



EUROPEAN UNION



Bharat Heavy Electricals Limited

## Conference on Clean Coal and Carbon Capture and Storage Technologies

CCT: Efficiency Improvement, CFB Technology and IGCC  
CCS: Pre-Combustion, Oxy-fuel, Post- Combustion and CO<sub>2</sub> storage

Project funded by the European Union

on 2nd and 3rd December, 2013  
at Trichy, Tamilnadu



## The Project ...

In India, the anticipated growth in energy demand is expected to widen the usage of coal in energy sector in the coming years. While on the other hand, for a sustainable energy future and low-carbon emission requirements, reducing the environmental impact of coal-fired energy generation, are very important. Moreover, worldwide in order to address climate change causes, coal based power plants, as a point source of emission, provide greater opportunities for emission reduction through Clean Coal Technologies and Carbon Capture and Storage Technologies.

In line with this, the Government of India has also taken-up many significant, proactive initiatives to increase the efficiency of the Indian coal fired power plants and thereby to reduce carbon emission.

In order to assist the Indian Thermal Power Sector to address the challenges of reducing carbon emissions by using efficient and latest Clean Coal Technologies, TREC-STEP, in partnership with Bharat Heavy Electricals Ltd., India's largest public sector manufacturer of power plant equipment, has taken-up a major development initiative, funded by the European Union, under its project, 'Developing a Cluster for Clean Coal Technologies (CCT) and Carbon Capture and Storage (CCS) for the Indian Thermal Power Sector'. The project with its comprehensive activity spectrum had organized a series of awareness build-up and capability development programmes, internships, study tours, demonstration and deployment projects, studies, innovation development and dissemination activities, creating an upsurge for CCT and CCS initiatives in India.

### **Conference on Clean Coal and Carbon Capture and Storage Technologies**

As an important convergence activity under the European Union supported project, this Leverage Conference has been planned, to disseminate new skills, technologies and techniques to the Indian Thermal Power Industry, in order to take-up effective CCT-CCS deployment actions in the near future. The main aims of the convergence conference are:

- To disseminate the latest, state-of-the-art clean coal and carbon capture and storage technologies among the Indian Thermal Power Players,
- To provide a networking platform for the Indian Power Sector Players, Academia, etc. for enabling knowledge linkages with national and also with international experts and eventually,
- To facilitate CCT CCS deployment and demonstration projects, in the near future.

The conference is mainly focused on the needs of Engineers from the Indian Power Plants, other Thermal Power Players, Policy Makers, Entrepreneurs and Innovators, Academicians, etc.

### **Programme Structure**

This two day Convergence Conference on Clean Coal and Carbon Capture and Storage Technologies shall provide the participants with a unique package of latest technologies in CCT and CCS successfully implemented in countries like the UK, Germany, Spain, Italy, US, etc. The invited experts in CCT and CCS areas are with rich experience and shall be able to provide valuable knowledge inputs for the participants. This programme is designed to cater to the knowledge leverage of the Thermal Power Players, Policymakers, Entrepreneurs, Innovators, Academicians and other technical personnel involved in Clean Coal Technologies and Carbon Capture and Storage.

# Conference on Clean Coal and Carbon Capture and Storage Technologies

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Date: 2nd and 3rd December, 2013

Venue: Hotel Sangam, Trichy



## Day 1 - 2nd December, 2013

10:00 - 11:00 am	<b>Inauguration</b>
	<i>Networking break</i>
11:30 - 12:30 pm	<b>Keynote Presentation</b>
11:30 - 12:00 noon	<b>Clean Coal Technologies Today and the Move Towards CO<sub>2</sub> Capture</b> <ul style="list-style-type: none"> <li>- Dr. John Topper, CEO, International Energy Agency (IEA) Coal Research Ltd (Operating Agent for IEA Clean Coal Centre) and CEO, IEA Environmental Projects Ltd (Operating Agent for IEA Greenhouse Gas Programme), UK</li> </ul>
12:00 - 12:30 pm	<b>The EU clean coal and CCS activities and EU-India Clean Coal Cooperation.</b> <ul style="list-style-type: none"> <li>- Dr. Marion Wilde, EUROPEAN COMMISSION, Directorate-General for Energy, Brussels, Belgium</li> </ul>

