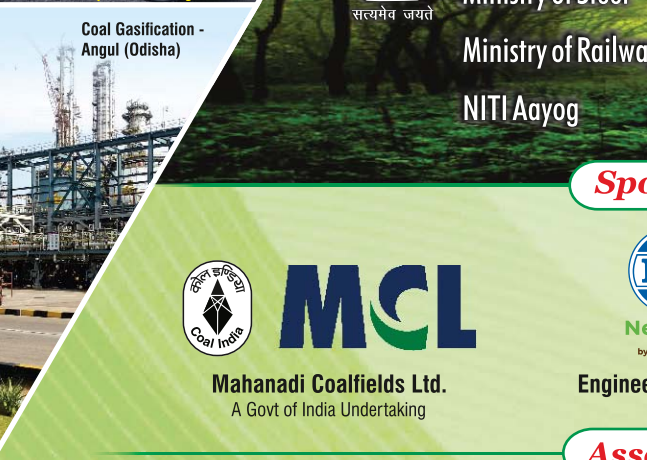

# Souvenir



# 8th Coal Summit, 2023

## National Seminar on Coal

## Theme : Sustaining Coal - Gasification Route

**18th January, 2023 • Hotel Le Meridien, New Delhi**

### Supporters

सत्यमेव जयते

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**Mining Geological & Metallurgical Institute of India - Delhi Chapter**

**Indian School of Mines Alumni Association - Delhi Chapter**

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# 8th Coal Summit, 2023

*"Sustaining Coal - Gasification Route"*

**18th January, 2023 • New Delhi**

## Contents


# Turning coal into eco-friendly fuel for a fuel-efficient India

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**India's largest* coal beneficiation company**

*[Source CRISIL Research Review and Outlook on Power and Coal, September 2014]

# SECTION-1

# *Messages*

INDIA ENERGY FORUM

MINING GEOLOGICAL & METALLURGICAL INSTITUTE OF INDIA 1906 DELHI CHAPTER

INDIAN SCHOOL OF MINES ISMAA DELHI

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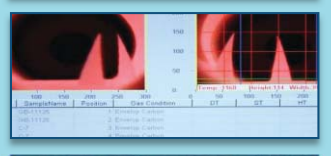
- *Specialized Services in the field of Blasting, Ventilation, Support Design, NDT, Clean Coal Technology like CBM, CMM & Coal Gasification, etc.*




**CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED**
(A Subsidiary of Coal India Limited)
Gondwana Place, Kanke Road,
Ranchi 834 031 (Jharkhand) INDIA

Tel: +91 651 2230116/2230483
Fax: +91 651 2232249/2231447
Email: gmbd.cmpdi@coalindia.in

अमृत लाल मीना, भा०प्र०से०
सचिव
**AMRIT LAL MEENA, IAS**
**SECRETARY**
Tel.: 23384884 Fax : 23381678
E-mail : secy.moc@nic.in

भारत सरकार
GOVERNMENT OF INDIA
कोयला मंत्रालय
MINISTRY OF COAL
शास्त्री भवन, नई दिल्ली–110 001
SHASTRI BHAWAN, NEW DELHI-110 00
www.coal.gov.in

# Message

I am happy to learn that India Energy Forum (IEF), Mining, Geological and Metallurgical Institute, Delhi Chapter (MGMI) and Indian School of Mines Alumni Association, Delhi Chapter (ISMAA) are jointly organizing the **8th Coal Summit on 18th January 2023 at Hotel Le Meridien, New Delhi.** The summit will focus on "Sustaining Coal – Gasification Route".

Coal remains the important and major sources of energy for the country. In order to reduce, the harmful effect of burning coal in Boilers, organisers have appropriately selected the theme.

Coal Industry is passing through a challenging phase to catch up increasing demand of coal especially for the power sector. Coal Industry is poised to have quantum jump in coal production in next few years due to recent policy changes of large scale involvement of private sector in coal production.

It is therefore important that for promotion of coal diversification all stakeholders deliberate in an open Forum on chosen theme of this 8th Coal Summit "Sustaining Coal – Gasification Route".

I wish conference a great success.

4.1.23
**(Amrit Lal Meena)**

Dated: 04.01.2023

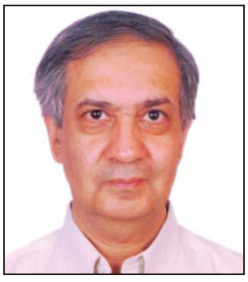
# 8TH COAL SUMMIT 2023

*Theme : "Sustaining Coal - Gasification Route"*

Wednesday, 18th January, 2023 • Hotel Le Meridien, New Delhi

## Alok Perti, IAS (Retd)

Former Secretary, Ministry of Coal



## Message

The India Energy Forum is organizing the 8th Coal Summit on 18th January 2023. Previous such conferences organized by IEF have extremely beneficial to participant and have helped to identify urgent issues needing attention, connected with usage of coal both for generation of energy and also production of cement, steel, etc. This year the forum has selected a topic related to coal Gasification.

The fact that global warming is taking place which may be disastrous for human existence and therefore rightly the intensive efforts are afoot to ensure reduction in emission of GHGs. Burning of fossil fuels for generation of energy have been identified as the main source of increased proportion of GHGs in the atmosphere. Reducing direct burning of fossil fuels has therefore been the thrust of all international agencies dealing with climate change. However, despite this very laudable objective transission to net zero emission will be a very difficult and highly planned exercise. While use of newable energy sources will steadily increase it may not be possible to completely eliminate the use of coal as a source of energy aleast in the next two to three decades. Under the circumstances conversion of coal to gas and liquid would reduce direct burning and consequently lead to lesser emissions. It is with this objective the topic for the conference has been selected.

The technology for conversion of coal to gas has been known to mankind for decades but its deployment has been selective. As long as cheap petroleum products are available the necessity to go for coal gasification is diminished. Now that there is world wide pressure to avoid direct burning of fossil fuels and encouragement to adopt usages which result in lesser emissions coal gasification will become a more attractive alternative.

This conference will provide a excellent platform to discuss, deliberate and expand knowledge base for participant. We all are looking forward to very exciting and intensive deliberation in this conference.

I wish the conference all success.

**Alok Perti**

Conference Secretariat, C/o India Energy Forum, 408, PHD House, 4/2, Siri Institutional Area, August Kranti Marg, New Delhi-110016
Tel. : +91-11-41021423 • E-mail : coalsummits@gmail.com

N. SRIDHAR, IAS
Chairman & Managing Director

Singareni Bhavan, Red Hills
Hyderabad- 500004,Telangana State
Telephone: (91-40) 2330 7938, 23393746
FAX: (91-40) 23393746
E-mail: cmd@scclmines.com

# Message

I am happy to note MGMI of India jointly with ISM Alumni Association Delhi Chapter (ISMAA-DC) and India Energy Forum are organising 8th Coal Summit 2022 on "Sustaining Coal Gasification's Route" (theme) on 18th January 2023 at Hotel Le Meriden, New Delhi.

We are aware all physical activities for holding technical discussions and conference had to be suspended after 7th Coal Summit 2018 due to Covid epidemic. We are glad that we have come out of it with a few causalities.

India, under the leadership of our Prime Minister has taken steps to encourage alternate sources of energy by harnessing solar and wind power. But the gap between supply and demand is so large that India cannot afford to completely ignore generation of power by utilising coal.

Since coal will have to stay for power generation but we can definitely find ways of developing technologies for making coal combustions more environmental friendly by adopting coal gasification route in India. Coal demand continues to increase for two more decades and is expected to rise to 2000 Mt by 2047 as there are no other low-cost alternatives available in our country.

Though the challenges are many, it is the stakeholders' responsibility to step towards achieving sustainable mining goals like socio-economical development and addressing the environmental challenges amicably for the betterment of our country and the mining industry in particular.

The theme of the conference is one of the surest ways to minimise harmful effects of utilising coal directly.

I wish the Summit all success.

**(N.SRIDHAR)**
*Chairman & Managing Director*

**Bhola Singh**
**Chairman cum Managing Director**
**भोला सिंह**
**अध्यक्ष सहप्रबन्ध निदेशक**

**नार्दर्न कोलफील्ड्स लिमिटेड**
*(भारत सरकार का एक मिनीरत्न प्रतिष्ठान)*
सिंगरौली 486889 (म.प्र.)
**NORTHERN COALFIELDS LIMITED**
*(A Government of India Mini Ratna Enterprise)*
P.O. & Distt. Singrauli-486889(M.P.)
Phone: 07805: 266621(Off),266459(Fax)
email: cmd.ncl.cil@coalindia.in

# Message

*It is a matter of great privilege to know that Mining Geological and Metallurgical Institute of India (MGMI-DC) jointly with Indian School of Mines Alumni Association, Delhi Chapter (ISMAADC) and India Energy Forum (IEF) are organising the* ***'8th Coal Summit'*** *on Coal on 18th January, 2023 at New Delhi on the theme* ***"Sustaining Coal – Gasification Route"****.*

*Mining Industry in India is growing of a very rapid pace with increased level of mechanisation and modernisation and is targeting to produce over 1 billion tonnes by 2019-20. It is really a tough task and calls for detailed planning and its execution. It is also important that our precious resources are used judiciously by minimising adverse effect on environment. Use of Ultra super critical and super critical Boilers, Circulated Fluidised Bed Combustion (CFBC) Technologies are need of the hour for efficient use of fuel along with use of coal in other fields like Coal to Liquid, Coal to Gas, Coal to Chemicals etc. .*

*I hope the focus of this conference would also be on reduction of carbon foot prints. I wish the conference a grand success and come up with recommendations for coal sector to sustain momentum.*

**(Bhola Singh)**

सीएसआईआर-केन्द्रीय खनन एवं ईंधन अनुसंधान संस्थान
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**CSIR-Central Institute of Mining and Fuel Research**
(Council of Scientific & Industrial Research)
Barwa Road, Dhanbad - 826 001, Jharkhand, India

प्रो. अरविंद कुमार मिश्रा, एफ.आई.ई
निदेशक

**Prof. Arvind Kumar Mishra**, F.I.E
**Director**

# Message

It gives me immense pleasure to learn that India Energy Forum; The Mining, Geological & Metallurgical Institute of India (MGMI); and ISM, Alumini Association are jointly organizing a **National Seminar on Coal – 8th Coal summit on the theme "Sustaining Coal – Gasification Route"** on 18th January, 2023.

