

About Solar Energy Centre

The SEC (Solar Energy Centre) of the Ministry of New and Renewable Energy, Government of India, is the technical focal point for the development of solar energy technologies. The Centre works on research and development of both solar thermal and photovoltaic technologies and practices, and contributes in advancement of related science and engineering. The facilities created at the Centre to enable it to perform its role are the most advanced and unique in India and south Asian region. Located at the outskirts of Delhi, the Centre provides an effective interface between the government and institutions, industry, and user organizations for widespread utilization of solar energy in the country.

About TERI

TERI (The Energy and Resources Institute), India, has been working on development of solar thermal systems for various applications. It has also successfully developed and marketed for the last five years biomass gasifier-based thermal and power generation systems to meet the power demand of isolated communities. TERI has gained valuable experience in setting up distributed energy systems with over 400 units installed, not only in India but also in countries like Bhutan, Nepal, Myanmar, Sri Lanka, and Bangladesh.

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About CSIRO

CSIRO (Commonwealth Scientific and Industrial Research Organisation), is widely recognized as one of the world's leading research organizations. It has wide ranging research activities in the fields of solar energy, cooling, and power generation. Relevant current research includes (i) an absorption refrigeration test facility, (ii) a solar absorption cooling demonstration, (iii) a demo of solar Rankine cycle power generation, (iv) a small-scale Rankine cycle fluid motor development (v) a small-scale adsorption cooling technology development and (vi) desiccant airconditioning developments. The CSIRO TrigenAir technology, which has been demonstrated at the Hornsby City Council Library, is a particularly relevant example of CSIRO's expertise and experience in sorption cooling systems.



WORKSHOP ON SOLAR COOLING

5 October 2009
Magnolia Hall, India Habitat Centre
New Delhi



Background

In a tropical country like India, the importance of refrigeration can hardly be over-emphasized. Around 70% of India's population is engaged in agriculture and the contribution of agricultural output amounts to 40% of the national income. The country is producing in excess of 60 million tonnes of fruits and vegetables per annum. While India's agricultural production base is quite strong, at the same time wastage of agricultural produce is massive. It is estimated that due to lack of proper storage and transit facilities, about 33% of the agricultural produce, especially fruits and vegetables, is spoiled. The wastage in fruits and vegetables is estimated to be about Rs 330 billion (US \$7.3 billion). India and other developing countries, which are predominantly agriculture-based economies, have a tremendous growth potential with respect to rural-based food processing. However, poor infrastructure including lack of integrated cooling facilities (that is, cold chains) has retarded the growth of the food processing industry. The Ministry of Food Processing in India has identified refrigeration and cold storages as the weakest link in the whole cold chain.

The lack of proper storage facilities has led to the following consequences:

- i Excess produce either floods the market and results in an oversupply or is totally wasted, and
- ii An artificial scarcity is created during non-harvesting periods.

Farmers, the majority of which are marginal and small farmers, are forced to sell their produce immediately after its harvest at low prices primarily due to the lack of storage facilities. In spite of tremendous growth in this sector, the cold storage capacity has been unable to keep pace with the growth in production especially in rural and remote areas. The conventional cold storages, which are being set up in urban and semi urban, areas are of 100TR and above capacity making them unviable for small village-level applications. Added to it is the problem of unavailability of grid power in many rural areas in India, and indeed, in most developing countries.

Thus, it is essential to enhance cold storage capacity to meet the ever-growing need for storage of perishable produce and also to reduce wastage. There are a number of larger cold storage facilities available but their locations are generally not within the reach of marginal and remotely located farmers. Generally, food production centres in many developing countries are situated in areas where the electrical power supply for the operation of conventional refrigeration plants is either unavailable or is erratic and unreliable. Furthermore, in the absence of proper storage of perishables, it is impossible to further process the produce. This in effect means that the rural populace is denied a decent livelihood opportunity by way of

value addition to the raw produce and necessitates the development of alternative, viable options to conventional cooling systems. Thus, there exists an urgent need to develop a smaller capacity refrigeration system, which can be operated independently of grid electricity.

This workshop is being organized under the aegis of an ongoing project titled 'Solar cooling for urban and remote rural applications' under Asia Pacific Partnership on Clean Development and Climate project that seeks to develop and demonstrate solar cooling products appropriate to key Indian and Australian applications. Specific target applications of the technology are: (i) Solar-biomass cooling for remote rural villages; targeting food preservation in developing countries such as India, and (ii) Solar cooling for urban homes; targeting residential air-conditioning in Australia and India. This is a collaborative project between the SEC (Solar Energy Centre), CSIRO (Commonwealth Scientific and Industrial Research Organization), Australia, and TERI; with Thermax and Rinnai as the industrial partners. This project aims to address the need of solar cooling by developing and testing a zero emissions 15 kW solar-biomass cooling system for remote and rural applications in un-electrified areas of India and other developing countries. A biomass-based producer gas engine generator will be used to supply backup heat for the solar cooling system and overcome intermittency in the solar heat source.

The workshop has been planned to review the national and international efforts on solar cooling in general, and solar thermal cooling in particular, with an aim to promote solar cooling technologies in various sectors of the country.

AGENDA

Venue Magnolia Hall, India Habitat Centre

Date 5 October 2009

0930–1000	Registration
1000–1045	Inaugural Session
1045–1100	Tea
1100–1330	State-of-the-art in Solar Cooling Technologies
1330–1415	Lunch
1415–1730	Technology Development
1600–1615	Tea
1615–1730	Field evaluation of Solar Cooling Technology
1730–1800	Recommendation/future action plan