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## **Project Inception Report**

# **UNDP-GEF Project “Market Development of Solar Concentrating Systems for Process Heat Applications in India”**

**Prior Consultations:** 8<sup>th</sup> May 2012 at MNRE  
**Inception workshop:** 18<sup>th</sup> May, 2012 at Hotel Ashok, New Delhi

**Government of India  
Ministry of New & Renewable Energy**

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## EXECUTIVE SUMMARY

India is endowed with a vast solar energy potential. About 5,000 trillion kWh per year of solar energy is incident over India's land area, with nearly all of India receiving an average 5-7kWh/m<sup>2</sup>/day. The abundant solar radiation, clean character of solar energy, high cost of fossil fuels and negative emission consequences along with large requirements for process heat below 250°C are the key drivers of the strong focus on the development of solar thermal applications in India. The use of solar concentrator to meet the process heat requirement of community, industrial and commercial establishments is an emerging and exciting market opportunity in India.

The Ministry of New and Renewable Energy is implementing a National Programme on Solar Thermal aimed at peak shaving, conservation of electricity and fossil fuels and providing a clean, non-polluting solution to meet the process heat requirement in community, commercial and industrial sectors. Various promotional incentives in the form of capital subsidy or soft loan are available for solar energy projects under the Jawaharlal Nehru National Solar Mission (JNNSM).

To boost the use of Concentrating Solar Technologies, the Ministry is implementing a new UNDP-GEF supported project on "Market Development & Promotion of Solar Concentrator based Process Heat Applications in India". The objective of the project is to promote and commercialize Concentrating Solar Technologies for industrial process heat applications in India and facilitating the installation of 45,000 m<sup>2</sup> of installed solar collector area by March 2017 through demonstration and replicated projects.

As part of the project, an inception workshop was organised on 18th May 2012 at Hotel Ashok, New Delhi. It was attended by over 200 stakeholders from all over the country including officers from MNRE and UNDP. The purpose of the workshop was to make all these stakeholders aware of the project activities and to know their interested in contributing to those activities.

The workshop proceeding was divided into three session. Opening session started with the address by Sh.Tarun Kapoor, Joint Secretary, MNRE and a detailed presentation on project activities by Dr. A. K. Singhal, Director, MNRE & National Project Manager of the project. Second session was chaired by Dr. Bibek Bandyopadhyay ,Adviser MNRE wherein the focus was to highlight the present status on concentrating solar technologies under promotion in the country. These technologies included Parabolic Trough Concentrators Fresnel reflector based ARUN Dish, Scheffler concentrators, Linear Fresnel Reflector (LFR) and Paraboloid dishes. The third session was chaired by Mr Alok Srivastava, Joint Secretary (IR), MNRE which focused on the prospects & barriers in the CSH market

During this session the UNDP-GEF Project on "Concentrating Solar Heat" was also formally launched for its implementation by Sh. Girish B. Pradhan, Secretray, MNRE apart from launching of a specific website on solar water heaters developed under a different UNDP-GEF project on solar water heating systems.

The workshop was found to be conducted well satisfactory as it gave a platform to various stakeholders and to the speakers to discuss about barriers, limitation, opportunities and the potential in promoting CSTs in industrial and commercial establishments. Around 12 manufacturers also showed interest in bringing posters on their technologies in the workshop which were displayed for the information of participants. Participants were able to know about the technologies and their status on implementation in the country. The

Workshop created a great enthusiasm among participants towards development and promotion of Concentrating Solar Technologies (CSTs) in the country for community cooking, process heat and cooling applications. It helped participants in understanding various components of the Project and activities planned to be performed in five years' duration of the Project. Many institutions/ industries/ individuals such as TERI, Thermax,NPC, Asahi Glass, ATE Enterprises, SSVPS BSD College of Engg, Dhule, Essential Equipments, SITRA, SPRERI, IIT Bombay, Enersun Power Tech. Ltd, CII, etc showed interest in participating under various activities of the Project.

## 1. Background

The Ministry of New and Renewable Energy (MNRE) signed a new GEF funded project “Market Development and Promotion of Solar Concentrator based Process Heat Applications”<sup>1</sup> with UNDP India on 28<sup>th</sup> March 2012 for implementation during a period of 5 years, which also a project start date. The objective of the project is to increase the use and promotion of Concentrated Solar Heat (CSH) systems for low and medium temperature process heat applications. This will be achieved through barrier removal activities proposed in the project and achieve wider adoption of CSH technologies in India. The total allocated budget of the project is 23.75 million USD of this total allocation 4.40 million USD is being provided by GEF and 7.35 million USD is by the Ministry. Rest is to be met by industry beneficiaries and the financial institutions. The project aim is to reduce GHG emissions by increasing the use and promotion of CSH systems for low and medium temperature process heat applications in India. Major components of the project include:

- i) Technical capacity development
- ii) Awareness enhancement and capacity building
- iii) Pilot demonstration & replication of CSH technologies for various applications;
- iv) Sustainable financial approach in adoption of CSH technologies applications

Through this project, it is expected to install 45,000 sq. m. of concentrating solar technologies area in around 90 industries and commercial establishments which could result in 39,200 tonnes of CO<sub>2</sub> emission reductions and saving of 3.15 million liters of fuel oil per year.

The Project envisages active stakeholder involvement including industry associations, manufacturers, research & test centers, technical experts, entrepreneurs, state nodal agencies, financial institutions/banks, central ministries/departments, international organizations etc. Accordingly, as part of project inception, a stakeholders’ consultation workshop was organized on 18<sup>th</sup> May 2012 at Hotel Ashok, New Delhi. It was attended by over 200 participants from all over the country including officers from MNRE and UNDP. The programme and the list of participants of the Workshop are placed at **Annexure-I & II**. A poster session was also organized in the workshop wherein about 12 manufacturers displayed information on their technologies related solar concentrators.

## 2. Pre Inception Workshop Meetings

### 2.1 Signing of Project Document

The project execution started on 28<sup>th</sup> March, 2012 by signing of the project document (Pro-Doc) between MNRE and UNDP. A small get together was organized for signing of the document wherein about 30 senior officers from MNRE and UNDP were present. Secretary, MNRE graced the function.

During the event, a concise presentation was made by Dr. A. K. Singhal, Director, MNRE and National Project manager, CSH Project to brief about the project activities and budget break up to the participants. It was followed by remarks from Secretary, MNRE and signing of the document by Sh. Tarun Kapoor, Joint Secretary, MNRE and Ms Alexandra Solovieva, Deputy Country Director, UNDP, India.

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<sup>1</sup> Also referred in the text as CSH project.

## **2.2 Project Executive Committee (PEC) Meeting**

Signing of the document was followed by formation of the Project Executive Committee whose 1<sup>st</sup> meeting was held on 11<sup>th</sup> April, 2012 to chalk out further course of action on implementation of the project. Major decisions taken in the meeting were as below.

- i) The Inception Workshop may be organized in third week of May at some prominent venue. Hon'ble Minister may be invited for inauguration. In the list of participants all the stakeholders may be included which are given at page 23 to 25 of project document apart from CSP developers. A couple of user organizations invited may also be asked to narrate their success stories in the workshop.
- ii) A letter may be addressed immediately to IREDA for opening a separate Savings Account for the Project.
- iii) AWP-2012 may be prepared in consultation with UNDP and SEC and submitted to UNDP urgently for drawing the GEF money to start activities in the Project. The AWP may include technology mapping work by SEC, MNRE; consultancy development programme and test protocol development for CSH systems
- iv) IREDA needs to energize itself to provide loans to the beneficiaries of Concentrating Solar Systems for Process Heat. The minimum loan amount limit may be reduced to INR.20 lakhs<sup>2</sup> from INR.50 lakhs per Project as a special case for CSH Technologies. IREDA needs to interact with other commercial banks also to rope them in for providing loans for CSH Projects.
- v) Action may be initiated to appoint support staff under the Project along with a Technical Officer as per the requirement.

## **2.3 Stakeholders Consultation**

### **2.3.1 Approach Followed**

The consultation meeting was attended by the officials of MNRE, Solar Energy Center (SEC), Gurgaon and UNDP India. National Consultant involved in preparing the FSP for submission and seeking grant from GEF on this project was also invited in the meeting. Basic objective of the meeting was to go into details of the project document and understand its components and various activities which need to be performed in a time bound manner. With small presentations from SEC and UNDP officials who were actively involved in formulation of the Project Document along with national Consultant, brain storming discussions were held among participants on various components and aspects of the project with outcomes as per below.

### **2.3.2 Outcomes on various aspects of Project**

#### **2.3.2(a) Project Design**

The participants of the consultation meeting found that though the project document was well formulated with each and every item well explained, it had too many components/outcomes/outputs/activities which could confuse to various stakeholders participating in the project. The major confusion was in outcomes and outputs which seemed to be similar. There were a few other activities like development of projects in ESCO mode, exploration of CDM opportunities, development of manufacturing facilities for solar glass mirrors & evacuated tube heat receivers etc. which are important, but these were not found to be included in the project document. Participants suggested that all the activities of the project could be placed under following headings for the better understanding of various stakeholders.

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<sup>2</sup> 1 lakh = 0.1 million

## **Component-1: Technical capacity development**

*Outcome 1.1: Enhanced understanding of CSH technologies, applications and markets*

*Outcome 1.2: Adoption of standards and specifications for guidance of manufacturers and users for assurance of CSH quality, safety, and performance*

*Outcome 1.3: Adequately capable and operational testing laboratories for verification of manufacturer claims and guidance of CSH users to enable informed decisions*

### **Activities**

#### Information packages

- 1.1 Technology assessment of Concentrating Solar Systems world-wide & their scope of promotion in India
- 1.2 Status report on functioning of existing CST installations in the country
- 1.3 Development of performance measuring norms & equipment/instruments required for CSTs
- 1.4 Performance assessment reports of few existing installations on different technologies & applications at locations with different DNI
- 1.5 Potential market assessment studies of CSTs for process heat & cooling applications
- 1.6 Identification & development of suitable technological packages for various establishments/industrial units & applications. This will include best practices involved in installation & integration of CSTs with conventional systems

#### Standards/Specifications & Test Facilities

- 1.7 Development of National standards & component specifications of different CSTs for adaption by BIS & ISO
- 1.8 Development of Test procedure & 'Proof -of -Concept' testing on new technologies
- 1.9 Development of field performance monitoring guidelines for CSH end-use applications
- 1.10 Establishment of National test facility for CSTs at SEC
- 1.11 Strengthening of at least one Regional test centre for test facility of CSTs
- 1.12 Mobile test set up for performance evaluation in field

## **Component 2: Enhanced awareness and capacity building**

*Outcome 2.1: Strengthened technical capacity and awareness of stakeholders of CSH systems for industrial/ institutional process heat applications*

*Outcome 2.2: CSH project deliverables facilitated and/or influenced the wide spread replication of CSH technology applications in India*

### **Activities**

#### Training Programmes for various Stakeholders

- 2.1 Training needs assessment for various stakeholders
- 2.2 Development of course materials for training of users, installers, dealers, manufacturers, etc.
- 2.3 Organisation of training programmes for various stakeholders
- 2.4 Manpower development of Ph.Ds & M.Techs in the field of CSTs at Solar Energy Centre & various other academic institutions
- 2.5 Organise and conduct international training program on testing for various stakeholders and exposure to CSTs that are commercially available in abroad

(mainly for SEC staff and staff at regional testing centre where industries to share at least 50% cost if intended to send their staff).