Clean coal technologies are of utmost importance considering India's vast reserve of coal dominating inferior grade high ash non-coking coal. In this regard, coal gasification is an attractive option to utilize coal efficiently meeting stringent environmental regulations. The clean syngas can be utilized for various value-added applications, such as production of hydrogen, ammonia, fertilizers, substitute natural gas, methanol, Fischer-Tropsch liquids etc. It can also be used for direct reduction of iron ore (DRI), power generation and various thermal applications on another side.

In India, number of stake holders are involved in the development and demonstration of suitable gasification technology for aforementioned applications. In this direction, the present coal summit on gasification provides a platform to the industries, R&D organizations and academia to deliberate and disseminate on the challenges & opportunities in gasification. Hope, collective efforts of all concerned will be path forward towards judicious utilization of Indian coal resource through gasification route for various downstream applications.

My best wishes for the grand success of the **Coal Summit on Gasification**.

January 3, 2023

03/01/23
(Arvind Kumar Mishra)

HQ :Dhanbad - Tel.: +91-326-2296023 (O) Fax : +91-326-2296025 E-mail : director@cimfr.nic.in
Digwadih Campus : Tel.: +91 - 326 - 2388202. Regional Centres : Bilaspur : Tel : +91-7752-271450

**Ganesh Chandra Mrig**
Chairman: Vayunandana Power Limited
Former CMD : BCCL & SECL [GOI U/T)
Former Promoter-MD: ACB (India) Limited
President: ISMAA Delhi Chapter
Vice President: India Energy Forum
Trustee | Budhwanti Education and Research Foundation
Trustee | Mrig Foundation

# Message

I am immensely happy to know that India Energy Forum in association with MGMI Delhi Chapter and d Indian School of Mines Alumni Association, Delhi Chapter (ISMAADC) is organizing a National Seminar to discuss the theme "Sustaining Coal – Gasification Route", on 18th January 2022 at New Delhi.

Coal has been the prime source of energy in India for considerable long period. In consideration of the fact that Coal has been identified as the prime contributor to emission of GHGs which has led to global warming and India as a global partner and signatory to declaration of COPSs has to play its role in containing the adverse impact of Coal usage from environmental consideration.

The Govt of India has undertaken ambitious program for meeting 50% of our power requirement from renewables. It has become incumbent upon every country to plan out its energy transition to ensure net zero emission.

Coal gasification is one of the routes to meet the challenges of environmentally use of coal. With high ash and lower rank of Indian coals, we require up-gradation of coal quality and have to carry out research evolving our own modification of established technology of use of Indian high ash coals.

I am sure that the conference shall focus on developing efficient technology for adoption of coal gasification route.

I wish the seminar a grand success!

**Ganesh Chandra Mrig**

# 8TH COAL SUMMIT 2023

*Theme : "Sustaining Coal - Gasification Route"*

Wednesday, 18th January, 2023 • Hotel Le Meridien, New Delhi

## Upendra Kumar

Former Chairman-cum-Managing Director :
South Eastern Coalfields Ltd., Bilaspur (Chattisgarh)
Northern Coalfields Ltd., Singrauli (M.P.)
(Coal India Ltd.)

## Message

It is very gratifying to learn that India Energy Forum together with MGMI, Delhi Chapter and Indian School of Mines Alumni Association, ISMAA are organizing a National Seminar on Coal Gasification – " 8th Coal Summit" on 18th January, 2023 at Le Meridian Hotel, New Delhi.

Coal has been the prime pillar of Energy infrastructure of India for a long long time. Even looking at future, Coal will continue to dominate the Energy scenario in India. We, however cannot get away the fact that Coal is the prime contributor to global warming and moving forward, our Earth will become uninhabitable if rate of this warming is not arrested immediately. The international community has therefore taken a view that use of Coal has to be phased down.

We, as responsible global citizens have taken a major step in this direction by moving our focus from Coal to Renewable Energy Sources for Power Generation. But, simultaneously, we have also to take steps for making Coal Combustion more environment- friendly.

Coal gasification has evolved as a major technological advance for achieving this objective and It is in the fitness of things that the 3 Organizers which are leading Think-Tanks in all matters related to Energy have taken this step for spreading this message to Indian industry and encouraging them to go for coal gasification in a systematic but a major way.

It is expected that the Researchers and Industry Houses which are already active on Coal Gasification front would join the Event and share their ideas with the participants so that an implementable road-map could be prepared for giving a major thrust to Coal gasification and our Industry switching to Coal Gas (Syngas) for major industrial use like Power Generation and Steel making etc. from solid Coal and contain the adverse impact of Coal use on Environment.

I do hope and trust that the dedicated team of Organizers will make a great success of this Event which will pave the way for our Industry moving to the new technological paradigm of utilizing Coal in gaseous form which is more Environment-Friendly than solid Coal which we are using now.

My heartiest congratulations to the Organisers in advance.

**Upendra Kumar**

Conference Secretariat, C/o India Energy Forum, 408, PHD House, 4/2, Siri Institutional Area, August Kranti Marg, New Delhi-110016
Tel. : +91-11-41021423 • E-mail : coalsummits@gmail.com

# 8TH COAL SUMMIT 2023

*Theme : "Sustaining Coal - Gasification Route"*

Wednesday, 18th January, 2023 • Hotel Le Meridien, New Delhi

## P S Upadhyaya

**President, MGMI - Delhi Chapter**
**Former Director (Technical), NMDC Ltd.**

## Message

I am very happy to note that India Energy Forum together with MGMI, Delhi Chapter and Indian School of Mines Alumni Association, ISMAA are organizing a National Seminar on Coal Gasification on the 18th January, 2023 at New Delhi.

Coal has been the prime source of energy of India for ages. and will continue to do so in the next few decades. However, Coal being the main contributor to global warming we immediately need to arrest this trend for our future survival. Globally, very strong movement is taking place that use of Coal must be phased down, by switching over to other forms of energy ,specially the renewables.

But for Countries highly dependent on coal like India, Coal gasification has emerged as a major technological breakthrough for achieving the objective of reducing carbon footprint and in this context organizing this conference could not have been at a better time than this. I therefore, compliment the three organizations for this timely initiative.

I am sure that major researchers and organizations already active on Coal Gasification efforts would participate in the event and share their experience to enable development of road-map for major thrust to Coal gasification in India .

I wish the Conference a grand success .

**P S Upadhyaya**

## SECTION-2

# *Coal Gasification in India*

INDIA ENERGY FORUM

MINING GEOLOGICAL & METALLURGICAL INSTITUTE OF INDIA 1906 DELHI CHAPTER

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**AMPL** is an end to end service provider to the coal industry.

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# Coal Gasification in India

by **U Kumar**
***Former CMD, SECL/NCL***

## Coal-Primary Energy Source

The prime source of Energy all across the globe, prior to industrial revolution in 1750 was Human and Animal power for work and activities and Biomass particularly wood for heating and cooking. Industrial revolution brought about a sea change and these traditional sources were replaced by Fossil fuels like Coal and subsequently Oil and Gas and today the latter account for 68% of Commercial Energy across the globe.

Though, India has also followed this sequence , it is Coal ,which has been the prime Energy source in the country for ages and this has been so for the simple reason that it is the only Fossil Fuel of which the Country has huge resources- the same being very limited in case of Oil and Gas.

## Coal-Main Contributor to Global Warming

The consumption of Coal in the country has steadily increased and as the pace of industrialization has picked up, the rate of increase in coal consumption has also increased. This can be seen from the fact that while the country was self sufficient in matters of Coal with an annual production level of about 70 million tons ( MT) in early 70's when Coal Mines in India were nationalised, today it has to import 200 to 250 MT per annum even when domestic production has reached a level of about 800 MT per annum now. In effect ,therefore the Coal consumption has increased from 70 mill tons per annum to more than 1000 milion tons over a period of just 50 years.

Coal has however, been identified as the main culprit responsible for global warming. The situation has already reached such a pass that unless drastic action towards controlling the Coal consumption is taken, the Earth will become uninhabitable because of increase in temperature.

The international community therefore, has started work on reorientation of energy use so that the temperature increase can be contained at or preferably lower than1.5 Degrees Celsius.

## India Plays its Role

India, as a responsible global citizen recognizes the imperative need for controlling coal consumption. It is however, faced with the enormous challenge of improving the quality of life of its teeming millions . This requires quantum jump in Power generation in the Country. Though Coal accounts for only 55% of commercial energy in the country, it accounts for almost 75% of Power generation and inspite of the ambitious programme for generating Power from Renewables, the immediate requirement of additional power for meeting this quantum jump will have to be met from Coal and the natural consequence is increase in Coal consumption and resultant increase in

GHG emission.And the country will have to be prepared to keep on facing this challenge right up to 2040 till when the Coal consumption is projected to rise and it is expected to reach the peak of about 2000 million tons. .

