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ENVIRONMENT AND ENERGY



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Market Development and Promotion of Solar Concentrator Based Process Heat Applications in India

PROJECT INFORMATION

Area: Environment and Energy

Budget: Total: US\$ 23.75 million

- US\$ 4.4 million (Global Environment Facility)
- US\$ 6 million (Ministry of New and Renewable Energy – Grant subsidy)
- US\$ 1.35 million (Ministry of New and Renewable Energy – In Kind)
- US\$ 6 million (Industries)
- US\$ 6 million (Financial Institutions)

Duration: 2012-2017

Government counterpart: Ministry of New and Renewable Energy, Government of India

Implementing partner(s): Ministry of New and Renewable Energy, Government of India; Solar Energy Centre

Location(s): National

Background

The industrial sector is second only to the residential sector in its energy consumption in India. Industries require both electricity and thermal energy for their processes. Key industries such as pharmaceuticals, chemicals, metal treatment, textiles, food and dairy processing require thermal energy and have a significant requirement of low and medium temperature heat (up to 250°C) as steam, as well as hot water, air and oil. Hot water and steam are also required in the commercial sector, such as in hotels, hospitals and other institutional buildings, for space cooling, cooking and space heating. Traditional fuels such as LPG, fuel oil, coal (for larger heat loads), biomass and electricity (for cooling) are used to meet thermal energy requirements. Low-cost natural gas is not widely available for process heat purposes in India, as in most other major countries.

Alternate clean energy sources such as solar energy are a viable option, given that India receives solar energy of 5-7 kilowatt-hours per square meter per day (kWh/m²/day). A significant part of industry's thermal energy requirements can be met by concentrating solar heat (CSH) technologies, which can supplement conventional fuels. In addition to decreasing energy costs, it can play a crucial role in reducing global carbon dioxide emissions, local air pollution and India's growing dependence on expensive imported oil.

In 2012, the baseline year, India had 85 installations with 25,000 square metres (m²) of collector area. CSH technologies for process heat applications are in their early stages of development. The use of CSH installations for cooking applications has been properly demonstrated in religious and educational institutions. However, their use in other applications, such as dairy pasteurization, food processing, metal treatment and space cooling, have not been sufficiently demonstrated. Only two

CSH technologies tested were commercially available in India, with annual CSH sales of around 3,000 m² per year. To promote the use of CSH technologies, the Ministry of New and Renewable Energy (MNRE) provides technology support, as well as subsidies on the capital costs of the systems.

About the project

The project aims to:

- Complement MNRE in its efforts to strengthen awareness and capacities and remove market and financial barriers to promote the use of CSH technologies;
- Provide technology application information packages suited to process heat applications, support three additional CSH technologies (bringing up the total to five) and establish test procedures and performance standards to ensure standardization and quality assurance;
- Strengthen technical capacities and create awareness among industry stakeholders on the use of CSH systems by conducting training programmes for manufacturers, installers and CSH users;
- Support 30 demonstration projects (15,000 m² of collector area) and 60 replication projects (30,000 m² of collector area) of CSH systems in at least five different sectors leading to the creation of a knowledge base of feasibility studies and detailed project reports that can enable performance monitoring of all supported pilot projects;
- Address financial barriers such as low payback on CSH investments and lack of performance-based incentives by enhancing the understanding of the financial viability of CSH technologies, undertaking innovative measures to mitigate investment risks and adopting favourable financial policies to promote CSH technologies

Results so far

- Reduced total CO₂ emissions by an estimated 6,200 tonnes annually by installing CSH systems for process heat applications in 210 establishments over an area of 52,000 m²
- Expanded manufacturing capacity of CSH systems by adding 28 manufacturers, all of whom follow technical specifications laid down by MNRE
- Provided inputs on specifications to help develop standardized norms under the Bureau of Indian Standards
- Created an information and knowledge base for CSH technologies by publishing monthly e-newsletters, a widely available quarterly magazine (Sun Focus) and a compendium of all informational material. Video capsules were made available on the CSH website (www.cshindia.in).
- Contributed to the academy by presenting 10 papers at national and international conferences
- Established two research and development facilities at the National Institute of Solar Energy, Gurgaon, and the University of Pune, Pune, where 12 systems were tested
- Helped address financial barriers to the adoption of CSH technologies, with five banks agreeing to lend for CSH systems, and four agreeing to provide loans at the priority lending rate

Looking to the future

- Install CSH systems for process heat applications in area of 85,000 m² and reduce cumulative CO₂ emission by 32,900 tonnes annually
- Actively use testing laboratories for certification to enable sales of certified systems in the Indian and international market
- Continue to address financial barriers to CSH adoption by encouraging banks to provide an equated monthly instalment (EMI) option for CSH systems

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