

## News for the month of July 2015...

### GEF-UNIDO-MNRE project to enhance India's potential of concentrated solar thermal



The United Nations Industrial Development Organization (UNIDO) has partnered with the Ministry of New and Renewable Energy (MNRE), Government of India will be operating a 5-year project to promote business models for increasing penetration and scaling up of concentrated solar thermal (CST) heating and cooling applications in industrial processes requiring temperatures above 120°C. The project has formally started in January 2015 with additional partners IREDA and the National Institute of Solar Energy. The budget outlay including co-financing is US\$ 26,191,044/-and will be targeting 45,000 m<sup>2</sup> of solar concentrator area installed.

The project has been conceived aiming to contribute to the GEF Climate Change Strategic Objective namely, promoting investment in renewable energy (RE) technologies by transforming the market for solar energy for industrial heat applications in India. It will be achieved through investment, market demonstration, development of appropriate financial instruments, development of technical specifications, capacity building and contributions to establish a favorable policy and regulatory environment. The project is designed to also complement MNRE's support program under the National Solar Mission by helping remove barriers associated with various types of CST technologies, its awareness, capacity building, market and financial barriers.

Ayumi Fujino, Regional Director South Asia, UNIDO said "India is the sixth largest energy consumer with significant amount of energy consumed in the industrial sectors; and the potential for energy conservation is 23% in the industrial and agricultural sectors." She addressed the participants of the Interactive Meet organized by UNIDO on 01 July 2015 in New Delhi bringing together the representatives from the solar thermal sector.

Tarun Kapoor, IAS, Joint Secretary(Solar) in MNRE assured full support of the Government of India for the success of the project. He called upon the industry associations to promote this technology amongst their members: "100 to 200 systems must be developed in each cluster, and this mass utilization will lead to the reduction in costs on similar line what the photovoltaic industry is witnessing. As the industrial cost of power is on the rise, the concentrated solar must catch on this opportunity to meet the increasing needs." He however categorically mentioned that for proper growth of this technology, the manufacturers must ensure proper operation and maintenance services. "It is seen that there is constant increase in complaints regarding operations and maintenance of systems, and this issue must be addressed for keeping end-user's faith", he added.

Dr. Anil Misra, National Project Manager, UNIDO describing the initiative as timely and need-based was hopeful that the project will be able to transform the outlook of solar thermal use in Industries in India.

Indian Renewable Energy Development Agency (IREDA) will be soon launch an easy financing scheme for lending money for projects with attractive rates of interest to make the projects viable.

Contact for more information: Dr Anil Misra, National Project Manager, UNIDO at [a.k.misra@unido.org](mailto:a.k.misra@unido.org).

<http://www.mnre.gov.in>

## Delightful results at Unique Biotech



The 2-axis tracking concentrator solar thermal (CST) system installed at Unique Biotech Ltd. near Hyderabad is yielding delightful results with close to 180 kgs of furnace oil savings per day. It has a well laid out large scale fermentation facility established in 2001 for manufacturing of Probiotics, Enzymes, and Nutraceuticals with state of art equipment in the Genome Valley, Hyderabad. For its distillation process it utilizes Furnace Oil (FO) based hot water heating system for boilers for providing thermal energy in distillation process. The requirement is between 25,000-30,000 litres of hot water at 90°C daily for its distillation process.

The company decided to reduce the use of FO hence decided to explore solar thermal based heating and commissioned 6 solar concentrator dishes each of 90m<sup>2</sup>. The 2-axis tracking with moving focus concentrated solar thermal system is integrated in the existing thermic fluid heating set-up without disturbing the present set-up and pre-heats the thermic fluid so as to save nearly 80% of the FO consumed otherwise. Solar field with thermic fluid as primary circuit has advantages of scalability and non-uniqueness.

The project is set up at an estimated cost of Rs. 1.3 crore and has received central grants Rs. 46.8 lakh. According to Megawatt Solutions, supplier of the system, the system is performing nearly close to the theoretical calculations and will pay back in less than 3 years.

The system is fully automated including pumps, solar field, heat exchangers, valves and very minimal human intervention is required for operating entire facility like washing of the dishes. Other safety features in solar field include auto top-up & charging of oil, low level safety, low flow safety, high temperature defocus safety and an advanced control system that isolates solar field automatically on as-required basis

The 2-axis moving focus project is unique in it and has been able to demonstrate successfully the heating requirements for process heat and should inspire in future other similar industries to opt for it.

<http://www.uniquebiotech.com/>

## New Patented Parabolic technology



EnerSun Power tech Pvt. Ltd., Mumbai through and with help of Prof. Joshi and Prof Panse from ICT (Institute of Chemical Technology), Mumbai have indigenously developed a unique Concentrator Linear Fresnel Reflector (CLFR) to overcome the problems faced by parabolic dish concentrators and parabolic trough concentrators.

To overcome the wind-load problems that every solar concentrator faces (larger the area more the wind-load) the team from Enersun and ICT took the route of developing a CLFR. Instead of curved mirror they developed flat mirrors which are placed in such a way that they act as a parabola. They arranged the mirrors in such a way that the wind passes in between.

