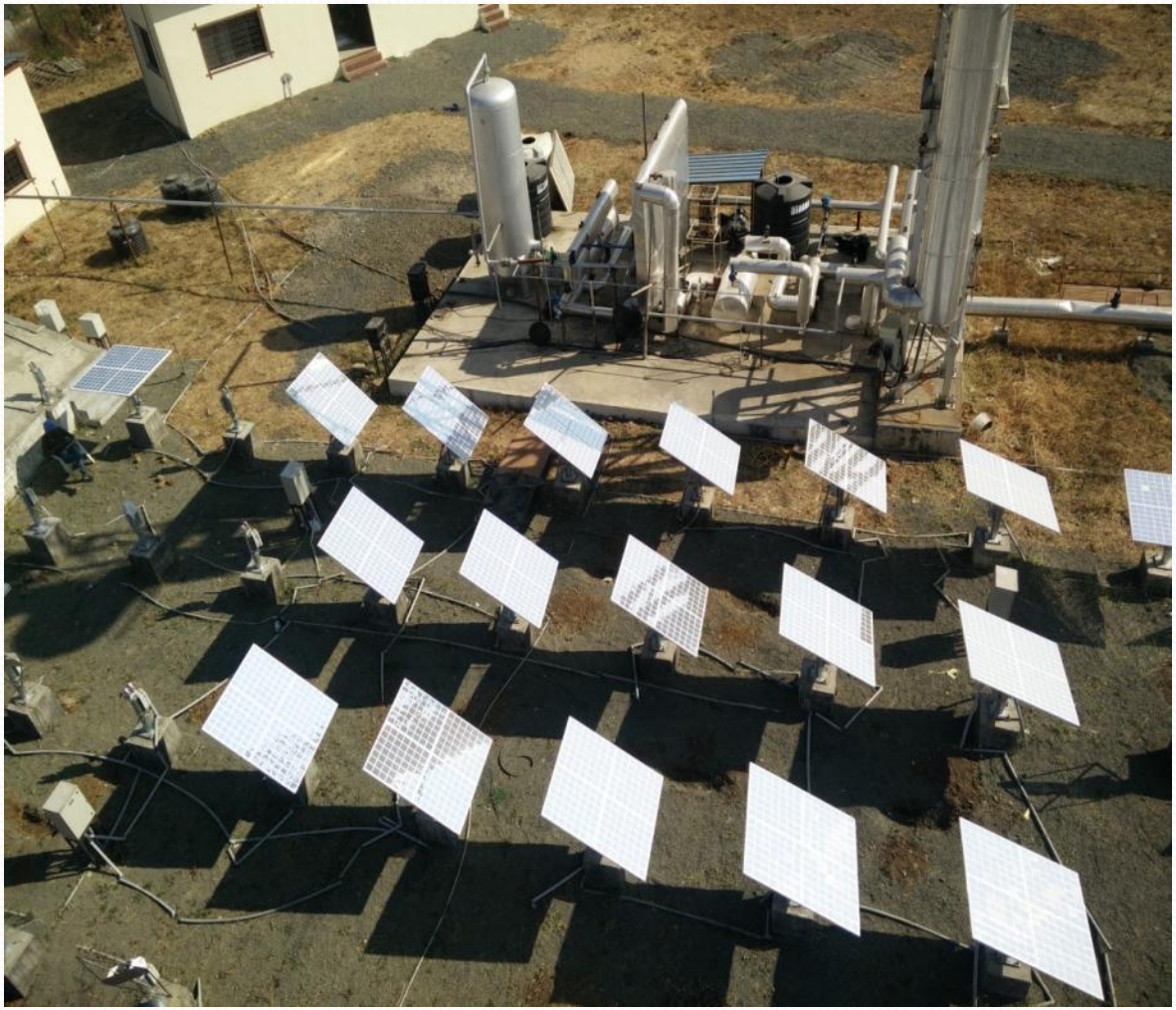
Glimpses of Research & Testing Facility at School of Energy & Environment Management , R.G.T.U., India

