

## MNRE-GEF-UNIDO Project

Promoting business models for  
increasing penetration and scaling  
up of solar energy

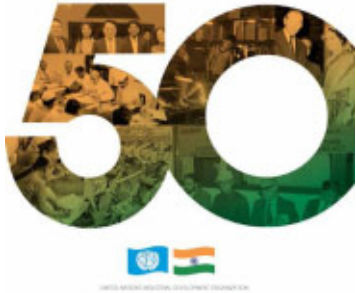


Anil Misra  
National Project Manager  
UNIDO

# UNIDO in India

50 TOGETHER  
for a sustainable future

Marking the 50<sup>th</sup> Anniversary of UNIDO  
UNIDO-India cooperation



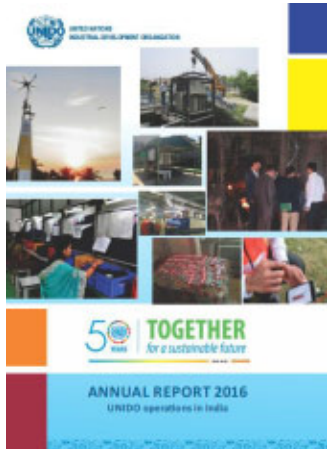
## ➤ Technical cooperation services since 1966

## ➤ 2013-2017 Country Programme

- Green industrial development
- Inclusive economic development
- South-South industrial cooperation
- Operationalized 24 projects with total budget of USD 87 million

## ➤ 2018-2022 Country Programming Framework

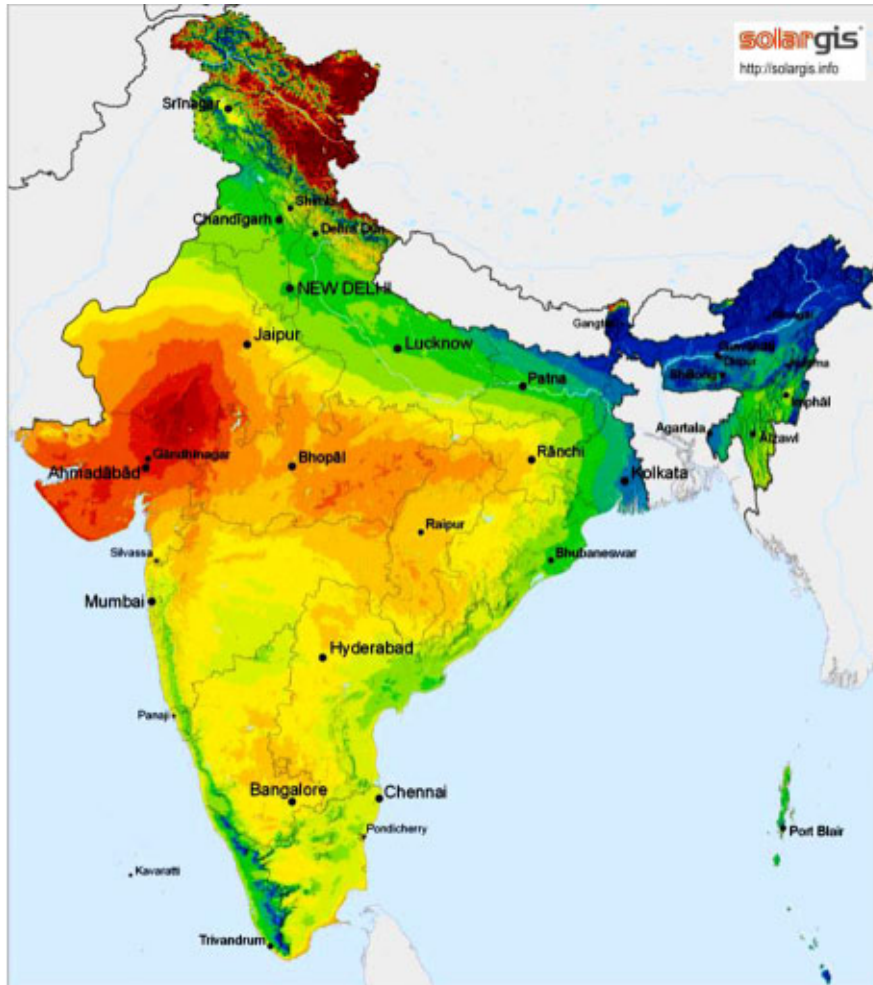
- Productive and resilient MSMEs
- Solutions for climate, resources and environment
- Inclusive and responsible value chains and business
- Strategic policy for industrial transformation





**Potential for deployment of CST technologies**  
**Current status and schemes to promote CSTs**  
**UNIDO's project supporting the growth of CST sector**

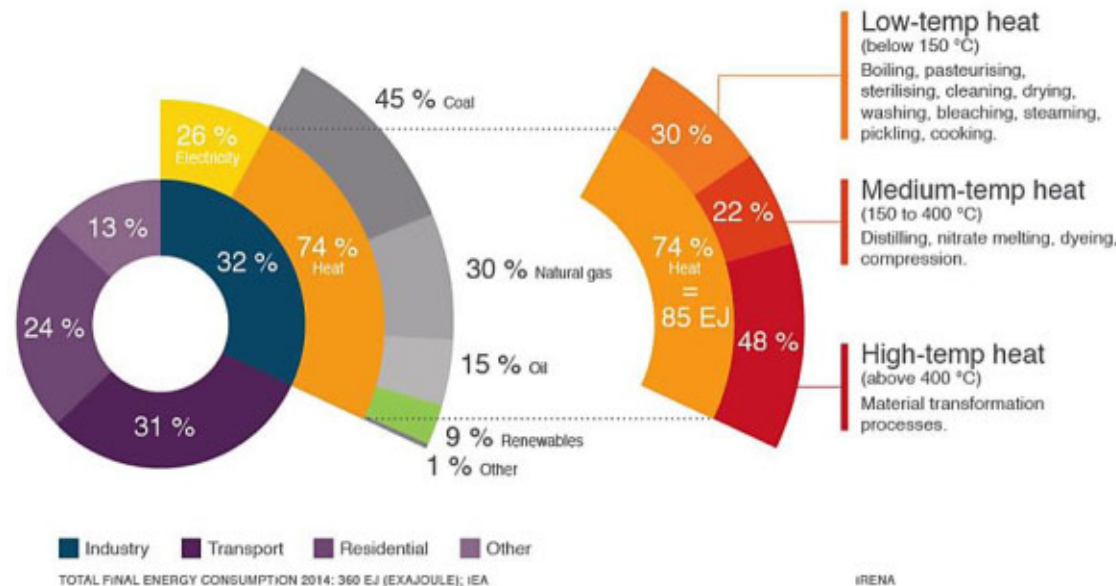
# Radiation Suitability for CSTs



- ✓ India has good climatic conditions to operate CST systems in direct competition to fossil fuels.
- ✓ Large number of potential customers - industrial units in many sectors.
- ✓ Applications: Process heat and steam, cooling, water desalination, hybridisation with biomass or biogas, electricity generation.
- ✓ Key criteria for the economical usage of solar thermal booster is a solar radiation DNI >1700 kWh/m<sup>2</sup> and possibly the availability of flat land or roof area.

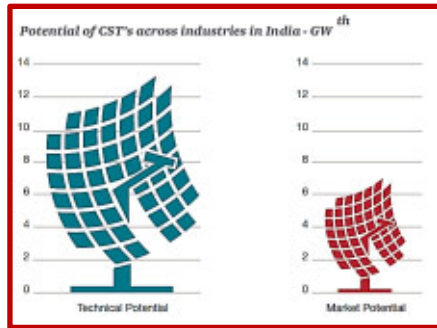
# Background

- ✓ Industrial energy consumption is responsible for 32% of India's total energy consumption.
- ✓ Energy demand of the Industrial sector accounted for 42% of the imported crude oil in 2014-15 (189.43 mil. tonnes), out of which around 30 mil. tonnes provided thermal energy at temperatures below 250 °C.
- ✓ A small part of energy demand is met by electricity, rest by coal, biomass, oil products and gas, indicating that a large amount of energy in the industrial sectors is used to provide thermal energy/heat.
- ✓ Industrial heat is characterized by a wide diversity with respect to temperature levels, pressures and production processes to meet the many different industrial process demands.
- ✓ Solar technologies can produce a range of temperatures, between 50°C and 400°C, which can be used in a variety of these thermal applications.





# Potential of CST Deployment



**Technical potential:** fraction of resource potential that can be used under the existing technical restrictions.

$$= \text{Potential for Energy Input During Sunshine Hours} * \text{Process Mapping Multiplier} * \text{Process Constraints Multiplier} * \text{Concentrated Technologies Multiplier}$$

**Market potential:** final CST potential incorporating the market dynamics (acceptability, financial viability, space limitations, etc.).

