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

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Preview of the SoPro India project website

Commercialisation of Solar Energy in Urban and Industrial Areas

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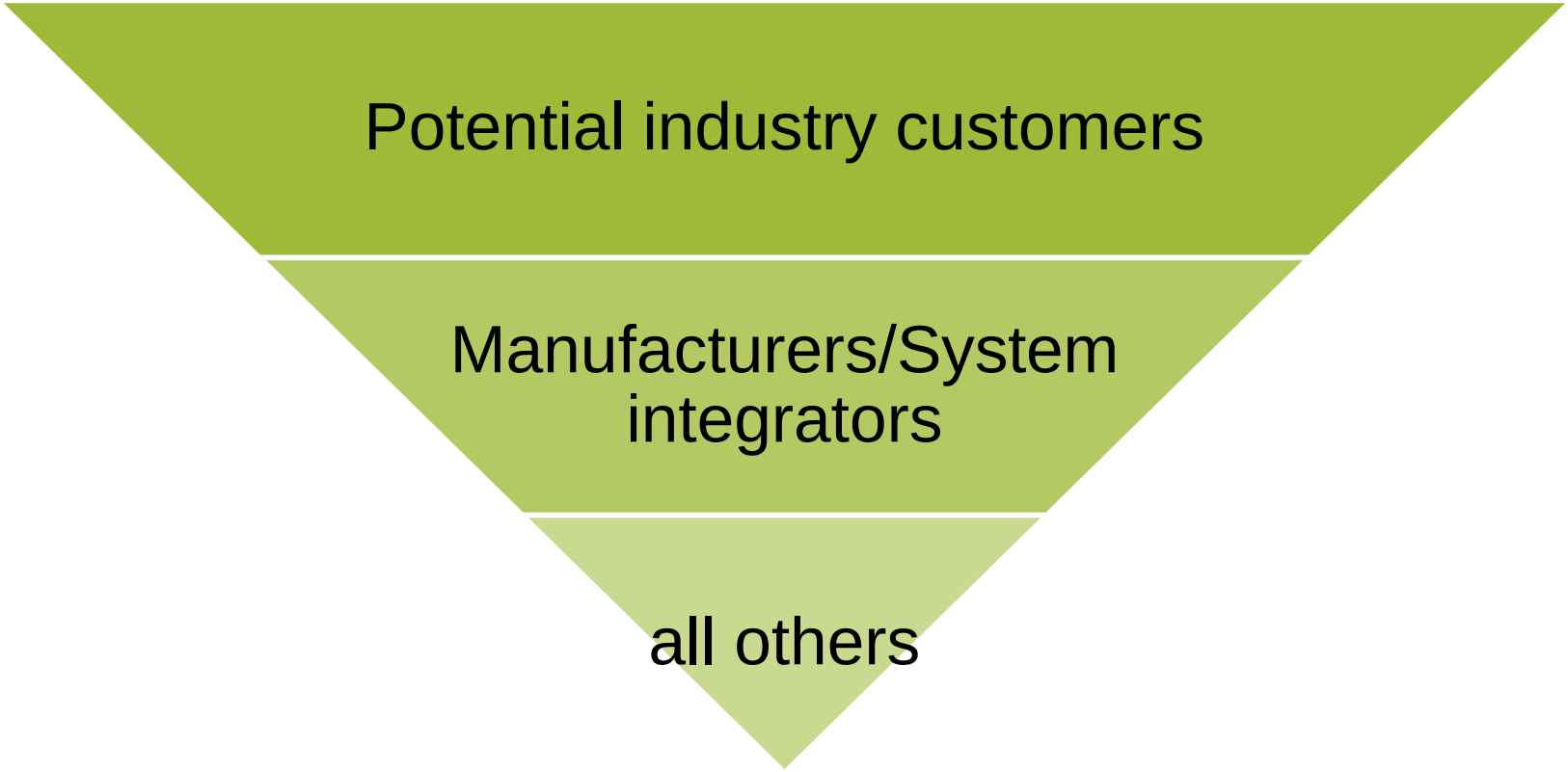
Indo-German Energy Programme

