

## News for the month of May 2015

### Test standards for CST systems advances



*Photo: Field testing at DLR Cologne, Germany*

The experts group meeting on finalizing the issues related to test set ups and test standards on testing of concentrated solar thermal technologies (CSTs) was held from 17-18 March 2015 at University of Pune. The committee observed that the draft standards submitted by Dr. ShirishKedare to Bureau of Indian Standards (BIS) for publication are more or less based on the detailed project report prepared by a consortium under an assigned given in UNDP-GEF MNRE project which had approval of an Expert Group formed by MNRE. The test procedures are applicable of all types of CSTs. The test procedure laid out for thermic fluid based systems will be applicable for systems based on pressurized hot water also. The title of such standard will therefore, be modified accordingly. The Committee went into the details of the standards including the changes suggested by Prof. Ajay Chandak to BIS. The modified standards were then asked to be discussed with Dr. S. B. Kedare by Dr. Vishal Sardeshpande. The finalized draft will be made available to National Institute of Solar Energy (NISE) and the office of UNDP-CSHP, MNRE for further course of action.

The committee also decided for a technical tour of working scientists be undertaken to Europe where already the Institutes have done extensive work in designing of the standards. The purpose to ensure that the test standards and test beds for testing of various types of CSTs being developed in India are in line with those available at International level. The modified draft test standards may then be forwarded to BIS.

It was also suggested that the name of members who were involved in examining these draft standards may also be kept in the Solar Thermal Committee of BIS.

In addition to above, the draft booklet on "Component & material specifications of Arun Dish" prepared by IT Power in association with Clique Development, Mumbai was also discussed by the members. The members were of the view that such booklets may be prepared by IT Power in consultation with respective manufacturers and MNRE/ PMU-CSH project only keeping view of the objective and utility of booklets.

Prof. Subhash Ghaisas in-charge of the testing centre at University of Pune expressing satisfaction on the response from manufacturers mentions "the present system is limited to the 180 degrees as the maximum test temperature. Certain valve settings and increase in the expansion chamber volumes are required to increase the test temperature range. Thus, we are also learning the requirements of the working test setup. I believe that this feedback based learning will help us creating highly reliable test setup."

Following companies are already benefitting from the testing set-up with their respective type of solar technology

- Thermax Ltd, Solar Division (Parabolic trough collector)
- Green Life Solutions Pvt. Ltd. (Parabolic solar concentrator)
- Suntrak Synergy (Parabolic trough collector)
- Enersun Power Tech Pvt. Ltd.(Compact liner Fresnel Reflector)

<http://physics.unipune.ernet.in/~energy/>

## Industry greets PRIORITY SECTOR lending status for renewable energy



The Reserve Bank of India has revised the priority sector lending norms, and has accorded priority sector lending status for renewable energy. Banks have to set aside a certain portion of their total advances for lending to priority sectors. Any bank that lends up to Rs 10 lakh to a household for solar power and biomass-based generators can classify the loan as priority sector.

The directive will help lenders differentiate renewable energy projects from the power sector, where banks are wary of lending because of an increase in stressed assets. Easy credit is crucial to Prime Minister Narendra Modi's plan to harness clean energy and show his government's resolve to protect the environment in the world's third-biggest polluting nation.

Financing woes have hindered the uptake of small-scale commercial and industrial renewable energy projects in particular solar energy. The inclusion of renewables under priority sector lending is expected to solve some of these problems, especially smaller solar energy projects.

As per a notification by the Reserve Bank of India (RBI), they will provide bank loans up to a limit of Rs 15 crore to borrowers for large scale renewable power projects and village electrification. For individual households, the loan limit will be Rs 10 lakh per borrower.

Priority sector refers to those sectors of the economy which may not get timely and adequate credit in the absence of this special dispensation. Typically, these are small value loans to farmers for agriculture and allied activities, micro and small enterprises, poor people for housing, students for education and other low income groups and weaker sections.

The rate of interest on various priority sector loans will be as per RBI's directives issued from time to time, which is linked to Base Rate of banks at present. Priority sector guidelines do not lay down any preferential rate of interest for priority sector loans.

The targets and sub-targets set under priority sector lending for all scheduled commercial banks operating in India are furnished below:

Categories	Domestic scheduled commercial banks and Foreign banks with 20 branches and above	Foreign banks with less than 20 branches
<b>Total Priority Sector</b>	40 percent of Adjusted Net Bank Credit [ANBC defined in sub paragraph (iii)] or Credit Equivalent Amount of Off-Balance Sheet Exposure, whichever is higher.  Foreign banks with 20 branches and above have to achieve the Total Priority Sector Target within a maximum period of five years starting from April 1, 2013 and ending on March 31, 2018 as per the action plans submitted by them and approved by RBI.	40 percent of Adjusted Net Bank Credit [ANBC defined in sub paragraph (iii)] or Credit Equivalent Amount of OffBalance Sheet Exposure, whichever is higher; to be achieved in a phased manner by 2020 as indicated in sub paragraph (ii) below.

