SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

TASK 43:
Solar Rating and Certification Procedures - Advanced Solar Thermal Testing and Characterization for Certification of Collectors and Systems

Semi-Annual Status Report
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1 Executive Summary

Task 43 was approved by the Executive Committee at the June ExCo meeting in Stavanger, Norway. The task is now operational and has met its first milestones:

- The first task experts meeting was held to develop roadmaps for Subtask A on Collectors and Subtask B on Systems. The meeting was held in conjunction with an ISO/TC180 meeting immediately following the ISES World Congress in Johannesburg, SA. Enric Mateu Serrats (Subtask A) and Harald Drueck (Subtask B) prepared roadmaps for their respective subtasks which were discussed and edited during the meeting. Comments from participants unable to attend the meeting are still being collected.
- By co-locating with ISES and ISO/TC180 the task experts meeting also accomplished another Task 43 milestone in meeting with standards and certifications bodies to help disseminate task results and encourage their input and participation.
- The roadmap for Subtask A on collectors made substantial progress toward accomplishing the first Subtask A deliverable, a state of the art white paper on testing and certification issues for flat-plate, ETC, air-heating and concentrating collectors, due December 2009. We plan to use participant input to expand and enhance the current paper.
- Jan-Erik Nielsen presented an approach for accomplishing the harmonization element of the task that involves convening joint meetings with representatives of different certification bodies and broaching the idea of an international organization of certification bodies for SHC that could be a permanent forum for harmonizing testing standards and certification.
- The roadmap for Subtask B clarified assignments for deliverables and made minor adjustments in deliverable schedules to better match planned meetings of technical experts, industry and standards/certification bodies.
- A Wiki page for sharing information and facilitating on-line collaboration was launched by CENER to help with the conduct of the task. This is a Task deliverable and is also part of the communications plan for the Task. CENER is operating the site while participants experiment with its capabilities and comment on its usefulness. In the future the participants will explore directly incorporating it into the IEA-SHC website work area for Task 43, where it can be maintained as an ongoing portal for discussion of testing and certification issues.

Next steps for the task are:

- Organize a web meeting(s) in early December to gather more input on the Subtask A white paper/roadmap and discuss the roadmap for Subtask B.
- Organize a Task Experts meeting at ITW in Stuttgart, Germany on February 9-10 that will gather research and industry experts to develop detailed system testing research plans that will be the material for Subtask B's next deliverable. The meeting will be preceded by an industry forum to introduce Task 43, its objectives, and test and assessment methods to industry.
- North American and Australian test laboratories need to contact QAiST concerning round-robin testing and determine how they can become involved in the rounds.
- Broader discussion and research on the best approaches to engaging certification bodies in the Task and in harmonization.
- Approaching European and other parties to join the Task to expand the workforce.

Issues for the ExCo's Attention:

- Watch for updated National Participation Letters and work with participants to complete and transmit them. Now that QAiST is operational and many national budgets are in place, these commitments should be easier to make.
- Advice/suggestions on engaging China and India. Some initial contacts have been made, but ideas/contacts to formalize their involvement would be useful.
- Advice/suggestions on countries/organizations that want to be involved in the task but are not formally part of IEA or of the IEA-SHC Programme, including India, China, Brazil and Chile. Because so much of this task is about communication and coordination with standards groups we have been open to observation and information sharing with all interested parties, although the work has been limited to IEA-SHC members.
- Approval to a slight modification of the work plan to move deliverable B1, results of a meeting of experts to discuss solar thermal systems testing and characterization issues and develop detailed research recommendations from 10/2009 to 10/2010 so that the next Task meeting in Stuttgart can be incorporated into the deliverable.
- Contact Jan-Erik Nielsen to see if the ExCo can influence funding sources for his role as Operating Agent.
- Any additional country interest in participation?

2 Short Description of Task 43

2.1 Purpose and Objectives

The task shall focus on research activities and not interfere with standardization bodies. Standardization bodies need the results of research and, with participation of the market actors, will work out the way the research results shall be applied to products. Communication and dissemination of results will include the legal authorities which define how certification shall be run, for use as they see fit. This proposed international collaboration will research and develop, where needed, new test procedures and characterization methods for addressing the testing of both conventional and advanced solar thermal products. It will leverage the knowledge from existing Tasks/Technical Committees/Certification Groups as a base for the development of work, inviting these groups to participate. By researching testing issues and improved approaches the outputs of this task can help optimize the time and resources companies, laboratories and certification bodies expend on testing and certification; while still assuring consumer protection and providing credible information on solar heating and cooling benefits. The scope of this proposed task includes performance testing and characterization, qualification testing, environmental impact assessment, accelerated aging tests, numerical and analytical modelling, component substitution procedures, and entire system assessment.