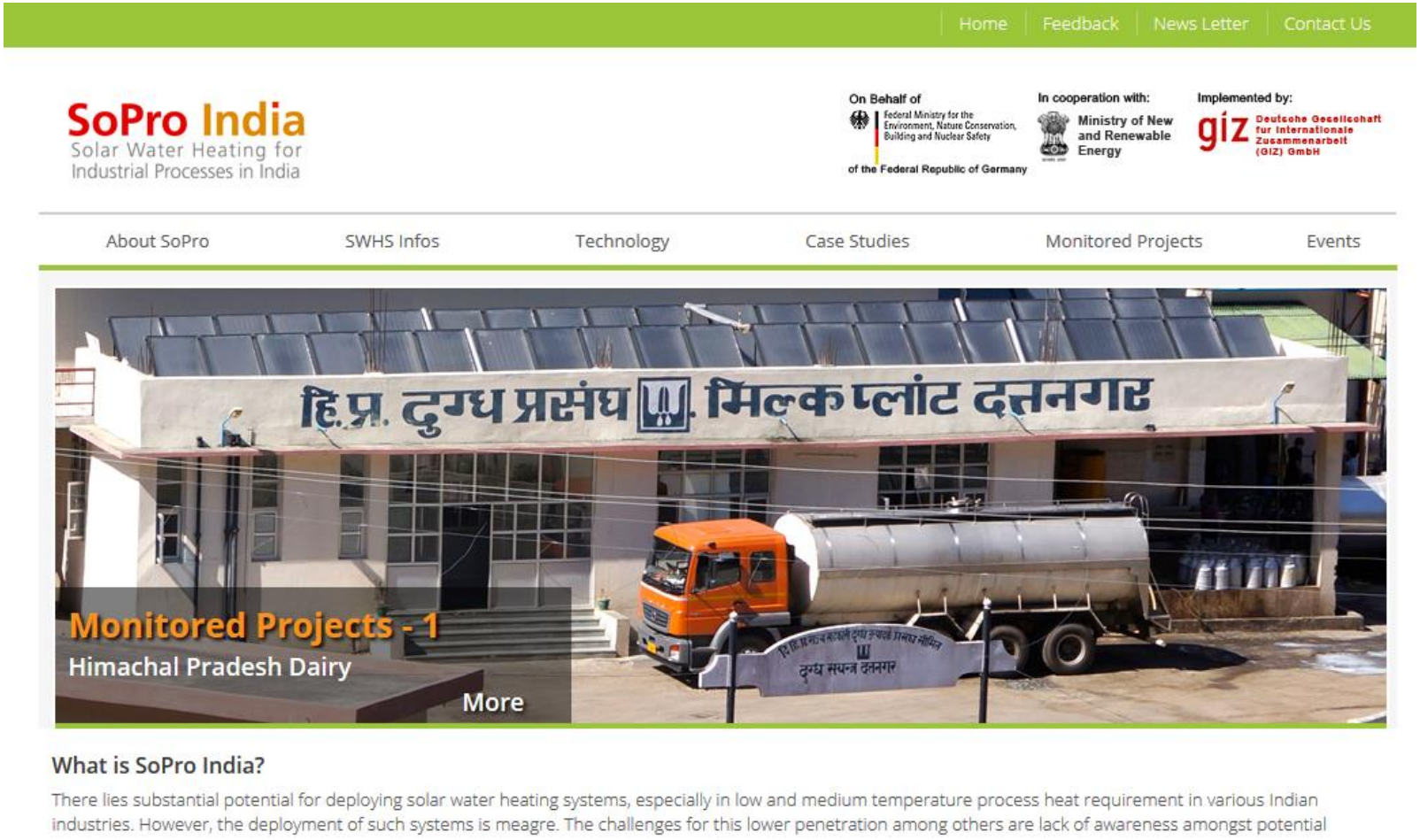
Objectives of the website

- Serve as marketing portal
- Build trust through presenting reliable information
- Raise awareness through presenting sound case studies
- Useful and sound information on designing and operating SWHS systems

Target group



Home page…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SoPro India
Solar Water Heating for Industrial Processes in India
On Behalf of
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany
In cooperation with:
Ministry of New and Renewable Energy
Implemented by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
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हि.प्र. दुग्ध प्रसंघ मिल्क प्लांट दत्तनगर
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More
What is SoPro India?
There lies substantial potential for deploying solar water heating systems, especially in low and medium temperature process heat requirement in various Indian industries. However, the deployment of such systems is meagre. The challenges for this lower penetration among others are lack of awareness amongst potential

Home page

What is SoPro India?

There lies substantial potential for deploying solar water heating systems, especially in low and medium temperature process heat requirement in various Indian industries. However, the deployment of such systems is meagre. The challenges for this lower penetration among others are lack of awareness amongst potential customers, concerns on reliability of technology, integration with the existing processes and dearth of reliable performance data of already installed and working plants.

The SoPro India project aims to address these challenges through

- Scientifically monitoring and presenting reliable information on key performance parameters of fuel saved and energy generated by SWHS.
- Raising awareness amongst potential customers through marketing existing system over a web platform.
- Presenting first concept of cheap, robust and reliable monitoring system in order to enable existing SWHS owner to understand how their system is performing and doing basic checks to improve its performance.
- Creating framework conditions for taking future work on fundamental aspects related to certification, design and operate SWHS.