30 kWt Cross Linear-Concentrated Solar Power Technology based Solar Thermal Project at RGPV

(Ongoing)



30 kWt CL-CSP INNOVATION PROJECT

(state-of-the-art solar thermal technology)

In pursuance of a GREEN TOMMOROW & GREEN INITIATIVES, RGPV has envisioned several GREEN PROJECTS in its campus. Among which 30 kWt Cross Linear Concentrated Solar Power (CL-CSP) Plant will be an impact breakthrough project in the area of solar Thermal which is being executed under the colloboration with Ministry of New and Renewable Energy (MNRE), Govt. of India, Solarflame Corporation , Japan; Toyo Engineering Corporation, Japan; Bergen Group, New Delhi; together with RGPV, Bhopal. This will be very first project which is going to be scaled up from 30kW capacity to 1MW and then 20MW on an actual power plant ultimately aimed at coal substitution.

CL-CSP site at RGPV Campus Bhopal

PRINCIPAL SCIENTIST
Prof. Yukata Tamaura
Tokyo Tech. Institute of Technology
Tokyo Japan

CHIEF PATRON
Prof. Piyush Trivedi
Vice Chancellor RGPV

PRINCIPAL INVESTIGATOR
Prof. Mukesh Pandey
Director R&E RGPV
Bhopal

MoU signing for the CL-CSP Project between RGPV and Tokyo Institute of Technology (Tokyo Japan, 2012)

CL-CSP - 2016

RGPV

Optical efficiency

- Trough and Linear Fresnel are one axial optical controlled, while CL is two axial optical controlled.
- CL can adjust mirror direction for higher concentration of sunlight with low cost and lesser optical loss
- Tower can provide high temperature with two axial optical control, but very costly. Also, the distance between receiver and mirror is huge which results in increased optical loss.

Thermal Efficiency

- Power generation efficiency depends on steam temperature. Higher the temperature higher is the efficiency.
- CL, owing to high thermal efficiency, can help in establishing cost effective thermal storage system.
- It is adaptable for high temperature requirement from steam turbine generators in case of hybrid power.

Advantages of CL System

- Apart from advantages of low cost and easy-to-scale-up like in Linear Fresnel and Trough, CL provides high temperature which is not possible in other two.
- Although Tower provides high temperature, but it is very difficult to achieve economies of scale.
- CL provides higher optical and thermal efficiency.

Applications of CL CSP

- Replacement of coal for existing Thermal Power Plants during the day Time.
- CL-CSP will replace Fossil Fuels in Factories/industries.
- Hybrid Technology for CSP Plants.
- Using solar steam for Reclaiming the arid land into the fertile land.
- CL-CSP Technology a Great Fit for Desalination.

Target

To demonstrate the innovative technology that could be installed near coal fired thermal plants for coal substitution by solar generated steam at high level of efficiency. Coal substitution is another focus area for Conventional coal fired Power Plants, where rising cost of Imported coal and Coal allocation issues have set aside many power plants from taking off the ground.

PROJECT TEAM

Project Team	Designation
Prof. Mukesh Pandey	PI
Prof. Yukata Tamaura	Co-PI
Mr. Rajinder Kaura	Co-PI
Prof. V.K. Sethi	Co-PI
Mr. Yoshinovo Kato	Toyo Corp. Japan
Mr. Kiyoshi Satake	Toyo Corp. Japan
Mr. Prashant Mishra	Project Manager
Mr. Himanshu Bora	Project Engineer
Dr. Pankaj Jain	Member
Mr. Ranjeet Joshi	Member
Mr. Anurag Gaur	Member

CITY

Solar power : World's first CL-CSP plant coming up at RGPV

आरजीपीवी में 1000 किलो वाट का सोलर

Contact

1. Dr. Mukesh Pandey (Principal Investigator) mo: 09425392415 Email: mukeshrgtu@yahoo.co.in
2. Mr. Prashant Mishra(Project Manager) mo: 09910798495 Email: prashant.mishra@rgtu.net

