

## News for the month of August 2015

### Salem Dairy commissions solar thermal system for milk pasteurization



For meeting the heating requirements of milk pasteurization the prestigious Salem Dairy has recently commissioned two nos. of ARUN@160 dishes each 169 m<sup>2</sup> on its rooftop supplied by Clique Solar Pvt. Ltd. The system will supply steam 200kg/hour for carrying out the pasteurization. The system is expected to save about 25,000-30,000 liters of furnace oil every year and investment will payback within 4 years after accounting for the capital subsidy and the additional benefit under the GEF-UNDP project.

It is a Feeder Balancing Dairy i.e. converting surplus milk solids into products like butter, ghee and Skim milk powder. They procure more than 4 lakh liters of milk per day from 1049 affiliated primary milk cooperative societies. There are 5 different applications where thermal energy is required in the Dairy i.e. pasteurization, cream pasteurizer, ghee melting and Powder production besides cleaning of containers.

As already mentioned the concentrated solar thermal system presently meets the partial energy requirements of milk pasteurization only. This process will continue whenever the sun is available. When the sun is not available, the existing heating system will turn on. This switchover between the solar and existing system is automatic. There is a control system that delivers steam to the existing boiler header and excess steam to heat the condensate or hot water tank.

The ARUN dish automatically tracks the sun from morning to evening. The solar radiation falling on the reflecting collector surface is concentrated at a single point at which the receiver is placed. The receiver coil at the focus of the dish transfers the heat of the sun to the heat transfer medium (water). "The Steam generation system" will consist of ARUN@160 dish system, pumps, valves, etc. Once the system starts generating steam, the pressure in the line starts increasing. Once this pressure matches the pressure in the existing boiler header, a valve will open and steam will be delivered to the common header. If there is reduction in steam usage by the process (due to holiday, lunch break, end of batch or any other reason), upstream pressure will begin to rise. This higher pressure will open another valve, delivering excess steam to the condensate or hot water tank through a temperature regulating valve.

As per Abhishek Bhatewara of Clique Solar "lot of careful thinking went in designing of the system. To optimize the heat delivery the RCC structure on the roof was thoroughly studied as there are also solar collectors and proper care had to be taken that the dishes do not cast shadow on them."

<http://www.aavinmilk.com/salem/>

## Passion drives Capt. Mallikharjun to exploit solar thermal process heating



Taking advantage of the rich radiant sunlight in Andhra Pradesh and motivated by the government to embrace solar energy a passionate Capt. Mallikharjun of Mobe Quality Fibres Pvt. Ltd. In Andhra Pradesh exploited the use of concentrated solar thermal heating for meeting the hot water requirements. They have installed 30 dishes of 16 m<sup>2</sup> each totaling to 480 m<sup>2</sup> that will deliver 40,000 liters of hot water per day up to 100°C for processing fibres. The total investment that has gone in setting up the project is about Rs. 90 lakh and will pay back within 5 years.

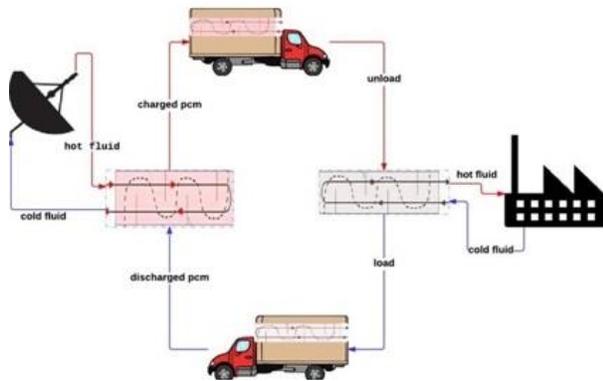
Synthetic and natural fibres like animal wool and natural hair are processed in hot water at temperatures of 90°C, which are later traded for various applications. The present heating requirement is close to 20,000 litres of hot water. To prevent scaling and inject quality water they have installed Demineralisation Plant.

