

4th annual international summit

COAL GAS

Summit Theme: "Burning Issues and Road Blocks for Coal Gasification"
11th & 12th February 2013, NDCC II Convention Centre, NDMC Complex, New Delhi



Shri Sriprakash Jaiswal, Minister Coal – Ministry of Coal, Shri Naveen Jindal, CMD – Jindal Steel & Power Limited, Shri V R Sharma, Dy. MD – Jindal Steel Power Limited, Shri Peush Mahajan, Director Technical – Engineers India Limited, Shri R K Sachdev, Pre - CPSI & Former Advisor (Coal) to Govt. of India, Shri Ashwinkumar, DG – Mission Energy Foundation



Initiative by



4th annual international summit **COAL & GAS** 2013

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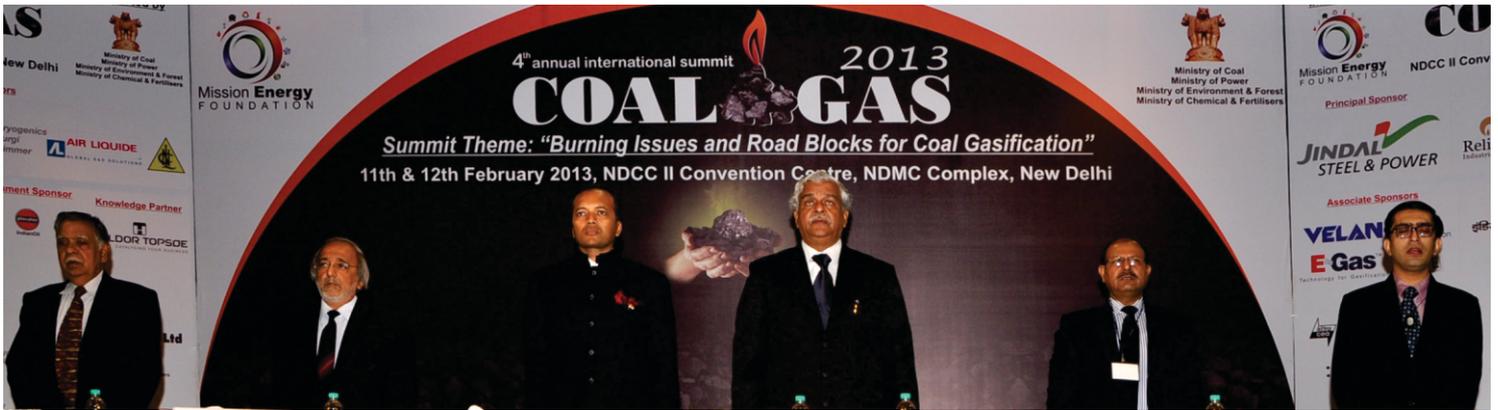
The 4th Annual International Conference COALGAS: 2013 on “Coal Gasification – Burning issues and Road Blocks for Coal Gasification”, organized by Mission Energy Foundation (MEF), under the aegis of Ministry of Coal, Ministry of Power & Ministry of Environment and Forest, Government of India with support from NSWAI, NEERI, SIMA, CMI took place in New Delhi on 11th and 12th February, 2013. It brought together more than 200 researchers, Government bureaucrats, representative of international organizations, the public and private sectors, financial institutions, civil society and academia.

The conference examined further changes at a policy level are needed to facilitate a step-change in advanced Coal gasification front in India and ways of mobilizing same.

Key take away from the Conference

- Forming an Association for Coal Gasification in India.
- National and international public private partnerships could help in accelerating the diffusion of advanced technology for Indian coal with multi feed systems
- Government grants and incentives could also accelerate development and deployment of new technology
- The technology pathway in meeting the national mission objectives (NMCCT)
- Effective utilization of Coal is a national priority
- Need for adoption of technologies for wide range of applications and minimize the dependency of petroleum feed stocks
- Reforms are required to allow easier allotment of coal blocks in India
- Underground coal gasification along with Carbon Capture and Storage technology (CCS) should be promoted to realize full benefits of coal gasification
- Strategy to outsource inbound and outbound logistics to 3PL/ 4PL can be really helpful especially for transportation of critical packages and bulk materials
- Significant scientific contributions to UCG are required in:
 - Geological studies on undergrowth cavity and potential impact on surroundings
 - Possibility of carbon sequestration in used UCG cavities