(www.rgpv.ac.in)

"Meeting the Energy Needs of Tomorrow"

ABOUT THE PROJECT

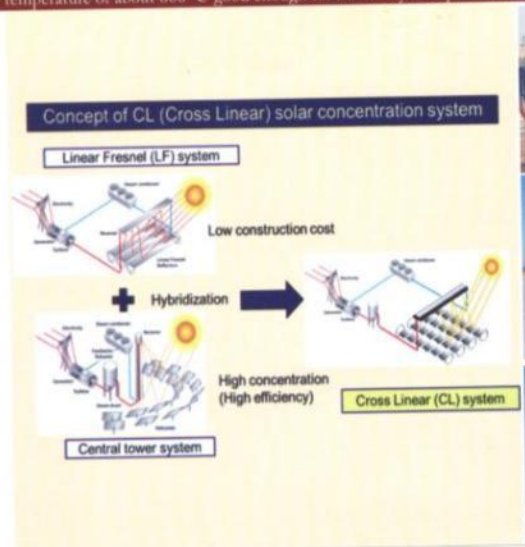
A new concentration system, Cross linear (CL), with a temperature range of 300-800 °C is amalgamation of two existing Solar Thermal technologies i.e. Solar Tower and Linear Fresnel System. This system is situated between point and linear focusing concentration. Hence, with the CL system we can get a higher temperature of around 800 degree C by applying Linear Focusing Method. The both lines are crossed each other at right angles; the mirror lines are aligned on a north-south axis and the receiver lines, on an east-west axis. The objective of 30 kWt innovative CL-CSP project is to achieve higher temperature of 600°C. In this installation, using Gyro Type Heliostats which is enable with EW and NS tracking with very less power consumption. The Levelized Electricity Production Cost (LEC) is lower by 20-30% compared to other solar thermal system. Solar beam energy collected by CL is higher by nearly 20% as compared to Linear Fresnel. Thus, the CL system seems to be promising solar concentration system to use the solar heating at a wide temperature range of 300-800 °C with the lowest production cost among the existing solar concentration systems.

This project has been sanction by MNRE in 2014 with following objective:

1. Demonstrate high temperature (>=600°C) attainment from CL-CSP
2. Optimize simulation technology of CL-CSP
3. Utilize to develop 1MWe plant
4. Development of road map to bring down the tariff based on this technology to be competitive to solar PV plants considering scaling up and indigenization aspects of the technology

Cross Linear Concentration System

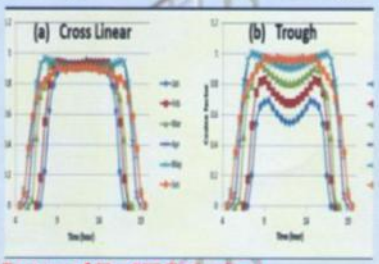
The shape of our future will be largely determined by how we generate and apply technological innovations to the energy sector and also to simultaneously enforce compliance of energy efficiency and environment management regulations. CL-CSP Technology of Concentrated Solar Power provides a promise to achieve high enough temperature of about 600 °C good enough for Power Cycle Optimization of a Mega scale CSP Plant.

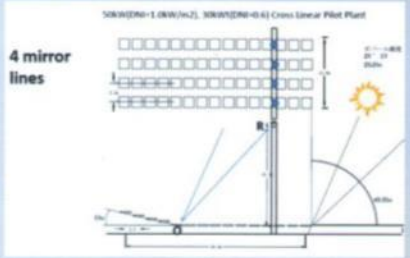


Comparison between CL-CSP and other Solar thermal Technology:

	Cross Linear	Tower, Trough, Linear Fresnel
Temperature	300-800 deg C	Tower: 1000 deg C Trough: 350 deg C Linear Fresnel: 450 deg C
Concentration	100-1000	Tower: 300-1000 Trough, Linear F <100
Thermal Fluid	Liquid: Water, Oil Gas: Air, Steam, CO_2	Tower: Stem, Molten Salt Trough: Oil, Steam, Molten Salt Linear Frensel: Steam
CL Heliostat	Axis: 1.01 Control Precision: Moderate or Low	Tower: 2.0/ high precision Trough, Linear F: 1.0/middle precision
CL Receiver	Cavity, CPC, Pipes	Tower: Cavity Trough: Vaccum Pipe Linear Fresnel: Pipes, CPC, Cavity