According to Capt. Mallikharjun "I am convinced that renewable energy is one of the best alternatives to meet our energy requirements particularly solar energy hence I decided to use it for meeting my heating load." The present system commissioned will result in monetary saving of Rs. 20,000/- worth of fuel annually. The system is oversized against the requirement however is done anticipating low radiation days and future growth.

The bold choice by Capt. Mallikharjuna is surely to set an example in future for similar processing industries and instill confidence in entrepreneurs where process heat is required.

Capt. Mallikharjuna Rao can be contacted at [capt.mallik@yahoo.in](mailto:capt.mallik@yahoo.in)

## Mobile heat carrier using PCM under research



The team of scientists at National Institute of Solar Energy led by Dr. S.K. Singh has developed a novel mobile solar thermal heat carrier using phase change material (PCM) as a part of their ongoing research activity. The PCM material chosen was magnesium dichloride ( $MgCl_2$ ). It is fed heat at  $125^{\circ}C$  since its melting temperature is  $117^{\circ}C$ . This material will then deliver  $40kcal/kg$  and when released in water heats it to  $110^{\circ}C$ .

Magnesium dichloride is a proven PCM material that is low cost and delivers very high heat. India is amongst the top 10 countries with highest magnesium reserves hence easy availability.

A desired feature in a sustainable energy system is to be able to use solar thermal energy from various sources at a consumer located at a distance from these sources. Depending on the distance, the storage medium could be transported on a heat carrier vehicle. In order to find a solution to this problem one possible mode is to devise a transportable mobile system using Phase Change Material (PCM). This could be achieved by using thermal energy storage technology (TES). When a solid PCM is heated up and reaches its melting point, it goes through a phase change, from solid to liquid absorbing heat, known as melting enthalpy while the temperature remains constant. Equally, when the phase change process is reversed, that is from liquid to solid, the stored latent heat is released, again at a nearly constant temperature.

The crucial properties of the TES for the technical and economical feasibility of such concepts are the storage capacity per volume and weight, and the charging and discharging power, which affects the possible number of storage cycles per time.

NISE is experimenting presently to surface transport the TES device at a near distance to supply different cold storage and study the technical and economic feasibility. It is designed keeping in mind those areas that are designated to be environment-friendly where no hydro carbon fuel is allowed to be used. As an example the region surrounding Taj Mahal in Agra city has to be kept free from hydro carbons and such PCM based storage will find useful application with smaller units desiring cold storages and small industries for process heat.

As per Dr. S.K. Singh the results so far have been encouraging and optimistic that it will find success on mass scale thus bring in economies of scale.

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

## Solar Water Heater market augmentation measures put forward



The Indian solar water heater market currently passing through transition phase post capital subsidy is slowly intensifying its market on self-sustaining basis.

A National Conference on “Roadmap for Solar Water Heater Business in India” was organized by the national body Solar Thermal Federation of India (STFI) jointly with Ministry of New and Renewable Energy Sources (MNRE), government of India in New Delhi 28<sup>th</sup> July, 2015.

The capital subsidy introduced under the National Solar Mission in 2011 did double the business however failure to get the timely subsidy by manufacturers had also had taken a hit in the business as it was slowing down. Since the withdrawal of capital subsidy since July 2014 and to keep the momentum going and faith of consumers members of the industry body suggested several alternative measures to capital subsidy to augment the business. Most promising was making mandatory in all future residential buildings by urban municipal bodies with stricter penalties and not providing electrical connections, extending electricity rebates by utility companies, imposing anti-dumping duty on cheaper imports, introducing heating obligation in industries extending personal income tax rebate up to 30% of basic system cost.

Tarun Kapoor, Joint Secretary in MNRE in his address informed that presently the market is in transition phase post subsidy and is gradually living up on its own strength. He was confident that in another two years the sector will mature enough and rising energy process itself will make way for the solar collector business. He appealed STFI to suggest a mechanism for stricter quality compliance and government intends to give a seal of certificate to manufacturers meeting quality norms similar to ‘Solar Keymark’ in Europe. MNRE will be announcing several awards for solar water heater industry, which will be suitably notified. He assured the august gathering that government is doing its best to settle all the pending subsidy claims and ensured sufficient availability of funds during the current financial year.

Mangal Akole, Chairman - STFI in his presentation illustrated that if the MNRE identified potential of 140 million m<sup>2</sup> is explored it can result in saving of 16 thousand GWh of electricity annually. Since the present ruling government is keen on adopting “Make in India” and considering nearly 80% of manufacturing components in solar water heater is domestic hence government should announce attractive financing schemes for manufacturing sector. Cost of finance in India is one of the highest in the world and borrowing loan for manufacturing expansion upsets the economic analysis.

Other measure suggested separate import codes on imports of solar water heating systems parts to curb the misuse by traders importing cheaper products in knocked down condition to claim VAT exemption.

The event concluded by drawing consensus on issues that were agreeable to all the manufacturers and revision in the target of 20 million m<sup>2</sup> by the 2022 to almost double. There

are select 3 of the 29 states in India, where solar water heater business worth 75% is concentrated and STFI will take efforts to penetrate other un-represented states. MNRE officials will be working in close coordination with STFI to ensure the business continues to grow and consumer's faith is maintained through series of events.

<http://www.stfi.org.in>

## YES BANK raises Rs. 315 crore of Green Infrastructure Bond



YES BANK, India's 5th largest Private Sector Bank has raised Rs. 315 Crore through the issue of Green Infrastructure Bonds to International Finance Corporation, Washington, member of World Bank Group on a private placement basis. This is the first investment by IFC in an Emerging Markets GREEN BOND issue in the World. The bonds are for a tenor of 10 years. This is the second such green bond issuance by YES BANK after a highly successful issuance of Rs. 1,000 crore in February 2015.

The amount raised will be used by YES BANK to finance Green Infrastructure Projects like solar power and wind power in the Renewable Energy space. KPMG in India will be providing the Assurance Services annually, on the use of proceeds in line with the Green Bond principles.

According to an official of YES Bank, they are open to financing any renewable energy project. This should certainly interest concentrated solar thermal manufacturers considering their projects are capital intensive in nature and financing plays an important role in market development. The projects would however be evaluated on their merits and rating of the company. Hence appraisal on case to case basis will be crucial to be considered for financing.

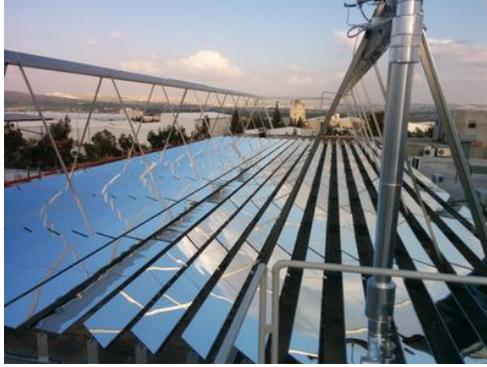
If the country has to meet the UNDP and UNIDO targets set it would require significant financing. There are challenges in existing financing mechanisms including sector limits, high interest rates and asset-liability mismatch. There will hence be a need to evolve innovative financing mechanisms to aid renewable energy projects.

Rana Kapoor, Managing Director & CEO, YES BANK said, "This first-ever investment by IFC, Washington in an Emerging Markets green bond further validates the tremendous commitment that global institutions have in YES BANK's Responsible Banking ethos, and this transaction cements our bank's status as a pioneer in Green Energy financing in India. This comes close on the heels of the highly successful issuance of India's first ever Green Infrastructure Bonds of Rs. 1,000 crores by us in February this year, and strengthens our conviction and resolve to come up with more innovative and effective structures to support the acceleration of Sustainable Energy Financing."