Conference Sessions	
12:30 - 1:00 pm	<b>Session 1: Modern design and upgrading of coal power plants: Adapting to the Indian coal</b> <ul style="list-style-type: none"> <li>- Dr. Andrew Timms, Head of Licensing and JP, Doosan Power Systems, UK</li> </ul>
01:00 - 02:00 pm	<i>Lunch break</i>
02:00 - 02:30 pm	<b>Session 2: Circulating Fluidized Bed Technology for Indian Coal</b> <ul style="list-style-type: none"> <li>- Dr. John Topper, CEO, IEA Coal Research Ltd. and CEO, IEA Environmental Projects Ltd, UK</li> </ul>
02:30 - 03:00 pm	<b>Session 3: Co-utilization of Coal and Bio-mass, Experience in Europe</b> <ul style="list-style-type: none"> <li>- Prof. Dr. Klaus R. G. Hein, Professor Emeritus, University of Stuttgart, Germany</li> </ul>
03:00 - 03:30 pm	<i>Networking break</i>
03:30 - 04:00 pm	<b>Session 4: Clean Coal Initiatives of BHEL</b> <ul style="list-style-type: none"> <li>- Mr. M. Muthukrishnan, General Manager, R&amp;D and Coal Research, Bharat Heavy Electricals Limited, Trichy</li> </ul>
04:00 - 04:30 pm	<b>Session 5: Gasification of Indian Coal - Challenges and Opportunities</b> <ul style="list-style-type: none"> <li>- Dr. Claudio Marsico*, Director Sales, Head of Sales Dept., Gas Technologies Division, ThyssenKrupp Uhde GmbH, Germany</li> </ul>
04:30 - 05:00 pm	<b>Session 6: IGCC: Towards zero emissions power plants</b> <ul style="list-style-type: none"> <li>- Dr. Francisco García Peña, Engineering R&amp;D Director, ELCOGAS, Spain</li> </ul>

### Parallel Sessions

Session on  
**Efficiency improvement through Advanced coal fired power plant technologies for Indian coal**

- Dr. Andrew Timms, Head of Licensing and JP, Doosan Power Systems, UK

## Day 2 - 3rd December, 2013



10:00 - 10:30 am	<b>Session 7: Carbon Capture and Storage: Developments, Potential and Challenges in the Global Context</b> <ul style="list-style-type: none"> <li>- Dr. John Topper, CEO, International Energy Agency (IEA) Coal Research Ltd (Operating Agent for IEA Clean Coal Centre) and CEO, IEA Environmental Projects Ltd (Operating Agent for IEA Greenhouse Gas Programme), UK</li> </ul>	<b>Parallel Sessions</b>  <b>Session on Bio-mass Utilization</b> <ul style="list-style-type: none"> <li>- Prof. Dr. Klaus R. G. Hein, Professor Emeritus, University of Stuttgart, Germany</li> </ul>
10:30 - 11:00 am	<b>Session 8: IGCC power plants with carbon capture and storage (CCS)</b> <ul style="list-style-type: none"> <li>- Dr. Francisco García Peña, Engineering R&amp;D Director, ELCOGAS, Spain</li> </ul>	
11:00 - 11:30 am	<b>Session 9: Carbonate and Chemical Looping for Coal Fired Power Plants</b> <ul style="list-style-type: none"> <li>- Prof. Dr.-Ing. Bernd Epple, Director of the Institute for Energy Systems and Technology (EST), Technische Universität Darmstadt, Germany</li> </ul>	
11:30 - 12:00 noon	<i>Networking break</i>	<i>Networking break</i>
12:00 - 12:30 pm	<b>Session 10: Oxy-fuel combustion advantages and development in coal fired power plants and Minimizing CO2 Removal penalty in Oxy fuel Combustion</b> <ul style="list-style-type: none"> <li>- Dr. Luca Mancuso, Process Director, Power Division, Foster Wheeler Italiana S.r.l., Italy</li> </ul>	
12:30 - 01.00 pm	<b>Session 11: Post Combustion CO2 Capture Technology: Current Status and Future Directions</b> <ul style="list-style-type: none"> <li>- Dr. Prachi Singh, Project Officer, IEA Greenhouse Gas R&amp;D Programme (IEAGHG), UK</li> </ul>	
01:00 - 2:00 pm	<i>Lunch break</i>	<i>Lunch break</i>
02:00 - 02:30 pm	<b>Session 12: BHEL's Oxy-fuel combustion and Bio-mass Co-firing projects</b> <ul style="list-style-type: none"> <li>- Dr. Sivaji Seepana, Senior Engineer, Coal Research, Bharat Heavy Electricals Limited, Trichy</li> </ul>	<b>Session on Puertollano IGCC: 20 years of experience</b> <ul style="list-style-type: none"> <li>- Dr. Francisco García Peña, Engineering R&amp;D Director, ELCOGAS, Spain</li> </ul>
02:30 - 03:00 pm	<b>Session 13: Waste Reduction in Coal Fired Power Plants by Carbon Reduction and Entombment of Ash Treatment CREAT</b> <ul style="list-style-type: none"> <li>- Dr. Shen-En Chen, Ph.D., P.E., Professor, Department of Civil and Environmental Engineering, University of North Carolina at Charlotte, Charlotte, USA and State Key Laboratory of Geomechanics and Deep Underground Engineering, China University of Mining and Technology, Xuzhou, China</li> </ul>	
03:00 - 03:30 pm	<i>Networking break</i>	<i>Networking break</i>
03:30 - 04:00 pm	<b>Session 14: CO2 storage and the long term fate of CO2 and Potential of Geological CO2 Storage in India</b> <ul style="list-style-type: none"> <li>- Dr. Juho Lipponen*, Head of Unit, Carbon Capture and Storage, International Energy Agency, France</li> </ul>	
04:00 - 04:30 pm	<b>Session 15: Cluster for Clean Coal and Carbon Capture Technologies for the Indian Thermal Power Sector Project</b> <ul style="list-style-type: none"> <li>- R. M. P. Jawahar, Executive Director, TREC-STEP</li> </ul>	
04:30 - 05:30 pm	<b>Valediction</b>	