Inaugural Session



- Opening Address:** Shri Sriprakash Jaiswal, Honourable Union Minister of Coal
- Welcome Address:** Shri Naveen Jindal, CMD - **Jindal Steel Power Limited**
- Keynote Address:** Shri V R Sharma, Dy. MD – **Jindal Steel Power Limited**
Shri Peush Mahajan, Director Technical – **Engineers India Limited**
Shri R K Sachdev, President - **CPSI & Former Advisor (Coal)MoC, Govt. of India**
- Vote of Thanks:** Shri Ashwinkumar, Director General – **Mission Energy Foundation**



Honorable Union Minister of Coal, **Shri Sriprakash Jaiswal** opened the conference by acknowledging presence of the eminent guest on the dais and introducing the theme of the conference, he said it is critically important that we address the countries major challenges are the climate change and global warming. Coal plays an important mix in developing the countries energy and will continue to be in future as well; above 55% in primary energy and about 70% in power generation in the country (is coal based).

The Opening Welcome address by **Shri Naveen Jindal**, CMD – JSPL touched on a number of important visions, research investment concepts and warning considering the COAL gasification Technology and in CTL (Coal to Liquid) and he also specified fitting long-term investments to address the predicted needs of the industries is a challenging task.



The Opening keynote address by **Shri V R Sharma**, Dy MD- JSPL, explained the need of Coal gasification requirement and the changes for improvement in this area and also touched on a number of key areas that require immediate attention. He being an expert pointed the areas that requires and action in fact track.

Shri Peush Mahajan, Director Technical, EIL started his keynote address with availability of Coal in India and emphasizing the importance of sustainable use of energy, he said developing countries like India should repeat the mistakes of the presently developed countries before world war II, but have the opportunity to adopt new technologies and new ways of thinking.



We also had a special address by **Shri R K Sachdev**, President – CPSI who threw lights on how Coal India took the initiative to develop on Coal gasification way back 1970 in India. He pointed out that the policy decision towards Coal gasification should be flexible, not a closed door one, review it after every 5years and the technology should be selected carefully; merely selecting the right technology will not suffice but you should also have your own R&D base to go along with it.

Finally, **Shri Ashwinkumar**, DG- Mission Energy Foundation gave the vote of thanks to everyone who made this event possible.



Current Needs India and world wide



Session Chairman: R K Sachdev, President - CPSI & Former Advisor (Coal) MoC, **Govt. of India**

Keynote Speaker: S S Krishnan, Principal Research Scientist - **Center for Study of Science, Technology and Policy (CSTEP)**

Keynote Speaker: Sakshi Marwah, Manager - **PWC**

Keynote Speaker: Roger Kumar, MD - **Case Group**

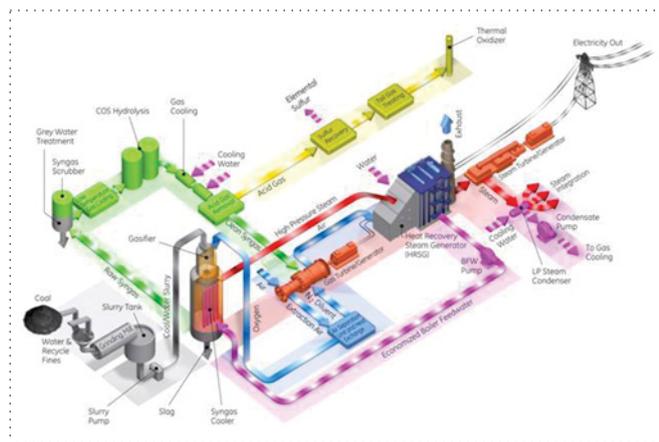


S S Krishnan, CSTEP started the session with an energy and Coal Background in India scenario. He pointed out in current scenario effective utilization of Coal is a national priority and access to efficient clean coal technology is needed. He pointed out the Global gasification scenario and spoke about the power generation

Overall installed capacity slated to double in next ten years

• Applications

- Chemicals --- 46%
- SNG --- 37%
- Syn Crude --- 4%
- Power --- 8%



Source: Gasification.org, NEFL

Sakshi Marwah, PWC pointed out many areas of policy making which requires immediate attention. She offered opinion that the challenge of sustainable developments needs to be discussed in the context of Coal gasification. Addressing this challenge requires giant leap of faith, motivation from regulatory authorities and action by Industry at all levels. This makes us remember Mahatma Gandhi's words "Speeding is irrelevant if you are going in wrong direction".