#### Industry development & their partnership with academic institutions

- 2.6 Enhancement of manufacturing units on different types of CSTs for process heat applications
- 2.7 Development of manufacturing facilities for solar glass mirrors & evacuated tube heat receivers
- 2.8 Development of technology platform comprising of experts from academic institutions & industries

#### Awareness generation & Market Development Programs

- 2.9 Publicity & awareness campaign through print/electronic media and hoardings
- 2.10 Organisation and conduct of awareness programmes (20 numbers)
- 2.11 Organisation and conduct of International CSH conference and exhibition in year 2 and 4.
- 2.12 Organisation of national seminars/workshops
- 2.13 Participation in industrial exhibitions & trade fairs
- 2.14 Market Development Programmes for various industrial & commercial sectors

#### Knowledge Products

- 2.15 Design, launch and operate project website on CSTs
- 2.16 Monthly newsletter/publications in trade/industrial magazines etc
- 2.17 Development of case studies & success stories
- 2.18 Training manuals for installers & manufacturers/suppliers
- 2.19 Design handbook on CSTs

### **Component-3: Pilot demonstration of CSH technologies for various applications**

*Outcome 3.1: Increased number of commercial and near-commercial CSH technologies for diversity of applications.*

*Outcome 3.2: Improved technical and economic performance of commercial and near-commercial CSH technologies in an increased diversity of applications*

#### **Activities**

- 3.1 Identification of potential sites for demonstration projects
- 3.2 Conduct feasibility studies & preparation of DPRs for potential sites
- 3.3 Execution of demonstration projects on different technologies/applications in different sectors/establishments
- 3.4 Performance monitoring and evaluation of demonstration projects
- 3.5 Development and maintenance of CSH projects database
- 3.6 Preparation of case studies
- 3.7 Development, installation and commissioning of replication projects
- 3.8 Performance monitoring and evaluation of replication projects

### **Component 4: Sustainable financial approach in the adoption of CSH technologies & applications in India**

*Outcome 4.1: Enhanced understanding of the financial viability of CSH technologies and measures to mitigate investment risks*

*Outcome 4.2: Promulgation of favourable financial policies that promote increased use and promotion of CSH for low and medium temperature process heat applications*

## **Activities**

- 4.1 Identification of banks/FIs for their interest in providing loans to CSH customers
- 4.2 Financial viability analysis of CSH technologies and technology packages application in different sectors
- 4.3 Development of suitable financial packages for customers on the installation of CSH systems
- 4.4 Development of projects in ESCO mode
- 4.5 Assessment of alternative financing options for CSH systems promotion and recommendations for policies on financial incentives, schemes and mechanisms

### **2.3.2(b) Project Key Indicators, Assumptions and Risks**

No change was envisaged by the participants on this component of the Project Document

### **2.3.2(c) Stakeholder Involvement Plan**

No change was envisaged by the participants on this component of the Project Document

### **2.3.2(d) Benefits of the Project**

No change was envisaged by the participants on this component of the Project Document

### **2.3.2(e) Project Oversight and Management**

Two Committees namely Project Advisory & Project Steering Committees are proposed in the Project Document to be formed which can meet once in 6 months for making Management decisions & to advise & guide to Project Management Unit (PMU). It was, however, suggested that one joint Committee namely Project Advisory & Steering Committee (PASC) may be formed instead two as the same Committee could look into all the aspects of both Committees. Composition of PASC and Project Executive Committee (PEC) will be as below:

#### **Project Advisory & Steering Committee (PASC)**

- Chairman : Secretary, MNRE
- Responsible for making Management decisions & to advise & guide to Project Management Unit (PMU)
- Members : MNRE, MoEF, MSME, BIS, BEE, IREDA, UNDP, GEF, DEA, IREDA, NABARD, SEC, Research institutions, Industry Associations, DG Boiler Control etc.
- To meet at least twice in a year

#### **Project Executive Committee (PEC)**

- Chairman : Joint Secretary & National Project Director
- Responsible for successful execution of the Project through guidance & supervision of PMU's activities
- Members : MNRE, SEC, IREDA & UNDP India
- To meet once in 2 months at least

Detailed discussions were held on the staff and officers required for successful implementation of the project during 5 years of its duration. Keeping in view of the provision already made in the project and the budget available, the members felt that following structure would be required for the PMU:

## Project Management Unit (PMU)

- ✓ National Project Manager - GEF Funds  
(Presently NPM is Director, MNRE who is drawing salaries from Government and is retiring on 31<sup>st</sup> October, 2012 )
- ✓ Deputy Project Manager - GEF Funds  
(Already appointed in Global Solar Water Heating Project (GSWHP) last year which is completing on 31<sup>st</sup> December, 2012)
- ✓ Component Manager\* (2) - GEF Funds
- ✓ Support Staff - GEF Funds  
( Staff already working in GSWHP may continue in this project after 31<sup>st</sup> December, 2012 with one or two to be taken as per requirement)
- ✓ PM (Admn. & Fin.) - MNRE Funds

\*Component Manager has been mentioned as Institutions in the Pro-doc which may help preparing feasibility studies and DPRs for demonstration and replicated projects. It was, however, proposed that one institution (to be identified in the country) and one Technical officer appointed in the PMU will serve better for successful implementation of the project.

### 2.3.2(f) Project Progress Reporting

No change was envisaged by the participants on this component of the Project Document

### 2.3.2(g) Monitoring and Evaluation Plan

No change was envisaged by the participants on this component of the Project Document

### 2.3.2(h) Annual Work Plan, Budget and Co-financing

This component was discussed in detail and based on the discussions held AWP 2012 was later prepared and submitted to UNDP. A small re-adjustment of Annual Budgeting was also suggested which is given as below. The Co-financing structure was found to be O.K.

In USD

Project Budget	Budget 2012	Budget 2013	Budget 2014	Budget 2015	Budget 2016
4,400,000	2,47,500	1,000,000	1,200,000	1,000,000	992,500

### 2.3.2(i) Overall Project Time-frame and Schedule

No change was envisaged by the participants on this component of the Project Document

## 2.4 Proceedings of inception workshop (18<sup>th</sup> May 2012)

### 2.4.1 Opening Session (10:00 to 11:15 hrs)

1. The Inception workshop started with the welcome address by Mr Tarun Kapoor, JS, MNRE. He welcomed Ms Alexandra Solovieva, DCD, UNDP and all the delegates attending the workshop. Mr Kapoor stressed the need for utilizing solar energy for industrial energy requirements. He said that a large part of India's foreign exchange reserves is consumed in importing oil. A continuous increase in the import of oil is

adversely affecting our foreign exchange reserves and hence is a contributing factor to the fall in the rupee value. In this context, it is important for the country to increase utilization of Renewable Energy to replace imported oil. Amongst renewable energy alternatives, solar energy is the most promising option. He informed that India has made a good progress in the implementation of grid connected solar power under the National Solar Mission. Around 950 MW installed capacity of grid connected solar power has been achieved, well ahead of the targets set as per the National Solar Mission. The UNDP-GEF project would bring focus on the use of solar energy in the industrial sector, and would fill the gaps (as in removing of barriers) and help the sector utilize the resources & support provided by MNRE.

2. Ms Alexandra Solovieva, DCD, UNDP spoke next. She expressed her pleasure in participating at the launch of the India-CSH workshop. She stated UNDP's support to the Indian government's efforts towards meeting its commitments to address global environment concerns through a two-pronged approach involving the leveraging of additional environmental finance and supporting activities on ground that will safeguard environmental resources. Share of renewable energy had grown significantly over the past 10 years and capacity addition of renewable energy in India in the 11th plan is 25 percent of the conventional sources; as for the 12<sup>th</sup> FYP, solar energy was expected to be the second largest contributor. Around one third of industrial process heat demand of industrial energy demand is below 250 °C which suits the integration of solar concentrator in process heat applications, it was essential to further increase the penetration of solar concentrators in the sectors of institutional cooking & dairy (where it is currently used) and tap into other sectors, such as, food processing, electro plating & space cooling. She congratulated the team involved in the project through its different stages of design and development – the consultants, individuals at MNRE & UNDP. She stated the main objective of the inception workshop was to inform the stakeholders of the project and seek their cooperation and participation in the project; assist the project team to understand and take ownership of the project's goals and objectives. She was confident that given the expertise and the depth of experience in partnership programmes, the workshop would meet its objectives.
3. Dr AK Singhal, Director, MNRE opened his presentation with statistics on the use of fuel oil & electricity. He informed that 15 million tonnes of oil for steam generation at 250 C & 35000 MW of electricity for cooling is being used in industries and various other establishments. Significant amount of these fuels could be reduced using Concentrator Solar Technologies (CSTs). He described the main features of the MNRE subsidy scheme under which 30% capital subsidy is available. He emphasized that MNRE has now simplified the process of subsidy disbursement and apart from availing subsidy through State Nodal Agencies (SNAs), the subsidy can also be availed directly through the private sector channel partners. As per the Government scheme, nongovernmental organisations, Financial Institutions, system integrators & manufacturers are eligible to get registered as channel partners. He spoke on the existing CST installations & and informed about the indigenous technology development e.g. fully tracked Scheffler system with heat storage, ARUN dish. He made observations on the limitations of installed systems. He said that most of the existing CSTs are being used predominantly in religious places with large budgets to spend or in institutions where the primary motive is to display a green tag. He listed the main barriers in large scale dissemination of CSTs as follows– lack of quality component materials & technology packages to suit a sector, space constraints for installations, varying Direct Normal Irradiance (DNI) with

locations, no test standards or labs for performance testing & low returns on huge investments.

Dr. Singhal then described the participants about project components, its budget breakup, etc. in detailed and informed about various activities being planned under the project. He also informed about Project Implementation Structure, Project Management Unit (PMU) and Annual Work Plan 2012 being planned to be executed. This planned activities may be seen in Para 2.3.2 above. He requested the participants to make their comments on these activities and also submit some information related to the Project as per the Questionnaire provided to them (Annexure-III). The responses received have been summarized by the PMU and may be seen at Annexure-IV. In general, there was also a consensus on the planned activities given in Para 2.3.2 above.