"Green bonds have opened a new finance flow that will be essential to confronting climate change impact," said Inessa Tolokonnikova, IFC's Financial Institutions Group Manager for South Asia, based in Mumbai. "IFC's investments in programs like YES BANK's Green Infrastructure bonds, will also encourage issuers in other markets to issue similar bonds and support greater resources for climate change finance."

<http://www.yesbank.in>

## Process heat success tastes at pharmaceutical industry in Jordan



*Photo courtesy: Industrial Solar, Germany*

RAM Pharma in Jordan has successfully installed a Fresnel collector system for direct steam generation. It consists of 18 concentrating solar LF-11 fresnel collectors with a total aperture area of 396 m<sup>2</sup> and a peak capacity of 223 kWh supplied by Industrial Solar, Germany. Installation began in November 2014 and completed in May 2015. The factory is located in the King Abdullah II Industrial City, about 15 km away from Amman, Jordan.

The system is commissioned on the factory roof of RAM is comprised of. The system provides steam for the pharmaceutical production processes and thereby cuts energy costs and CO<sub>2</sub> emissions of RAM. According to Industrial Solar the system will payback within 7 years after accounting for the subsidies received.

It was realized within a project between Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) and ISG to support the market development for solar process heat in Jordan. Through the develoPPP.de programme, the German Federal Ministry for Economic Cooperation and Development (BMZ) provides companies investing in developing and emerging countries with financial and, if required, also professional support. The company is responsible for covering at least half of the overall costs.

A long planning process is finally behind the solar specialists from Industrial Solar who set up the turnkey installation. "We had the first talks with our client in mid-2012," Christian Zahler, Managing Director of Industrial Solar, recalls. "Solar concentrating collectors are an entirely new technology in Jordan, so it took some effort to convince the customer." In the end, the decisive factor for Ram Pharma was the company's diesel demand, which caused high expenses each year. What furthermore helped in the decision-making process was a subsidy approved by the German Agency for International Cooperation, GIZ. "Guaranteed solar results are another means of increasing commercial client confidence in solar concentrating technology," Zahler explains. "The system has been up and running for two months," Martin Haagen, Business Development Manager at Industrial Solar, confirms. Simulations have shown a specific yield of 860 kWh/m<sup>2</sup> per year at the sun-rich site with an annual direct normal irradiance (DNI) of around 2,500 kWh/m<sup>2</sup>a.

RAM PHARMA is a pharmaceutical company established in the year 1992. It manufactures and distributes various pharmaceutical dosage forms, especially formulations based on Penicillin, Hormone and Cephalosporin.

<http://www.industrial-solar.de/>

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

## INTERVIEW



Bärbel Epp is the founder and managing director of the agency solrico – solar market research & international communication. She is responsible for the international newsletter on the web portal [www.solarthermalworld.org](http://www.solarthermalworld.org) since 2008. Every December, solrico publishes the World Map of the Solar Thermal Industry in cooperation with the international magazine Sun & Wind Energy. Bärbel Epp graduated with a degree in physics and looks back at 11 years of being the editor of the German renewable magazine Sonne Wind & Wärme and 4 years of building up Sun & Wind Energy as the editor-in-chief between 2006 and 2008. ([www.solrico.com](http://www.solrico.com)). Below is her exclusive interview to InSolTherm Times.

***IST: What made you undertake research in solar thermal considering solar PV is dominating the global solar energy market?***

BE: Solar thermal is the most effective technology to reduce energy consumption. It uses the endless, free-of-charge radiation of the sun with a much better efficiency per square metre than photovoltaics. It is a challenging technology which includes onsite storage in almost all installation and it can be used for a wide range of applications. All that convinced me to focus on solar heating and cooling when founding solrico, a German agency for market research and communication.