However, **Roger Kumar**, CASE Group explained how CASE group is playing a vital role in promoting gasification in India with different case studies. The technologies seek to facilitate the diffusion of energy efficient low carbon technologies in order to bring down endues energy levels, improve productivity and cost competitiveness together with a reduction in Green House Gases (GHG) emissions and related pollutants.

Challenges & Opportunities – Under Ground & Surface Gasification



Session Chairman: MPNarayan, Former Chairman –CIL, NLC

Keynote Speaker: Thomas Mathew, Group VP - RIL

Keynote Speaker: Naveen Ahlawat, AGM (CG- CTL)- JSPL

Keynote Speaker: Diptendra Krishna Sarkar, Senior consultant- PWC

Keynote Speaker: Shardul Kulkarni, Principal Energy - TSMG

Keynote Speaker: Dr. D Radhakrishna, MD - Deear Group

Thomas Mathew, RIL started the session with a case study of what drives RIL for coal gasification and its integration with refinery and the developments and overview of gasification. He also threw lights on how RIL has taken initiative like creating a gasification center for excellence and a pilot study on CTL, CBM and on Microbial Coal conversion. He also mentioned some of the upcoming capital projects.

Naveen Ahlawat, JSPL presentation included the one the key issues being faced by the industry the supply chain management and briefly introduced the Coal gasification projects at Angul and its current status. He pointed out some of the key learning for setting up a Greenfield Coal Gasification.

However, **Diptendra Krishna Sarkar**, PWC recommended adoption of right fit of technology for the Indian market and framing policy with a view to support such projects and a positive roadmap for policy formulation with a proper inter-ministerial coordination.

Dr. D Radhakrishnan, Deear Group pointed out that clarity of pricing mechanism and rationale and more R&D on Coal Gasification is required.

Shardul Kulkarni, TSMG explained, reforms are required to allow easier allotment of coal blocks in India. In order to promote coal gasification, the investors need to be incentivized through:

- Freedom in selling the gas in open market after priority sector allotment
- Freedom in pricing the gas in open markets

Underground coal gasification along with Carbon Capture and Storage technology (CCS) should be promoted to realize full benefits of coal gasification.



The Technology – for Indian Coal (Part 1)



Session Chairman: Thomas Mathew, Group VP - RIL

Keynote Speaker: Dr. Siddhartha Mukherjee, Director – Technology - Lurgi India Company Pvt Ltd

Keynote Speaker: David Slavich, Director India Operation - SES

Keynote Speaker: Ashwin Prabhu, Market Manager - Pall Corporation

This technology session widely discussed about the technology available for Indian Coal. **Dr. Siddhartha Mukherjee**, Lurgi India presented about the lurgi engineering and Air Liquide ASU experience and significant improvement on Lurgi FBDB mark plus. He explained what lurgi has as solutions to the challenges being a one stop shop and summarized the technology as minimum interfaces and maximum of integration.



Ashwin Prabhu from Pall Corporation spoke about the filtration and separation which pall develops, designs, and manufactures its own filter technology with a proven hot gas filter system designs in a wide array of applications, including gasification.



Advantages of Pall Blowback Filtration Technology:

- Dry Particulate Matter Removal
- Self On-line Cleaning system
- High Efficiency
 - High dust removal efficiency : < 1 mg/Nm³ (99.99 %)
 - Efficient for fine particles (down to 0.1µm)
 - Temperature :up to 800°C (1000°C)
 - High chemical resistance
 - Pressure : up to 69 bar
- Global Cost Reduction
 - Low operating and maintenance costs
 - No water/waste water and sludge treatment
 - Low electricity consumption
- Environmental Friendly
 - High dust removal efficiency
 - Does not create a waste water pollution problem
- Compact Design



However, **David Slavich** spoke about the technology which would suit Indian High ash coal for coal gasification and also specified that SES technology does not need coal washing; it can take ROM coal.