4. Dr SK Singh, Director, at Solar Energy Centre (SEC), MNRE spoke on performance assessments, limitations and suitability of CST systems for various sectors & applications. He presented a graph on the potential cost reduction expected in CST systems in coming years. He pointed out that with economies in scale, technological improvements and efficiency improvements the cost of CST systems may come down by 60% in 15 years. He showed that in case of a standalone CST system, the thermal energy provision was only for about 6 hours, whereas integration with proper storage & the provision of fuel backup can provide steam supply for entire 24 hour period. Some of the factors that influence CST efficiency are the DNI availability, ambient temperature, latitude, temperature required & wind velocity. He graphically showed the fall in efficiencies of the different CSTs as a function of demand temperature & available DNI. Efficiency of the systems could be maintained if there is flexibility in the output temperature which could be supplemented with back-up systems. The latitude had a strong bearing on the efficiency, giving an example of a particular CST technology he said that the average cosine losses at places near to equator (e.g. South India) are much lower compared to cosine losses in places located in North India during the month of December. He discussed the effect of DNI, angle of incidence, evacuated tube receiver, pressure of steam on the efficiency of Parabolic Trough Concentrators. He concluded that a large number of factors influence the choice of the CST system for a given industrial process heat application.
5. Useful perspectives were given by the audience on CSTs:
  - Mr Sudhir Kapoor representing CII task force on Solar Energy, said that the objectives under the Bureau of Energy Efficiency scheme on Perform & Trade (PAT) for industries, would be met with the use of CSTs. He was of the opinion that the focus should be on large-scale installations of CSTs (10MWth capacity). Another potential area for deployment of CSTs could be augmentation of steam generation in coal based power plants, whereas per his estimations coal consumption could be reduced by up to 10% with the use of CSTs.
  - Mr VK Desai of Adhunik Global Energy, Gujarat, who is involved in manufacturing of a 90 m<sup>2</sup> solar dish system was of the opinion that entrepreneurs & manufacturers in the rural areas must be encouraged in the manufacturing of CSTs. For this to happen, the technology must be simple & should not involve use of complex control systems. Small capacity CST systems (integrated with a small steam engine), capable of generating 10kW of

electricity are required for electricity generation in small industries such as textile, rice & oil mills, etc.

- Mr Ajay Srivastava representing Mahirishi Solar and Solar Energy Society of India (SESI), said that low awareness among industries is a major barrier in the promotion of CSH technologies. He was in favour of having mandatory provisions for use of CSH technologies in industries using petroleum fuels for heating.
- Mr D K Jain, a manufacturer of Scheffler systems said that the loss in efficiency in Scheffler systems can be minimized by the use of combination of dishes (in line & standing dishes). He said that small 10 & 20kW systems are needed to run steam engines for meeting power requirement of industrial units.
- Prof Milind Rane of IITBombay said that ETC systems (non-concentrating) could also be considered under this project to produce steam of 100 °C at 1 bar pressure.

#### **2.4.2 Technical Session I: Status of Technologies (11:45 to 13:00 hrs)**

The session was chaired by Dr B Bandyopadhyay, Adviser, MNRE.

6. The technical session opened with the presentation by Mr Kiran Deshpande of Thermax Ltd. He informed that Thermax is currently working on developing an appropriate Parabolic Trough Concentrator technology for India. The main focus is on developing a cost effective technology, with an aim to reduce the cost of PTC technology from Rs 20,000/m<sup>2</sup> to Rs 7,000/ m<sup>2</sup>. In his view, PTC technology is quite suitable for use in the medium temperature range (200 -250°C). He shared details of a PPP project with Dept. of Science & Tech., to generate electricity using PTC technology at Shive village in Maharashtra. The project has 8 PTC collectors which generate steam at 17 bar pressure and 200°C.
7. Mr Siddarth Malik of Megawatt Solutions spoke on the “Practical Approach towards Industrial Markets in India”. According to him, the key performance indicators for successful integration of CST in industrial applications are a) Energy yield (to the fuel it displaced & CST response to the local DNI conditions), b) Availability of land, c) Ease of CST integration with the existing system, and d) Cost. The DNI profile in India is in the range of 475 – 875 kW/m<sup>2</sup>. He informed that his company is involved in a CST based poly generation (heating, cooling and power generation) project in a textile industry.
8. Dr Shireesh Kedare, representing IIT, Bombay and Clique Solar spoke about Fresnel reflector based ARUN Dish technology. He welcomed the delegates & was happy to note the presence of young professionals in the workshop along with solar energy enthusiasts and activists. He informed that, in India, around 15 million tonnes of oil is consumed by the industry for thermal heat below 300°C. Around 30% of this thermal energy requirement can be met by CSTs, resulting in savings of 5 to 6% of our oil imports. He showcased the application of ARUN technology in dairy applications and other industrial applications. He said that ARUN can deliver up to 300°C (oil) & 25 bar steam, has an automatic 2-axis tracking & can be augmented with a heat storage facility for non-solar hours. Parameters that need to be considered for investment are the CST system and if storage was essential for the application, the fuel it would supplement, financing options and other operational factors that would influence its performance. Indicators specific to a

sector would be the kcal obtained over the lifetime of the CST system, land area occupied, energy delivered/day/sq. m, and the energy gain ratio.

9. Mr B K Jayasimha of Brahmakumari ashram, Mt Abu (Rajasthan), presented work done on Scheffler dish technology. He informed that the first set of Scheffler concentrators at Mt Abu were installed in 1996, and since 1999, one of the world's largest solar kitchen is operational in Brahma Kumaris Shantivan campus with 84 parabolic concentrators of 10 square meters which generates 3500 kg steam per day for cooking of 30000 meals per day. The unique features of these systems are: use of high quality reflective mirrors (93%), direct steam generation by thermo siphoning principle which results in less parasitic load and a buffer storage of 3 hours with pressurized hot water. He informed about new developments in the Scheffler technology, which includes – automating the daily & seasonal tracking system, development of large 60 m<sup>2</sup> dish and use of metal (Cast Iron) static receiver for energy storage. He emphasized the need for independent monitoring of the existing CSH projects.
10. Dr SR Vishwanathan, KG Group, Coimbatore spoke on the indigenously developed Linear Fresnel Reflector (LFR) technology. The company started working on LFR technology about 4 years ago. He showed pictures of a 1,400 m<sup>2</sup> system which the company has installed at Coimbatore. He informed that the company is also supplying a part of the solar concentrator field for the 2 MW power plant being setup at SEC by IIT, Bombay. Another system being installed is a solar-biomass desalination system at Ramanathapuram in Tamil Nadu. He mentioned of future steam generation costs -- where cost of steam produced from coal could be INR 16,000/ton in 25 years, over the same period steam from solar would saturate at around Rs 9,500/ton. A profit of INR 80 crore (Rs 800 million) can be made over 25 years with a solar concentrator collection area of 10,500m<sup>2</sup> that requires an initial investment of INR 12 crore (INR 120 million). He was of the opinion that once the CST industry sets up their manufacturing capabilities, the costs of the CST systems would come down due to maturity of operations.
11. Questions & observations from participants:
  - Mr Khatri from ITC, spoke about the need for using CSTs in crematoriums to replace wood as the fuel. Mr Jayasimha responded that a pilot crematorium exists at Muni Seva Ashram (near Vadodara). The experience suggests that the CST system takes around 4 hours for burning a body weighing 80 kg. He further stated that in case of crematorium, the main barrier is related with religious belief and not with the technology.
  - The representative from the South India Textile Manufacturers Association, Coimbatore spoke for the sector. He informed that 300 small & medium scale textile industries existed in southern India. He said that the typical steam requirement is 8000-10000 kg /hr. He said that it was essential to conduct awareness & training programs under project in this sector to educate on CSTs. Regarding use of CSTs in textile industries, Mr Sidharth Malik responded that one particular application could be evaporation of water from the waste water stream for zero-discharge.
  - Mr Lothare of National Peroxide reacting to the presentation made by KG Group, wanted to know how the figures were arrived of rise in prices of coal at 20%/yr and CSTs at 7%/yr. In response, it was informed that the cost of CSTs

involved servicing, maintenance & operations and payback of loans, whereas with increasing demands of coal from India & China, the rate of increase in the cost of coal which was at 12% presently was estimated to rise to 20%.

- Prof Milind Rane of IIT, Mumbai said that storage should be considered with CSTs where the additional cost would be \$15/kWh<sub>th</sub>.
- Mr Pankaj Kumar, representing Renewable Energy Agency Puducherry, suggested that CSTs would serve well for cooking purposes in jails, which shall feed over 12 lakhs inmates daily. One demonstration unit under the project must be in a central jail.
- Mr S Agarwal of MNRE stated that a hybrid model of biogas plant with CST was being implemented in the Golden temple for community cooking. It must be noted that the cooking cycles does not match with the operation time of the CSTs, and storage is required for this application.
- Prof Ajay Chandak from Dhule (Maharashtra) stressed the need for independent evaluation of CSH systems which would lead to standardization of the technology. He also said the present MNRE policies do not encourage new small manufacturers, and this needs to be changed.
- Dr Goswami from MNRE, gave example of successful application of CSH systems in jails and a paper mill located at Ludhiana.

#### **2.4.3 Technical Session II: Market Prospects & Project Outcomes/ Outputs (14:00 to 15:00 hrs)**

The session was chaired by Mr Alok Srivastava, JS (IR), MNRE and Mr Srinivasan Iyer, Assistant Country Director, UNDP India.

12. Dr Sameer Maithel representing Greentech Knowledge Solutions, New Delhi opened the session on the prospects & barriers in the CSH market. He showed that the levelized cost of steam was lowest when produced by solar concentrators over its lifetime of 20 years when compared to cost of steam generation using conventional liquid, gaseous & solid fuels. He presented a matrix, in which he divided industries based on the steam consumption and the type of fuel used. Based on this analysis, he showed that the pharma formulation units, dairy, beverage bottling are some of the more suitable industries for CSH integration. The other factors that influence CSH potential are the shadow free area, DNI, daily & seasonal profile of steam requirements and top management interest to use alternate fuels. He identified the key barriers as low awareness & knowledge of CSH technologies in the industries, few CSH installations that are fully operational, limited supply chain options and high capital investments for the small scale industrial sectors. The India CSH project addressed some of these barriers; the barriers due to supply constraints & investment costs need to be addressed fully.
13. Mr Sven Eberle of GIZ presented the activities undertaken under the ComSolar project in partnership with MNRE, to demonstrate viable models for commercialization of solar energy in urban & industrial sectors through pilot projects. The parallel drawn to the India CSH project was their initiatives with the industry sector, with the provision of customer tailored solar application with energy

efficiency improvement of the production process, showcase low- high temperature process heat; solar preheating, steam generation, etc., use of solar energy for drying and cooling, and PV systems to substitute DG captive power and for grid connection. While the promising sectors were mapped based on power supply & generation conditions, their energy consumption, size & dispersion of the sector, and existing experience with solar technologies. The pre-feasibility parameters studied were suitable solar technologies with the processes, estimated conventional energy replacement potential and the replication potential for the sector. Pilot projects are to be set up in paper & pulp, textile, food processing & pharmaceutical sectors where studies show that industry requirements are for hot water & low/medium pressure steam. Project support for the pilot units has been through system design, implementation & monitoring & dissemination of results. He informed that under the ComSolar project recently a training course was conducted on "Solar Thermal Process Heat Applications in Industry" by IIT Bombay & Renewable Energy Academy, Germany. The course was attended by technology providers who were imparted know how on design, integration & project management aspects.

