1. Final report: EUDP 17-II, 64017-0561

1.1 Project details

Project title	IEA SHC Task 57 - Solar Standards and Certification (II)
Project identification (program abbrev. and file)	EUDP17-II, 64017-0561
Name of the programme which has funded the project	Energiteknologisk Udviklings- og Demonstrations Program (EUDP). Området: Solenergi
Project managing company/institution (name and address)	SolarKey Int., Aggerupvej 1, 4330 Hvalsø
Project partners	SolarKey Int.
CVR (central business register)	26 95 92 76
Date for submission	2019-01-28

Note: IEA SHC Task 57 began in January 2016 and ended December 2018. This EUDP project covers participation in the last year of the task (2018). So, this is a report of the last year of the task. Participation of the first part was supported by another EUDP project: EUDP 15-I, 64015-0079, Internationalt samarbejde om prøvning og certificering af solvarmeprodukter (IEA SHC Task 57 Solar standards and certification).

1.2 Short description of project objective and results

English version

The objective was to continue Danish management of IEA SHC Task 57 "Solar Standards and Certification" until the end of the task period (31/12 2018). This task supported international co-operation on improvement and promotion of international standards – and harmonisation of national/regional certification schemes. The overall aim is to lower costs on quality products and minimise technical trade barriers.

The main specific results are :

- creation of the Global Solar Certification Network (GSCN)
- new proposals for solar standards
- guidelines in use of standards and implementation of certification schemes

Results are available from the websites:

- http://task57.iea-shc.org/
- http://gscn.solar/.

Furthermore, the Danish strategy for solar thermal has been updated, see under "Teknologistrategier og -vurderinger" at https://ens.dk/ansvarsomraader/forskning-udvikling/eudp

Dansk version

Formålet med projektet var at fortsætte den danske ledelse af IEA SHC Task 57 "Solar Standards and Certification" til udgangen task perioden (31/12 2018). Dette task støttese internationalt samarbejde vedr. forbedring og promovering af ISO standarder – samt harmonise-

ring nationale/regionale godkendelsesordninger. Det overordnede mål var en udvikling i retning af billigere kvalitetsprodukter og en mindskelse af tekniske handelsbarrierer.

Hovedresultaterne er:

- ❒ etablering af Global Solar Certification Network (GSCN)
- ❒ forslag til nye standartder
- ❒ vedledninger i brug af standarder og implementering af godkendelsesordninger

Resultater er tilgængelige fra hjemmesiderne:

- ❒ http://task57.iea-shc.org/
- ❒ http://gscn.solar/.

Endvidere er den nationale danske solvarmesrategi blevet opdateret, se under "Teknologistrategier og -vurderinger" på https://ens.dk/ansvarsomraader/forskning-udvikling/eudp.

1.3 Executive summary

IEA SHC Task 57 was divided in three subtasks. Below are short descriptions of the results obtained in these subtask.

1.3.1 Global Solar Certification Network

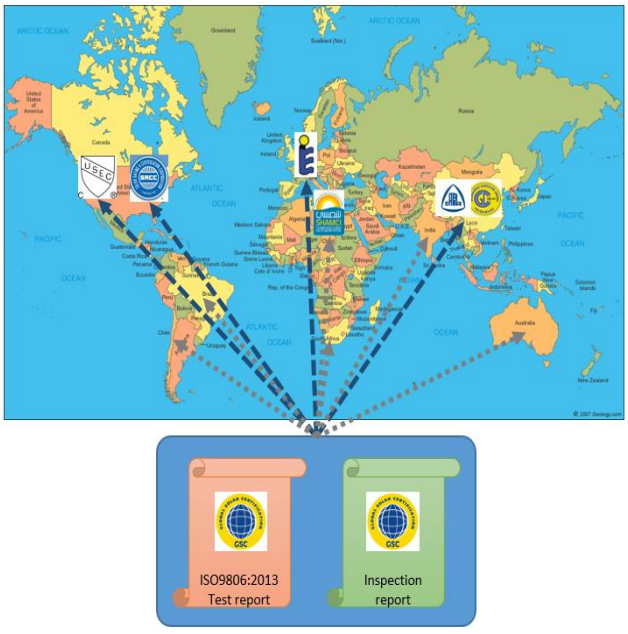
The concept of the Global Solar Certification Network (GSCN) is now in operation. After some hesitation, several certification bodies from different certification schemes – and several of their test labs and inspection bodies are now member of the Network. This means that the industry members now can present test and inspection reports from one certification scheme to a certification body from another certification scheme – and obtain certification here – without new testing and inspection.