The Total Priority Sector target of 40 percent for foreign banks with less than 20 branches has to be achieved in a phased manner as under:-

Financial Year	The Total Priority Sector as percentage of ANBC or Credit Equivalent Amount of Off-Balance Sheet Exposure, whichever is higher
2015-16	32
2016-17	34
2017-18	36
2018-19	38
2019-20	40

Majority of the manufacturers have greeted this move and have already advised their clients to take advantage of this scheme.

Mangal D. Akole, Chairman, Solar Thermal Federation of India states "The recent announcement by Govt of India is a step in the right direction,for effective promotion of solar energy. However, this may not be of any help to buyers of domestic systems, considering the reluctance by bankers to process small amount loans." He also expressed that once the terms are known the picture will be much clear on ease of finance availability.

Shivanand Nashi of Unisun Technologies said "availability of easy finance was the major hindrance for any concentrated solar thermal systems considering they are capital intensive in nature. This move of RBI has brought a relief to our industry as it will now help meet the initial capital for our customers. We have already recommended our customers to avail of this facility and the results are encouraging."

<https://rbi.org.in/Scripts/NotificationUser.aspx?Id=9688&Mode=0>

## Quality and skilful maintenance key for successful functioning



The solar thermal system at ICAR-Indian Institute of Horticulture Research, mushroom laboratory is paying dividends as they have been able to save energy. The lab supplies 40 tons of spawn per annum to the growers. Mushroom technology is highly energy intensive production system requiring energy for mushroom spawn production, mushroom substrate production and other related activities. Considering this fact the centre decided to opt for solar thermal for meeting the heating needs. The system was installed under a Department of Science and Technology funded research project.

Their heating requirements are met using 32 m<sup>2</sup> of concentrated solar parabolic dish and 25 m<sup>2</sup> evacuated tube type solar water heater.

A total of 15-18 bar of steam generation is required for the sterilization process of 160kg spawn to be completed. Steam is required for the process of sterilization of half boiled sorghum grains. The sterilization temperature required is 121-123°C at 15-18lbs pressure for three hours. This requirement is fulfilled by the concentrated solar dish system which is able to provide the requisite steam only for 30-40 days in a year considering the atmospheric conditions of Bengaluru. The solar water heater is used to pre-heat the boiler water fed to the autoclave and provides hot water up to 85°C.

Since the steam pressure requirement is high hence the concentrator system operates to its optimum capacity for about 50 days a year, when electricity usage is virtually eliminated and in the balance days it partly raises the temperature depending on the outside temperature.

While praising the technology Dr. G. SenthilKumaran, Principal Scientist, Agricultural engineering associated with this project at the mushroom laboratory, IIHR, also expressed concern relating to mirror reflectivity and tracking system, which needs to be more qualitative for longevity. They also share that professional maintenance personnel must be available at the suppliers end to ensure trouble-free operations.

Dr. Meera Pandey, Principal Scientist, Mushroom says “Professional annual servicing of both the systems and quality of input water are essential factors for the efficient functioning of both systems. This can be ensured only through the availability of quality professional after sales service which at present is a major issue. This could become one of the major issues for failure of functioning of systems.

This project has confirmed medium temperature solar thermal system has the potential to function successfully if qualitative material and skilled maintenance is available.

<http://www.iihr.ernet.in/>

## BRICS – the rising powers in solar thermal



*Photo: A combination of low temperature and medium temperature solar thermal systems at an industry in India*

According to the latest survey by International Renewable Energy Agency 25 % of the relevant solar thermal manufacturers in Brazil Russia India China and South Africa (BRICS) countries expect solar process heat to be the dominating application among their sales by 2020.

The deployment of renewable technology in the industry sector will be one of the key policy areas of IRENA in the coming years. They have developed a technology roadmap for the global manufacturing industry and published findings in a report entitled 'Renewable Energy in Manufacturing'. The report places India amongst the highest potential countries where solar energy can be useful for meeting medium to high temperature process heat in Industries. It however raises concern on high cost of financing that can hamper market development.

Ruud Kempener, one of the authors of Energy Technology Systems Analysis Programme (ETSAP) and a Technology Roadmap Analyst at the IRENA Innovation and Technology Centre in Bonn, Germany said “*When* comparing 2007 and 2014 data, we indeed observe that geographical markets and sectors for solar process heat are changing rapidly. Deployment in China, Mexico and, especially, India have grown substantially. We see special opportunities for small and medium-size enterprises in this sector. Although they only account for a quarter of the energy consumption of the industry sector, they account for more than 95% of all companies. They also play an important role in the economic growth taking place in BRICS countries and are vulnerable to changes in energy prices. Deployment of solar thermal process technologies in these countries would provide a reliable and cheap source of energy, and at the same time allow for a massive scale-up, with opportunities for replication, learning and associated cost reductions.”