14. Dr SN Srinivas, Programme Officer, Environment and Energy Unit (EEU) at UNDP defined the requirements under the project with regard to the institutional arrangements; M&E framework, impact monitoring and what involved the reporting of the project. Ms Malini Goel from UNDP elaborated on the guidance given – branding aspects and what was adaptive management.
15. The session was concluded by Mr Srinivasan Iyer, ACD, UNDP India who said that the day's technical sessions made a convincing case for CSTs for industrial thermal applications. He appreciated the participation by technology providers and hoped that the project would be able to bring users into the forefront on project completion. He further commented that the payback period of CSH systems was in the range of 2 to 7 years; it is equally important to gauge sensitivities to product performance, and choice of technology for heat requirements & variations in climatic conditions.

#### **2.4.4 Launch of UNDP-GEF Project "Concentrating Solar Heat" (15:00 to 15:50 hrs)**

16. Mr Tarun Kapoor, JS, MNRE gave the welcome address, welcoming Mr Gireesh Pradhan, Secretary, MNRE & Ms Caitlin Wiesen, Country Director, UNDP & Mr Rajrishi Bhattacharya, Special Secretary, MNRE. He highlighted the key aspects of the GEF funded India-CSH project.
17. Mr Gireesh Pradhan, Secretary, MNRE formally inaugurated the web site – [www.solarwaterheater.gov.in](http://www.solarwaterheater.gov.in) - an informative web portal on Solar Water Heaters established through the MNRE-UNDP-GEF GSWH project. He also formally launched the India-CSH project for its implementation phase. He spoke of the strides made by India in use of renewable energy for power generation. The installed capacity of renewable energy power generation was 3,500 MW in 2003, which has gone up to 25,000 MW in 2012 (of the total installed capacity of 200,000 MW). Off grid applications were more suited for several applications requiring power & heat, thereby not losing energy during transmission. He said that for renewable energy solutions such as SWH to be popular and be taken to the forefront, feedback from the end users need to be sought and reliable service given on the installed systems. Energy issues in small & medium industries need to be addressed in two ways: technology improvement of equipment to improve its efficiency & provision of alternate technologies such as CSTs to supplement fossil

fuels. He quoted how telecom industry for its transmission towers used 1 billion liters of diesel/year. He said that we must look for hybrid models replacing the use of diesel. CST systems should also be used for cooling applications, where air conditioning needs are on the increase. It must be promoted further for mass cooking in religious places, & for mid-day meals. The CSTs must be made tailor made for Indian/region specific needs. Credibility of systems is vital – constant efforts should be made towards technology improvements of CSTs and in improving after-sales service. He concluded extending his wishes and was certain that the project would be huge success.

18. Ms Caitlin Weisin, CD, UNDP gave her remarks on the occasion of the launch. She commended efforts being made by Dr Farooq Abdullah, Union Minister for New and Renewable Energy, as one of the Principals of the UN Secretary General's High-level Group on Sustainable Energy for All Initiative, for placing on the global stage India's commitment to increasing its reliance on renewables and expanding access to energy. The Inception Workshop of the GEF-MNRE-UNDP Concentrator Solar Heat (CSH) project, was an opportunity to re-examine and ratify the project design and share it with a wide set of stakeholders. The positive impacts of the project would expand the CSH market several fold and could very well transform India into a global hub for Concentrator Solar heat technology applications by industrial units. When successful, the units could provide useful lessons for expansion of Solar Concentrator technology worldwide for industrial heat applications. This could be one of the technologies to be used by the Global Energy Access Centre being proposed by the Minister. She congratulated all on the occasion of the inception workshop and wished it all success.

19. Dr AK Singhal gave the vote of thanks. He thanked Mr Pradhan for his sustained guidance & encouragement. His suggestions on the web site launched were noted. He further thanked UNDP officials, his team and all the delegates for their enthusiastic participation.

#### **2.4.5 Technical Session II: (Continued) (16:15 to 17:15 hrs)**

The session was chaired by Mr Tarun Kapoor, JS, MNRE and was moderated by Dr. Bibek Bandyopdhyaya, Dr AK Singhal, Director, MNRE and Dr S N Srinivas, UNDP

20. The second part of the Technical Session II continued following the launch event. It was an interactive session, where inputs were sought from the attendees on the project activities. ProDoc (hard copies as well as the web link) was circulated to participants to help them prior to the session. Following points were raised/discussed by the participants:

- i. Industries demand continuous steam supply and thus hybridization of CSH system with storage and other energy sources is important.
- ii. The need for providing soft loans for meeting working capital financing requirements of the CST manufacturers was raised.
- iii. The need to focus on rural sector was raised. Concept of a CST driven electricity generation system of 5-10 hp capacity for water pumping, in which the exhaust steam from the steam engine is used for ice production was put forward.

- iv. It was mentioned that the boiler act is a big barrier in CSH promotion and CSH systems should be exempted from the boiler act.
- v. The idea of large-scale use of CSH technologies for cooking in the hostels of engineering and other technical colleges was put forward. This would help many more engineers to enter the area of solar concentrators.
- vi. It was mentioned that the MNRE programme should also focus on developing specific technology packages (matching solar concentrators with specific thermal energy demand) for CSH applications.
- vii. It was stated that the testing/ monitoring of CSH systems should be through on-line automatic recording systems and the use of manual recording should be discouraged.
- viii. The need for training of officials of SNAs in the basics of CSH technologies was mentioned. It was felt that at present, the technology suppliers had to spend considerable time in educating SNA officials about CSH technologies.
- ix. The current MNRE subsidy is only on the cost of the solar concentrator. For solar cooling applications, the cost of additional boiler and Vapour Absorption Machines (VAM) machine is significant, hence, it was suggested that the subsidy should be calculated on the total system cost.
- x. It was suggested that labeling of solar concentrators could be undertaken. This would have a significant impact on the development of the CSH market.
- xi. The need for MNRE to directly engage Managing Directors/ CEOs of industries was emphasized to garner support of top management of industries for CSH adoption.
- xii. For Ladakh, the need for developing a multi-purpose system to meet space heating, power and water heating requirements was discussed. The need for conducting training of technicians in Ladakh and other remote areas was also raised.
- xiii. Idea of a domestic carbon financing scheme to finance CSH was mooted.
- xiv. The need to focus on cogeneration and tri-generation using solar thermal technologies was emphasized.

Mr Tarun Kapoor thanked all the delegates for their active participation and sought their involvement in all stages of the project, to ensure its successful implementation.

#### **2.4.6 Outcome of the Workshop**

- The Workshop created a great enthusiasm among participants towards development and promotion of Concentrating Solar Technologies (CSTs) in the country for community cooking, process heat and cooling applications. Over 150 stakeholders from various parts of the country (excluding MNRE officers) participated in the Workshop. Eighty percent remained present till end of the Workshop.

- Around 12 manufacturers showed interest in bringing posters on their technologies which were displayed for the information of participants. Participants were able to know about the technologies and their status on implementation in the country.
- The Workshop gave a platform to various stakeholders and to the Speakers to discuss about barriers, limitations, opportunities and the potential in promoting CSTs in industrial and commercial establishments. It also helped in having interaction among various stakeholders on relevant topics.
- The Workshop helped participants in understanding various components of the Project and activities planned to be performed in five years' duration of the Project. Discussions were held on the presentation made by Dr. Singhal, NPM of the Project and the activities planned along with implementation structure and proposed PMU (as given at para 2.3.2(e) above) was more or less agreeable to most of the participants, which is similar and a summarized plan of the Project Document. It is proposed to follow this during 5 years' implementation of the Project.
- Many institutions/ industries/ individuals such as TERI, Delhi; Thermax, Pune; NPC, Delhi; Asahi Glass ; ATE Enterprises, Pune, Prof. Chandak, Dhule, Maharashtra; Essential Equipments, Dhule; SITRA; SPRERI, Gujarat; LREDA, Leh; Prof. M. V. Rane, IIT Bombay; Enersun Power Tech. Ltd; CII; etc showed interest in participating under various activities of the Project. It is proposed to involve them and take their support for successful implementation of the Project as per the decisions of PASC and PEC.

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## Annexure-I: Inception Workshop Programme

### UNDP-GEF PROJECT “MARKET DEVELOPMENT & PROMOTION OF SOLAR CONCENTRATOR BASED PROCESS HEAT APPLICATION IN INDIA”

#### INCEPTION WORKSHOP PROGRAMME

Venue : Banquet Hall, 3rd Floor, Hotel Ashok, Chanakya Puri, New Delhi

Date : 18<sup>th</sup> May, 2012

9.00 – 10.00 A.M	Registration
10.00 - 11.15 A.M	<b>Opening Session</b> Chairman : Sh. Tarun Kapoor, JS, MNRE
10.00 - 10.05 A.M.	Welcome by Sh. Tarun Kapoor, JS, MNRE & Project Director
10.05 - 10.10 A.M.	Remarks by Ms Alexandra Solovieva, Dy. Country Director, UNDP, India
10.10 - 10.40 A.M	MNRE Programme & Details of UNDP-GEF project by Dr. A.K. Singhal, Director, MNRE & Project Manager
10.40 - 10.55 A.M	Performance assessment, limitations & suitability of CSTs for various sectors & applications Mr. S. K. Singh, Director, SEC, MNRE
10.55 - 11.15 A.M	Perspectives of few manufacturers/SNAs/users on CSTs
11.15 A.M.	Tea
11.45 AM - 1.00 PM	<b>Technical Session- I (Status on Technologies)</b> Chairman : Dr. B. Bandyopadhyay, Adviser, MNRE & Head, SEC
11.45 -11.55 A.M	Parabolic Trough Concentrators by Mr. Kiran Deshpande, M/s Thermax, Pune
11.55 AM -12.05 PM	Paraboloid Dish Technology by Mr. Siddharth Malik, M/s Megawatt Solutions, Delhi
12.05 - 12.15 P.M.	Fresnel Reflector based Arun Dish Technology by Dr. S. Kedare, IIT, Bombay
12.15 - 12.25 P.M.	Fixed focus automatically tracked Scheffler Dishes by Mr. Jayasimha, Brahmakumaris Ashram, Mount Abu
12.25 - 12.35 P.M	Linear Fresnel Reflector technology by Dr. S. R. Vishvanathan, KG Group, Coimbatore
12.35 - 1.00 P.M.	Discussions
1.00 P.M.	Lunch