The first solar collector manufacturer has now gone through the process of re-using test and inspection reports from Solar Keymark (in Europe) to obtain SRCC certification (in USA).

So now the GSCN concept is taking off! Much more information at GSCN.SOLAR.

How it will work for manufacturers:

A manufacturer having already a certificate accepted by the GSCN, simply apply directly to a certification body issuing the next wanted certificate (also accepted within the GSCN), showing his existing certificate and related test and inspection reports and other relevant documentation.



The "new" certification body will then tell the manufacturer if any additional testing/inspection will be needed.

If no additional testing/inspection is required – or when such additional testing/inspection has completed – the manufacturer is granted the license to mark his product with the "new" certificate too. Fees will apply for using the

system.

1.3.2 Support to ISO standardization

New proposals for solar standards are now available from the Task 57 website:

- ❒ Test methods for mechanical load on support of close-coupled solar water heating systems
- ❒ Test methods for close-coupled solar water heating systems reliability and safety
- ❒ Test methods and requirements for building integrated collectors and systems
- ❒ Performance check of large collector fields

It is expected that these proposals will be handed over to ISO/TC 180 during 2019 for further formal processing.

Work on accelerated ageing testing of solar collectors has been reported. A proposal for test procedures for accelerated ageing of collectors is being considered.

1.3.3 Promotion of ISO standards and implementation of certification schemes

A final version of "GUIDE TO STANDARD ISO 9806:2017 - A Resource for Manufacturers, Testing, Laboratories, Certification Bodies and Regulatory Bodies" has been published – see Task 57 website.

A "Guideline for Implementing Certification Schemes for Solar Heating and Cooling Products" has been published – see Task 57 website.

A survey on ISO 9806 has been published – see Task 57 website.

1.3.4 Updating the Danish Solar Thermal Strategy

Included in the project was an extra national Danish activity to update the Danish Solar Thermal Strategy (last edition was from 2007). This has been done; two documents in same format as for the Solar PV Strategy have been elaborated:

- Solvarmestrategi 2018 – Del 1 Baggrund
- Solvarmestrategi 2018 – Del 2 Indsatsområder

The documents will be available from the EUDP homepage:
https://ens.dk/ansvarsomraader/forskning-udvikling/eudp

1.4 Project objectives

The purpose and objectives of the task are to develop, improve and promote ISO standards on test procedures and requirements for solar thermal products - and to harmonize at international level certification schemes in order to increase in general the level of quality - and at the same time avoid the need for re-testing and re-inspection.

1.5 Project results and dissemination of results

The work was organized in three subtask:

Subtask A: Kick-off of operation of Global Solar Certification Network (GSCN)

- is supporting the operation of the Global Solar Certification Network with the aim to harmonize certification schemes and have mutual accept of test and inspection reports.

Subtask B: Improvement of test procedures – support and input to ISO

- is elaborating specific proposals for new and improved test procedures – and initiating new "ISO work items" for revisions of existing standards and for elaborating new standards.

Subtask C: Promotion and capacity building with respect to ISO standards and state-of-the-art certification schemes

- The ISO standards for solar thermal products are becoming increasingly popular throughout the globe; but still some countries stick to old national standards or even make new national standards. Subtask C will work to convince stakeholders in such countries that the ISO standards are very well proven and useful – and give guidance for implementation.

1.5.1 MAIN RESULTS

The following is a brief summary on the key results of each single work activity within the Subtasks.

1.5.1.1 Subtask A: Kick-off of operation of Global Solar Certification Network (GSCN)

The concept of the Global Solar Certification Network (GSCN) is now in operation. After some hesitation, several certification bodies from different certification schemes – and several of their test labs and inspection bodies are now member of the Network. This means that the industry members now can present test and inspection reports from one certification scheme to a certification body from another certification scheme – and obtain certification here – without new testing and inspection.

The first manufacturer has now (November 2018) gone through the process of using test and inspection reports from Solar Keymark (in Europe) to obtain SRCC certification (in USA).

So now the GSCN concept is taking off!

The deliverables A1 to A6 are listed below:

A1: Agendas and meeting reports from GSCN plenary meetings

- 3 GSCN Plenary meetings organized – reports available from: http://gscn.solar/meetings/network%20meetings.html

A2: Improved GSCN working rules

- GSCN Working Rules improved continuously during the task – latest version available from: http://gscn.solar/documents.htm l

A3: Acquisition and assessment of new network members

- Twenty members as per 31st December 2018:
    - Five major industry members (China and Europe)
    - Three certification bodies (US and Europe)
    - Six test labs (US and Europe)
    - Two inspection bodies (US and Europe)
    - Four supporting members (Europe)
- Ten applicants as per 31st December 2018:

- Six certification bodies (US, Canada, China, Australia and Europe)
- Two test labs (China and Europe)
- Two inspection bodies (China)

List of members available from: http://gscn.solar/members/list%20of%20members.html.

A4: Give assistance to manufacturers the mutual recognition of test reports and inspection reports

- Ongoing – first manufacturer is in the process of utilizing the GSCN concept

A5: GSCN website and other promotion

- WWW.GSCN.SOLAR
- http://task57.iea-shc.org/

A6: Promotion plan

- Promotion plan (version 5)

1.5.1.2 Subtask B: Improvement of test procedures – support and input to ISO

In subtask B several proposals for new standards have been developed. One is already put forward to ISO for creation of a work item to establish an ISO standard based on the elaborated draft. Three others are ready for presentation to ISO/TC 180 and next ISO meeting.

B1: Reports on accelerated ageing test of flat plate collectors and evacuated tubular collectors

- Report on "Accelerated ageing test of evacuated tube collectors"

Concerning accelerated testing of flat plate collectors Fraunhofer ISE gave status reports on the task meetings from the national projects "Speedcoll" and "SpeedColl2", see:

- http://www.speedcoll.de/en/home.htm l
- https://www.speedcoll2.de/en.html

Work between Fraunhofer ISE (DE) and CABR (CN) was coordinated during three sub-meetings on the issue.

B2: Draft proposal for test procedures for structural testing of collector and supporting structures

- Test methods for mechanical load on support of close-coupled solar water heating systems This is a final draft which may be proposed to ISO/TC 180

B3: Recommendations related to test procedures for building envelope integrated collectors and systems

- Test methods and requirements for building integrated collectors and systems. This is a final draft which may be proposed to ISO/TC 180

B4: Recommendations related to test procedures for e.g. system reliability and safety; new systems types / other applications

- Test methods for close-coupled solar water heating systems - Reliability and safety. This is a final draft which may be proposed to ISO/TC 180

B5: Draft definitions for environmental extreme conditions

- Brief survey report on what is going on in IEC/TC and IEA/ PVPS groups on "Extreme conditions".

B6: Draft proposal for ISO standard on "Performance check of large collectors fields" (extra deliverable)

- Check of solar collector field performance (has been delivered as proposal for new Work Item to ISO/TC 180)

1.5.1.3 Subtask C: Promotion and capacity building with respect to ISO standards and state-of-the-art certification schemes

- Guidelines for the new collector testing standard ISO 9806:2017 and guidelines for implementing a solar certification scheme have been made.
- A questionnaire on use of ISO standards in the solar thermal field has been circulated – and the answer analysed (showing high satisfaction with the major solar thermal standard (9806:2017).

C1: Guidelines on ISO 9806

- A comprehensive guideline for use of the new solar collector testing standard ISO 9806:2017 has been elaborated. The purpose of this guide is to provide guidance about the application and use of the ISO 9806:2017 standard, concerning the testing of solar thermal collectors. It is intended to support the interpretation and application of the standard. The guide has been developed with three different target groups and objectives in mind. - A guide directed to established and new test laboratories for collector testing. The main purpose here is to give a quick introduction to the standard for new laboratories and in general to contribute to a uniform interpretation of the standard and presentation of results. - A guide directed to manufacturers and importers of collectors. Here, the purpose is to give a very light introduction to the standard and to explain how it is used for type testing as well as for innovation and development support. - A guide directed to certification bodies. The intention here is to provide access to easy evaluation of the presented results.
    - Guidelines on ISO 9806

C2: Papers and presentations at national and international conferences and workshops and webinars

- See section 5.1.2.

C3: Update of Task 43 questionnaire with indication of interest in use of international standards

- A new questionnaire with indication of interest in use of international standards has been elaborated – and the results analyzed.
    - UTILISATION OF ISO9806:2017 IN GLOBAL SOLAR CERTIFICATION

C4: Model certification schemes

- To support implementation of certification schemes in countries regions with tradition/experience in certification scheme, an introduction to product certification schemes at a general level has been elaborated. Here guidelines for how to initiate and implement a certification scheme for solar heating and cooling products are given.

- Guideline for Implementing Certification Schemes for Solar Heating and Cooling Products

- In the Arab countries a certification scheme (SHAMCI) for solar thermal product is being introduced. SHAMCI is very much inspired by the European certification scheme Solar Keymark, and in the task a comparison between SHAMCI and Solar Keymark has been elaborated.
  - Comparison of SHAMCI and Solar Keymark

1.5.1.4 Updating the Danish Solar Thermal Strategy (not part of Task 57)

Included in the EUDP project was an extra national Danish activity to update the Danish Solar Thermal Strategy (last edition was from 2007). This has been done; two documents in same format as for the Solar PV Strategy have been elaborated:

- Solvarmestrategi 2018 – Del 1 Baggrund
- Solvarmestrategi 2018 – Del 2 Indsatsområder

The documents will be available from the EUDP homepage:
https://ens.dk/ansvarsomraader/forskning-udvikling/eudp

1.5.2 Dissemination

1.5.2.1 Reports, Published Books & Online Tools

Author(s)/ Editor	Title	Publication Date	Target Audience	Web or Print
JE Nielsen et al	GSCN Working Rules, improved continuously during the task – latest version available from: http://gscn.solar/documents.html		GSCN members and applicants	Web
Shen Bin	Test methods for mechanical load on support of close-coupled solar water heating systems This is a final draft which may be proposed to ISO/TC 180	09, 2018	Test labs and manufacturers, ISO/TC 180	Web
Zhang Lei, Gu Xiuzhi	Test methods and requirements for building integrated collectors and systems. This is a final draft which may be proposed to ISO/TC 180	09, 2018	Test labs and manufacturers, ISO/TC 180	Web
He zinian	Test methods for close-coupled solar water heating systems - Reliability and safety. This is a final draft which may be proposed to ISO/TC 180	09, 2018	Test labs and manufacturers, ISO/TC 180	Web
He Zinian	Brief survey report on what is going on in IEC/TC and IEA/ PVPS groups on "Extreme conditions".	09, 2018	Test labs and manufacturers, ISO/TC 180	Web

JE Nielsen	Check of solar collector field performance (has been delivered as proposal for new Work Item to ISO/TC 180)	09, 2018	Test labs and manufacturers, ISO/TC 180	Web
Korbinian Kramer	Guidelines on ISO 9806		Test labs and manufacturers, ISO/TC 180	Web
JE Nielsen	Guideline for Implementing Certification Schemes for Solar Heating and Cooling Products	11, 2018	Certification bodies, national authorities, subsidy scheme operators, and manufacturers	Web
Ashraf Kraidy,Lotus Shaheen	Comparison of SHAMCI and Solar Keymark	08, 2017	Test labs and manufacturers	Web

* Restricted: available only to Task participants via internal Task website

1.5.2.2 Journal Articles, Conference Papers, Press Releases, etc.

Author(s)/Editor	Title	Publication / Conference	Bibliographic Reference
JE Nielsen / B Epp	"Three Global Solar Certification and Standardisation Meetings in Berlin" IEA SHC: Mutual Recognition of Test and Inspection Reports Saves Industry Costs	www.solarthermalworld.org	http://www.solarthermalworld.org/keyword/global-solar-certification-network
JE Nielsen / B Epp	Global Solar Certification Network: Facilitating International High-Quality Collector Trade	www.solarthermalworld.org	http://www.solarthermalworld.org/content/global-solar-certification-network-facilitating-international-high-quality-collector-trade
JE Nielsen / B Epp	YouTube interview: Jan Erik Nielsen: Global Solar Certification Network	SHC Conference, Abu Dhabi 2017	https://www.youtube.com/watch?v=zEe8NkeNt0U
JE Nielsen	"IEA SHC Task 57 Solar Standards and Certification", poster	SOLARTR-2016, Istanbul, Turkey, December, 2016	http://solartr.org.tr/