(Advantages of CL compared to Tower, Trough and Linear Fresnel)





Features of CL - CSP Technology

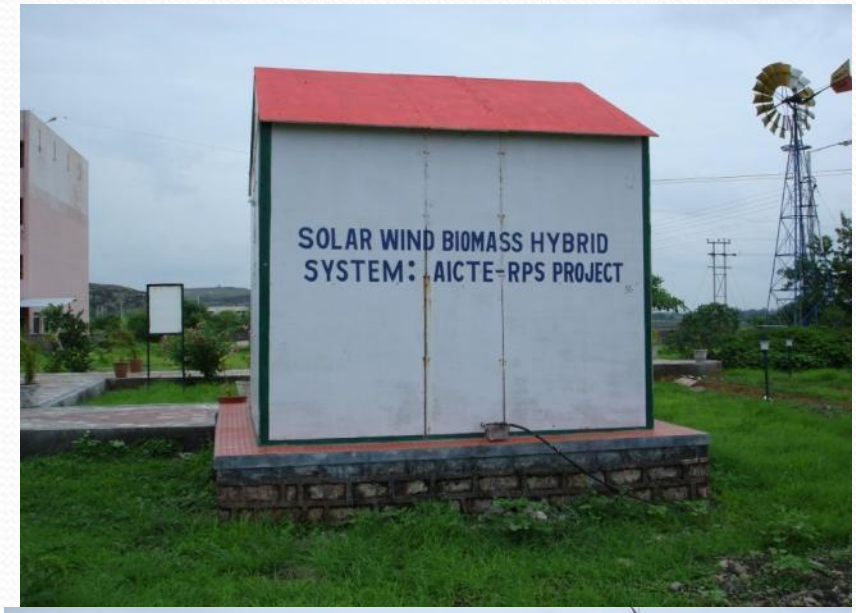
- It has virtues of both conventional Linear Fresnel and Tower technologies.
- It can provide very high temperatures (above 700 deg C), not possible with conventional methods.
- It is very cost effective and can easily be scaled up.
- It could prove to be an economical method of power generation.
- It can be employed as a substitutive of coal.
- It has higher optical efficiency (than Trough and Linear Fresnel) and thermal efficiency
- Trough and Linear Fresnel are one axial optical controlled, while CL is two axial optical controlled.
- CL can adjust mirror direction for higher concentration of sunlight with low cost and lesser optical loss.
- Tower can provide high temperature with two axial optical control, but very costly. Also the distance between receiver and mirror is huge which results in increased optical loss.
- Power generation efficiency depends on steam temperature. Higher the temperature higher is the efficiency.
- CL, owing to high thermal efficiency, can help in establishing cost effective thermal storage system.
- It is adaptable for high temperature requirement from steam turbine generators in case of hybrid power.
- Not only do these technologies help reduce global carbon emissions, but they also add some much needed flexibility to the energy resource mix by decreasing our dependence on limited reserves and overseas sources of fossil fuels.

Cross Linear (CL) Solar Concentration System

- It has virtues of both conventional Linear Fresnel and Tower technologies.
- It can provide very high temperatures (above 600 deg C), not possible with conventional methods.
- It is very cost effective and can easily be scaled up.
- It could prove to be an economical method of power generation.
- It can be employed as a substitutive of coal.
- It has higher optical efficiency (than Trough and Linear Fresnel) and thermal efficiency

CO_2 Sequestration Pilot Plant installed under the DST Project (Completed) at Energy Park- RGPV