2.2 Task Organization

Two main subtasks are planned for this task, each with more specific activities designed to accomplish the purpose and objectives of the overall task. The main subtasks and their objectives are:

Subtask A: Collectors. The objective of this subtask is to examine existing testing and certification procedures for low-temperature evacuated tube and flat-plate collectors, air heating collectors, medium- to high-temperature concentrating collectors, to identify

weaknesses, inconsistencies in application, and significant gaps. The research will result in new or improved tests that can be communicated to ISO/TC 180 for consideration in updating old standards or developing new standards. Results will be promoted to certification bodies when they are relevant for consideration in how product certification is implemented. Methods include round robin tests to refine existing test procedures, in cooperation with researchers, industry and certification bodies involved in these technologies. The task will also establish ongoing information dissemination and communications to provide necessary information and feedback among participants, industry, and certification bodies to promote harmonized standards and coordination among certification bodies.

Subtask B: Systems. The objective of this subtask is to examine existing testing procedures for entire systems and identify weaknesses, inconsistencies in application, and significant gaps. Testing research will investigate component/material substitution issues, including implications for qualification and safety testing. System performance characterization, testing, simulation and modelling and extrapolation will be investigated to help clarify key issues including accelerated aging testing and performance prediction. The research will extend to analyzing how system testing and performance characterization results can be applied to analysis and public dissemination of public benefit indictors, including environmental, economic, energy and occupant comfort indicators for solar thermal systems. Where appropriate, research results that have implications for testing standards will be communicated to ISO/TC 180 and/or certification bodies to consider. Methods will include round robin tests to refine existing test procedures, in cooperation with researchers, industry and testing bodies involved in these technologies. The task will also establish ongoing information dissemination and communications to provide necessary information and feedback among participants, industry, and certification bodies to promote harmonized standards and procedures.

2.3 Expected Results/Deliverables

The products from this Task are for industry, testing laboratories and certification bodies to use in improving and harmonizing testing and certification processes. The improvements that result should benefit consumers and policymakers by providing better information on the performance and benefits of solar thermal technologies. Results will include:

Subtask A, Collectors:

- Task Experts Meeting and conference to develop a roadmap of solar thermal testing and certification issues for collectors, approaches to improve existing systems and harmonize standards and certification. (Target Date: 10/2009, Lead CENER for Subtask A, submitted, still open to comments from task participants)
- State of the art white paper on testing, measurement and certification issues concerning:
    - Flat-Plate Collectors; (Target Date: 12/2009)
    - Evacuated Tube Collectors; (Target Date: 12/2009)
    - Air Heating Collectors; (Target Date: 12/2009)
    - Concentrating Collectors for Medium to High Temperatures, based on meetings with Alanod, SRCC and other active parties; (Target Date: 12/2009)

  (Target Date: 12/2009, draft ready in roadmap)
- Reports on the results of round-robin tests for:
    - Flat-Plate Collectors; (Target Date: Will be adjusted to match QAiST schedule)
    - Evacuated Tube Collectors; (Target Date: Will be adjusted to match QAiST

schedule)
    - Air Heating Collectors; (Target Date: Will be adjusted to match QAiST schedule)
    - Concentrating Collectors for Medium to High Temperatures; (Target Date: Will be adjusted to match QAiST schedule)
- If deemed appropriate, draft recommendations for revising performance test standards, qualification and safety test standards:
    - Flat-Plate Collectors; (Target Date: 8/2011)
    - Evacuated Tube Collectors; (Target Date: 8/2011)
    - Air Heating Collectors; (Target Date: 8/2011)
    - Concentrating Collectors for Medium to High Temperatures; (Target Date: 8/2011)
- Joint meetings with Solar Keymark, ISO, and other standards groups to discuss testing and certification issues and promote harmonization, distinct technical tracks or sessions on testing and certification at large international meetings, such as ISES. (Target Dates: March 2009, semi-annually thereafter. First effort accomplished with joint meeting with ISO/TC180 and ISES World Congress in SA)
- A web page or pages that connect major organizations involved in testing and certification and provide more forward-looking information on work in progress and new initiatives that impact testing and certification. It would also provide a forum for participants and newcomers to pose questions or make suggestions regarding testing and certification processes, particularly for developers of new collector technologies. (Target Date: 9/2009, Completed and operational).
- A communication plan for reaching the industry, testing and certification bodies concerned with the activities in this task, means of continuing communication and coordination after the task is completed, and more active outreach to alert target audiences of new developments. (Target Date: 9/2009 Not Complete – Draft form in Task Communication Plan)