# **Conference on Clean Coal and Carbon Capture and Storage Technologies**

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Project funded by the European Union

For further information, please contact:

## **The Programme Coordinator**

EU CCT CCS Project

TREC-STEP

Tiruchirappalli - 620 015

Tamilnadu

Tel: 0431-2500085 / 2500697 / 2500757

Mobile: 9944922157

Fax: 0431 - 2500175

Email: binb\_ts@yahoo.com

For more details please visit: <http://www.carboncap-cleantech.com/>







#### About TREC-STEP...

TREC-STEP is a multi-dimensional developmental organization promoted by the central and state governments of India, along with financial institutions and other institutions in 1986, for promoting technology and entrepreneurship initiatives. TREC-STEP being a technology business incubator has a strategic focus on promoting new entrepreneurial start-up ventures into successful high growth business ventures. TREC-STEP has worked with a number of international developmental organizations in development projects, such as the UNDP, the UNIDO, the European Commission, the World Bank infoDev, the British Council Division, etc. TREC-STEP has worked with several government agencies, developmental agencies and major financial institutions in India, in development projects focusing on the technology and entrepreneurship domain. TREC-STEP has also won many awards and accolades from the Government of India, the World Bank, the European Union and others. For more information, kindly visit [www.trecstep.com](http://www.trecstep.com) ...



#### Bharat Heavy Electricals Limited

#### About BHEL...

BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing companies in India in terms of turnover. Established in 1964 the company has now realized the capacity to deliver 20,000 MW per annum of power equipment enabling to address the growing demand.

BHEL's Trichy Complex is one of the leading boiler manufacturers in the world providing total boiler island solutions for utility, industrial, captive power and heat recovery applications. Steam Generators for power generation have been supplied up to 800 MW with supercritical technology. The company is moving forward with Ultra supercritical and Advanced Ultra supercritical boiler developments.

BHEL Trichy is the technology leader for coal based R&D in the country with Coal Research Centre, Combustion test facilities for pulverised fuel and FBC/CFBC, IGCC and Supercritical test facility for high efficient, low emission power generation. BHEL and TREC-STEP have entered into a MoU under EU aid for "Developing a Cluster for Clean Coal Technologies (CCT) and Carbon Capture and Storage (CCS) for the Indian Thermal Power Sector".

**Disclaimer:** This document has been produced with the assistance of the European Union. The contents of this document are the sole responsibility of TREC-STEP and can in no way be taken to reflect the views of the European Union.



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#### A Project Implemented by

Tiruchirappalli Regional Engineering College -  
Science and Technology Entrepreneurs Park  
Thuvakudy,  
Tiruchirappalli - 620 015  
Tel: 0431 - 2500697, 2500085  
Fax: 0431 - 2501681, 2500175

#### This Project is funded by the European Union

Delegation of the European Union to India,  
65 Golf Links  
New Delhi - 110 003  
Tel : 011 - 24629237  
Fax : 011 - 24629206

#### The European Commission is the EU's Executive body.

"The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development, whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders."