

Monitoring and evaluation of SHIP system: Solar process heat (SoPro)-India

Highlights

- The Key challenges in the Indian solar process heat sector are lack of awareness, concerns on reliability, dearth of reliable performance data, financing etc.
- The activity SoPro mainly attempts to tackle first three challenges by developing a monitoring and marketing strategy through following interventions:
  - Attracting potential customers through a marketing platform,
  - Installation of monitoring systems to analyse SHIP systems
  - Compare SHIP system design between Indian and European systems
  - Optimise existing SHIP systems designs in India
  - Improve system quality through recommending cheap, robust and reliable monitoring concept

Context

International energy agency (IEA) energy technology perspective (ETP) 2012 two degree scenario (2DS) estimates that by 2050, the potential for solar heat globally in industrial applications could contribute up to 7.2 EJ per year on the basis of an installed capacity of over 3200 GWth, in industrial low temperature applications up to 120°C. India's share in this potential estimate is around 200 GWth. As of 31st March 2014, 8.1 million sq. meters of solar water heating collector area has been installed translating to 5.6 GWth capacity. However, these numbers reflects installation largely in domestic and commercial sectors while solar process heat is pretty much in its infancy - 35 SHIP systems corresponding to 11 MWth capacity were identified during preparation database of SHIP systems under SoPro activity.

GIZ's work

Since 2010, ComSolar team at GIZ has been working in the Indian solar thermal sector. The activities included sector studies, identification of pilot projects, organising workshops, capacity building and training of academicians and students.
Through these interventions some of the key barriers to slagging performance of solar process heat were identified. The barrier include but not limited to lack of awareness, concerns on quality of systems, financing, dearth of reliable data on performance and cost savings.

To address few of these challenges, the SoPro-India project was conceived. SoPro-India is supported by German Federal Ministry of Environment, Nature conservation, Building and Nuclear Safety (BMUB) and designed in cooperation with Indian Ministry of New and renewable Energy (MNRE). It is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in consultation with Fraunhofer Institute of Solar Energy (ISE), Germany and APITCO, India.

GIZ along with Fraunhofer ISE aims at scientifically monitoring three SHIP systems and collect data on temperature and mass flow for one year in order to analyse units of heat produced. This would then quantify the corresponding fuel and emission savings achieved. Thus, providing reliable data through actual monitoring and leading to increased confidence on the solar process heat technology.

In addition, twenty successful examples of solar process heat systems will be presented through an online marketing portal. These examples would be representative of different applications, in varied industries dispersed throughout the country. This would include information on basic data on system configuration, economics and technical performance. The objective is to increase awareness amongst the potential consumers on adopting solar process heat.

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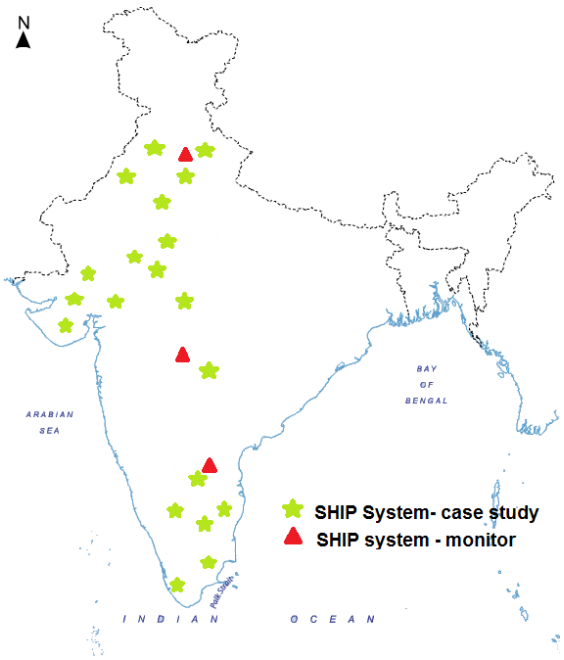
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

Activity Details

The activities are stretched over five work packages. Starting with identification of key SHIP systems to be analysed – this factors in the geographical spread of system, low temperature process heat applications in high potential industries. The systems ideally are installed by manufacturers having highest market share to give a representation on system design followed. Post shortlisting of SHIP systems data is gathered on key techno-economic parameters for evaluation.

Of these system three systems are chosen for monitoring, shortlisting criteria includes willingness of system owner to cooperate in the project activity. These system would then be monitored for one year and analysed for their performance. In the end SHIP system designs followed in India would be compared with European systems and recommendations given on design optimisation.

The aforementioned information shall be presented over a marketing platform. Together with, checklists that would help system owners to better operate and maintain their systems and support decision making for potential companies to identify that whether they should install a SHIP system.



Up-scaling

The concept of cheap and robust monitoring system developed shall be discussed with MNRE. This would then be taken up by MNRE for implementation in SHIP systems and form as a basic component in all future SHIP installation. The objective is to develop a reliable and sustainable solar process heat market in a longer term horizon.

Outcomes

- Through scientifically monitoring three SHIP systems, it shall be proved that solar systems can deliver a significant amount of heat and save a fossil fuels, if they are designed and operated well. This shall help to increase the trust in solar heating technology.
- Based on the experiences with the three monitored systems, a concept for simple, robust and low cost monitoring systems, which are suited for the Indian solar heating market, will be elaborated by Fraunhofer ISE and GIZ in the framework of the SoPro India project.
- Sharing benefits and check lists of solar process heat with potential industry customers through a marketing platform.

Case Study and Monitoring approach

- The technologies covered include both ETC and FPC.
- Industries covered are automobile, dairy, food processing, pharmaceutical, textiles and metal.
- Processes include boiler feed water pre heating, direct use for washing, heating of bath vessels.
- The system installations done by eight major manufacturers
- Systems spread across India barring eastern regions.

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