Subtask B, Systems:

- Task Experts Meeting and conference to develop a roadmap of solar thermal testing and certification issues for systems, approaches to improve existing systems and harmonize standards and certification. (Target Date: 10/2009, Lead ITW for Subtask B, submitted, still open to comments from task participants)
- Results of a meeting of experts to discuss solar thermal systems testing and characterization issues and develop detailed research recommendations. (Target Date: 10/2010, ITW Lead)
- A white paper detailing the results of research on the effects of component/material substitution and extrapolating size have on actual system performance versus predictions and recommendations on how tests and standards for systems need to be adapted. (Target Date: 12/2010, SPF Lead)
- A report on norms for systems testing and characterization that addresses system boundaries and definitions. (Target Date: 6/2010, ITW Lead)
- A report on qualification and safety testing that identifies inconsistencies, gaps and problems and recommends actions to resolve key issues. (Target Date: 9/2010, Lead TBD)
- A white paper on simulation and modeling tools that identify strengths, weaknesses, gaps in their capabilities, and inconsistencies in their application or interpretation. (Target Date: 10/2010, Lead TBD)

- A report examining the relation between test and characterization information and user experience – for example, testing and measurement as it relates to occupant comfort in space conditioning – with recommendations for improvements or new approaches. (Target Date: 5/2010, Lead TBD)
- A report examining the connection between solar thermal system testing and measurement and measures of the public benefits of solar thermal systems, with recommendations for making testing, measurement and certification more effective as a foundation for benefits estimates. (Target Date: 1/2010, Lead TBD)

2.4 Time Schedule

This Task will enter into force July 1st, 2009 and remain in force until June 30th, 2012. Within the limits of the term of the Agreement, this Task may be extended by two or more Participants, acting in the Executive Committees, and shall thereafter apply only to those Contracting Parties and Sponsors, if any, which expressed in writing their wish to participate in this Task.

3 Progress Report

3.1 Meetings

The first technical experts meeting for Task 43 was held at the South Africa Bureau of Standards in Pretoria from in conjunction with a meeting of ISO/TC180, in keeping with the Task 43 work plan to co-locate meetings as much as possible with standards or certification bodies that would find Task 43 useful. The ISO/TC180 meeting included reports from subcommittees that are currently revising or developing new testing standards for collectors and systems, and coordinating efforts with CEN, the European Standards organization. The technical information and the participants in the subcommittees was very useful for Task 43 because many of the same issues, people and organizations are involved in both.

The next full TC180 meeting was scheduled for the second week in October, 2011, with plans to coordinate with the Solar Keymark meeting in Brussels, Belgium. This will facilitate coordination with CEN/TC312 and continued liaison with Task 43, which intends to send a representative to the meeting.

On Friday, October 16th the ISO/TC180 meeting adjourned at 10:00 AM and Kevin DeGroat convened the Task 43 meeting. The meeting began with a short presentation providing the background on Task 43 to those who were unfamiliar, then explained the day's objectives of amending the draft roadmap for Subtask A on collectors and Subtask B on systems, followed by a discussion of next steps for the overall task. The following are key results from the meeting:

- Subtask A roadmap for collectors was amended to assign topics in the roadmap and the relationship between Europe's QAiST research projects and Task 43, particularly in round-robin testing, were explored in some detail. A webinar will be scheduled in early November to engage other Task participants and to confirm details of assignments.
- Subtask B roadmap for systems was amended to assign topics in the roadmap and revise deliverable dates for key analyses. A webinar will be scheduled in early November to engage other Task participants and to confirm the details of assignments.

