
- C6: Collaboration with T45 for contracting models
- C7: Certification process definition for small systems

**Subtask D:** Dissemination and policy advice

- D1: Web site
- D2: Best Practices brochure
- D3: Simplified short brochure
- D4: Guidelines for Roadmaps on Solar cooling
- D5: Updated specific training seminars adapted to the Quality procedure
- D6: Outreach report

**SUBTASK LEADERSHIP**

**Subtask A : Quality procedure on component**

Politecnico di Milano  
Dep. Energy - Via Lambruschini 4  
Milano 20156, Italy

**Subtask C : Market support measures**

CSIRO  
PO Box 330  
Newcastle, NSW 2300, Australia

**Subtask B : Quality procedure on system level**

Fraunhofer ISE  
Heidenhofstraße 2  
Freiburg 79110, Germany

**Subtask D : Dissemination and policy advice**

Green Chiller Association  
Verband für Sorptionskälte e.V.  
Stendaler Str. 4  
10559 Berlin, Germany

**PARTICIPATING COUNTRIES (status in June 2012)**

Australia, Austria, Canada, China, France, Germany, Italy, Singapore and USA  
*(no claim for completeness)*

**PARTICIPATING MANUFACTURERS AND COMPANIES (status in June 2012)**

Industrial Solar GmbH, Invensor, Sortech, SOLEM, SOLID, TECSOL, Thermosol Consulting, Kawasaki.  
*(no claim for completeness)*

**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 it is accomplished through the international collaborative effort of experts from Member countries and the European Union.

**OPERATING AGENT**

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**RELATED SITES**



[www.iea-shc.org](http://www.iea-shc.org)

[www.iea-shc.org/task48](http://www.iea-shc.org/task48)