

# Integrated Solar Dryer and Pyrolysis pilot plant

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**In News:** Dr. K J Sreeram, Director, CSIR-Central Leather Research Institute (CLRI), Chennai, laid the foundation stone for the Integrated Solar Dryer and Pyrolysis pilot on the 74th foundation day of CLRI on April 23, 2021.

## About Integrated Solar Dryer and Pyrolysis Pilot Plant

- The pilot is part of the Indo-German project 'Pyrasol' launched to transform urban organic waste into biochar and energy in smart cities.
- It was awarded to CSIR-CLRI by the Indo-German Science & Technology Centre.
- The project will ultimately lead to technology development for the joint processing of Fibrous Organic Waste (FOW) and Sewage Sludge (SS) of Indian smart cities into hygienic and highly valuable biochar associated with energy recovery, carbon sequestration and environmental improvement.
- Indo-German Science & Technology Centre (IGSTC) was established by the Department of Science & Technology (DST), Govt. of India & Federal Ministry of Education and Research (BMBF), Govt. of Germany to facilitate Indo-German R&D networking with emphasis on industry participation, applied research and technology development.
- IGSTC through its flagship program '2+2 Projects', catalyses innovation centric R&D projects by synergising the strength of research and academic institutions and public/private industries from India and Germany.

## Types of solar dryers

### Integrated solar dryers

- An integrated solar dryer is one in which solar energy collection and drying take place in a single unit.
- Cabinet dryers, rack dryers, tunnel dryers, greenhouse dryers, and multi-rack dryers fall under this category.
- Normally, these dryers are small in size and are stand-alone units.

### **Distributed solar dryers**

- A solar dryer in which solar energy collection and drying take place in separate units is known as a distributed solar dryer.
- This type of solar dryer has two parts:
  - (1) a flat-plate air heater
  - (2) a drying chamber.
- Air is heated in the flat-plate heater placed on the roof of the building or on the ground. Hot air from the air heater is circulated in the drying chamber with the help of a blower.
- These dryers can be designed in different sizes with various configurations, depending upon the temperature of hot air, airflow rate, types of products to be dried, etc.

### **Mixed-mode solar dryers**

- A solar dryer in which solar energy collection takes place in both air heater and drying unit, and drying takes place only in the drying unit, is known as a mixed-mode solar dryer.
- In this dryer, solar energy is collected through flat-plate solar collectors and also by the roof of the drying chamber.
- In large industrial drying systems, the solar-heated air is combined with air heated by conventional energy; this adds to the reliability of the system and at the same time helps in significantly reducing conventional energy consumption.

## Uses of solar dryer

- Solar dryers are more economical compared to dryers that run on conventional fuel/electricity.
- The drying process is completed in the most hygienic and eco-friendly way.
- Solar drying systems have low operation and maintenance costs.
- Solar dryers last longer. A typical dryer can last 15-20 years with minimum maintenance.

## Limitations

- Drying can be performed only during sunny days, unless the system is integrated with a conventional energy-based system.
- Due to limitations in solar energy collection, the solar drying process is slow in comparison with dryers that use conventional fuels.
- Normally, solar dryers can be utilized only for drying at 40-50°C.