- Jan-Erik Nielsen presented a concept for engaging certification bodies in the task, with the objective of eventually developing a framework for international certification that would serve to coordinate the activities of the various national and local certification bodies now involved in SHC testing and certification. The proposal was well-received, and will be developed more fully through further discussion.
- The Wiki tool for communications was discussed and the group made suggestions for making it more effective, for example by setting up notification capabilities to inform people when new material is posted. Eventually the Wiki tool will be integrated with the SHC work area for Task 43 on the IEA website.
- The next task meeting was scheduled for February 8, 9 and 10 in Stuttgart, Germany. One of the days, preferably the 8th, will be dedicated to a workshop on testing and certification for industry that will introduce them to the process and to the objectives of Task 43.

Attendees at the meeting included:

Max Maffucci, Australia
Ken Guthrie, Australia
Sarah Miller, Australia
Harald, Drueck, Germany
Stephan Fischer, Germany
Stefan Albrecht, Germany
Korbinian Kramer, Germany
Jan Steinmetz, Germany
Peter Kovacs, Sweden
Bengt Perers, Sweden
Herman Strauss, South Africa
Karl Deist, South Africa
Sanj Lutchman, South Africa
Solly Peter, South Africa
Enric Mateu, Spain
Jan-Erik Nielsen, Denmark
Les Nelson, USA
Jim Huggins, USA
Kevin DeGroat, USA
Robert Hassett, USA
Doug Tucker, USA

3.2 Website/Communications

CENER made a Wiki tool for sharing/collaborating on documents, holding on-line discussions, and creating notices for Task participants available in early October. Participants have been assigned logins and passwords and have begun to use the site. The plan is to solicit feedback on existing features and ideas for new features to gradually develop it into a robust communication tool for both the participants and for people seeking information on SHC testing and certification issues. When it if more fully developed and functional it will either be linked or fully incorporated into the Task 43 work area on the IEA-SHC website.

There has no progress on a comprehensive communication plan beyond the general plan included in the Task 43 Work Plan. Participants are looking for a responsible party to assign to developing communications ideas and incorporate them into a plan.

3.3 Status of Participation

The first table includes information on individuals whose institutions have expressed interest/commitment in participating in the task. The second lists interested parties who wish to be kept informed of progress and may provide input or comments where their expertise is useful. The third table includes representatives from industry who are interested in helping with the task and staying apprised of developments.

Table 1: Participating Organizations and Individuals

Members:	Organization	Participation
Franz Helminger	Austrian Institute of Technology (formerly arsenal)	Participants
Heinrich Huber	Austrian Institute of Technology (formerly arsenal)	Participants
Josef Buchinger	Austrian Institute of Technology (formerly arsenal)	Participants
Michael Monsberger	Austrian Institute of Technology (formerly arsenal)	Participants
Roland Sterrer	Austrian Institute of Technology (formerly arsenal)	Participants
Pilar Navarro Rivero	Canary Islands Institute of Technology	Participants
Enric Mateu Serrats	CENER	Participants
Fabienne Sallaberry	CENER	Participants
Lourdes Ramirez Santigosa	CENER	Participants
Sarah Miller	CSIRO	Participants
Vinod Kumar Sharma	ENEA	Participants
Alfred Brunger	Exova Americas (formerly Bodycote)	Participants
Jim Huggins	Florida Solar Energy Center/SRCC	Participants
Markus Kratz	Forschungszentrum Jülich - PTJ	Participants
Korbinian Kramer	Fraunhofer Institute, ISE	Participants
Stefan Mehnert	Fraunhofer Institute, ISE	Participants
Ana Neves	INETI	Participants
Manual Lopes Prates	INETI	Participants
Manuel Collares-Pereira	INETI	Participants
Maria Joao Carvalho	INETI	Participants
Daniel Eggert	Institut für Solarenergieforschung Hameln (ISFH)	Participants
Nele Rumler	Institut für Solarenergieforschung Hameln (ISFH)	Participants
Harald Drueck	ITW University of Stuttgart	Participants
Jay Burch	National Renewable Energy Laboratory	Participants
Tim Merrigan	National Renewable Energy Laboratory	Participants
Doug McLenahan	Natural Resources Canada	Participants
Jan-Erik Nielson	Solar Keymark	Participants
Bengt Perers	SP Technical Research Institute of Sweden	Participants
Peter Kovacs	SP Technical Research Institute of Sweden	Participants
Les Nelson	SRCC	Participants
Stephen Still	SRCC	Participants
Ken Guthrie	Sustainability Victoria, Standards Australia Committee	Participants
Robert Hassett	U.S. Department of Energy	Participants
Graham Morrison	University of New South Wales	Participants
Wasim Saman	University of South Australia	Participants
Sandy Klein	Wisconsin State University	Participants