A study undertaken by solrico, Germany places India 4<sup>th</sup> in the global business development in solar thermal after European Union, China and Brazil.

Country / region	Turnover (in EUR)	Source
Europe	2,300 million	ESTIF
China	14,400 million	CSTIF
Brazil	561 million	DASOL / ABRAVA
India	178 million	MNRE
Turkey	181 million	Industry estimates
Others	376 million	solrico estimates
<b>Total</b>	<b>17,996 million</b>	

Under the UNDP-GEF concentrated solar thermal heating project close to 16,000 m<sup>2</sup> area worth of projects are deployed. In the low temperature segment, close to 80 lakh m<sup>2</sup> of solar collector area is implemented.

The BRICS countries have a key role to play in the global search for green transformations. They are already producing leading firms in some of the core green economy sectors that are emerging across the world. Solar thermal is one technology which will make them a rising power globally to reckon with.

<http://irena.org/remap/REmap%202030%20Renewable-Energy-in-Manufacturing.pdf>

## Developing standards center of attention at Task 49 IEA meeting



*Photo: Participants at the 7<sup>th</sup> meeting of Task 49 IEA-SHC, courtesy: International Energy Agency*

The 7<sup>th</sup> meeting of IEA Solar Heating and Cooling (SHC) TASK 49/IV for Solar process heat for production and advanced applications was held at Spain from 12-13 March 2015. It was divided in several sub-tasks.

The members of subtask 'A' made presentations on the current status of development of a quasi-stationary Concentrated Parabolic Collector and also highlighted the discrepancies between collector and field efficiency curves during measurements in labs. comprehensive recommendations for standardized testing procedures was suggested. The influence of dusting on solar collectors was one of the important topics debated. Adding to these presentations, further presentations on collector development and solar field measurements are already foreseen to the next meeting. a discussion on collector characterization and information contents took place, based on STAGE-STE database current contents. A brochure on solar process heat collectors will shortly be released aiming at general public.

The construction of a calculation sheet enabling the production of key figures from the kWh/m<sup>2</sup> output of the different simplified methodologies is also under consideration.

Fraunhofer Institute of Solar Energy (F-IESE) also presented their final version of ScenaoCalc, a tool that determines the calculation of collector gross gain. They also presented their comprehensive recommendations for standardized testing procedures

The US standards based SRCC methodology, developing a thermal performance rating for solar collectors at specified rating conditions in a specified rating environment and applicable to non-tracking collectors was shared in the meeting

One of the aims of Subtask 'B' is to develop tools to identify suitable integration points of solar heat in industrial processes with the following requirements:

- The tools can model current heat flows incl. their real-time profiles (batch or continuous processes with varying loads) and
- optimizes the system via heat integration and ideal heat management
- allows planners to choose suitable places to integrate solar thermal heat

A software on “Methodologies and Software Tools for Integrating Solar Heat into Industrial Processes” was presented

Bastian Schmitt showed the Wikiweb “Matrix of Indicators” and its updates that have been done within the last months. The new integration concepts have been added to the matrix and linked to suitable unit operations in food processing. A short summary paper on the updates will be produced as a supporting document to the deliverable “Extended matrix of Indicators”.

At this meeting a session was devoted to the integration efficiency of solar process heat projects. A collection of monitoring data from realized solar process heat plants was presented. It included a presentation by BhoovarahanThirumalai of Aspiration Energy who showed the practical experiences of a solar assisted energy supply system of a paint shop in India. In general the importance of good heat exchanger design was highlighted, as losses based on inappropriate design can amount to up to 6%. Energy losses should also be considered over the temperature loss of the heat exchanger. Based on the Indian Case Study, practical experiences with successful ESCO models were also discussed and how to minimize risks in these financing schemes.

A Ranking Matrix as devised to identify suitable integration points for solarthermal heat. 12 participants were then invited in the parallel session to apply the matrix to a real case study called SolFruit. After a short presentation of the case boundaries, three groups were built to screen the provided case description and fill in the Ranking Matrix draft in Excel. Two groups presented and argued their -different- final results to the plenum. The participants highlighted the need for criteria weighting to account for ‘most important’ decision making factors.

The 8th IEA Task 49/IV meeting: 16th and 17th of September 2015, will be held at SUNTI Montpellier, France and the Next SHC conference will be held in Istanbul, Turkey in December 2015

<http://task49.iea-shc.org/>



Exclusive interview of Dr. Butchaiah Gadde, Regional Technical Specialist UNDP - Global Environment Facility to InSolTherm Times on the mid-term review (MTR) of UNDP-GEF concentrated solar thermal project.