As it is, we are 3rd highest polluter in the world and though our per capita contribution to the emission of greenhouse gases is lower than the international average, there is an urgent need for taking parallel action so that while Coal consumption increases, the increase in emissions is kept under control.

The Country has launched a very ambitious programme for generating Power from Renewables so that Coal consumption for Power Generation can be controlled. In this direction, while it had set a target to 175 GW of Renewables by 2025, the same has been revised to 500 GW by 2040. The new target obviously looks very steep but when it is seen in the backdrop of the Country, already achieving the level of +173 GW Power from Renewables by now, it does appear to be achievable.

## The Challenge

But then, the projected level of Coal consumption and production of about 2000 MT by 2040 has still to be faced. The solution lies in making Coal consumption more environment-friendly. In this direction, the Country is keeping a close watch on scientific developments in the world and our own scientists are working on evolving technologies for cutting down on Green House Gas (GHG) emission from Coal combustion.

So, India has to contend with a situation where in Coal production and consumption will continue to grow till about 2040 and yet it has to ensure that the GHG emissions do not increase proportionately with the increase in consumption of Coal.

One of the actions in this direction and a very important one is Coal Gasification and our Hon'ble Prime Minister has given a clarion call for the country getting ready for gasification of 100 MT of Coal per annum by 2030.

It has been a well- established scientific fact that homogenous sources of energy are more efficient and eco-friendly and Petroleum and Gas therefore score over Coal which is the lowest in homogeneity ranking and this is where coal gasification comes in.

Coal Gasification can yield large no of valuable products but in the initial stages, India is going to concentrate on the following:

1. Methanol
2. Ethanol
3. Olefin
4. Acetic Acid and
5. Formic Aldehide

Coal Gasification is a process of partially oxidizing Coal with Air, Oxygen, Steam or Carbon-Dixiode to form a Fuel gas called Syngas. In the gasification process, sulphur present in the coal is converted to hydrogen sulphide and minor amounts of carbonyl sulphide. These sulphur compounds can be easily and economically removed from gas streams. The separated acid gas is further processed to recover elemental sulphur.

Most of the washed waters can be recycled and effectively treated. Gasification plants do not produce any scrubber, sludge and no cost is to be incurred on its disposal.

Handling of ash in high ash coal like in India is an issue but the coal ash from gasifier is not hazardous and its leaching effect is very low. The fine ash generated can be used for value added products.

Syngas primarily consists in Carbon Monoxide (CO), Hydrogen, Carbon Dioxide (CO2), Methane (CH4) and Water Vapour (H2O) In earlier times this was used as Town Gas but now it is commonly used for Power generation - both in conventional Thermal Power Stations and Molten Carbonate Fuel Cell Power Stations. Another important use of this Gas is as Chemical Feedstock. Hydrogen obtained from this Gas can be used for various purposes such as making Ammonia or powering Hydrogen economy or upgrading Fossil fuels.

Alternatively, Coal-derived Syngas can be converted into transportation fuels such as Gasoline or Diesel and through additional treatment, into Methanol which, itself can be used as transportation fuel or fuel- additive. It can also be cooled till it liquefies as fuel in transportation sector.

## India Moves Forward

For ensuring that this ambitious programme receives close attention, two high- powered Committees have been formed by NitiAayog - namely a Steering Committee under the Chairmanship of a Member of the Aayog and a Technical Standing Committee consisting of Experts.

Simultaneously, Ministry of Coal has also constituted an Implementation Committee involving all industry stakeholders under the Chairmanship of Additional Secretary, Ministry of Coal.

Further, a resource group consisting of Experts from CIMFR, IIT Mumbai, IIT ISM Dhanbad and IIT Madras has been constituted by Ministry of Coal to take care of the research needs for the Gasification mission.

Setting up of a Coal Gasification plant requires heavy capital as well as long time – about 48 months. The programme for construction of these plants also requires very thoughtful planning and close monitoring. It has therefore been decided to set-up the Gasification projects in phases. In phase -1, a Project based on low ash coal available in ECL, a wholly owned subsidiary of CIL will be taken up. ECL will take care of mining and supply of coal and marketing of the product. The plant will be set up on BOO/BOM/LSTK contract basis.

Considering the fact that our reserves of low ash Coal and production thereof is limited, success of gasification mission would, to a large extent, depend, on the success of our indigenous efforts for gasification of high Ash coal. This part of the mission would naturally be taken up in succeeding phases.

Niti Aayog is presently exploring a road-map and suitable Technology option for Coal Gasification in the Indian context. It has been decided that CMPDI, Ranchi and CIMFR, Dhanbad would carry out detailed analysis of Coal from suitable Coal Blocks to identify such Coal which will be tried for Gasification. In this connection, 18 sources of Coal in MCL, 7 in CCL and 5 in ECL are being taken up for study.

Coal gasification action can yield a host of valuable products - primarily Synthetic Gas and Hydrogen.

While Synthetic Gas can be used for Power Generation and Iron Reduction as a fuel, It can also be converted into Naphtha, Waxes and Diesel / Jet Fuel through Fischer Tropsch process and Methanol . from which the following products can be obtained :

a. Acetic acid

b. Dimemetale Ether

c. Thai ascetic

d. Ethylene and

e. Propylene

On the other hand, Hydrogen can be utilized or producing Ammonia, Urea and Ammonium Nitrate.

## Policy Intervention

Government has made following key policy interventions for giving a boost to the programme.

1. Coal Gasification has been taken as a Mission
2. Ministry of Coal has created a separate window for auction of Coal Blocks on long term basis for Gasification.
3. Ministry of Coal had organized a post-budget Webinar on Coal Gasification
4. Ministry of Coal has provided 50% rebate in revenue share in Commercial Coal Block Auction for Coal to be used for Gasification.
5. The Union Budget for 22-23 has provided for 4 Gasification Projects in Government sector.
6. The focus area of these Pilot Projects are as under :

(i) ***SECL - South Eastern Coalfields Ltd.***

Product – Ammonia

Capacity 0.7 MT per annum

Coal Requirement – 1.3 MT Per Annum

Mine – Maha Maya

(ii) ***MCL – Mahanadi Coalfields Ltd.***

Product - Ammonium Nitrate

Capacity - 0.66 MT per annum

Coal Requirement – 1.2 MT Per Annum

Mine – Lakanpur

(iii) ***ECL – Eastern Coalfields Ltd.***

Product - Methanol

Coal Requirement – 1.3 MT Per Annum

Mine – SonepurBazari

(iv) ***WCL – Western Coalfield Ltd.***

Product – Ammonium Nitrate

Capacity - 0.66 MT per annum

Coal Requirement - 0.8 MT Per Annum

Mine – Niljai

Another Company – TFL, a Joint Venture of CIL, GAIL, RCF and FCIL has also planned a Coal Gasification Project The salient features are :

Product – Urea

Capacity – 1.27 MT Per Annum

Coal Requirement -2.5 MT Per Annum

Mine – Coal Linkage from Mahanadi Coalfield Ltd.

Apart from these 5, NLCIL is also taking up a project for production of Methanol from Lignite. This project which will have a capacity of 1200 Tons per day will be located at Neyveli, Tamilnadu.

## Achievement So Far

While details of 6 ambitious products have been furnished above, a large number of Private Sector Companies have also moved in the matter. The leader among them, Jindal Steel and Power Ltd (JSPL) has played a pioneering role by making a grand success of the gasification concept by setting up the state- of- the- art plant at Angul, Orissa where Syngas is being be used or producing sponge iron. A remarkable feature of this Plant is that Carbon Dioxide is also been captured here using commercially proven technology. This Plant has 7 Gasifiers and 2,25,000 Nm3 per hour Syngas is being produced from gasification of 270 Tons of Coal per hour.

About 2000 Tons per day of concentrated CO2 is being captured at this plant and this CO2 is being utilized for producing Algae and Spirulina. Enthused by the success achieved at Angul, JSPL has plans for setting-up their second Coal Gasification Plant at Raigarh in Chhattisgarh.

## Disadvantages of Coal Gasification and Ameliorative Factors

As in everything else, Coal Gasification also has some negatives.

According to the Centre for Science and Environment (CSE), Power generated from Syngas derived from Coal produces more Carbon Dioxide- almost 2.5 times than that generated from a conventional Coal-based Power Station.

Another negative is that Syngas-based Power is costlier than that generated from the latter and that Gasification is a more energy and water- intensive process.

It has to be appreciated that Coal Gasification on a large scale for major economic activities like Power Generation or Steel making is a recent initiative and Scientists and Researchers are working on taking care of these negatives and bringing about improvements in different aspects thereof and one can predict with confidence that theywould be successful in their effort

This apart, we also have to keep it in view that Carbon Sequestration from a Coal Gasification Plant is easier and bulk of the CO2 produced from these Plants ,irrespective of its quantity being higher compared to conventional Power Plants, can be captured and utilised for producing high value items. While the negative involving production of higher quantities of CO2 can be mitigated by capture of bulk of the said CO2, higher cost of Power generation from Syngas will ,at least , partially be offset by the sale value of theproducts from CO2

## A Different Angle

India has to look at it from a different angle also. It has a Coal resource amounting to about 320 Billion tons which is a great national asset given by Nature. Even though it is producing only about 800 MT per annum, it provides direct employment to about 4 Lakhs and indirectly it provides livelihood to may be 10 Million people. These benefits would only grow as we move forward and Coal production increases to reach a level of2000 million tons per annum by2040. If we look at the products which are made out of Coal or in which Coal plays an important role, its contribution to the National Economy is enormous and any thought of stopping Coal Mining activity cannot even be contemplated.

But notwithstanding these, its harmful impact on Environment cannot be wished away and a pragmatic solution has to be found out so that while India meets its huge requirement of additional power and it is conceded that Coal will have to play an important role in achieving this goal, the consequent increase in GHG emission is reduced to the minimum and the various ameliorative steps put together enable the country reach Net Zero Carbon target by 2070. Coal Gasification can play a major role in India achieving this objective.

## SECTION-3

# *About*
# *8th Coal Summit 2023*

INDIA ENERGY FORUM

MINING GEOLOGICAL & METALLURGICAL INSTITUTE OF INDIA 1906 DELHI CHAPTER

INDIAN SCHOOL OF MINES ISMAA DELHI

# 8th Coal Summit, 2023

## *"Sustaining Coal - Gasification Route"*

**18th January, 2023 • New Delhi**

### Introduction

Coal has been the prime commercial Energy Source in India for ages and even today, the Country depends on Coal for 55% of its Commercial Energy needs and for 75% of Power Generation. It makes sound economic sense, since the world has mostly depended on fossil fuels for its commercial energy requirement and it is only Coal of which India has substantial resources - those of Oil and Natural Gas being extremely limited.

The importance of Coal for Indian economy can be gauged from the fact that while the country consumes about 1000 MT of Coal and produces about 750 MT annually, coal production is projected to reach 2000 MT annually by 2050.

However Coal, has been established as one of the primary contributors to global warming and like most countries in the World, as a responsible global citizen, India too is shifting from Coal to Renewables and is programmed to increase Renewables-based Power generation capacity from 140 GW now to 500GW by 2050. The country is also trying to develop technologies for making coal combustion generally more environment-friendly.

In spite of this ambitious programme for increasing Renewables-based capacity, Coal will continue to dominate the Energy scene in India for at least next 4 to 5 decades. However, the harmful impact of Coal combustion needs to be contained which can be done by changing the structure of Coal from Solid to Liquid or Gas and this is where the process of Coal Gasification comes in.

Our Hon'ble Prime Minister has given a clarion call for gasification of 100 MT of Coal annually and for achieving this task on mission mode two high - Powered bodies - Steering and Implementation Committees have been set up.

Globally, Coal Gasification is an established technology in countries like USA and China and many Indian Research and Commercial organizations in India are also engaged in evolving technologies and setting up commercial scale facilities for gasification of Indian Coal, bulk of which is high in Ash and low in Rank unlike Coal in USA and China which is of superior quality. The established technologies being practised in USA/ China therefore, cannot be adopted in India without substantial modification.

In this direction, work is already in progress on construction of a Fertilizer Plant at Talcher in Odisha and a Methanol Project through gasification of 4 MT of Coal per annum at Dankuni in West Bengal. While the former is based on gasification of high ash Coal produced from Mahanadi Coalfields Limited with blending of Petcoke, the latter is being set up based on low ash Coal produced from Eastern Coalfields Ltd.

As a significant development, Coal India Ltd ( CIL) has identified 4 key Gasification projects in ECL, SECL, WCL and CCL to gasify 60 MT of Coal annually and to produce various downstream products like Methanol, Ammonia and Synthetic Natural Gas. It will also facilitate stake holders to become active participants in implementation of Gasification Road map in India.

Importantly, commercial sector Coal Gasification will need superior and consistent quality of Coal, which is not plentiful in India and Government has identified sources for supply of such coal to gasification plants which will be set up in different parts of the country. And here, Coal Washing can have an important role which, by reducing Ash content in Coal to the desired extent, improve the availability of Coal suitable for Gasification.

It is in consideration of the importance of coal gasification which will grow at a very fast pace that 3 important Think-Tanks involved in Energy issues in the country are organizing a National Seminar on Coal – 8th Coal Summit with the theme "Sustaining Coal – Gasification Route".

## Coal Summit

This Summit is being organized jointly by 3 Leading Technical Organizations working on Energy issues. This Summit is being so designed that it will be of interest to every one related with Coal like Producers, Consumers, Academia, Research Scholars, Regulators and all those working in Power, Steel, Cement, Chemicals and Fertilizers and Pharmaceutical sectors. The Seminar will be divided into 4 parts namely Inaugural Session, Two Technical Sessions - 1 & 2 and then finally a Session for Panel Discussion. We are inviting Experts in different aspects of production and use of coal, for sharing their thoughts with participants who will be drawn from different Industries dependent on or related to Coal.

We do hope to make a positive contribution to this National Mission by drawing National attention to the revolutionary changes which Coal Gasification can make in the manner of utilization of Coal which is the prime energy source in India.

The proposed Summit will provide an ideal forum for Mine Operators, Planners and Policy Makers to discuss the various issues affecting Coal mining and allied industries across the globe. The Summit will be a unique platform for Entrepreneurs, Decision Makers, Senior Government Officials, Investors, Industry Members, Traders, Equipment Manufacturers & Suppliers, Academia, Mining Engineers and Coal Traders to exchange views. We are also inviting and expecting Trade Delegations from different sectors to congregate, brainstorm, showcase and forge meaningful partnerships for business development.

## About Organisers

### *India Energy Forum*

India Energy Forum is a unique, independent, non-profit research organization and represents energy sector as a whole. It was set up in February 2001 and formally inaugurated in January 2002. The mission of IEF is to help evolve a National Energy Policy aimed at development of a sustainable and competitive energy sector in India. It is, probably, the only organization which champions the cause of TOTAL ENERGY - all forms of energy ranging from Coal, Power - Thermal & Hydro, Oil & Gas, Nuclear and Renewables, right from its inception.

The range of issues that it covers, has given it a distinctive advantage of taking an integrated look on the energy scene. In fact, IEF did frame an Energy Policy document which became an input to the Planning Commission's Integrated Energy Policy brought out in August 2006.

### *MGMI - Delhi Chapter*

Mining, Geological and Metallurgical Institute of India (MGMI) is the oldest technical organization of this nature in Asia. It was set up in 1906 and today it has a membership of more than 3000 professionals from different fields of mineral based industries, Technocrats, Planners and Policy Makers both in Private and Public sector at State/Central levels, experienced Managers in different sub-disciplines in evaluation of resources and their eco-friendly exploitation, Academicians/Research workers and students from Geology, Mining and Metallurgy streams & Chief Executives of most of organizations related to mining and minerals in India. The Institute is now recognized as one of the preferred professional societies for membership by all appropriately qualified personnel associated with the study and use of minerals and mineral-related industries in India.

### *ISM Alumni Association*

This is an association of Alumni of Indian School of Mines and Applied Geology (now IIT-ISM), the internationally recognized Mining institution based at Dhanbad. It has chapters at all the mineral related centres in India and even abroad where the alumni of this institution work and operate. This Association is also a think tank and contributes to exchange and dissemination of mineral related information and practices.

# 8th Coal Summit, 2023

## *"Sustaining Coal - Gasification Route"*

## Programme

| | | |
|---|---|---|
| 9:30 a.m. - 10:00 a.m. | : | **REGISTRATION & NETWORKING TEA** |
| 10:00 a.m. - 11:15 a.m. | : | **INAUGURAL SESSION** |
| ***Start of the Proceedings by*** | : | **Shri N N Gautam**, Chairman, Coal Group, IEF & Former Advisor, Ministry of Coal |
| ***Welcome Address by*** | : | **Shri Alok Perti**, IAS (Retd), Patron, National Advisory Board, 8th Coal Summit and Former Secretary, Ministry of Coal |
| ***Remarks by*** | : | • **Shri G C Mrig**, President, ISMAA-DC |
| | | • **Shri P S Upadhyay**, President, MGMI-DC |
| ***Presidential Address - Setting the Context by*** | : | **Shri R V Shahi**, President, IEF |
| ***Inaugural Address by the Chief Guest*** | : | **Shri Amrit Lal Meena**, Secretary, Ministry of Coal |
| ***Vote of Thanks by*** | : | **Shri U Kumar**, Co-Chairman, Organising Committee and Former CMD, SECL/NCL |
| 11:15 a.m. - 11:45 a.m. | : | TEA |
| 11:45 a.m. - 1:15 p.m. | : | **SESSION I** *"Relevance of Coal Gasification"* |
| ***Chairman*** | : | **Shri Naveen Jindal**, Chairman, JSPL |
| | | **Shri B C Tripathi**, Former CMD, GAIL |
| ***Distinguished Speakers*** | : | • **Shri M Nagaraju**, Addl Secretary, Ministry of Coal |
| | | • **Dr R R Sonde**, Professor IIT Delhi, Deptt of Chemical |
| | | • **Shri S Prabhakar**, GM, BHEL |
| | | • **Shri Asheesh Kumar**, Chief Manager (Mining), CMPDIL |
| ***Session Coordinator*** | : | **Dr M M Seam,** Former Advisor, Essar Minerals |
| 1:15 p.m. - 2.00 p.m. | : | Lunch |