AICTE-RPS PROJECT: SOLAR WIND & BIOMASS HYBRID



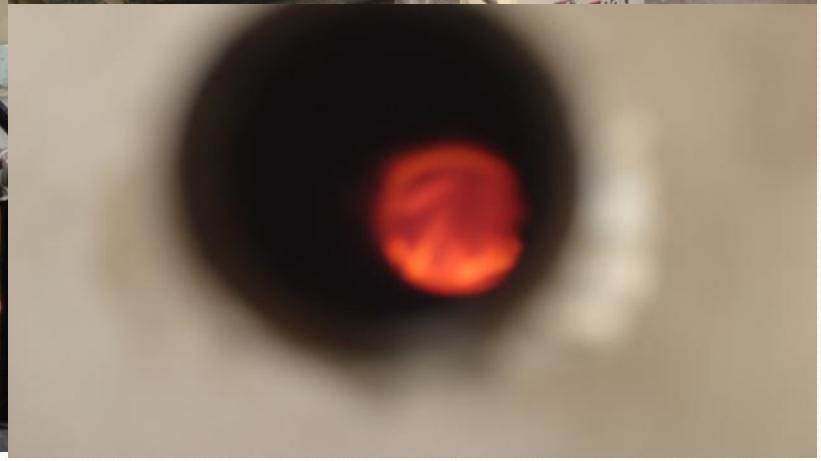
Inaugural Ceremony of 5x12kW Solar Wind Hybrid System at Hill top of RGPV

LABS OF THE DEPARTMENT

- Energy Park
- Environment & Energy Lab

100 Ltrs. Bio Diesel Reactor commissioned at RGPV

10 kWe Bio mass Gasifier installed at Energy Park, RGPV



Baby Boiler installed at Energy Park, RGPV

Automatic Weather Monitoring Station

Sr. No	Stn. ID	Station Name	Date	Time (GMT)	PERIPHERAL STATUS	AIR TEMPERATURE (C)	HUMIDITY (%)	ATM. PRESSURE (hPa)	SOLAR FLUX (hr:mm)	RAIN FALL (mm)	WIND SPD. (m/s)	WIND DIRECTION (Deg)	BATTERY VOLTAGE (V)
1	AF8E97AC	[ISRO466	27-Dec-08	0:00:00	0	12.7	62	954.5	7.58	193.5	1.8	303	12.7
2	AF8E97AC	ISRO466	27-Dec-08	1:00:00	0	12.1	57	954.7	0	193.5	1	297	12.6

International Symposium on CSP: 25 January 2012

National –International Visitors/Experts at Research Facility of Dept. & Interactions with Students

Dr. Anil Kakodkar, Eminent Scientest

Dr. R. K Gosawami,Director-MNRE

Dr. H.P Garg, Sr. Solar Consultant, MNRE

Prof. P.B. Sharma, Director General- Amity University

UNIDO,CII & MNRE Visit

Dr. D. P. Agarwal, Ex-Chairman UPSE

Dr. Pramod Shrestha , National Consultant-Nepal

Prof. from Keney

MNRE officals Visit

Visit of Prof.(Dr.) D. P. Agrawal

Visit of Dr. Anil Kakodkar

Visit of Members of European Union at CL-CSP Project Site

Visit of MNRE Officials, Govt. of India

Visit of Prof.(Dr.) H.P. Garg, Advisor MNRE & Professor IIT, delhi

National Institute of Solar Energy, GoI, New Delhi, India

National Institute of Solar Energy, GoI, New Delhi, India

Directorate of Technical Education
MADHYA PRADESH

03 Days Training Programme on "Solar Photovoltaic" from 21st-23rd Nov., 2017

Supported by :-DTE,Bhopal,M.P.