...Contd/-

<b>2.00 - 3.00 P.M. &amp; 4.15 - 5.15 P.M</b>	<b>Technical Session – II (Market Prospects &amp; Project Outcomes/ Outputs)</b> <b>Chairman : Sh. Alok Srivastava, JS(IR), MNRE</b> <b>Co-Chairman : Sh. Srinivasan Iyer, Assist. Country Director, UNDP India</b>
2.00 – 2.05 P.M.	Remarks by Sh. Srinivasan Iyer, Assistant Country Director, UNDP India
2.05- 2.15 P.M.	CSH market - Prospects & Barriers by Mr. Sameer Maithal, M/s Greentech Knowledge Solutions, Delhi
2.15 - 2.25 P.M	Identification of Industrial sectors promising commercialization of solar energy by Mr. Sven Everle, GIZ, India
2.25 - 2.40 P.M.	GEF Guidelines for Project management & execution by Dr. S.N. Srinivas, UNDP India and Ms. Malini Goel, UNDP New York
2.40 - 2.55 P.M.	Discussion
2.55 P.M.	Break for launching of Project Session
<b>3.00 - 3.50 P.M.</b>	<b>Launching of UNDP-GEF Project on ‘Concentrating Solar Heat’ by Hon’ ble Minister (NRE)</b>
3.00 - 3.10 P.M.	Welcome & Highlights of UNDP-GEF Project by Sh. Tarun Kapoor, JS, MNRE
3.10 - 3.20P.M.	Launching of website on Solar Water Heater <a href="http://www.solarwaterheater.gov.in">www.solarwaterheater.gov.in</a> developed under UNDP-GEF project on GSWH by <b>Sh. Gireesh. B. Pradhan, Secretary, MNRE</b>
3.20 - 3.25 P.M.	Remarks by Ms Caitlin Wiesen, Country Director, UNDP India
3.25 - 3.40 P.M.	Address by Sh. Gireesh. B. Pradhan, Secretary, MNRE
3.40 P.M.	Vote of Thanks
<b>3.45 - 4.15 P.M.</b>	<b>Tea</b>
<b>4.15 - 5.15 P.M.</b>	<b>Technical Session II (Continued)</b> <b>Chairman : Shri Tarun Kapoor, JS, MNRE &amp; NPD</b> <b>Moderators : Dr. B. Bandyopadhyay, MNRE; Dr. A. K. Singhal, MNRE &amp; Dr. S. N. Srinivas, UNDP</b>
4.15 – 5.00 P.M.	Discussions on project activities & outcomes : i) Technology package development and standardization ii) Awareness and capacity building iii) Planning & operationalization of demonstration projects; and iv) Identification & removal of financial barrier in adoption of solar concentrated technologies in India
5.00- 5.15 P.M.	Closing Remarks & Vote of Thanks

## Annexure-II: Participants

### List of participants

Name of the Organization	S.No.	Name of the Person	
<b>Speakers &amp; Chairpersons</b>			
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Airier Natural, Bangalore	55.	Dr. Prashanth Bhat,Sr.VP	Mob:9901560678 Email: <a href="mailto:drprashanthbhat@airier.com">drprashanthbhat@airier.com</a>
Aksons Solar, Pune	56.	Sh.M.D.Akole, MD	Mob:09422000459 Email: <a href="mailto:mdakole@gmail.com">mdakole@gmail.com</a>
	57.	Dr.Gurmeet Singh	Mob:9811980116 Email: <a href="mailto:gurmeetchauhan@gmail.com">gurmeetchauhan@gmail.com</a>
	58.	Sh. Vijay Dua	Mob: 9810149441
Asahi India, New Delhi	59.	Shri Shahid Sheikh, Head	Mob:9810861907 Email: <a href="mailto:ssheikh@aisglass.com">ssheikh@aisglass.com</a>

5.	60.	Shri Rajat Koushik, Pro.Mgr	Mob:971644477 Email: <a href="mailto:rajat.koushik@aisglass.com">rajat.koushik@aisglass.com</a>
ATE Enterprise, Pune	61.	Dr. Prasanna	Mob: 9880821732
Bhagwati Gases, NOIDA	62.	Sh. D.K. Jain	Mob: 9891388782
Dalkia Energy, New Delhi	63.	Ms. Nisha Menon	Mob:9582940366 Email: <a href="mailto:nishamenon@dalkia.co.in">nishamenon@dalkia.co.in</a>
EBTC ,New Delhi	64.	Sh.Vittalkumar Dhage	Mob:9999517931 Email: <a href="mailto:dhage@ebtc.en">dhage@ebtc.en</a>
Enersun Power, Mumbai	65.	Mr. Dabasaheb Mukane	Mob:7738088694, Email: <a href="mailto:baba.mukane@enersunpower.com">baba.mukane@enersunpower.com</a>
	66.	Dr. Sudhir Panse	Mob:9967645145 Email: <a href="mailto:sudhirpanse@yahoo.com">sudhirpanse@yahoo.com</a>
Essential Equipments, Dhule	67.	Sh. Ritesh Kumar	Mob: 8287888089
Forbes Marshall, Pune	68.	Mr. Ramani Iyer	Mob:9881402505 Email: <a href="mailto:rriyer@forbesmarshall.com">rriyer@forbesmarshall.com</a>
Gadhia Solar, Valsad, Gujarat	69.	Sh.Vijay Arora	Mob:9926808217 Email: <a href="mailto:sales.mr@gadhia.solar.com">sales.mr@gadhia.solar.com</a>
Greentech, New Delhi	70.	Sh.Richard Sequeira	Mob:9810294797 Email: <a href="mailto:richard@greentechsolution.co.in">richard@greentechsolution.co.in</a>
	71.	Sh. Sonal Kumar	Mob: 9971447171 Email: <a href="mailto:solar@greentechsolution.co.in">solar@greentechsolution.co.in</a>
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IT Power, Gurgaon	73.	Sh.Dwipen Boruah	Mob:9560550075 Email: <a href="mailto:dwipen.boruah@gmail.com">dwipen.boruah@gmail.com</a>
IIT, Powai, Mumbai	74.	Prof. Miland Rane	
K.Energy, Jaipur	75.	Sh.Sanjeev Kachhwaha, C.E.	Mob: 9829022899 Email: <a href="mailto:info@kenergy.co.in">info@kenergy.co.in</a>
Maharishi Solar, New Delhi	76.	Sh. Pradeep Khanna	Mob:9811290832 Email: <a href="mailto:pradeep@maharishisolar.com">pradeep@maharishisolar.com</a>
	77.	Sh. Ajai Srivastava	Mob:9811910101 Email: <a href="mailto:solar@maharishi.net">solar@maharishi.net</a>
Mahindra & Mahindra, Mumbai	78.	Sh.Umesh Joshi, GM	Mob: 9987512344
National Peroxide Ltd., Mumbai	79.	Sh. Suhas R. Lohokare, MD	Mob: 9821055487
New Era Solar Solutions, New Delhi	80.	Dr. T.C. Tripathi	Mob: 9868854569
NMTDC, Hyderabad	81.	Dr. K. Balasubramanian, Dir	Mob:9848304940 Email: <a href="mailto:director@nftdc.res.in">director@nftdc.res.in</a>
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	84.	Sh. Rohit Singh	Mob: 9311370499
QCI, New Delhi	85.	Sh. C.K. Veda, Consultant	Mob: 8800438885
Saint Gobain, Chennai	86.	Sh. Amit Roy	Mob:9500068343
SSVPS BSD College of Engg, Dhule	87.	Prof. Ajay Chankak	Mob:09823033349
STFI, Pune	88.	Sh. Gopal Kabra	
State Bank of India, Mumbai	89.	Sh. Gini Zacharias Specialist Technical Executive	Mob:9819459598
KVK Energy, New Delhi	90.	Sh.G.L.Sourave	Mob: 9810007767
CII, New Delhi	91.	Sh.R.Ravichander	Mob:9849909674 Email: <a href="mailto:ravi.c@cii.in">ravi.c@cii.in</a>
	92.	Sh Sudhir Kumar	Mob:981013701

Suntrak Synergy, Chennai	93.	Sh.Vinod Bomb	Mob: 9840052556
Taylormade, Ahmedabad	94.	Sh.Dharmendra Gor	Mob:9712933390 Email: <a href="mailto:dharam@tss-india.com">dharam@tss-india.com</a>
	95.	Sh.Parminder Singh Sidhu	Mob: 8427122990 Email: <a href="mailto:parminder@tssindia.com">parminder@tssindia.com</a>
	96.	Sh.Amit Kumar	Mob: 9212073637
TERI University, New Delhi	97.	Dr. V.V.N.Kishore, Director	Mob: 9811392240
	98.	Prof. R.L. Sawhney	Mob: 9811089107
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	100.	Sh. Anand Upadhyay	Mob:9811914995 Email: <a href="mailto:anans.upadhyay@teri.res.in">anans.upadhyay@teri.res.in</a>
Thermax, Pune	101.	Sh.Deepak Thakur, Head	
	102.	Sh. Salil Dutt, Sr. Manager	
Ultra Conserve, Mumbai	103.	Sh.Siddharth Udas,MD	Mob: 9820936956
	104.	Sh.Vivek Mahajan	Mob: 9910101338
Unisun Technologies, Bangalore	105.	Mr. Shivanand Nashi	Mob:9880022272 Email: <a href="mailto:unisun@vsnl.com">unisun@vsnl.com</a>
	106.	Mr.Mathew Chandy	
	107.	Mr. M.Joseph	
Vijaya Bank, Bangalore	108.	Sh. Phulwar Singh, AGM	Mob:9312941963
Visual Percept	109.	Mr. K.P. Singh	Mob: 9936019999
Consultant	110.	Mr. Atam Kumar	Mob: 9811123246
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ITC Hotel, New Delhi	112.	Sh. N. Kharte	Mob: 9818115512
Syndicate Bank, New Delhi	113.	Sh. S. Balakrishnan, GM	Mob:9810803404
	114.	Sh. D.Balakrishnan, Chief Manager	Mob:9968309187
Fabrako Engineers, Bareilly	115.	Sh. H. K. Verma	Mob: 9911099459
	116.	Sh. M.K. Verma	
Moser Baer Project Pvt. Ltd, New Delhi	117.	Sh.Jacob Alexander	Mob:9718380570 Email: <a href="mailto:jacob.alexander@moserbear.in">jacob.alexander@moserbear.in</a>
Satyam Enterprises	118.	Sh.Satya Veer Singh	Mob:9412235433 Email: <a href="mailto:satyam122@dataone.in">satyam122@dataone.in</a>
Pratham Bank	119.	Sh. B.K. Pandit, Chairman	Mob: 9837036728
	120.	Dr. Ramesh Jalan	Mob:9810127799 Email: <a href="mailto:ramesh.jala@one.in.org">ramesh.jala@one.in.org</a>
	121.	Sh. Jai Kr. Gaurav	Mob:9811808661 Email: <a href="mailto:jai.gaurav@gmail.com">jai.gaurav@gmail.com</a>
Malviya Solar Energy, Pune	122.	Sh. Jaideep Malaviya	Mob:9970450000
HAREDA, Chandigaah	123.	Sh. Sandeep Yadav, P. O.	
	124.	Sh. Saumya Rana	
GEDA	125.	Sh. S. B.Patel	
	126.	Sh. Ashish Vijaywargi	
World Bank	127.	Sh. V. C. Subramaniam	Email: <a href="mailto:csubramaniam@worldbank.org">csubramaniam@worldbank.org</a>
	128.	Sh. K. Garg	Mob: 9711060647

			Email: <a href="mailto:kgarg@worldbank.org">kgarg@worldbank.org</a>
	129.	Sh. Sushil N Agrawal	Mob: 9860798111 Email: <a href="mailto:sushilnagrawal@gmail.com">sushilnagrawal@gmail.com</a>
National Productivity Council	130.	Sh. Sunil Kumar, Dy. Director	Mob: 9818299682 Email: <a href="mailto:sunil.kumar@npcindia.org">sunil.kumar@npcindia.org</a>
University of Pune	131.	Sh. Ghaisas	Email: <a href="mailto:svg@electronics.unipune.ac.in">svg@electronics.unipune.ac.in</a>
NTPC	132.	Dr. K. Kayas	Mob: 09413329794
	133.	Sh. Sudhir Zutshi	Mob: 9818611686 Email: <a href="mailto:sudhir.zutshi@uc.com">sudhir.zutshi@uc.com</a>
DRDO	134.	Sh. Anjesh Kumar	Mob: 9911773599 Email: <a href="mailto:anjeshkumar97@gmail.com">anjeshkumar97@gmail.com</a>
MNRE	135.	Sh. H.R. Khan	
	136.	Ms. Anju Vij	
	137.	Sh. Pratap Singh	
	138.	Sh. Prem Chand	
	139.	Sh. Jugul Kishor	
	140.	Sh. M. R. Nouni	
	141.	Sh. J. P. Singh	
	142.	Sh. Deep Bansal	
	143.	Sh. B. L. Ram	
	144.	Sh. M.L. Bamboriya	
	145.	Sh. J. K. Jelhani	
	146.	Dr. R. N. Sawant	
	147.	Dr. S. K. Sharma	
	148.	Sh. Anil Kumar	
	149.	Sh. B. K. Bhat	
	150.	Sh. Rajesh Dube	
	151.	Sh. K. C. Vaghri	
	152.	Dr. Santram	
	153.	Sh. G. R. Singh	
	154.	Sh. I.P. Singh	
	155.	Sh. S. K. Bhardwaj	
	156.	Sh. P.K. Dash	
	157.	Sh. Arun Kumar	
	158.	Dr. Ashvini Kumar	
	159.	Sh. D. Majumdar	
	160.	Sh. PNBV Chalapati	
	161.	Sh. Anand Narvane	
	162.	Sh. G. L. Meena	
	163.	Sh. G. Prasad	
	164.	Sh. Sohail Akhtar	
	165.	Sh. Ahmar Raza	
	166.	Sh. V. K. Jain	
	167.	Sh. Ram Prakash	
	168.	Sh. Mahinder	
	169.	Ms. Parveen Dhamjia	
	170.	Dr. Rajesh Kumar	
	171.	Sh. Tarun Singh	
	172.	Sh. Suresh Pal Singh	

	173.	Sh. S. K. Talwar	
	174.	Dr. R.P.Goswami	
	175.	Sh. N.P. Singh	
	176.	Sh. Mesh Ram	
	177.	Sh. A.K.Varshney	
	178.	Sh. Pankaj Saxena	
	179.	Dr. B. S. Negi	
	180.	Sh. Dilip Nigam	

### **Annexure-III: Questionnaire Survey Form**

#### **QUESTIONNAIRE**

Q.1 Do you feel any of the activity under various project components need not to be performed and should be dropped from the Project? If yes, please indicate the number.

Ans.

Q.2 Do you feel any activity under various project components has been left out and needs to be performed in the Project? Please indicate if any.

Ans.

Q.3 Mention five top activities, which should be performed immediately in the project. Please indicate numbers priority wise,

Ans.

Q.4 Please state for any of the activities, if you would be able to contribute effectively.

Ans.

Q.5 Any further suggestions for better implementation of the project

Ans.

**(Name of the participant & Organization with Mobile No.)**

#### **Annexure-IV: Responses received from stakeholders**

**Q-1 : Do you feel any of the activity under various project components need not to be performed and should be dropped from the Project? If yes, please indicate**

<b>S. No.</b>	<b>Name of organization</b>	<b>Response</b>
1.	Sh.Anand Upadhyay, TERI	<ul style="list-style-type: none"> <li>• Development of projects in ESCO Mode</li> </ul>
2.	Sh. Amit Kumar, TERI	<ul style="list-style-type: none"> <li>• Instead of international study tours, there could be study tours within India</li> </ul>
3.	Dr. Tripti Agarwal, NIFTEM (MEPI)	<ul style="list-style-type: none"> <li>• A very good initiative. Quite impressive. Project covers most important areas</li> </ul>
4.	Prof. Ajay Chandak, Dhule	<ul style="list-style-type: none"> <li>• Manpower development of Ph.Ds &amp; M.Techs in the field of CSTs at Solar Energy Centre &amp; various other academic institutions</li> </ul>
5.	Sh. Rahul Kulkarni, Essential Equipments, Dhule	<ul style="list-style-type: none"> <li>• Organize International study tours for various stakeholders on exposure to CSTs commercially available abroad. Industries to share at least 50% cost</li> </ul>
6.	Er. V. Siva Reddy, SPRERI	<ul style="list-style-type: none"> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> </ul>
7.	Sh. Umesh Joshi, Mahindra & Mahindra Ltd.	<ul style="list-style-type: none"> <li>• Technology assessment of Concentrating Solar Systems world-wide &amp; their scope of promotion in India – Technology assessment- ranking can be done on post performance and publish</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings – more use of print/selection -media</li> </ul>
8.	Prof. Sudhir Panse Enersun Power Tech. Pvt. Ltd.,	<ul style="list-style-type: none"> <li>• Organization and conduct of training programmes</li> <li>• Design and publication of advertisements in industrial magazines, design and display of hoardings in industrial clusters, participation in industrial exhibitions and trade fairs</li> </ul>
9.	Sh. Siddharth D. Udas Ultra Conserve Pvt. Ltd.	<ul style="list-style-type: none"> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> </ul>

**Q-2 : Do you feel any activity under various project components has been left out and needs to be performed in the Project? Please indicate if any.**

<b>S. No.</b>	<b>Name of organization</b>	<b>Response</b>
1.	Sh. Dinesh K. Awasthi, EE, CREDA, Raipur	<ul style="list-style-type: none"> <li>• S.C.H.P. working in industry data.</li> <li>• Some more information regarding self loan</li> </ul>
2.	Sh. Lavleen Singhal	<ul style="list-style-type: none"> <li>• Accurate, reliable of validated assessment of solar resource &amp; characterization</li> </ul>

	Acira Solar P. Ltd.	
3.	Sh.Anand Upadhyay, TERI	<ul style="list-style-type: none"> <li>• Training of ITI's &amp; Diplomas-technicians and trainers training,</li> <li>• Selective coating facilities for different surfaces at high temperature</li> <li>• Insurance against low performance due to excess cloud/dust/storm</li> </ul>
4.	Sh. Salil Dutt, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Application of CSTs in rural areas (may be cold storage hybrid with gasifier)</li> <li>• New hybrid technologies with its applications (with biomass, fossil etc.)</li> <li>• Operation &amp; maintenance of pilot projects to be in the scope of technology supplier &amp; yearly feedback to be provided to the project</li> </ul>
5.	Sh. Kiran Deshpade, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Yes, Viability gAP funding, new technology risk mitigation. Viability GAP funding for manufacturing</li> </ul>
6.	Sh. Sunil Kumar, NPC	<ul style="list-style-type: none"> <li>• Project feasibility (in terms of total investment in terms of currency, knowledge, manpower etc.)</li> </ul>
7.	Sh. Amit Kumar, TERI	<ul style="list-style-type: none"> <li>• system design &amp; configuration –storage aspects</li> <li>• Co/poly generation – independent M &amp; V</li> <li>• Modeling</li> </ul>
8.	Sh. G.B. Patil, GEDA	<ul style="list-style-type: none"> <li>• Performance guarantees/ various technologies to help consumer to be assured/what is ultimately going to gain</li> </ul>
9.	Dr.Vishal R. Sardeshpande/ Dr.Prasanna Rao, ATE Enterprises	<ul style="list-style-type: none"> <li>• Good selection</li> </ul>
10.	Sh. Gini Zacharias, SBI	<ul style="list-style-type: none"> <li>• Dissemination of cost benefit analysis of various projects</li> </ul>
11.	Prof. Ajay Chandak, Dhule	<ul style="list-style-type: none"> <li>• Include small concentrators below 10 sq.m.in the program. These have enormous potential in community cooking, hospitals, PHCs etc.</li> </ul>
12.	Sh. Rahul Kulkarni, Essential Equipments, Dhule	<ul style="list-style-type: none"> <li>• Solar cooking with dish cookers should be included</li> </ul>
13.	Sh. Umesh Joshi, Mahindra & Mahindra Ltd.	<ul style="list-style-type: none"> <li>• Organization of seminars/workshops including National &amp; International- awareness can be from top most in industry (like Chairman, MD).</li> </ul>
14.	Prof. Sudhir Panse Enersun Power Tech. Pvt. Ltd.,	<ul style="list-style-type: none"> <li>• Regular meet/conference/workshop of all stakeholders in the area (like the present one)</li> </ul>
15.	Prof. M. V. Rane, IIT, Mumbai	<ul style="list-style-type: none"> <li>• Solar air heating in the range of 100 to 300<sup>0</sup>C</li> </ul>
16.	Sh. Siddharth D. Udas Ultra Conserve Pvt. Ltd.	<ul style="list-style-type: none"> <li>• Organize International study tours for various stakeholders on exposure to CSTs commercially available abroad. Industries to share at least 50% cost</li> </ul>

**Q-3 : Mention five top activities, which should be performed immediately in the project. Please indicate numbers priority wise,**

<b>S. No.</b>	<b>Name of organization</b>	<b>Response</b>
1.	Sh. Dinesh K. Awasthi, EE, CREDA, Raipur	<ul style="list-style-type: none"> <li>• Implementation of immediately following sector in the project are, industries, jail, education institution, police &amp; arm force mess, big hotel kitchen</li> </ul>
2.	Sh. Lavleen Singhal, Acira Solar P.Ltd.	<ul style="list-style-type: none"> <li>• Technical Capacity Development</li> <li>• Standards (specs. &amp; test facilities)</li> <li>• Financing &amp; bankability</li> <li>• Engineering packages, project feasibility</li> <li>• Feasibilities + feasibility studies</li> </ul>
3.	Sh.Anand Upadhyay, TERI	<ul style="list-style-type: none"> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Mobile test set up for performance evaluation in field</li> <li>• Identification of banks/FIs for their interest in providing loans to customers</li> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> </ul>
4.	Sh. Sanjeev Kachwala K.Energy	<ul style="list-style-type: none"> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> <li>• Organize International study tours for various stakeholders on exposure to CSTs commercially available abroad. Industries to share at least 50% cost</li> <li>• Identification &amp; development of suitable technological packages for various establishments/ industrial units &amp; applications. This will include best practices involved in installation &amp; integration of CSTs with conventional systems</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Market Development Programmes for various industrial &amp; commercial sectors</li> </ul>
5.	Sh.Phulwar Singh, Vijaya Bank	<ul style="list-style-type: none"> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Identification of potential sites for demonstration projects</li> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> </ul>