SES technology does not produce tars and oils; no expensive clean up systems are required. SES technology has inherent low water utilization and can be designed for zero water discharge.

The Technology – for Indian Coal (Part 2)



Session Chairman: Thomas Mathew, Group VP - RIL

Keynote Speaker: Phil Amick, VP - **Phillips Gasification Services Co**

Keynote Speaker: Jose Del Buey, VP - **Velan Inc.**

Keynote Speaker: Dr. D K Sharma, Professor - **IIT Delhi**

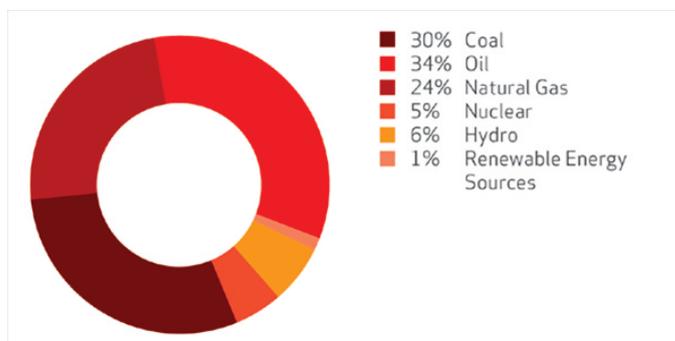
Keynote Speaker: J. Michael Poulsen, Business Development Manager - **Haldor Topsoe**

In continuation of the technology available for Indian coal, **Phil Amick**, Phillip gasification services threw light on the E-Gas technology and its advantages and how it uses petcoke. He also specified that E-Gas operators prefer petcoke – very consistent day to day, year to year. The Wabash plant has run on nothing but petcoke since 2000. The Slag is non-leaching at 2500 ppm metals or more. Petcoke has to be blended with Coal; Wabash runs 100% petcoke with 2-3% limestone or PC bottom ash flux, blending is an economic choice, not technical. He also mentioned E-Gas technology scope in India.

Jose Del Buey from Velan Inc made some important point in terms of valves in severe service application and some of the applications he mentioned are blowback filter applications, lockhopper application, syngas application and last about coal slurry application.

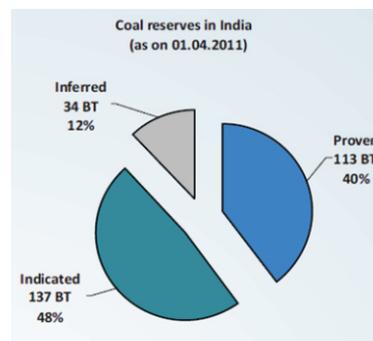
Dr. D K Sharma from IIT – Delhi summed up by saying that clean coal technology may help in the efficient utilization of coal in India. These may lead to the reduction of CO₂ emissions with the possibility of earning credits of CDM. Efforts in cleaning coal, Fluidized bed combustion, Supercritical boilers have already started in India. Further R & D work may be required for adopting the Clean Coal Technologies on high ash Indian coals. There may be a need to go in for even chemical cleaning (organo-refining or alkali-acid leaching) of coal to conserve coal reserves by their efficient utilization. However, chemical cleaning processes may have to be made economical. Some efforts in this direction are underway in Japan, Australia etc., and in laboratory at IIT Delhi.

World Coal Institute Coal Facts



Global primary energy consumption in 2010 by different fuels

Coal Resources & Coal Reserves in India



However, **J. Michael Poulsen** from Haldor topsoe spoke about SNG (substitute Natural Gas) from coal based plants. He explained how Haldor topsoe plays a vital role in 9 plants around the world in SNG lines. Haldor Topsoe is the catalyst for gasoline production.

Panel Discussion – Future Effects: Coal Gasification for India



Session Chairman: Dr. Sri Chandra, Advisor - **Bharath Coal Chemicals limited**

Keynote Speaker: Thomas Mathew, Group VP - **RIL**

Keynote Speaker: Prof Preeti Aghalayam - **IIT Madras**

Keynote Speaker: Varun Kumar - **Dev Energy**

Keynote Speaker: Prabhakar Bhandarkar - **Simon India**

This session discussed Future course of action for Coal gasification for India and how we can secure the development in this aspects in more detailed manner. **Thomas Mathew** from RIL described the need for an Association for Coal Gasification in India where coal gasification think tanks in India regularly have a discussion in the open forum for the further development of this sector in India.