ICT technocrats have amended the cooking vessel design. Conventionally Solar steam is generated and injected into the cooking vessel filled with rice/ dal/ vegetables and water or the steam is circulated in an outside jacket of vessel and the rice/ dal/ veg immersed in water gets cooked. The biggest advantage is that it is continuous cooker where rice is fed into hopper and it is carried to cooking vessel by a screw feeder where solar hot water is injected and the cooked rice is directly made available.

They have developed a continuous rice cooking system that automatically feeds the rice and 100 kg/hr hot water @ 100°C in the cooking vessel instead of directly using steam thus reducing the energy consumption by as much as 50-60%. Explains Babasaheb Mukane, Chief General Manager at Enersun “the advantage of delivering instead of steam is that it is easier to store it unlike steam which condenses. Further the stored hot water can also be utilized during non sunshine hours like evenings or next day early morning.”

To practically demonstrate the development a 34 m<sup>2</sup> system was installed at Muni Seva Ashram on its terrace of kitchen of Athithi Mandir (Guest House). The results obtained during the month of May yielded average 75 kgs of cooked rice per hour mixed with 100 °C hot water generated. The results have been exciting so far as per Deepak Gadhia, one of the trustees of the Ashram and also a mentor for the project.

The prototype system is presently undergoing test at National Testing Facility for Concentrating Thermal Technologies, School of Energy Studies, University of Pune and results are awaited.

<http://www.enersunpower.com>

## Research & Development on solar thermal builds up



For the “Research, Design and Development of Solar Photovoltaic Technology and Solar Thermal Technology” the Ministry of New and Renewable Energy has sanctioned a budget of Rs. 33.90 crore during year 2015-16. The details of the programme component, implementation methodology, financial assistance, release of funds and monitoring mechanism will be followed during the remaining period of the 12th Plan.

Until the end of financial year 2014-15 the following projects in concentrated solar thermal were completed under Research, Design and Development on solar thermal:

- Framework for setting up indigenously developed solar thermal power demonstration plants
- Development of a Modular Central Receiver Concentrated Solar Power Plant for Decentralized Power Generation undertaken by SunBorne Energy, Gurgaon
- Integrating and Hybridizing a 2-Axis Tracking Parabolic Dish Based Concentrated Solar Thermal with Biomass Based Thermic Fluid Heating System In a Process Industry undertaken by Megawatt Solutions Pvt. Ltd., Noida

There are currently six R&D projects are ongoing and are at various stages of completion.

- World Renewal Spiritual Trust, Mount Abu is setting up a 3.5 MW el. solar thermal power plant with 16 hours thermal storage for continuous operation. It is more than half way through with all the components received and is in the final stage of completion. The project when completed will deliver 24 MWh/day of power besides will also cogenerate - 1 million litres/day hot water at 60 °C.
- IIT, Bombay is developing of a megawatt scale national solar thermal power testing, simulation and research facility at National Institute of Solar Energy, Gurgaon using parabolic trough and linear Fresnel reflector. The project has undergone all tests and is also in final stages of completion and results are expected by the end of the year.
- A Centre for excellence in solar passive architecture is coming up at Centre for Environmental Planning and Technology University (CEPT) Ahmedabad and is presently delivering successful results. Entire database of various types of building materials is placed online in public domain. U value calculator tool is ready to facilitate designers to take informed decision regarding selection of materials for wall and roof.
- A High Temperature Solar Thermal Research Laboratory is also coming up at IIT, Jodhpur. It is a 5 year R&D project started in 2011. The centre is building a solar tower to produce up to 800°C, developing design of receivers and heat exchangers, conducting research on improving performance of mirrors against dust deposition, durability and reducing weight, evaluating efficacy of air cooled condensers and studying the various thermal storage materials.

- Solar Energy Corporation of India, New Delhi is setting up a facility for calibration of solar radiation measuring sensors and its analysis/ modelling based on ground surface measurements. The four year project started in 2013 and will be able to provide with precise radiation data.
- Besides 30 kW cross liner-CSP system Test Unit at Gandhi Proudyogiki Vishwavidyalaya, University Institute of Technology, (RGVP) Bhopal and Design, construction and demonstration of zero energy building for Solar Decathlon Europe 2014 Department of Energy Science and Engineering at IIT Bombay, Mumbai have also been sanctioned.

[http://mnre.gov.in/file-manager/rd-scheme/R&D\\_Solar\\_Scheme\\_2015-16.pdf](http://mnre.gov.in/file-manager/rd-scheme/R&D_Solar_Scheme_2015-16.pdf)

## Green buildings in Maharashtra to get property tax rebate



The Maharashtra government plans to give 3-7% rebate on property tax for construction of green buildings in both residential and commercial spaces. Currently, Pune is the only city in Maharashtra that gives such tax sops. The civic body of Pune does not just give property tax rebates, but also offers additional 5% floor space index (FSI).