| | | |
|---|---|---|
| 2:00 p.m. - 3.30 p.m. | : | **SESSION II**<br>***"International Status & Indian Update"*** |
| *Chairman* | : | **Shri Alok Perti**, Former Secretary, Coal<br>**Shri A K Jha**, Chairman, Jindal Power Ltd. & Former Chairman, CIL |
| *Distinguished Speakers* | : | • **Dr. Sunjoy Joshi**, Chairman, ORF<br>• **Dr. A K Balyan**, CEO (Oil & Gas), ADA Group<br>• **Shri Ujjwal Bhattacharya**, Director (Tech), NTPC<br>• **Dr. Mahesh Murthy**, CTO Thermax Ltd. |
| *Session Coordinator* | : | **Shri P S Upadhyaya**, Former Director, NMDC |
| 3.30 p.m. - 4.00 p.m. | : | TEA |
| 4.00 p.m. - 5.00 p.m. | : | **PANEL DISCUSSION** |
| *Chairman* | : | **Shri P S Bhattacharyya**, Former Chairman, CIL |
| *Distinguished Panelists* | : | • **Shri K Mohan Reddy,** CMD, NLC<br>• **Shri S N Yadav**, ED, GAIL & Mg Director, TFL<br>• **Shri Prakash D Chavan**, Principal Scientist (Gasification), CIMFR<br>• **Shri Kapil Dhagat,** Sr Vice President, JSPL |
| *Session Coordinator* | : | **Shri S K Grover**, Former GM, NTPC |
| 5.00 p.m. | : | **VALEDICTORY SESSION AND SUMMING UP** |
| *Valedictory address by* | : | **Shri C K Mishra** IAS (Retd), Former Secretary, MoEF&CC |
| *Summing Up by* | : | **Shri R V Shahi**, President, IEF |
| *Vote of Thanks by* | : | **Shri B Bhambhani**, Secretary General, IEF |

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**Shri Sukhvir Singh**
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MGMI, Kolkatta

**Shri Kapil Dhagat**
JSPL

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Former CMD, SECL

**Shri V K Sehgal**
Former CMD, SECL

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**Shri M N Jha**
Former CMD, SECL

**Shri Kapil Dhagat**
VP, JSPL

# *Glimpses of Previous Conferences*





7th Roundtable Conference on Coal
A K BALYAN
M N JHA


RANJIT RATH
ALOK PERTI
VIVEK BHATIA
S MISHRA


RAJIV SHEKHAR
TUHIN MUKHERJEE
PANKAJ SATIJA


7th Roundtable Conference on Coal

## SECTION-4

# *Recommendations*

INDIA ENERGY FORUM

MINING GEOLOGICAL & METALLURGICAL INSTITUTE OF INDIA 1906 DELHI CHAPTER

INDIAN SCHOOL OF MINES ISMAA DELHI

# 7th Coal Summit 2018

## Conference & Expo

## *Theme : "Can India Grow Sustainability without Green Coal?"*

**5th & 6th September, 2018 • Hotel The Ashok, New Delhi**

## Recommendations

### Preamble:

The response to the theme of the Summit "Can India grow Sustainably without Green Coal?" from Conference was very emphatic and unambiguous – Coal will continue to be the major source of Commercial Energy in India for as long as one can foresee and that Indian economy can grow sustainably only if Coal & its use are made green. So, while Coal will continue to maintain its importance, despite increasing contribution from Renewables, effective mitigative measures will have to be taken to ensure that adverse impact of large scale coal combustion on Environment is contained. Against this background the following issues were addressed at the Conference and recommendations as under were arrived at.

1. **Coal Demand / Supply:** India is blessed with large Coal reserves particularly of non-coking Coal and though coal production has recorded continuous growth, it has failed to keep pace with the increase in coal demand resulting in endemic coal shortage and huge import even of non –coking coal- of the order of 150 mill tons per annum.

   Indian Coal Industry therefore, must achieve higher production growth rate by adopting more productive technologies and improving the systems for grant of statutory clearances and land acquisition.

2. **Structure of Indian Coal Industry:** Close to 95% of Coal production in India comes from Public Sector companies. Attempt towards involving Private Sector through Captive Mining route has not been successful. Globally however, Coal Mining is mostly in Private Sector. The Summit therefore was of the opinion that time has come for opening Coal Sector for Commercial Mining but the system should be carefully designed to avoid the problems which have been responsible for failure of Captive Mining.

3. **Coal Beneficiation :** Indian Coal being of Drift Origin is inherently dirty and beneficiation for reducing the Ash content is a must for mitigating the adverse impact of Coal combustion on Environment. It is recommended that washing of all Coal for Power Generation should be made mandatory.

   Simultaneously R&D efforts should be intensified for evolving better washing technologies including Dry Beneficiation and Chemical cleaning of Coal or combination of various such

technologies. Further, the current mandate of all washery rejects being utilised for power generation should be amended to encourage better washing technologies for reducing migration of Coal into Rejects and utilisation of Rejects for power generation should be insisted upon only if they have Heat Value above a scientifically evolved norm.

4. **Statutory Clearances:** Opening of Coalmines in India is a very long drawn out process primarily on account of delay in Statutory Clearances & difficulties in Land Acquisition & this is what is primarily responsible for Coal-shortage in the country. Coal production needs of the country should be balanced with the need for protection of Environment and grant of Forestry and Environment clearances should be regulated keeping in view that loss of forest cover because of Mining is of temporary nature and the Industry has developed the expertise for regenerating better quality Forest in the mined out areas after due reclamation.

5. **Coal Transportation:** Coal Evacuation facilities should receive greater attention and construction thereof should be synchronized with mine development so that the need for road transportation of coal which is inherently anti-environment should be avoided.

6. **Coal Combustion:** Coal Combustion systems for power generation should be upgraded by adopting High Efficiency Low Emission (HELE) technologies followed by Carbon Capture and sequestration by ensuring that all new power plants operate on super-critical/ultra super-critical systems and all old power plants should be replaced with those based on these systems.

7. **Coal Bed-Methane:** Harnessing of CBM, CMM, AMM, VAM and VCBM should receive greater attention so that this clean source of energy gets fully utilised.

8. **Mine Safety:** Mining practices should be modernised to reduce the human exposure to sources of danger in the mines and tailor- made safety management plans for each mine should be adopted for inculcating safety culture among the miners .

9. **Alternative Usage of Coal :** Coal is a great economic resource given to the Nation by Nature and though going forward, its share in the energy basket may go down consequent upon greater role for Renewables, it will be in the economic interest of the country that the versatility of coal is fully utilised by producing more valuable products like Ethanol, Methanol, Petroleum products and Fertilisers from it.

10. **De-ashing and De-moisturisation of Coal :** Scientists in Wyoming University, USA have evolved a technology for reducing Ash in Coal which could convert Thermal Coal into Coal suitable for Metallurgical purposes. This could enable High Ash Washery grade Coal in India being converted into Metallurgical Coal. Similar success has been achieved on reducing moisture in Coal to improve its Heat Value.

    Indian Coal Industry should take a serious look at these technologies particularly De-ashing of Coal in the context of ever increasing Import of Metallurgical Coal against heavy out-go of precious foreign exchange.

# 7th Roundtable Conference on Coal

## *Theme : "Indian Coal : Potential and Diversification"*

**24th September, 2019 • Hotel Le Meridien, New Delhi**

## Recommendations

### A. Introduction to Theme

**The Theme of the Conference was "Indian Coal- Potential and Diversification"**. Response to the theme came through 3 Technical Sessions at which 12 learned papers were presented and Inaugural and Valedictory Sessions. The response confirmed the tremendous potential of Indian Coal for the present and also the diversification in its use for keeping it relevant for future.

Coal started as the prime source of Commercial Energy over best part of the developed world and though part of Europe has successfully reduced its dependence on Coal and large number of countries across the world have also fixed the dates for minimisation of coal use for power generation, it continues to be the main stay of Energy sources in the Developing world including India.

We however, as a responsible global citizen have appreciated the adverse impact of large scale coal consumption on Global warming and have launched a massive programme for generating power from Renewables for containing sharp increase in coal consumption, Notwithstanding this, till an economically viable technology is developed for storage of this Power, coal will continue to dominate the power scenario in India for may be as long as 3-4 decades.

The country is well endowed with coal resources- of the order of 320 Billion Tons. 60% thereof is available at a depth of less than 300 mtrs and thus amenable to O/C mining and fast ramp up of production. The country has an old history in Coal Mining and it has technically well- qualified technical and managerial base but there is endemic coal-shortage and it is to a large extent dependent on coal import and this dependence is growing.

While Import of metallurgical coal and superior quality power grade coal of which country's resources are inadequate is understandable, import of medium quality power grade coal which constitutes almost 70% of the import is just not acceptable.

It is therefore, an imperative necessity that a sharp growth in coal production is achieved and this is what was discussed in the "Potential" part of the theme of the conference.

Simultaneously, the industry has to remember that going forward, dominance of coal as a fuel for power generation would go down but by the time this happens the country will be producing close to 2 Billion Tons of coal p.a. and will not be able to afford losing the value of this wealth which would be a very significant part of the GDP. Fortunately, coal is a very versatile commodity and can be used more gainfully than for power generation by using it as a feed-stock for valuable items like Chemicals, Fertilisers, Methanol, Gasoline etc.

Attempts in the direction of finding alternative usage of Coal have continued internationally for quite some time leading to Commercial scale operations and it is time that India joins this Caravan so that Nature's valuable gift in the form of Coal can continue to be utilised for economic development and well-being of the masses. This is what was discussed in the second part "Diversification" of the theme of the Conference.