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RGPV WELCOMES YOU


AN INDO-AUSTRALIAN INTERNATIONAL
ROUND TABLE DELIBERATION ON
"Emerging Trends & Application of CSP
Technology For Collaborative Research
Between Academia & Industry"
Under
III
18
School of Energy &
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Rajiv Gandh
ishwavidyala
(State
ya Pradesh)
AC)


RAJIV GANDHI PROUDYOGIKI
SOLAR PHOTOVOLTAIC
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5th May, 2018
Organized by
School of Energy & Environment Management
Rajiv Gandhi Proudyogiki Vishwavidyalaya
(State Technological University of Madhya Pradesh)
(Accredited with "A" Grade by NAAC)
Mr. Ian Atkinson
Prof. Sunil Kumar
Mr. George Nicola
Mr. Artur Zwolski


30 kW Thermal Cross Linear Concentrated Solar Power Project

Interaction

ROUND TABLE CONFERENCE
CORE COMMITTEE

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Prof. Sunil Kumar
Hon'ble Vice Chancellor, RGPV, Bhopal

Patron
Prof. S.C. Choube
Co-Ordinator, TEQIP , RGPV

General Chair
Prof. Mukesh Pandey
Head, School of Energy & Env. Mgmt. Rgpv, Bhopal

Prof. Yutaka Tamaura
Emeritus Prof. Tokyo Institute of Technology, Japan

Programme Chair
Prof. Hiroshige Kikura
Prof. Takahashi
Tokyo Institute of Technology, Japan

Programme Co-Chair
Dr. Aseem Tiwari
HOD, Mech. Deptt. UIT-RGPV
Dr. Savita Vyas
SoEEM, RGPV
Dr. Pankaj Jain
SoEEM, RGPV
Mr. Prashant Mishra
Ex. Project Manager, RGSTP
Er. Anurag Gour
SoEEM, RGPV

- Time -
Registration
at 9:30 AM

Advisory Committee

Dr. H.P. Garg, Advisor MNRE, GoI
Dr. G.N. Tiwari, Ex Prof. IIT, Delhi
Dr. Rajeev Shekhar, Prof. IIT, Kanpur
Dr. Laltru Chandra, Prof. IIT, Jodhpur
Prof. Sagar Manjhi, Prof. DCE, Delhi
Mr. Rajinder Kura, MD, BERGEN Group
Dr. V.K. Sethi, VC, RKDF, Bhopal
Prof. Saroj Ragnekar, Retd. Prof. MANIT, Bhopal
Mr. Anil Kumar, MNRE, GoI
Dr. Anil Kumar, Prof. MANIT, Bhopal
Mr. Srikant Deshmukh, MPUVN, Bhopal
Mr. Surendra Bajpai, MPUVN, Bhopal
Dr. Bibek Bandopadhyay , Advisor, MNRE- USAID
Dr. Omkar Jani, GERMI, Ahmedabad
Dr. Indrajit Mukhopadhyay, PDPU, Gandhi Nagar
Mr. Jayshimba Rathore, CEO, India one Solar Plant
Dr. Deepak Gadiya, CEO, Gadia Solar, Gujrat
Dr. Anurag Mishra, USAID, New Delhi

Organizing Committee

Prof. R. S. Rajput, Director, UIT-RGPV
Prof. S.K. Jain, Registrar, RGPV, Bhopal
Dr. A.K. Singh, Controller Exam, RGPV
Prof. S.S. Bhadoria, Head Civil Deptt., UIT-RGPV
Prof. Sanjay Silakari, Head, CSE, UIT-RGPV
Dr. Rakesh Singhai, Dy. Registrar, RGPV
Dr. Alka Bani Agrawal, UIT-RGPV
Dr. Seema Saxena, Head, EX UIT-RGPV
Prof. Sanjeev Sharma, Head, SoIT-RGPV
Dr. Rajesh Bhargav, Dy. Registrar, RGPV
Dr. R. K. Shrivastava, Principal, Univ. Poly
Prof. Ravindra Patel, Head, MCA UIT-RGPV
Dr. Nitin Shrivastava, UIT-RGPV
Prof. Ravindra Randha, UIT-RGPV

Please send Participation Confirmation at Email
head_soeem@rgtu.net on or before 26th March 2018

- Venue -
Senate Hall, Administrative Block
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA
Airport Road, Gandhi nagar, Bhopal (M.P.)