Case Study - 2

Wheels India – Automobile

About SoPro
- Project at a Glance
- Fact sheet
- Consulting Partners

SWHS infos
- Why Solar Thermal Energy
- Typical Energy yield of SWHS Systems
- Quality and Certification

Technology
- Pre-Heating Systems
- Space Heating
- Industrial Process Heat ETC and FPC

Monitored Projects
- Case 1- HP Dairy
- Case 2- Synthokem Labs

Case studies- Structure

SoPro India
Solar Water Heating for Industrial Processes in India

On Behalf of Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of the Federal Republic of Germany
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About SoPro | SWHS Infos | Technology | Case Studies | Monitored Projects | Events

HP State Cooperative Milk Production Federation

--- Other Dairy Case Studies ---

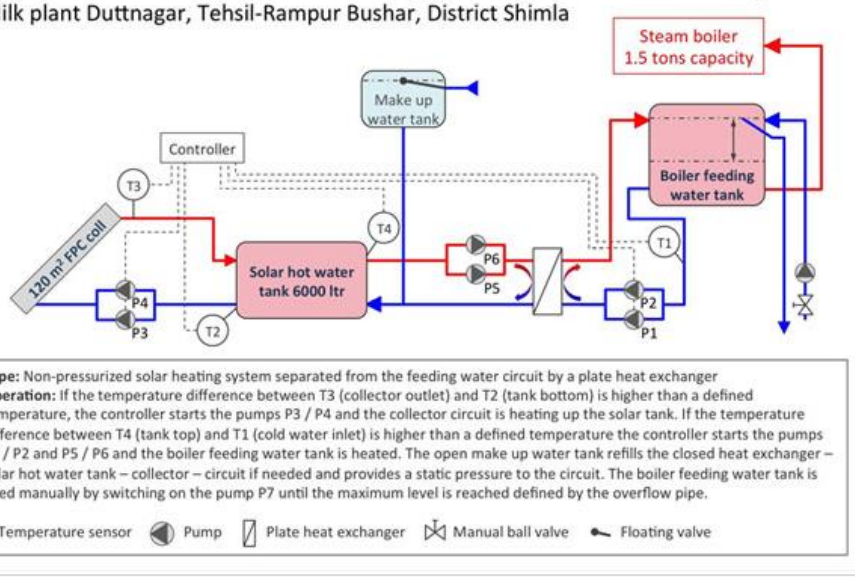
General Information | Technical Description | Energy balance | Economy | Experiences

Description of the solar thermal system

Type of solar plant	:	Non-pressurized FPC solar water heater plant for preheating of steam boiler feeding water. The SWHS is designed to deliver about 6000 LPD hot water with 60OC. (FPC = flat plate collector, LPD = litre per day)
Year of installation	:	The SHIP was commissioned in 2013.
Solar collector field	:	 The SWHS has 60 FPC panels with selective coating of 2 X 1 m size with a total gross area of 120 m2. The panels are installed over the flat roof of the plant. There are 5 collector fields connected in parallel. The collector field is oriented towards south-east.
Water storage tank	:	 The water storage tank has a volume of 6000 litre. It is insulated with rock wool of 100 mm thickness and protected by an aluminium cladding.

Case studies- technical description

Hydraulic scheme and operation of the system	:	**Hydraulic scheme** of the solar water heating system at Himachal Pradesh Dairy – Milk plant Duttnagar, Tehsil-Rampur Bushar, District Shimla
Supplier/ manufacturer of the solar system	:	The solar system was designed, delivered and commissioned by: *KotakUrja Pvt Ltd* *No.378,10th Cross,4th Phase,* *Peenya Industrial Estate,Bangalore* *www.kotakurja.com*
Data recorded	:	The plant maintains records for the HSD consumption each day.



Type: Non-pressurized solar heating system separated from the feeding water circuit by a plate heat exchanger
Operation: If the temperature difference between T3 (collector outlet) and T2 (tank bottom) is higher than a defined temperature, the controller starts the pumps P3 / P4 and the collector circuit is heating up the solar tank. If the temperature difference between T4 (tank top) and T1 (cold water inlet) is higher than a defined temperature the controller starts the pumps P1 / P2 and P5 / P6 and the boiler feeding water tank is heated. The open make up water tank refills the closed heat exchanger – solar hot water tank – collector – circuit if needed and provides a static pressure to the circuit. The boiler feeding water tank is filled manually by switching on the pump P7 until the maximum level is reached defined by the overflow pipe.