Potential (GW)  
0 50 100 150 200 250 300 350

Energy Requirement of Industries **293,18** Current energy requirement, 100%

Equivalent Input from Solar Thermal **260,61** Equivalent energy input from CSTs, 89%

Potential for Input During Sunny Hours **70,28** The Energy Input during sunny hours in a year, 21.3%

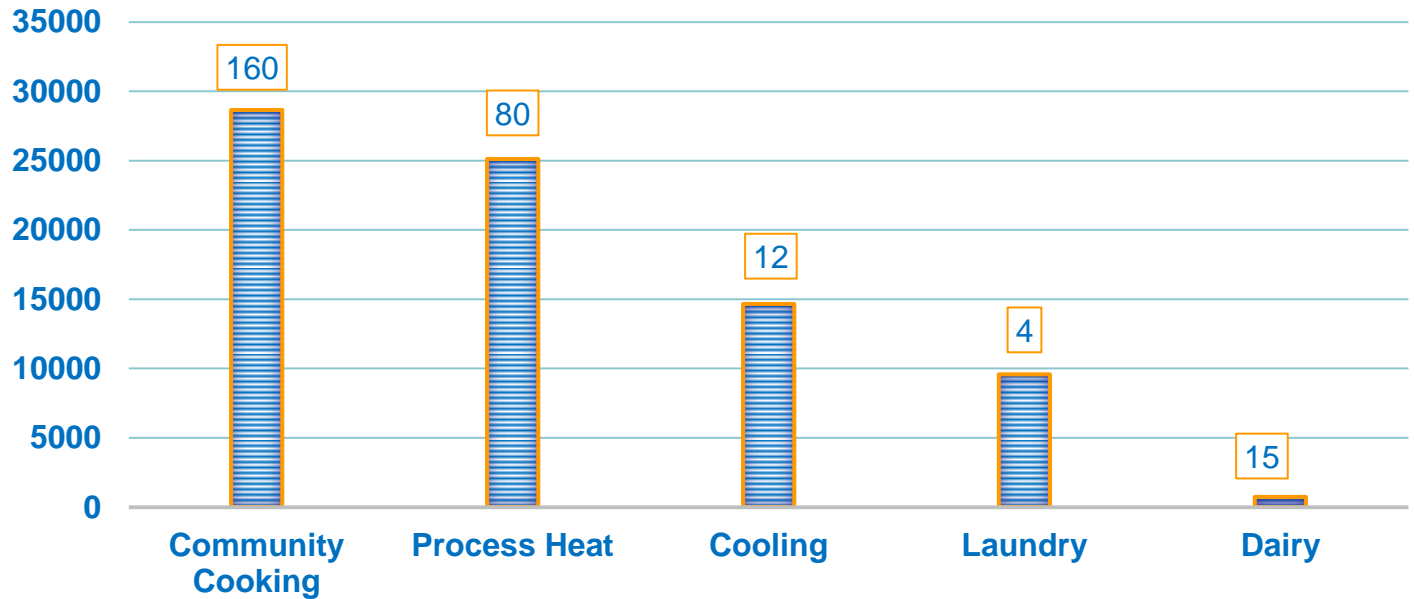
Process Mapping **28,11** Mapping industry-wise processes, 8.5%

Process Constraints **23,90** Market Forces incl. financial viability, willingness to implement & land availability, 7.3%