The following Recommendations emerged :

## B. Recommendations

I *Achieving the "Potential" :*

1. **Exploration :** For ensuring increased coal production for meeting country's requirement, additional Coal Reserves have to be proved and additional resources are to be deployed for exploring unexplored areas and converting Indicated/Inferred resources into Proved Reserves. Forestry Clearance for Exploration in Forest Land has to be simplified so as to remove meaningless impediments to Exploration efforts.

2. **Increase in Production:** Despite huge Coal resources, country has become Import - dependent not only for Coking coal of which country is deficient in endowment (and import thereof is therefore understandable) but also for Non-Coking coal which is available in plenty and import thereof is totally unacceptable. This shortage can be over- come by simplifying and expediting procedures for Clearances and Approvals for opening new mines and upgrading existing mines.

3. **Greening Coal production:** For reducing adverse Environmental impact of Coal mining and use, mining technologies have to be improved, truck transportation has to eliminated and universal washing of coal should be adopted. In respect of use, Modern "HELE" technologies like super critical & ultra supercritical have to be adopted.

4. **Land Acquisition:** Land Acquisition has become and is becoming more and more difficult by the day. Consideration may be given to "Leasing" of land being made the default system for obtaining land for mining purposes. After mining is over, land should be reclaimed and given back to the land owners. During the Lease period, the owner should be compensated adequately with lump sum grant at the start and end of Lease period.

5. **Evacuation:** A comprehensive Rail system for Developing and under-developed coalfields should be constructed with funding from Clean Environment Cess and contribution from Mine Owners which should be treated as their Equity in the Capital structure of the system.

6. **Coking Coal:** For addressing acute shortage of Coking coal, greater coordinated attention should be paid to implementation of Jharia Master plan, Washing of Washery Grade III and IV coal which is presently used as Power grade coal and R&D efforts for converting non-coking coal into coking coal.

7. **Commercial Mining:** Coal Sector should be opened to Commercial Mining with mine sizes being capable of producing atleast 10 mill tons p.a. and clear -cut policies about production levels and pricing .

II. ***Identifying Roads for "Diversification":***

**i. Coal Gasification:** Coal is generally used as Fuel for power generation in its solid state. This utilisation system however, suffers from major contribution to atmospheric pollution and this is the main contributor to Coal having been declared as responsible for Global warming.

Coal utilisation can however be made cleaner and greener by converting it into Gaseous form. This is achieved by heating the Coal away from Air leading to production of Syngas which is a mixture primarily of Carbon mono-oxide, Hydrogen, Carbon Dioxide, Methane and water vapour. It is this gas which is used as a fuel for power generation.

ii. **Underground Coal Gasification:** Currently however, Syngas is produced only from Coal which is taken out from the mine and then gasified. An alternative is to produce syngas from in-situ Coal through the process of U/G Gasification. Though commercial success had been achieved on this process, the operation has got stopped on account of contamination of U/G water sources. Studies have to be made for finding a solution to this problem but if it succeeds, it will open huge opportunities of utilising Coal locked in deep-seated and geologically disturbed formations which cannot be produced by Conventional Mining Systems.

iii. **Metallurgical Coal from non-Coking Coal:** Coal is and will continue to be an important input for steel production. For this purpose the coal that is required has to have certain properties which bulk of the global coal resources which are non-coking type do not have. Scientists in USA have developed a technology for converting Non-Coking coal to Coking Coal. Once developed on commercial scale it will open new Vistas for more gainful utilisation of non-coking coal than for power generation.

iv. **Non-Coking coal for Steel making:** A technology called Stamp Charging has successfully been developed for utilisation of Non-coking coal for conventional steel making systems. More work needs to be done so that non-coking coal can be used in higher proportions.

v. **Pulverised Coal Injection:** This is another technology which has successfully been developed for utilising Non-coking Coal for Steel making in suitable proportions.

vi. **Coal Bed-Methane:** This gas which is "adsorbed" in coal seam can be extracted as a Clean Fuel. Though India's resources of CBM have not been fully explored, this can contribute significantly to the objective of switching our energy base to 15% Natural Gas.

It has however to be appreciated that the success on these fronts like (i) to (v) cannot be replicated directly in Indian conditions since our quality of India Coal is rather poor. Serious R&D efforts on this front have therefore to be made and they have to be started straight away. One Source of funding can be the money collected through Clean Environment Cess of which inflow comes to close to Rs. 40000 crores p.a.

Detailed Recommendations are enclosed herewith as Annexure.

## SECTION-5

# *Speakers' Profile*

INDIA ENERGY FORUM

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INDIAN SCHOOL OF MINES ISMAA DELHI

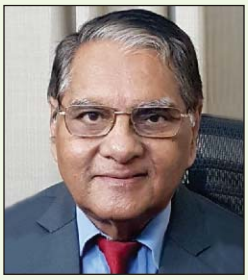
# Speakers' Profile

## Shri Amrit Lal Meena, IAS

*Secretary, Ministry of Coal*
*Government of India*

Shri Amrit Lal Meena is an Electrical Engineer, and a PG Degree on Pubic Policy from IIM, Bangalore. He belongs to Bihar Cadre of IAS -1989 Batch. He started his career as Sub-Divisional Officer, Begusarai in 1991 and has moved ahead from that position to that of Dy. Development Commissioner, District Magistrate and has been a District Collector in 5 districts, which is very rare achievement. Among the experience he has had in State Government are stints in Rural Development, Housing and Urban Development, Rural Development and Rural Construction Department. He held prestigious Additional Secretary position at the Centre in Department of Commerce and Promotion of Industry and Internal Trade and now in the challenging and prestigious assignment of Secretary (Coal) since November 2022 .

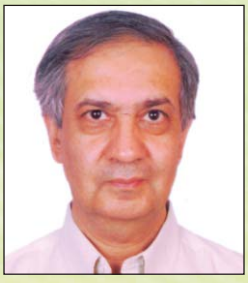
He has undergone special training at Jaipur, Mussoorie and New Delhi. He had a brilliant record all through his career and Indian Coal Industry is blessed in having him in the top policy making position. Indian Coal Industry is on crossroads and is facing multiple challenges of increasing production, improving quality and contributing to the national efforts of containing the Coal related pollution in the atmosphere.



## Shri R.V. Shahi

***President, India Energy Forum***

Shri R V Shahi was Secretary, Ministry of Power, Government of India, from 2002-07 which is the longest term served by any incumbent. In this position, he was responsible for policy initiatives and implementation for India's entire Power Sector (2,00,000 MW capacity) and over significant restructuring with the institution of the Electricity Act 2003, National Electricity Policy 2005 and National Tariff Policy 2006. Other major initiatives include 50,000 MW Hydro Power Initiative 2003, Accelerated Power Development and Reform Programme 2003, Setting up Bureau of Energy Efficiency 2003, Rural Electrification Policy 2005, Ultra Mega Power Policy 2006 and Merchant Power Policy 2006. Shri Shahi is currently the Chairman of Energy Infratech Pvt. Ltd. and was formerly the Chairman and Managing Director (1994-2002) of professionally managed BSES Ltd (later taken over by Reliance Energy in 2004). He transformed BSES from a small distribution utility to a multi-unit fully integrated power utility having generation, transmission and distribution. At National Thermal Power Corporation (NTPC) from 1978-94, he was the General Manager in charge of Dadri Power Project; Executive Director in charge of Southern Region of NTPC, and Member on the Board of Directors of NTPC in-charge of Operations, R&D and Commercial functions. He has authored several books on the power sector, is a Fellow of the World Academy of Productivity Sciences, Institution of Engineers (India), International Institute of Electrical Engineers, and Indian National Academy of Engineering. He has been on the Boards of Xavier Management Institute Bhubaneshwar, IIM Lucknow, and Management Development Institute in Gurugram. Shri Shahi is a graduate in mechanical engineering from the National Institute of Technology, Jamshedpur, post-graduate in Industrial Engineering, post graduate in Business Management (MBA), and a diploma in Advanced Industrial Management (Delft, Holland). Shri Shahi is currently, as a consultant, is Sr. Energy Advisor for South Asia Regional Collaboration with the World Bank. President, India Energy Forum an Independent Think Tank, Distinguished Fellow and Chairman, South Asia Group on Energy (SAGE) in RIS.



## Shri Alok Perti

***Former Secretary Ministry of Coal, Government of India***

Masters in Physics from Prestigious Allahabad University and an IAS officer of 1977 batch (Assam - Meghalaya) cadre Shri Perti has had a distinguished career both at the State and Central governments.

He held very important positions of Secretary Coal, Government of India apart from serving in the Ministries of Health and Defense in various capacities.

Shri Perti has held special assignments as consultant to WHO for conducting study and validation of National Immunization Program in Bhutan and served as Consultant to UNICEF to develop material management system for their supplies in Myanmar.

## Shri C.K. Mishra

***Former Secretary, MEFCC, Govt. of India***

Shri C.K. Mishra joined the Indian Administrative Service (IAS) in 1983 and till recently was heading the Ministry of Environment, Forest and Climate Change. Government of India.

He led the Indian negotiations at important Forums such as United Nations Framework Convention on Climate Change (Conference of the Parties (COP)) to assess progress in dealing with climate change; Montreal Protocol on Substances that Deplete the Ozone Layer and various other multilateral events. He leads the government initiative for air pollution mitigation in Delhi and indeed all pollution control strategies for the country. He is also the administrative head of Forest & Wildlife conservation efforts in India.