Prabhakar Bhandarkar from Simon suggested that for accelerating developments we need to our research streamlined in the proper channel first like the feasibility, logistic etc before investing on the projects.

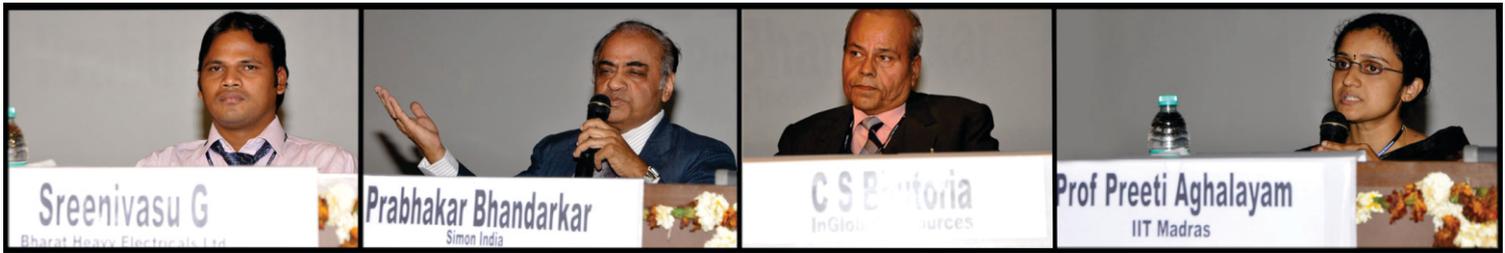
Varun Kumar from Dev Energy explained about the Coal Gasifier which is they have successfully installed in numerous Indian plants in small and large scale. He described the advantages and the economic benefit of the same and also how it manages the residue.

Prof Preeti Aghalayam from IIT Madras highlighted on the a interesting area of research she is been working (UCG) Underground coal gasification is likely to be an important clean coal technology, especially in India

Dr. Sri Chandra briefly summarized and explained some of the Govt. Lethargy and how Coal gasification is very important for Industry in the current scenario of gas shortage, R&D, Pricing in the I&G and also explained about the need for infrastructure.



Current & Future R&D- A must to do



Session Chairman: Prabhakar Bhandarkar - Simon India

Keynote Speaker: Sreenivasu G, Senior Engineer - BHEL

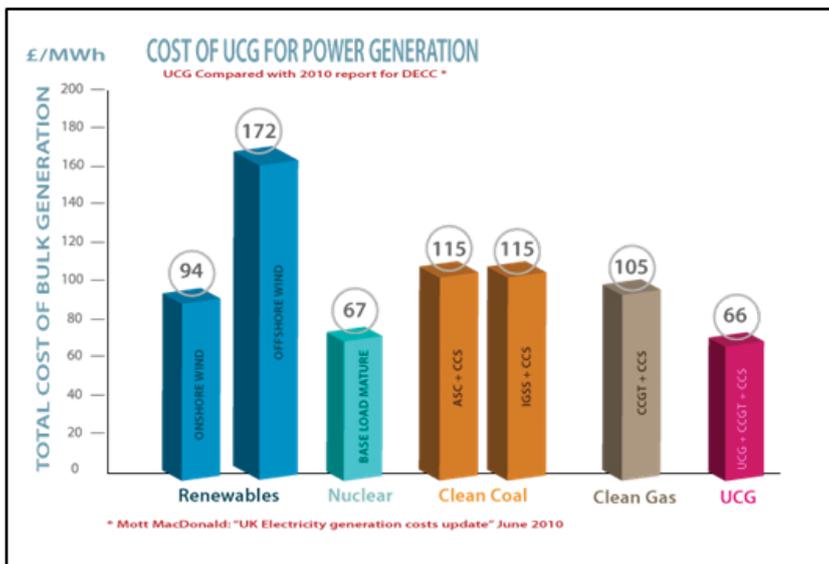
Keynote Speaker: Prof Preeti Aghalayam - IIT Madras