“Currently, we are discussing what should be defined as a green building, whether we should give ratings to various measures and offer incentives accordingly among other things,” said an official of the state urban development Ministry.

On an average, environmental clearances in the state take around 6-8 months though the by-law stipulates 90 days. In Mumbai, it stretches up to a year or 18 months. For developing every 30,000 square feet, the developer has to take environmental clearances. This is granted after undergoing an environmental impact assessment by various committees. Those who conform to green building practices, approvals are accelerated and the state is already offering priority for getting environmental clearance if a developer submits a proposal to construct a green building with features like sewage treatment plant, rainwater harvesting, garbage disposal within the building premises, use of solar power and solar water heaters among other things.

Leadership in Energy and Environmental Design (LEED) green building rating system is an internationally-accepted measurement system designed for rating new and existing commercial, institutional and high-rise residential buildings. The other rating systems are Green Rating for Integrated Habitat Assessment (GRIHA) by The Energy and Resources Institute and star ratings by the Bureau of Energy Efficiency. India ranks third on the US Green Building Council's annual ranking of the top 10 countries for Leadership in Energy & Environmental Design (LEED) certified buildings.

Vijay Desai, Sr. Executive Projects hails this move and said “The need of the hour is to leverage use of sustainable technologies even with individuals as it will help reduce the pollution and also conserve energy”

Prashant Deshmukh, one of the leading Architects in western Maharashtra feels Architects owe a moral responsibility to design all future buildings as GREEN so as to facilitate use of renewable energy technologies. With such an incentive it will compel Architects to ensure designs favour use of solar energy since it will now be a marketing memo for builders.

“The proposal will encourage many developers to go for green building projects. This is the need of the hour. There has to be sheer effort and focus towards saving nature and energy conservation,” said Getamber Anand, president of Confederation of Real Estate Developers Association of India.

<https://housing.maharashtra.gov.in/>

**Interview with Dr. S.K. Singh, Director, Solar Energy Centre on the Research and Development activities being undertaken on concentrated solar thermal systems to InSolTherm Times (IST)**



***IST: Give us brief on the various R&D activities carried out related to solar thermal at National Institute of Solar Energy (NISE)?***

**SKS:** The R&D project are carried out for decentralized as well as solar thermal we are presently concentrating on projects for developing high efficiency solar thermal proto type air cooling system using both absorb and adsorb through collaborative research projects. Besides our R&D is also focused on water decentralization and solar - Biomass hybrid cold storage application. We have also developed mobile carrier system which would be a revolutionary technology.

***IST: You are working on a concept of providing fossil fuel free steam generation using solar thermal metal heating. Please explain in brief this concept.***

**SKS:** This project is basically intended to provide consumer with hot water for their process where they are prohibited from using fossil fuel based heating. The solar thermal energy will be generated using phase change material (PCM) at a central location and stored up to a temperature of 170 °C. This technology can also be extended for cold storages.

***IST: What is solar thermal-biomass solar cooling and what are the results so far?***

**SKS:** It is a project on a solar-biomass hybrid system for remote village application in electrification and providing cold storage facility was undertaken by NISE in collaboration with TERI, Thermax Ltd. and CSIRO. Under the project, a 50 kW biomass gasifier system provides electricity and the waste heat of the engine (exhaust) is used as the main source of energy for the cold storage. The system has been designed in such a way that in the day time (when the sun is available) the system will be operated using engine exhaust and solar heat (provided by Scheffler Solar Dishes). During evening, when the sun is not available and the gasifier would run at its peak to meet the evening electricity load, the cold storage will be operated on engine exhaust only. In case, no sunshine is available and engine exhaust is not sufficient to meet heat requirement of VAM for cold storage, provision has been made for burning of producer gas in the Heat Recovery Unit for interrupted heat supply to VAM.

***IST: What are the results of concentrated decentralized solar thermal power generation?***

**SKS:** This project is undertaken Sun Borne Energy Technologies with collaboration and other consortium technology partners based on heliostat system. Thermal storage as rock has been selected already based on a similar system has already tested at University of South Florida. Testing and fabrication of 13 heliostats has been completed out of 16 heliostats. Designing and installation of main volumetric receive and thermal storage systems are yet to be completed.

***IST: What testing facilities presently are available for concentrating solar thermal at NISE?***

**SKS:** We have equipment for testing high temperature systems. Besides we also have equipment that can measure the generated steam or hot water from various types of CST technologies. We have also developed a test facility for characterization of all types of evacuated tubes. There is a reflectometer to test the reflectivity of the CST surface.

***IST: What are the other R&D projects planned in future for solar thermal?***

**SKS:** As earlier mentioned we would be focusing on development solar thermal and decentralized power generation and cold storage systems also developing efficient storage system will be our focus lastly we wish to develop cost effective solar thermal water desalination for providing clean drinking water.

***IST: Will the 'Surya Bhawan' recently built will also meet some of its energy using concentrated solar thermal system in future?***

**SKS:** Presently no CST system is commissioned in Surya Bhawan but plans are there to use them in future.

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