Prior to this, he was Secretary in-charge of Ministry of Health & Family Welfare and also held the additional charge of Ministry of AYUSH for some time. Before his elevation as Secretary, Ministry of Health & Family Welfare, he was Additional Secretary & Mission Director, National Health Mission, who led one of the largest public health programme globally. In more than 30 years of public service, Shri C. K. Mishra has served as an administrator, policy-maker and public health strategist holding a wide range of assignments in the fields of Health, Education, Industry and Power. Shri C.K. Mishra is recognised for his significant contributions to improving the Indian Public Health landscape.

He was earlier also associated with delivering health care at the provincial level and played a key role in eradicating polio in the toughest region of Bihar. He has been the force behind `Mission Indradhanush' — the largest ever focussed campaign to immunize children. His views on Maternal child heath are well accepted globally as he brings a practical implementation perspective to his views.

Born in Patna, Bihar, Shri C.K. Mishra earned his Bachelor's Degree in History (Hons) from St. Stephens College, Delhi University. In addition to this, he has received a Post Graduate Diploma in Media Law at NALSAR, Hyderabad. He has also completed the Advanced Leadership Programme from Australia and New Zealand School of Government (ANZSOG), Australia

## Shri Partha S Bhattacharyya

***Former Chairman, Coal India Ltd***

Shri Bhattacharyya, MSc (Physics) from Jadavpur University and a Cost Accountant joined Coal India as a Management Trainee in 1977 and rose to become its Chairman in October 2006. In his tenure CIL secured higher empowerment by receiving Miniratna status in March 07 and Navaratna in October 2008. In Jan 2009, Mr. Bhattacharyya successfully concluded year long wage negotiation for 500,000 coal workers without loss of a single day of work. During his tenure, Mr Bhattacharyya placed Coal India on a global map by acquiring coal assets in Mozambique and initiating the process of creating strategic partnership with coal mining companies abroad.

Before joining CIL as Chairman, Mr. Bhattacharyya was CMD of Bharat Coking Coal Ltd. (BCCL) from Nov 2003 to Sept 2006 when he turned around this perennially loss making company in 2005-06 with the company recording a profit of Rs. 202 crores. For this he received the 'Chief Executive of the year 2005' award by the Indian Institute of Materials Management in Nov 2005 and was honoured by the Citizens' Forum of Dhanbad in February 2008.

## Shri Anil Kumar Jha

***Former CMD, Coal India Limited***

Shri A.K. Jha did his graduation in mining engineering in the year 1983 from IIT-ISM, Dhanbad and M.Tech. with specialization in Mine Planning & Design with distinction in the year 1988 from the same Institute. Having worked in various Subsidiaries of CIL & MOIL Shri Jha assumed the charge of CMD of Coal India Limited on 18th May 2018. Prior to this he was CMD, Mahanadi Coalfields Limited, a Miniratna Company, contributing about 25% of the coal production and 50% of the profit to CIL, from 1st November, 2015. Post retirement from CIL Currently Shri Jha is with JSPL group

## Shri B. C. Tripathi

***Former CMD, GAIL***

Shri B.C. Tripathi is a Mechanical Engineering Graduate from NIT Allahabad and graduated in 1982. He started his career in Oil and Natural Gas Corporation and subsequently joined Gas Authority of India Limited (now GAIL India Limited) in 1984 when the Gas Industry in India was at its infancy. Shri Tripathi is one of the founder employee of GAIL and has worked under different capacities in different departments in GAIL. Further he has been involved in the execution of several prestigious projects of GAIL starting from the HVJ to the recently concluded Dahej Dabhol Pipeline. He was the project Manager for the GAILs prestigious Dahej-Vijaipur Pipeline project, which received Silver Medal for Excellence in project Management in the Mega Project Category from International Project Management Association, Germany. He has also published a case study on this project in Petromin Pipeliner. Over the past 27 years Shri Tripathi gained varied experience and competence in the areas related to Operation & Maintenance of Pipelines, Project Management, Contracts Management, Customer Relationship Management, Marketing etc.

## Shri Naveen Jindal

***Chairman, JSPL***

A well-known Indian Industrialist and Philanthropist, Mr Naveen Jindal is the Chairman of Jindal Steel & Power limited (JSPL), India's leading infrastructure Conglomerate with interests in steel, mining and power sector.

His vision at JSPL is driven by the core principle of Nation Building. Under his leadership, each of the businesses of JSPL is focussed towards building world-class capabilities to make India self-reliant and a global economic powerhouse. His tenacity and drive have transformed JSPL into a conglomerate with presence across Africa, Oman and Australia.

Mr Jindal was declared the Industry Communicator of the year by the World Steel Association in 2016. He was featured by the Fortune magazine as Asia's 25 Hottest People in Business for turning a struggling steel company into an Asian blue-chip giant. JSPL, under his leadership, was declared as the highest wealth creator in the world between the Years 2005-2009 by the Boston Consulting Group. In 2011, The Economic Times-Corporate Dossier list featured him as India's Most Powerful CEOs. Ernst & Young conferred upon him the Entrepreneur of the Year Award in the field of Energy and Infrastructure in 2010.

He is the President of the Flag Foundation of India. He led a campaign to democratise the Tricolour, and his decade-long legal struggle resulted in a historic Supreme Court judgment allowing every Indian to display the Indian Flag with pride on all days of the year. He was elected twice to Indian Parliament where he served as a Parliamentarian for 10 years and made many contributions.

Mr Naveen Jindal is also the founding Chancellor of O P Jindal Global University, which is ranked the number one private university in India as per the QS World university rankings 2021.

Mr Jindal completed his MBA from the University of Texas at Dallas (UTD) in 1992. In recognition of his exceptional entrepreneurship skills and public service, the School of Management of the University of Texas, Dallas christened it as the Naveen Jindal School of Management. This recognition has led to the establishment of the Naveen Jindal Institute for Indo-American Business Studies.

He is an avid sportsperson, an active Polo Player and a National record holder in skeet shooting.

He is married to noted Indian classical dancer and a compassionate CSR leader Ms Shallu Jindal. The couple is blessed with two children, Venkatesh and Yashasvini.

## Shri M. Nagaraju, IAS

***Additional Secretary, Ministry of Coal***

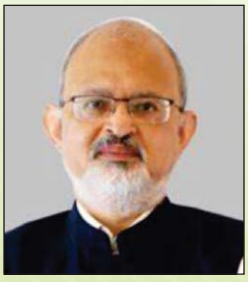
Shri M. Nagaraju joined IAS in1993 belonging to Tripura cadre.

Over these years, he had the opportunity to serve at local, state, national and international level in the areas of public order, development finance, international economic relations, Industries and commerce, healthcare and State finances.

During 2004-08, he served in the Ministry of Finance, Department of Economic Affairs as Director. Thereafter, he worked as Advisor to the Executive Director at the World Bank in Washington DC till 2012. He worked as Principal Secretary, Finance & Industry & Commerce in the State.

He was a visiting fellow at the University of Pennsylvania, USA for one year in 2012-13 and Visiting Research Scholar in Stonehill College in 2018-19.

He has worked as Joint Secretary, Ministry of Coal since 30th January, 2020 and serving as Additional Secretary, Ministry of Coal, from 03rd November, 2020.



## Shri Sunjoy Joshi

***Chairman, ORF***

Shri Sunjoy Joshi has a Master's Degree in English Literature from Allahabad University, India, as well as in Development Studies from University of East Anglia, Norwich. He also studied Upstream Economics and Risk Analysis at the Petroleum Economist, Woking, UK. He joined the Madhya Pradesh Cadre of the prestigious Indian Administrative Services in 1983, but has taken premature retirement from the service in 2009 in order to pursue his primary interests in energy and environment.During his career spanning over 25 years in the Indian Administrative Service, Sunjoy has gained experience across the conventional as well as non-conventional energy sectors. He has handled oil and gas exploration as Joint Secretary in the Ministry of Petroleum and Natural Gas and was the Government nominated Director on the Boards of ONGC, OVL, OIL and MRPL. Sunjoy headed the Madhya Pradesh Energy Development Agency as its Managing Director and served as Chairman of M.P. Wind farms. He has been Visiting Associate at the International Institute of Strategic Studies, London as well as Distinguished Visitor to the Program on Energy and Sustainable Development, University of Stanford, USA.

## Shri A K Balyan

***CEO (Oil & Gas), ADA Group***

Shri A K Balyan passed his M.Tech from IIT Delhi in 1972 and PhD from from Germany in 1981.

He has About 45 years of experience in Oil & Gas business in Upstream, LNG and Downstream Petrochemicals, Renewable Energy Sectors.

He Worked in ONGC E&P Group from 1976 Vll 2010 and held the posiVons of Director ( HR) and Business Development .

Currently Shri Balyan is CEO (Oil & Gas), ADA Group.

## Shri Ujjwal Kanti Bhattacharya

***Director (Tech), NTPC***

Shri Ujjwal Kanti Bhattacharya joined NTPC in the year 1984 as Ninth Batch of Engineering Executive Trainees and was initially posted at NTPC Korba. He is an Electrical Engineering Graduate from Jadavpur University, Kolkata. He has also completed his PG Diploma in Management from MDI, Gurgaon.

He started his career in Green Field Project Construction, followed by working in the areas of Power Plant Operation & Maintenance, Renovation & Modernization, Environment Management, Technical Services at 1600 MW Farakka STPP.