Table 2: Interested Parties

Members:	Organization	Participation
Rodolphe Morlot	Agence de l'Environnement et de la Maîtrise de l'Energie	Interested Parties
Pierluigi Premoli	ICIM	Interested Parties
Vincenzo Delacqua	ICIM	Interested Parties
Stanislaw Golebiowski	Laboratory for Solar Collectors Testing	Interested Parties
Paolo Trisoglio	Modulo Uno	Interested Parties
Herman Strauss	South Africa Bureau of Standards	Interested Parties
Karl Diest	South Africa Bureau of Standards	Interested Parties
Solly Peter	South Africa Bureau of Standards	Interested Parties
Andreas Bohren	University of Applied Sciences Rapperswil HSR	Interested Parties
Matthias Rommel	University of Applied Sciences Rapperswil HSR	Interested Parties
Sebastian Laipple	University of Applied Sciences Rapperswil HSR	Interested Parties
Peter Markus	University of Oslo	Interested Parties

Table 3: Industry Participants/Interested Parties

Members:	Organization	Participation
Jurgen Kosok	Bosch Germany	Industry
Tiago Mateus	Bosch Portugal	Industry
Uwe Trenkner	European Solar Thermal Industry Federation	Industry
Richard Pelan	Kingspan Renewables	Industry
Joakim Bystrom	Lumicum/Absolicon	Industry
Stefan Albrecht	Solar Experience Consulting	Industry
Barry Johnston	Solar Twin	Industry
Jean-Marc Suter	Suter Consulting	Industry
Mark Thornbloom, SRCC	Viessman Manufacturing	Industry

3.4 Status of Deliverables/Budget

Updated National Participation Letters have been distributed to interested participants, which will secure budget commitments. Most participants feel they will have budget and resources to support their participation, except Jan-Erik Nielsen still needs formal support from ESTIF or another source to fund his work.

As noted earlier the first Task Experts meeting, the roadmap for Subtask A and B, and the Wiki site deliverables have all been completed on time.

The next major deliverable due in December is on track. This deliverable is Subtask A's white paper(s) on flat-plate, ETC, air-heating, and concentrator collectors which will be based on the roadmap discussed in the first Task Experts meeting.

A slight modification of the work plan is needed to move deliverable B1 (results of a meeting of experts to discuss solar thermal systems testing and characterization issues and develop detailed research recommendations) from 10/2009 to 10/2010 so that the next Task meeting in Stuttgart can be incorporated into the deliverable.

4 Next Steps

A web meeting or meetings are planned for early December to gather more input on the Subtask A white paper/roadmap and discuss the roadmap for Subtask B. This will help participants who couldn't attend the South Africa meeting and fill in some of the work assignments/plans for the two subtasks.

The Task Experts meeting at ITW in Stuttgart, Germany is planned for February 9-10. The plan is to get expert input from industry on system testing issues and research plans that will be the material for Subtask B's next deliverable. The meeting will be preceded by an industry forum to introduce Task 43, its objectives, and test and assessment methods to industry to garner their support and engage them in the effort.

North American and Australian test laboratories need to contact QAiST concerning round-robin testing and determine how they can become involved in the rounds. QAiST participants have already established a schedule and costs for participation. Questions concern what the cost would be to include North American and Australian laboratories in some of the round-robins, which systems they would be interested in testing, the likely costs, and when they could expect the systems for testing. With the large current backlog of system and collector tests at the North American laboratories, scheduling will be a difficult issue.

The concept Jan-Erik Nielsen presented for engaging certification bodies will be discussed at a webinar and/or as part of the Stuttgart meeting so a plan of action can be developed. If appropriate a modification/expansion of the Task 43 work plan may be needed to accommodate some work on this topic, which can be addressed at the ExCo meeting planned for the US in 2010.

The Subtask leaders have already approached researchers and industry representatives that they think would be valuable additions to Task 43 and invited them to at least stay informed about the Task, and if appropriate join the effort. Since there is a lot of work to be done there is interest in expanding the number of participants.