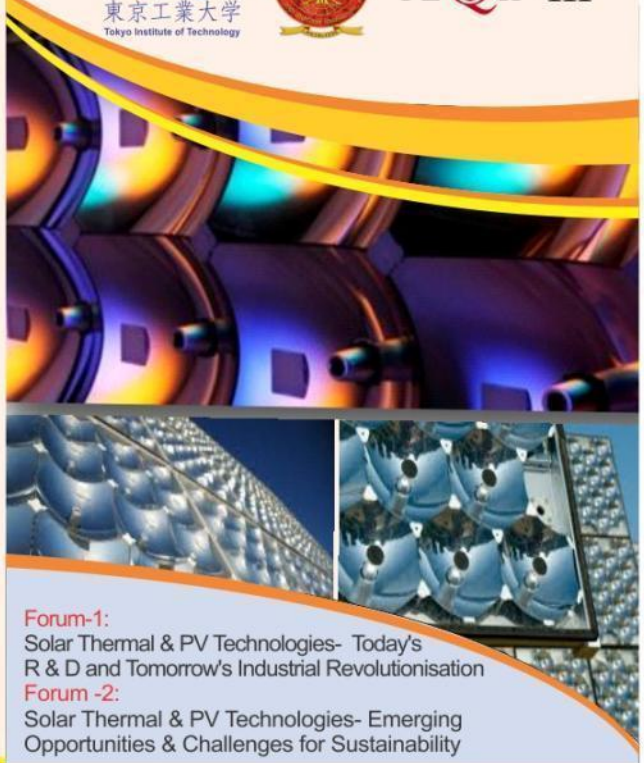
INTERNATIONAL ROUND TABLE CONFERENCE ON
CSP & PV for Cost Effective Solar Power

(Under TEQIP - III)

28th March, 2018

東京工業大学
Tokyo Institute of Technology

TEQIP-III



Forum-1:
Solar Thermal & PV Technologies- Today's R & D and Tomorrow's Industrial Revolutionisation

Forum -2:
Solar Thermal & PV Technologies- Emerging Opportunities & Challenges for Sustainability

Organized By :
School of Energy & Environment Management
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INTERNATIONAL ROUND TABLE
CONFERENCE ON
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Under
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28th March, 2018


Recent Trends in
Energy Storage &
Hydrogen Energy
28th - 29th April, 2017
Co-Sponsors

ECBC Workshop

Member of Parliament in Renewable Energy Programme

NAAC Accreditation Team Visit at SoEEM, RGPV

Industry Academia Meet, at RGPV

Faculty Development Program on Solar Energy


CONVOLUTION 2018

Faculty Development Program on Application of Green Energy Technologies

Indo-Japanese- Norway Delegation Meeting at Norway Embassy, New Delhi

Expert Lecture by Dr.Jeff Cumpston,Australian National University,Australia under TEQIP-III Organized by School of Energy & Environment Management 19th March, 2019

National Institute of Solar Energy sponsored "Rooftop Solar Grid Engineer Course-(Ist Course- 11/03/2019 to 20/03/2019 & IInd Course - 27/03/2019 to 05/04/2019)" conducted at School of Energy & Environment Management, Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, M.P.


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पर
दो सप्ताह का प्रशिक्षण पाठयक्रम
Two Weeks Training Course
on
Rooftop Solar Grid Engineer
11th MARCH - 20th MARCH 2019
Supported by
National Institute of Solar Energy (NISE)
(Ministry of New & Renewable Energy, Government of India)
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रूफटॉप सोलर ग्रिड इंजीनियर
Two Weeks Training Course
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Rooftop Solar Grid Engineer
NISE

Invited Industrial Expert Talk & Interaction on "RENEWABLE ENERGY: INDUSTRY PERSPECTIVE (VIABLE ENERGY SOLUTION)" By Mr. Ravi Kapoor, CEO, Swathi SunSource Power Pvt. Ltd., Mumbai on August 01st, 2019

School of Energy & Environment Management

Rajiv Gandhi Proudyogiki Vishwavidyalaya, M.P.

Thank You