After serving in Farakka in various departments, he moved to Talcher Thermal Power Station (450 MW), an Old and Underperforming asset, taken over from State Electricity Board. He, along with his team, created history in turning around the station, which went on to become a top performing station in years to come.

Before appointment as Director (Projects), NTPC he has worked as MD and CEO (Bangladesh India Friendship Power Company Limited), ED (Business Development) and ED(Projects), NTPC.

## Dr. R R Sonde

***Professor, Dept. of Chemical Engineering – IIT Delhi***

Dr Sonde graduated as Chemical Engineer from KREC (now NITK Surathkal) in the year 1979 and started his early career working as a scientist at BARC. Subsequently after 23 years of working in Atomic Energy, he joined as Executive Director in NTPC. Dr Sonde was Executive Vice President and CTO, on the Board of Thermax Ltd from 2008 to 2020. He is currently full-time professor on a visiting/professor of practice basis in the department of chemical engineering at IIT Delhi since 2020 .

## Dr. Mahesh Murthy

***Thermax Limited***

Dr. Mahesh Murthy is currently the Executive Vice President and Chief Technology Officer of Thermax Limited. He oversees technology initiatives related to the energy and environment portfolio of the company. Mahesh has over 25 years' experience contributing to various technologies related to the New Energy domain. Prior to joining Thermax in April 2021, Mahesh headed the New Energy Technology vertical for Group Technology & Innovation Office at Tata Sons since August 2015.

Mahesh has contributed as a task force member for the National Hydrogen Mission whitepaper spearheaded by MNRE, supported the Nano Mission Council of DST, served as reviewer of NNetRA projects funded by Meity and contributed to various initiatives led by CII's National Mission on Technology, R&D and Innovation.

In the early part of his career, Mahesh worked in the US at W.L. Gore & Associates, a USD $4.5 BB company for 18 years on varied topics such as fuel cells, hydrogen, energy storage and other electrochemical technologies. He headed the technology function and further assumed business development responsibilities during this time.

Mahesh's educational qualifications includes a Ph.D in Chemical Engineering from the University of South Carolina, USA in 1997 and an MBA from the University of Delaware, USA in 2009. His undergraduate degree is in Electrochemical Engineering from CSIR, CECRI in 1992.

## Shri Sachchidanand Yadav

***Managing Director, Talcher Fertilizers Ltd.***

Shri Sachchidanand Yadav is Managing Director of Talcher Fertilizers Ltd. a company mandated by Govt. for undertaking the revival of FCIL Talcher unit. Through coal gasification technology, the project shall produce 1.27 MMTPA of urea. A Mechanical Engineer graduate from prestigious MNNIT Allahabad, Sh. Yadav is on deputation from GAIL and in a career spanning above 31 years has been entrusted with various important assignments across India with most notable one being in-charge of Phase 1 of the prestigious Pradhan Mantri Urja Ganga Pipeline Project. He has extensive experience in project planning, construction & commissioning and O&M of pipelines. His areas of expertise include rotary equipment, gas turbines & compressors and project management.

## Shri U Kumar

***Former CMD, SECL/NCL***

1. Graduated from Indian School of Mines, Dhanbad in Mining Engineering in 1958.
2. Obtained B.Sc. (Hons) (Mining) Degree from Bihar University in 1958.
3. Cleared statutory examination-2nd Class Colliery Manager's Certificate of Competency in 1960 and 1st Class Colliery Manager's Certificate of Competency in 1961.
4. Worked for Govt. Coal Companies for 39 years. Retired in 1997 as CMD of the largest Coal Mining Company in India namely South Eastern Coalfields Limited, Bilaspur.
5. Post-retirement, served Private Sector for about 13 years and still continuing.
6. Present assignment-Advisor(Coal) Aditya Birla Group Company - Essel Mining & Industries Ltd.
7. Currently holding the position of Vice Chairman, Standing Committee under MMDR Act for granting RQP status and approval of Mining Plans.
8. Have served as :

- Director World Coal Institute, London, U.K
- Member, Central Pollution Control Board, Government of India.
- National President, Mining Geological & Metallurgical Institute of India for a record 3 consecutive terms.
- President, All India Public Sector Sports Control Board.
- Director, Board of Governors, Indian Institute of Coal Management.

9. Have received several awards like :

- India Priyadarshini Vriksha Mitra Award, Govt. of India.
- D.D. Thacker Gold Medal for Life time contribution to Mining Industry – M.G.M.I.
- Distinguished Alumnus Award – Indian School of Mines.
- Engineer of Year Award by Institution of Engineers in 2006.

## Shri N. N. Gautam

***Adviser, ACB India Ltd, India***

Shri Gautam has been associated with ACB India Ltd since 2009. He is also associated as Advisor to Board of Directors in the field of Marketing and Business Development. He holds Ist Class Mine Manager's Certificate of Competency (Coal) from DGMS, Dhanbad. He was Director (Technical)/ Advisor (Projects) with Ministry of Coal, Government of India. Mr Gautam is also Chairman of Coal Group of India Energy Forum, a think tank of energy sector.

## Dr. Prakash Dhondiram Chavan

***Principal Scientist (Gasification), CIMFR***

Dr Chavan, BE Chemical and PhD. Gasification is currently Sr. Principal Scientist & Head of Gasification and Catalysis at CSIR-CIMFR posted at Dhanbad. Dr Chavan specialization is in the areas of Coal/Biomass gasification, Fluidized Bed Gasifier development, Support to gasification to industries and feasibility studies in the area of gasification. Dr Chavan represents CSIR-CIMFR on various National Committees of Government and has a number of Research publications to his credit . He also holds a number of patients in his name .

## Shri S Prabhakar

***General Manager & Head/Coal to Chemicals & Hydrogen Business***
***BHEL New Delhi***

Graduated from Maulana Azad National Institute of Technology (MANIT) Bhopal in mechanical engineering.

Post graduate in Management from Bhartidasan University Trichy.

More than 34 years of Professional experience in engineering, project & Contract management of Industrial, subcritical& Supercritical Power plants. Areas of experience includes engineering of Circulating Fluidized Bed Boilers, HRSG's & Coal Gasification. Contract management of NTPC, NLCIL Power projects, FGD's being executed by BHEL.

Currently heading the newly formed Coal to Chemicals & Hydrogen business vertical at BHEL Power sector business group New Delhi.

## Shri Asheesh Kumar

***Chief Manager, CMPDI***

Shri Asheesh Kumar is a Mining Engineer at CMPDI of Chief Manager rank. He graduated from IIT ISM Dhanbad in 1993 and completed M.B.A from BIT Mesra in 2013. He started his career from Sesa Goa Ltd. Later He joined CCL in 1994. During his service at CCL he assisted in the execution of the Mine Operational Readiness Plan, effective and sustainable production of Coal from the mines. He is recipient of the Jawaharlal Lal Nehru award of excellence in public Sector in 2009. After serving CCL for more than 15 years, he was posted at Ministry of Coal, GoI, New Delhi. At the Ministry level he was instrumental in formulation of Underground Coal Gasification Policy, Project Monitoring, Mine Plan approvals and coal block auctions and Diversification Plan. He gathered experienced in Contract Management, Coal Project Monitoring and Investment appraisal. Since December 2020, he has been working in CMPDI, Ranchi and looking after Clean Energy department, which is the Nodal agency for the Surface Coal gasification and Underground Coal gasification as part of diversification plan of Coal India Limited.

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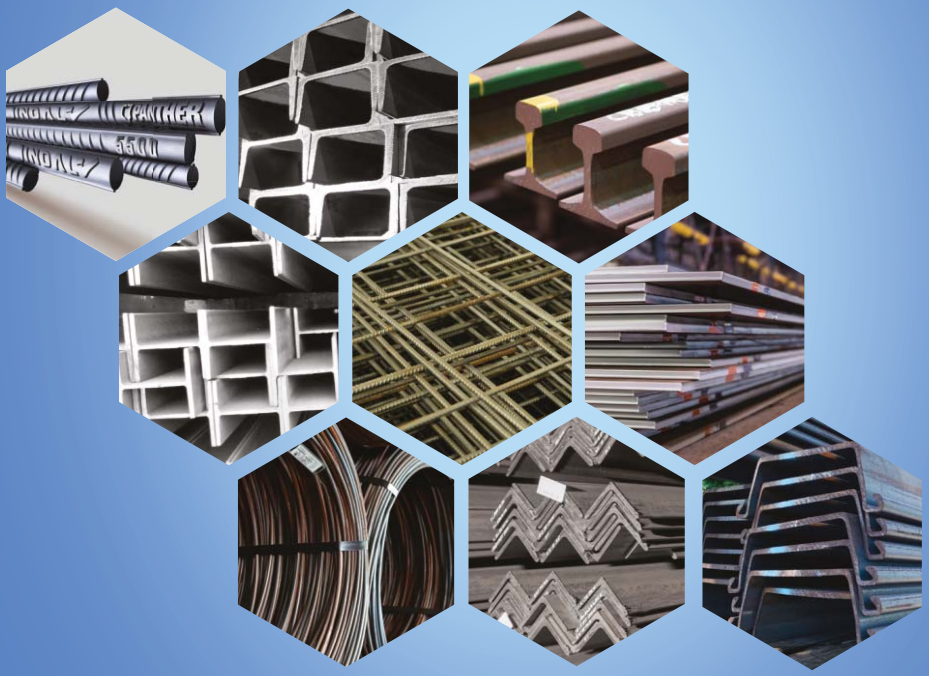


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