Technical Potential of CST's **13,45** Solar thermal potential, 4.4%

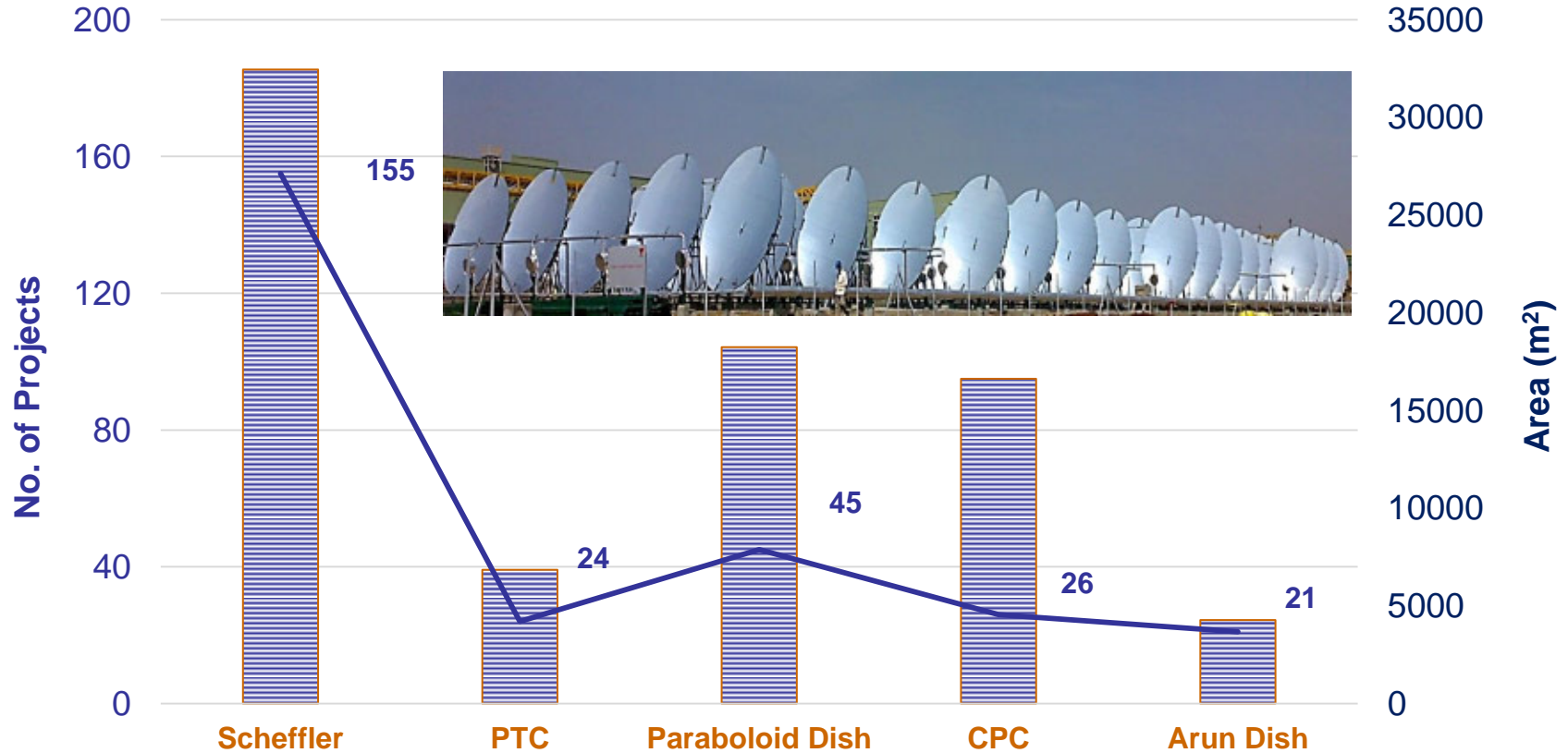
Market Potential of CST's **6,45** Eliminating processes that may use solar thermal instead (70% of processes below 100 °C)

# Applications and Potential Sectors for CST Deployment



S. No.	Sector	S. No.	Sector
1	Textiles (Weaving, Finishing)	8	Rubber
2	Pharmaceuticals	9	Chemical & Fertiliser
3	Dairy	10	Petroleum Refineries
4	Breweries	11	Desalination
5	Pulp & paper	12	Ceramic tile & pottery
6	Electroplating	13	PoP, Steel re-rolling, Cement, Mining
7	Food processing (including Sugar industry)	14	Other industries including tertiary use of steam/cooling

# CST Technologies used in the Installations



**Total No. of projects = 271 (Collector area = 79,761 m<sup>2</sup>; Power = 53.16 MW)**





**Chitle Dairy, Sangli  
(338 m<sup>2</sup>; Milk Pasteurization)**



**Paraboloid Dishes at Synthokem  
Pharmaceutical, Hyderabad  
(540 m<sup>2</sup>; Process Heating)**



**Parabolic Trough Collectors  
at Honeywell Technology  
Solutions, Hyderabad  
(820 m<sup>2</sup>; Cooling)**



**Non- imaging Collectors at  
Neel Metal, Gurgaon  
(612 m<sup>2</sup>; Process Heating)**



**Parabolic Trough Collectors  
at Siddhartha Surgical, Vadodara  
(263 m<sup>2</sup>; Process Heating)**



## Central Financial support available for CST projects

Solar Collector Type	Benchmark Cost (USD/ m <sup>2</sup> )
Solar Collector Systems for Direct Heating	172
Concentrator with Manual tracking (Dish solar cookers)	100
Solar Collector Systems for Direct Heating & drying and Non imaging/ Compound Parabolic Concentrators (NIC/CPC)	172
CSTs with single axis tracking (including Scheffler Dishes)	214
CSTs with single axis tracking, Solar Grade Mirror/ Reflector & Evacuated tube collectors	258
CSTs with double axis tracking	286