T Temperature sensor | Pump | Plate heat exchanger | Manual ball valve | Floating valve

Case studies- experiences

HP State Cooperative Milk Production Federation

--- Other Dairy Case Studies ---

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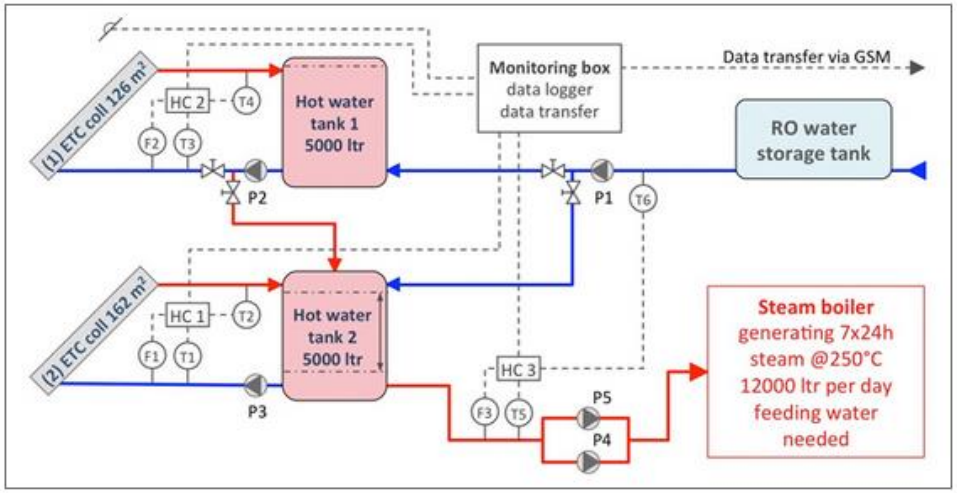
Experiences

Operation experience	:	The system has been functioning well.
Statement of the owner	:	 Rakesh Kumar Chauhan (Production Manager): "I am very satisfied with the solar hot water system, the temperature of the collector field reaches typically 60°C as expected."
Statement of the supplier/manufacturer	:	The manufacturer has also indicated that the plant has been functioning to their satisfaction.

Monitored projects

Case 2- Synthokem Labs

Monitoring system for the solar water heating system at Synthokem Labs



Type: Scientific monitoring system to measure the yield of the solar water heating system and subsystems

Concept: Each heat circuit has an own heat counter, which uss a flow meter F and the temperature difference between two temperature sensors T to calculate the thermal energy generated. Heat counter 1 and 2 measure the solar yield of the two solar fields, heat coutner 3 measures the total thermal energy delivered to the boiler which should be about the sum of heat coutner 1 and 2. Principapply the two temperature sensors of a heat counter must be positioned at palces where the fluid is flowing at the same time. This is not possible in the case of heat counter 3, however this is not a problem in this case since the RO water temperature T6 is constant. The pyranometer is positioned in the same angle than the collectors and measures the intensity of the solar irratdiation.

F Flow meter T Temp sensor HC Heat counter Pyranometer Pump Water level Gate valve

- Case 1- HP Dairy
- Case 2- Synthokem Labs

Other information

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Typical Energy yield of SWHS systems

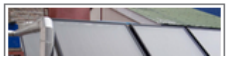
Solar thermal systems are converting solar irradiation into heat with high efficiency of up to 80%. However, what counts is the amount of fuel which is saved by the solar thermal system. One would expect that it is simple to evaluate the fuel savings, however it is more complicated then it looks like.

Here are the main factors influencing the solar energy yield:

- **Solar irradiation:** India is a sunny country, however the solar irradiation is not everywhere the same. In most parts of India, the annual average global solar irradiance on a horizontal area with 1 square meter is between 5 and 6 kWh per day this means 1,800 and 2,200 kWh per year.

- **Solar thermal collector:** How much of the solar irradiance is converted into useful thermal energy (heat) depends on the efficiency of the collector and on the temperature of the heat transfer fluid. Typically the efficiency is between 30% and 80% during operation.
- **Piping:** The heat transfer fluid (which can be water or freeze protected water-glycol mixture in cold regions) is circulating in pipes to the heat storage and the point of use. Some of the energy gets lost during the transport depending on the thermal insulation of the pipes.
- **Hot water storage tank:** A tank is typically installed to store the solar hot water since there is usually a mismatch between the solar water heating and the hot water usage. The hot water storage tank is loosing heat depending on the thermal insulation, the temperature of the hot water and the duration how long the heat is stored.

- **Heat demand:** The ability of the solar thermal system to deliver thermal energy depends also on the demand side. If the heat demand is low in relation to the collector area, then



- Why Solar Thermal Energy
- Typical Energy yield of SWHS Systems
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Web link

http://soproindia.in/

Thank you for your attention

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