		<ul style="list-style-type: none"> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> </ul>
6.	Sh. Salil Dutt, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> <li>• 1.9- Establishment of National test facility for CSTs at SEC</li> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> </ul>
7.	Sh. Kiran Deshpade, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Demonstration project implementation</li> <li>• Monitoring performance &amp; publicity of the same</li> <li>• Viability GAP funding method , de.&amp; publicity</li> <li>• Viability Gap funding for manufacturers of solar &amp; component</li> </ul>
8.	Sh. G.B. Patil, GEDA	<ul style="list-style-type: none"> <li>• A manual on all the technologies, giving the example/working, deliverables, cost economics be developed for dissemination amongst the consumer</li> </ul>
9.	Sh.Shahid Sheikh, Asahi India Glass Ltd.	<ul style="list-style-type: none"> <li>• Assist some stakeholders in financing side- for R&amp;D work</li> </ul>
10.	Sh. Jacob Alexander Moser Baer Projects	<ul style="list-style-type: none"> <li>• Development of performance measuring norms &amp; equipment/instruments required for CSTs</li> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Performance assessment reports of few existing installations on different technologies &amp; applications at locations with different DNI</li> <li>• Identification &amp; development of suitable technological packages for various establishments/industrial units &amp; applications. This will include best practices involved in installation &amp; integration of CSTs with conventional systems</li> <li>• Mobile test set up for performance evaluation in field</li> <li>• Identification of banks/FIs for their interest in providing loans to customers</li> </ul>
11.	Dr.Vishal R. Sardeshpande/ Dr.Prasanna Rao, ATE Enterprises	<ul style="list-style-type: none"> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies-- development of test procedure &amp; proof of concept testing</li> </ul>
12.	Sh. Satya Veer Singh Satyam Enterpriser	<ul style="list-style-type: none"> <li>• Organization of training programmes for various stakeholders</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Manpower development of PhDs &amp; M.Techs in the field of CSTs at Solar Energy Centre &amp; various other academic institutions</li> <li>• Identification of potential sites for demonstration projects</li> <li>• Execution of demonstration projects on different technologies/applications in different</li> </ul>

		sectors/establishments
13.	Sh. Gini Zacharias, SBI	<ul style="list-style-type: none"> <li>• Technology assessment of Concentrating Solar Systems world-wide &amp; their scope of promotion in India</li> <li>• Organization of training programmes for various stakeholders</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Development of case studies &amp; success stories</li> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> </ul>
14.	Dr. Tripti Agarwal, NIFTEM (MEPI)	<ul style="list-style-type: none"> <li>• Development of technology for small scale application</li> <li>• Awareness &amp; education of the society &amp; industries about positive aspects of solar energy</li> <li>• Solar energy can be heavily utilized in the food sector at various points in the supply chain. It should be given priority</li> <li>• Demonstration of technologies to SMEs</li> <li>• Financial help to adopt these technology</li> </ul>
15.	Prof. Ajay Chandak, Dhule	<ul style="list-style-type: none"> <li>• Status report on functioning of existing CST installations in the country</li> <li>• Development of performance measuring norms &amp; equipment/instruments required for CSTs</li> <li>• Performance assessment reports of few existing installations on different technologies &amp; applications at locations with different DNI</li> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies</li> <li>• Training manuals for installers &amp; manufacturers/suppliers</li> </ul>
16.	Sh. Rahul Kulkarni, Essential Equipments, Dhule	<ul style="list-style-type: none"> <li>• Status report on functioning of existing CST installations in the country</li> <li>• Development of performance measuring norms &amp; equipment/instruments required for CSTs</li> <li>• Performance assessment reports of few existing installations on different technologies &amp; applications at locations with different DNI</li> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies</li> <li>• Training manuals for installers &amp; manufacturers/suppliers</li> </ul>
17.	Sh. A. Sivaramkrishnan, The South India Textile Research Association	<ul style="list-style-type: none"> <li>• Contacting respective industries and their research associations for implementation</li> <li>• Making mandatory for solar projects because it is clean</li> <li>• Government should give more incentives in the form tax benefits</li> </ul>
18.	Sh. R. Ravi Chander, CII	<ul style="list-style-type: none"> <li>• Demand assessment</li> <li>• Establish a viable business model , tailor-made model for each industry segment</li> <li>• Demonstration</li> <li>• Widespread awareness generation</li> </ul>

19.	Er. V. Siva Reddy, SPRERI	<ul style="list-style-type: none"> <li>• Performance evaluation of demonstration projects</li> <li>• Organization of training programmes for various stakeholders</li> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Enhancement of manufacturing units on different types of CSTs for process heat applications</li> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> </ul>
20.	Sh. Ashish Vijaywargi, GEDA	<ul style="list-style-type: none"> <li>• Identification &amp; development of suitable technological packages for various establishments/industrial units &amp; applications. This will include best practices involved in installation &amp; integration of CSTs with conventional systems</li> <li>• Training needs assessment for various stakeholders</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> <li>• Identification of banks/FIs for their interest in providing loans to customers</li> </ul>
21.	Sh. Umesh Joshi, Mahindra & Mahindra Ltd.	<ul style="list-style-type: none"> <li>• Awareness campaign by various measures</li> <li>• Government support &amp; schemes to industry to spread Pilot demonstration</li> <li>• Development of capability buildings and manufacturers</li> <li>• Sustainable solutions</li> </ul>
22.	Prof. Sudhir Panse Enersun Power Tech. Pvt. Ltd.,	<ul style="list-style-type: none"> <li>• 'Proof-of-concept' testing of new technologies at SEC</li> <li>• Establishment of a national testing facility for CSH technologies and applications at SEC</li> <li>• Strengthening of one regional testing facility for CSH technologies and applications</li> <li>• Publication and quarterly project newsletter</li> <li>• CSH technology platform formation and facilitation</li> </ul>
23.	Ms. Kunzes Dolma Sr. Project Engineer LREDA	<ul style="list-style-type: none"> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Identification of potential sites for demonstration projects</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> </ul>
24.	Prof. M. V. Rane, IIT, Mumbai	<ul style="list-style-type: none"> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> <li>• Development of projects in ESCO mode</li> <li>• Development of case studies &amp; success stories</li> </ul>

		<ul style="list-style-type: none"> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies</li> <li>• Status report on functioning of existing CST installations in the country</li> </ul>
25.	Sh. Siddharth D. Udas Ultra Conserve Pvt. Ltd.	<ul style="list-style-type: none"> <li>• Status report on functioning of existing CST installations in the country</li> <li>• Identification &amp; development of suitable technological packages for various establishments/industrial units &amp; applications. This will include best practices involved in installation &amp; integration of CSTs with conventional systems</li> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> <li>• Mobile test set up for performance evaluation in field</li> </ul>

**Q-4 : Please state for any of the activities, if you would be able to contribute effectively.**

<b>S. No.</b>	<b>Name of organization</b>	<b>Response</b>
1.	Sh. Lavleen Singhal Acira Solar P.Ltd.	<ul style="list-style-type: none"> <li>• Solar Resource Assessment (DNI)</li> <li>• Engineering for industry verticals</li> <li>• Project evaluation &amp; assessment</li> <li>• Research (thermal storage technologies, identification for industrial applications)</li> <li>• Sites selection</li> </ul>
2.	Sh.Anand Upadhyay, TERI	<ul style="list-style-type: none"> <li>• Technical capacity development &amp; Sustainable financial approach in the adoption of CSH technologies &amp; applications in India</li> <li>• Design handbook on CSTs</li> </ul>
3.	Sh. Sanjeev Kachwala K. Energy	<ul style="list-style-type: none"> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> </ul>
4.	Sh.Phulwar Singh, Vijaya Bank	<ul style="list-style-type: none"> <li>• Identification of banks/FIs for their interest in providing loans to customers</li> <li>• Development of suitable financial packages for customers on installation of CSHPs</li> </ul>
5.	Sh. Salil Dutt, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> <li>• Development &amp; installation of replicated projects</li> <li>• Monthly newsletter/publications in trade /industrial magazines etc</li> <li>• Development of case studies &amp; success stories</li> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies</li> <li>• Identification &amp; development of suitable technological packages for various establishments/industrial units &amp; applications. This will include best practices involved in installation &amp; integration of CSTs with conventional systems</li> </ul>

6.	Sh. Kiran Deshpade, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Testing methodology</li> <li>• Manpower development in program of selecting demo projects</li> </ul>
7.	Sh. Sunil Kumar, NPC	<ul style="list-style-type: none"> <li>• Third party evaluation</li> <li>• Impact Assessment</li> <li>• Project monitoring</li> </ul>
8.	Sh. Amit Kumar, TERI	<ul style="list-style-type: none"> <li>• Potential assessment</li> <li>• Performance assessment</li> <li>• Design of packages</li> <li>• System design</li> <li>• Knowledge products</li> <li>• Capacity building &amp; awareness creation</li> <li>• DPRs &amp; feasibility studies</li> <li>• Other barriers removal of exercise</li> </ul>
9.	Sh. Shahid Sheikh, Asahi India Glass Ltd.	<ul style="list-style-type: none"> <li>• We would like to work with MNRE team &amp; product developers for good quality &amp; durable reflectors (mirrors) for CST/CSH systems.</li> </ul>
10.	Dr. Vishal R. Sardeshpande/ Dr. Prasanna Rao ATE Enterprises	<ul style="list-style-type: none"> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies</li> <li>• Development of course materials for training of users, installers, dealers, manufacturers, etc.</li> <li>• Development of technology platform comprising of experts from academic institutions &amp; industries</li> <li>• Performance evaluation of demonstration projects</li> </ul>
11.	Sh. Satya Veer Singh Satyam Enterpriser	<ul style="list-style-type: none"> <li>• Organization of seminars/workshops including National &amp; International</li> <li>• Market Development Programmes for various industrial &amp; commercial sectors</li> <li>• Identification of potential sites for demonstration projects</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> </ul>
12.	Sh. Gini Zacharias, SBI	<ul style="list-style-type: none"> <li>• Identification of banks/FIs for their interest in providing loans to customers--Bank can develop some attractive loan schemes to improve the usage in the market</li> </ul>
13.	Dr. Tripti Agarwal, NIFTEM (MEPI)	<ul style="list-style-type: none"> <li>• At the NITEM (MoFPI), Kundli, we are interested in working on the greenery of sector. In this direction, application of solar concentrators can be a good beginning. We would like to promote solar energy in the food processing sector in a small, medium &amp; large scale industries.</li> </ul>
14.	Prof. Ajay Chandak, Dhule	<ul style="list-style-type: none"> <li>• Status report on functioning of existing CST installations in the country</li> <li>• Status report on functioning of existing CST installations in the country</li> </ul>