JE Nielsen	"Global Solar Certification Network"	PTB Workshop on certification of solar thermal products in Maghreb region (North Africa) Morocco 7-9 May 2017	-
JE Nielsen	"Solar Standards and Certification", Keynote	SHC 2017 Conference, Abu Dhabi, November 2017	http://www.shc2017.org/
JE Nielsen	Global Solar Certification Network,	Asia-Pacific Solar Research Conference, Melbourne. December 2017	http://apvi.org.au/solar-research-conference/
Harald Drück	Global Solar Certification Network (GSCN) and Global Certification of Collectors	EuroSun 2018, Rapperswil, September 2018	http://www.eurosun2018.org/home.html
Parker J. G, Guthrie L.T. and Guthrie K.I.	Utilisation of ISO9806:2017 in Global Solar Certification, 2018	Asia Pacific Solar Research Conference Sydney December 4-6 2018	http://apvi.org.au/solar-research-conference/wp-content/uploads/2018/12/179_SHC_Parker_J_2018_PAPER_reviewed.pdf
JE Nielsen et al		IEA SHC Webinar on Solar Standards & Certification, December 2018	https://www.youtube.com/watch?v=iVcTL59_82E&index=1&list=PLHMZ2tGVXsM-ZzrQB5UKHPopviqbdv1Jq

1.5.2.3 Conferences and Workshops

Task participants presented Task work and results at 10 conferences and workshops over the course of the Task. See table below.

Conference/workshop/seminar Presentations

Conference / Workshop / Seminar Name	Activity & Presenter (keynote, presentation, poster, etc.)	Date & Location	# of Attendees	If Task Hosted: # Countries, Industry, Government, Research
ESTIF Webinar	"Global Certification",	Web, February 2016	-	

	JE Nielsen			
SHAMCI workshop	ISO standards, Ken Guthrie; GSCN, JE Nielsen	Cairo, 2016-11-24	20 (9)	
SOLARTR-2016	Poster: "IEA SHC Task 57 Solar Standards and Certification", JE Nielsen	Istanbul, Turkey, December, 2016	-	-
PTB Workshop on certification of solar thermal products in Maghreb region (North Africa)	"Global Solar Certification Network", JE Nielsen	Morocco 7-9 May 2017	30	-
SHC 2017 Conference,	"Solar Standards and Certification", JE Nielsen, Keynote	Abu Dhabi, November 2017	-	-
Asia-Pacific Solar Research Conference	Global Solar Certification Network, JE Nielsen	Melbourne. December 2017	-	-
EuroSun 2018	Global Solar Certification Network (GSCN) and Global Certification of Collectors, Harald Drück	Rapperswil, September 2018	-	-
IEA SHC National Day	Solar Standards and Certification – Task 57, JE Nielsen	Lisbon, November 2018	-	-
Solar Academy Seminar	IEA SHC Webinar on Solar Standards & Certification, JE Nielsen et al	Web, December 2018	173	-
Asia Pacific Solar Research Conference	Utilisation of ISO9806:2017 in Global Solar Certification, Parker J. G, Guthrie L.T. and Guthrie K.I. 2018, Asia Pacific Solar Research Conference	Sydney December 4-6 2018.	-	-

At every Solar Keymark Network meeting, every ISO TC180 meeting and every CEN TC312 meeting, GSCN was promoted and status given.

1.6 Utilization of project results

The project leads in general to easier access to solar markets worldwide, which will be utilized by the main Danish actors in the field.

The project is supporting Danish manufacturers of large collectors and systems for solar district heating by making international sales easier and by – in cooperation with these manufacturers - elaborating an international standard (ISO) for simple check of performance of large collector fields.

The project participant has expanded his network in the field of solar standards and certification and earned a good international reputation. This already lead to one new international projects plus good future opportunities.

1.7 Project conclusion and perspective

The concept of the "Global Solar Certification Network" is now taking off for solar thermal collectors. Other product such as complete solar water heaters and solar heating/cooling systems could be included in the next stage[1]. The "Global Solar Certification Network" is a cooperation between representatives of global acting solar manufacturers and solar certification bodies and test labs around the world. When a product has been certified by one of the participating certification bodies/schemes, the product can obtain certification from all other participating certification schemes without re-testing of the product and without re-inspection of production facilities. The perspectives here are considerable savings for the manufacturers with respect to testing and inspection.

New draft ISO standards has been being prepared. Main expected impacts/perspectives in this field:

- Improvement of quality of small and cheap "close couple systems"
- Consistent checking of performance of large solar collector fields

Promotion of the use of ISO standards has been focusing on promotion of the collector test standard ISO 9806. Big efforts have been done in making this standard useful all over the world, and a comprehensive guide in using the standard has been made to support this. The standard is now becoming more and popular – and adopted by more and more countries.

The Danish Solar Thermal Strategy has been updated (last edition was from 2007). This strategy has now the same format as the Solar PV Strategy. This strategy specifies focus areas, which should be considered in the future development of solar thermal systems and components.

[1] A follow-up to the Task 57 is being planned – concept paper to be presented at the IEA ExCo meeting in June 2019.