***IST: What is the purpose of mid-term review?***

BG: The purpose of mid-term review is to review the project progress towards the achievement of the project objectives and outcomes as specified in the endorsed Project Document, assess early signs of project success or failure with the objective of identifying the necessary changes to be made in course correction of the project to achieve its intended results, and provide an update on the identified risks and mitigation measures to ensure project sustainability.

The CSH project had already concluded its MTR and identified that, adaptive management, monitoring and reporting, and stakeholder's involvement in the project are highly satisfactory.

***IST: How would you rate the status of CSH development in India under global scenario?***

BG: India leads in the number of CSH installations, 163, with a total collector area of 40,418 m<sup>2</sup> when compared with rest of the countries in the world. The total global installed capacity of solar for process heat<sup>1</sup> is at 125,000 m<sup>2</sup> of collector area, and this number includes India as well. The CSH project is helping the country to accelerate the deployment of solar thermal for various process heat applications.

***IST: How have the various training programs benefited and what are your future plans?***

BG: A dedicated component of the project is focusing of awareness enhancement and capacity building activities. The project developed training manuals, information packages including audio-visuals and brochures on the six CSH technologies. Subsequently conducted 12 training workshops on the operation and maintenance, and online performance monitoring. Apart from these, the project is disseminating information for public that includes suitability of technology for selected industrial applications, financial viability including payback details, and a national toll-free helpline number to address related queries. Further, the project has facilitated establishment of platform for stakeholders including private sector, experts, to discuss various aspects to promote CSH. Meetings are scheduled periodically to follow up on the identified issues that are common to the stakeholders. All these trainings and awareness programmes are strengthening the solar thermal for process heat application that defines the sustainability of the project initiatives even after CSH project completion. State of the art test centres were established at National Institute of Solar Energy, Gurgaon and University of Pune, Pune. It is expected that these centres act as hub for both national and international training on CSH in future.

***IST: Do you plan capacity building workshops for financial institutions?***

BG: The payback period for CSH systems is about 5 to 8 years depending on the replaced fuel in business as usual scenario. Assistance from project and MNRE subsidy are playing an instrumental role currently in the promotion of concentrated solar for heat applications. The project is encouraging ESCO modality as market instrument to popularise solar concentrator. With these efforts now, demand for CSH is increasing. However, the Financing Institutions are not fully aware of CSH systems. To increase their understanding on CSH and build their capacity to make assessments, project has awarded an assignment to train the banks, financing institutions and non-banking financing institutions. These efforts are expected to result in their increased understanding and help including CSH in the lending schemes.

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<sup>1</sup> Source: [http://task49.iea-shc.org/data/sites/1/publications/IEA\\_SHC-Task49-Highlights-2014.pdf](http://task49.iea-shc.org/data/sites/1/publications/IEA_SHC-Task49-Highlights-2014.pdf).

***IST: High cost of financing and reluctance for lending are the barriers. How do you plan to address them?***

BG: To overcome the initial barriers of high cost of financing, reluctance by potential investors, and to encourage market, project is planning to provide low interest rate loans for a few units. The low interest rate will be factored from project grants. ESCO mechanism proposes that the service provider invests, while the user is expected to only pay for the services i.e. energy used. These measures are expected to address the barriers for lending and help to establish ESCO business for the promotion of CSH systems.

***IST: You see the ESCO mode as rule sharing mode for the beneficiary.***

BG: ESCO modality was tested in a solar water heater project two years ago, which provided useful lessons. Then a solar thermal collector area of 1,800 m<sup>2</sup> was established through the direct project support while 4,000 m<sup>2</sup> was put up post project.

The project will continue to explore the ESCO modality for the promotion of CSH systems. In this, ESCOs and beneficiaries are expected to honour the rules of performance based contracting. Otherwise, it is not expected to make a difference in the promotion of concentrated solar systems.

***IST: Can you tell us about the 'end of project' impact study?***

BG: During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also layout recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results. This has not yet been commissioned, but following the MTR findings, it can be said that the project may likely achieve all its targets.

***IST: Given India's pioneer position in CSH worldwide, how can the lessons learnt be transformed through international cooperation?***

BG: There is a possibility through South-South cooperation to disseminate the lessons and experiences to other regions. There is one UNDP-GEF project in Namibia that focuses of concentrated solar for power generation. There could be few bilateral institutions who may like to scale up this initiative in India and to other countries in the region.

Key members of MNRE and UNDP visited research and other facilities in Germany that work in solar thermal. MNRE is pursuing collaboration to learn from Germany on standards setting, testing protocols, etc.