- 30% of the bench mark cost or actual cost (whichever is less) to all beneficiaries in all states.
- 60% of the bench mark cost or actual cost (whichever is less) to Non-profit making bodies and institutions in special category states, viz., NE states, Sikkim, J&K, Himachal Pradesh, Uttarakhand and islands.
- Accelerated depreciation (AD) benefits to profit making bodies.
- The pattern of subsidy to continue for 2 years where after, it will be reduced to 20% and 40% respectively.

## Central Financial support for CST projects (Highlights)

- No upper cap on the subsidy to be provided on CST based systems.
- The subsidy will be released to implementing agencies/Channel Partners/beneficiaries on a reimbursement basis after successful commissioning of the system and on receipt of relevant documents.
- A CST Project should have been approval by the Ministry before its implementation. Projects started before sanctioning will not be eligible for the subsidy.
- The projects will have to be completed within 12 to 18 months. Non completion of the projects within this time might attract reduction or forfeiture of eligible subsidy from MNRE.
- Mirrors of solar grade quality will be made mandatory for CST based systems after one year of operation of this scheme.



## UNIDO's Project

The project aims to complement MNRE's support programme by helping to **remove barriers associated with Concentrating Solar Thermal (CST) technology, its awareness, capacity building, market and financial barriers.**

**The project will therefore assist in the commercialization of concentrating solar technologies by innovating the technical and financial support**

## Financing Arrangement under UNIDO project

- ✓ The beneficiary's or project developer's contribution would be 25%.
- ✓ Subsidy of 30% would be provided by MNRE.
- ✓ Bridge loan against subsidy and at normal interest rate would be available.
- ✓ Loan for the remaining amount would be provided at an interest subvention of 5%. The funds under the UNIDO project would be used for subvention of the interest rate.
- ✓ In this manner, 75% of the project cost could be considered upfront for the provision of loan, including the bridge loan for short period till the completion and successful demonstration of the system.
- ✓ Both the loan and MNRE subsidy would be bundled in form a financial package by IREDA. Therefore, a single project application would be required from the beneficiary for loan, subsidy and interest subvention under this scheme.
- ✓ Support is available also for improving the manufacturing of CST system/components besides technical support.



## Benefits of the Scheme

### Soft Loan for the Project

- ✓ Soft loan for 45% of the Project Cost under UNIDO Interest Subvention of 5%

### Single Window for Multiple Funding

- ✓ Application for MNRE Subsidy, Soft Loan under UNIDO Subvention Scheme and Bridge Loan against MNRE Subsidy to be filed at a single window i.e. IREDA

### Simpler Processing and Documentation

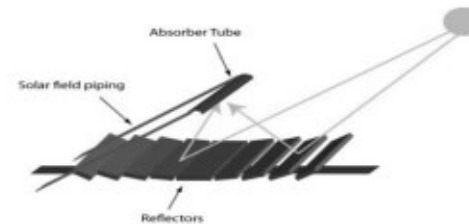
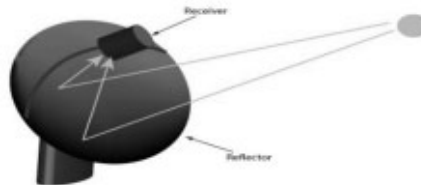
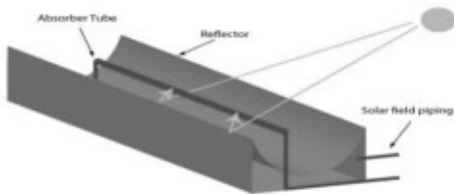
- ✓ Composite loan application form for Soft Loan and Bridge Loan

### Increased Availability of Finance and Faster Disbursal of subsidy

- ✓ Effective method for lowering capital cost of project by providing faster incentives and reducing the burden of lack of working capital



Anil Misra  
a.k.misra@unido.org





**SUSTAINABLE DEVELOPMENT GOAL 9**  
INDUSTRY, INNOVATION AND INFRASTRUCTURE