		<ul style="list-style-type: none"> <li>• Performance assessment reports of few existing installations on different technologies &amp; applications at locations with different DNI</li> <li>• Potential assessment studies of CSTs for process heat &amp; cooling applications</li> <li>• Identification &amp; development of suitable technological packages for various establishments/ industrial units &amp; applications. This will include best practices involved in installation &amp; integration of CSTs with conventional systems</li> <li>• Development of National standards &amp; component specifications of different CSTs for adaption by BIS &amp; ISO</li> <li>• Development of Test procedure &amp; 'Proof-of-Concept' testing on new technologies</li> <li>• Mobile test set up for performance evaluation in field</li> <li>• Training needs assessment for various stakeholders</li> <li>• Development of course materials for training of users, installers, dealers, manufacturers, etc.</li> <li>• Organization of training programmes for various stakeholders</li> <li>• Enhancement of manufacturing units on different types of CSTs for process heat applications</li> <li>• Development of technology platform comprising of experts from academic institutions &amp; industries</li> <li>• Organization of seminars/workshops including National &amp; International</li> <li>• Development of case studies &amp; success stories</li> <li>• Training manuals for installers &amp; manufacturers/suppliers</li> <li>• Design handbook on CSTs</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> <li>• Performance evaluation of demonstration projects</li> </ul>
15.	Sh. Rahul Kulkarni, Essential Equipments, Dhule	<ul style="list-style-type: none"> <li>• Performance assessment reports of few existing installations on different technologies &amp; applications at locations with different DNI</li> <li>• Enhancement of manufacturing units on different types of CSTs for process heat applications</li> <li>• Development of technology platform comprising of experts from academic institutions &amp; industries</li> <li>• Identification of potential sites for demonstration projects</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> <li>• Performance evaluation of demonstration projects</li> </ul>

		<ul style="list-style-type: none"> <li>• Development &amp; installation of replicated projects</li> <li>•</li> </ul>
16.	Sh. A. Sivaramakrishnan, The South India Textile Research Association	<ul style="list-style-type: none"> <li>• SITRA is ready to coordinate with MNRE to promote solar energy in textile application</li> <li>• Seminar on solar energy and its application to other industry-SITRA can organize and involve in the implementation</li> </ul>
17.	Sh. R. Ravi Chander, CII	<ul style="list-style-type: none"> <li>• CII being largest industry association, would be able to contribute very much under various linked activities –</li> <li>• Training needs assessment for various stakeholders</li> <li>• Development of course materials for training of users, installers, dealers, manufacturers, etc.</li> <li>• Organization of training programmes for various stakeholders</li> <li>• Manpower development of Ph.Ds &amp; M. Techs in the field of CSTs at Solar Energy Centre &amp; various other academic institutions</li> <li>• Organize International study tours for various stakeholders on exposure to CSTs commercially available abroad. Industries to share at least 50% cost</li> <li>• Enhancement of manufacturing units on different types of CSTs for process heat applications</li> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> <li>• Publicity &amp; awareness campaign through print/electronic media and hoardings</li> <li>• Organization of seminars/workshops including National &amp; International</li> <li>• Participation in industrial exhibitions &amp; trade fairs</li> <li>• Market Development Programmes for various industrial &amp; commercial sectors</li> <li>• Identification of potential sites for demonstration projects</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> <li>• Performance evaluation of demonstration projects</li> <li>• Development &amp; installation of replicated projects</li> </ul>
18.	Er. V. Siva Reddy, SPRERI	<ul style="list-style-type: none"> <li>• Component 3- Pilot demonstration of CSH technologies for various application</li> </ul>
19.	Sh. Ashishs Vijaywargi, GEDA	<ul style="list-style-type: none"> <li>• Awareness generation and market development programs</li> </ul>
20.	Sh. Umesh Joshi, Mahindra & Mahindra Ltd.	<ul style="list-style-type: none"> <li>• I can be part of industry development and their partnership with institutions</li> <li>• Sustainable financial approach (component 4)</li> </ul>
21.	Prof. Sudhir Panse	<ul style="list-style-type: none"> <li>• Development of technology application information packages</li> </ul>

	Enersun Power Tech. Pvt. Ltd.,	<ul style="list-style-type: none"> <li>• Development of training programmes and materials for different stakeholders</li> <li>• Organization and conduct of training programmes</li> </ul>
22.	Ms. Kunzes Dolma Sr. Project Engineer LREDA	<ul style="list-style-type: none"> <li>• Identification of potential sites for demonstration projects</li> <li>• Organization of feasibility studies &amp; preparation of DPRs for such sites</li> <li>• Execution of demonstration projects on different technologies/applications in different sectors/establishments</li> <li>• (If given chance, contribution to the whole project)</li> </ul>
23.	Prof. M. V. Rane, IIT, Mumbai	<ul style="list-style-type: none"> <li>• Development of manufacturing facilities for solar glass mirrors &amp; evacuated tube heat receivers</li> <li>• Potential assessment studies of CSTs for process heat &amp; cooling applications</li> </ul>

**Q-5 : Any further suggestions for better implementation of the project.**

S. No.	Name of organization	Response
1.	Sh. Dinesh K. Awasthi, EE, CREDA, Raipur	<ul style="list-style-type: none"> <li>• Before implementation of the project some sanction should be given to nodal agencies for organize seminar/workshop, making DPR for projects and also given guidance regarding the same.</li> </ul>
2.	Sh. Lavleen Singhal Acira Solar P.Ltd.	<ul style="list-style-type: none"> <li>• Development of engineering standards for industry verticals</li> <li>• Loan DNI maps of India &amp; forecasting of resource</li> <li>• Bankability of the project</li> <li>• Technology partnerships with experienced technology providers</li> </ul>
3.	Sh.Anand Upadhyay, TERI	<ul style="list-style-type: none"> <li>• Technical capacity development</li> <li>• Sustainable financial approach in adoption of CSH technologies &amp; applications in India</li> <li>• Design handbooks on CSTs</li> </ul>
4.	Sh. Sanjeev Kachwala K. Energy	<ul style="list-style-type: none"> <li>• India &amp; specially, Rajasthan have storage of water &amp; one should look for power generation --direct heat engines of accommodate small power generation</li> </ul>
5.	Sh.Phulwar Singh, Vijaya Bank	<ul style="list-style-type: none"> <li>• Not any. Already dealt with by various speakers &amp; delegates</li> </ul>
6.	Sh. Kiran Deshpade, Thermax Ltd.,	<ul style="list-style-type: none"> <li>• Concentration of demo project through which other activity will automatically will get focused</li> <li>• singular focus should be on demo projects at user end through a process of bringing manufacture, user and financier together</li> </ul>

7.	Sh. Sunil Kumar, NPC	<ul style="list-style-type: none"> <li>• Develop standard &amp; labeling scheme similar to S&amp;L scheme of Bureau of Energy Efficiency (BEE) for CST</li> <li>• Assess GHG Emission &amp; draw financial leverage and use the fund for same scheme again</li> </ul>
8.	Sh. Amit Kumar, TERI	<ul style="list-style-type: none"> <li>• Need to focus not only on technologies, but on the products and system integration. Thus, emphasis has to be on greater interaction between users-technology providers-research community</li> </ul>
9.	Sh. G.B. Patil, GEDA	<ul style="list-style-type: none"> <li>• Benchmarking of the cost per unit / various technologies, need to be addressed to, to have a transparency &amp; confidence of the consumer</li> <li>• Sectoral specific technology in decentralized manner could help in dissemination/ the technology</li> <li>• The presentation made during the workshop be emailed to all the participants.</li> </ul>
10.	Sh. Shahid Sheikh, Asahi India Glass Ltd.	<ul style="list-style-type: none"> <li>• Have annual workshop, say May-2013, 2014, to review progress and see what achievements have been made and address barriers which still exist</li> <li>• Need to give this programme more publicity to industry as well as focus users</li> </ul>
11.	Sh. Jacob Alexander Moser Baer Projects	<ul style="list-style-type: none"> <li>• Continuous monitoring of performance of CSH systems</li> <li>• Incentives for development of larger manufacturing units</li> </ul>
12.	Sh. Satya Veer Singh Satyam Enterpriser	<ul style="list-style-type: none"> <li>• More awareness &amp; understanding of concept of technology to end-user &amp; involvement of technology experts and industrial users.</li> </ul>
13.	Sh. Gini Zacharias, SBI	<ul style="list-style-type: none"> <li>• To conduct Entrepreneurship Development Programme (EDP) amongst young students in various technical colleges/institutions to set up manufacturing units</li> </ul>
14.	Dr. Tripti Agarwal, NIFTEM (MEPI)	<ul style="list-style-type: none"> <li>• There is a huge potential of solar energy application in the food sector. In my opinion, these should be a focus to tap that potential by this project so that the industry and society gets benefited can ultimately we help achieving the target of reducing the GHG emissions in our country to which SME is a big contributor.</li> </ul>
15.	Prof. Ajay Chandak, Dhule	<ul style="list-style-type: none"> <li>• Develop new test centers</li> <li>• Keep open entry for different &amp; emerging technologies</li> <li>• Development of test protocols is extremely important and given an opportunity. We are ready to volunteer this work.</li> </ul>
16.	Sh. Rahul Kulkarni, Essential Equipments, Dhule	<ul style="list-style-type: none"> <li>• Make registration &amp; subsidy availability for small manufacturers easy and accessibility</li> </ul>
17.	Sh. A. Sivaramakrishnan, The South India Textile Research Association	<ul style="list-style-type: none"> <li>• Solar power generator at small level 10 KVA to 100 KVA will be more useful for small and medium scale enterprises</li> <li>• Workshops and seminar in textile clusters to overcome serious power shortage in South India. 20% - 40% for 5 months in a year</li> <li>• Feasibility and implementation part of the solar energy systems can be given to the</li> </ul>

		respective industry research associations for effective and rapid installation of the system
18.	Sh. R. Ravi Chander, CII	<ul style="list-style-type: none"> <li>• Efforts should be put on developing a risk-return business model for the industry to take up implementation on a large scale</li> </ul>
19.	Er. V. Siva Reddy, SPRERI	<ul style="list-style-type: none"> <li>• Strengthening of at least one Regional test centre for test facility of CSTs-can establish in SPRERI also</li> </ul>
20.	Sh. Umesh Joshi, Mahindra & Mahindra Ltd.	<ul style="list-style-type: none"> <li>• Create awareness in all industries addressing to tope most (like chairman, MD)</li> <li>• Possibly make compulsory use of solar heating in industry for use of using fossil fuel/electricity above certain norms</li> <li>• Rank the available system based on output and your experience</li> </ul>
21.	Ms. Kunzes Dolma Sr. Project Engineer, LREDA	<ul style="list-style-type: none"> <li>• Promotion of manufacturing units in remote places</li> <li>• Start pilot projects in the first two years</li> </ul>

**Annexure-V: Presentations of Inception Workshop**

**Presentations of Speakers**  
(Available on MNRE website: [www.mnre.gov.in](http://www.mnre.gov.in))

**Annexure-VI: Few Photographs of Workshop**