***IST: Explain us about the ISOL Business Climate Index?***

BE: So far, the major indicator for solar thermal market development on the national level has been the newly installed collector area per year. However, because collectors do not feed into a central grid, they are difficult to count. Therefore national statistics are often published late or not at all. At the same time solar system suppliers and their equipment manufacturers need reliable, up-to-date market information. That's why solrico developed a Business Climate Index especially for the global solar thermal sector which we survey annually since 2010. The ISOL Index is a point-based indicator ranging from 0 to 100 points and showing the satisfaction of the solar thermal industry on a national, regional and global level. **India led the global ranking of the highest ISOL country Indices between 2011 and 2013 with fare above 50 points.**

***IST: What are the real challenges the solar thermal industry is facing?***

BE: The solar thermal industry is in transition. In several European countries as well as in China the demand of private house owners is falling. Therefore the biggest challenge for the industry is to develop new cost-effective technology solutions and business models for hotel chains, manufacturing businesses or district heating companies on large scale. Commercial customers are demanding and solar heating and cooling systems must automatically include monitoring, guaranteed results and O&M services. This is a new business field which only a few system suppliers meet successfully worldwide so far.

***IST: As per your analysis are solar process heat applications finding good markets globally?***

BE: The solar process heat market is still in its infancy. The most comprehensive database of solar process heat projects online is the website [www.ship-plants.info](http://www.ship-plants.info). The database built up within in the IEA Solar Heating and Cooling Programme Task 49 Solar Process Heat for Production and Advanced Applications includes 155 solar process heat projects. The countries with the largest capacity of solar process heat in this database are Chile, China, USA, India, Austria, Greece and Spain, which have a combined installation of 125,00 m<sup>2</sup> receiver area. All project developers or solar process heat collector

manufacturers which would like to add reference projects to the database can create an account on the website first. They can then add a new project. The administrator of the website, the Austrian Research Institute AEE INTEC, checks all additional information before making it available to the public.

***IST: Which countries support the solar thermal process heat development actively?***

BE: There are still very few countries worldwide as India which has subsidy schemes in place especially for solar process heat, among them Germany (since 2012), Austria (since 2010) Thailand (since 2008), Mexico (since 2004) and Spain (since 2011). The federal and state tax credits in the USA are available for all sorts of solar thermal applications. You find further information on these support schemes and their impact on the market on [solarthermalworld.org](http://solarthermalworld.org).

***IST: Which countries are emerging in the process heat market?***

BE: There is potential for solar process heat in very many countries worldwide. The above mentioned SHIP Plant Database includes systems from 29 countries. High fossil energy prices and availability of low-interest project financing are the two most important drivers for solar process heat deployment according to the industry. Austria, Germany, Mexico, France, India, Turkey and Italy were the countries where relatively large number of solar thermal system suppliers experienced solar process heat as the fastest growing segment in their national solar thermal market in 2012/2013 according to our surveys. In Austria every third collector manufacturer agreed to this trend, in Germany, Mexico, France and Italy it is every tenth company. Solar process heat is therefore still a niche market segment, but with a huge potential for growth.

***IST: In all these years of your analysis where would you place India on the global map in terms of market growth on year to year basis? What is so significant about India?***

BE: India Solar Mission – unique in the world. In the Solar Mission 2010 showed the strong commitment of the Indian government to support the three solar technologies: PV, solar thermal and CSP. This is for sure unique in the world, since most political roadmaps are more general looking at a wide range of technologies, which usually caters the targets and the action plan for the solar heating and cooling sector. A second worth mentioning fact in India is that the market development is on track with the long-term targets for the solar thermal sector and that the industry is even confident enough to suggest a doubling of the target from 22 million m<sup>2</sup> of collector area installed by 2022 to 40 million m<sup>2</sup>. I would appreciate if some of this speed and impulse proceed to the European markets, where the RES 2020 targets are not on track and the confidence of the sector is low.

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