Keynote Speaker: C S Bhutoria, Technical Advisor - InGlobal Resources

This session discussed about the current and future R&D. **Sreenivasu G** from BHEL spoke about the IGCC, he explained in India coal will be the dominating fuel feed stock for IGCC. For the Indian coals, due to higher ash content and difficulty in washing to below a certain level of ash content, non - slagging moving - bed and fluidized - bed gasification processes are the only technologies adaptable for IGCC

Owing to advantages of higher throughput per unit area , absence of tar and phenolic effluents and availability of extractable sensible heat for steam generation, fluidized - bed gasification is more energy - efficient and economical compared to moving - bed gasification. BHEL is the only organization in India to have hands - on experience in design, engineering, fabrication, erection and testing of both moving - bed and fluidized - bed gasifier systems and their integration to IGCC

In India prospects of development of UCG technology are high, with total energy potential of UCG estimated at 15,000 billion cu. m. of gas.”
(Goel, 2010)



C S Bhutoria from InGlobal Resources spoke about double stage Coal Gasifier and its features of adopted technology and gas production and processing. Adopted technology has distinct advantage to separate out undesirable impurities in parent Coal, during Coal gasification process and then subsequent gas processing process. It requires small setup towards effective disposal of separated out harmful constituent (Phenol water) and thereby being environ friendly having no other effluent/pollutant for disposal.

Black Gold – Potential Application & Conversion



Session Chairman: Dr Sri Chandra, Advisor - **Bharath Coal Chemicals limited**

Keynote Speaker: Jayant Pavgi, Advisor & BD - **Exergy Dryers Pvt Ltd**

Keynote Speaker: Amitava Banerjee, Advisor - **Lurgi India company Private Limited**

Keynote Speaker: Yuan Weijun, Chairman – **Tangshan Keyuan Environmental Protection Technology & Equipment Co.Ltd.**

This session discussed more on the new potential application and conversion of the Coal which is chaired by **Dr. Sri Chandra** who also explained some the potential application and conversion in chemical fronts. On the other hand **Jayant Pavgi** from Exergy Dryers Pvt Ltd (Swedish Exergy AB) who explained the characteristics of Exergy Technology and its main features.



Amitava Banerjee pointed out the global scene on coal based energy conversion whether any possibilities in India? He spoke about the global and Indian Energy scenario and also GL/CTL technology status and some of the present initiatives in India and also explained about the project conceptualization and approach

The Energy Mix In India:

Primary Fuel	Unit	Av. Yearly Demand X th Plan (2002-2007)	Equivalent MtOE (2002-2007)	Av. Yearly Demand XI th Plan (2007-2012)	Equivalent MtOE (2002-2007)	Energy Mix (%) (2012)	Energy Security Drive Energy Mix (%) (2030)
Low Rank Coal	MT	460	190	620	255	46	54.0
Lignite	MT	58	155	81.5	22.0	4	
Crude Oil	MT	134	135	172	173	34	25.7
Natural Gas (NG)	BCM	47.5	43	64	58	10.5	5.5
Hydroelectric	gKWH	148	12.7	216	18.5	3.3	0.7
Nuclear	gKWH	23	6.0	58	1.4	2.6	4.0

Yuan Weijun with a use of interpreter explained the classification of Coal Gasification Technology. At present, the gasifier for coal chemical and IGCC power plant, generally single unit production is large-scale and system investment and running cost are high which do not meet the production requirements for industrial fuel gas. He suggested Developing industrial fuel gas gasification technology should also be based on the improvement and optimization of existing technology, development of good performance of development of the briquette fixed bed gasification technology; while development of oxygen-enriched gasification technology and high-temperature air gasification technology which will help to improve the gas calorific value and gasification efficiency.

Concluding session



In concluding session, **Sivakumar T**, Secretariat, Mission Energy Foundation summarized the main points of the two days discussions. He also specified summit theme being **BURNING ISSUES AND ROAD BLOCKS FOR COAL GASIFICATION.**

Sivakumar concluded with a vote of thanks to our Sponsors, Speakers, advisory board member, Government Bodies for their excellent, informative presentations and contributions. All speakers have generously made their presentations available online at the Mission Energy Foundation *website* at:

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Summit Summary



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