SUSTAINABLE ENERGY DEVELOPMENT: OPPORTUNITIES AND INNOVATION FOR INDIAN COAL

WORLD COAL ASSOCIATION CONFERENCE PROCEEDINGS

INDIA HABITAT CENTRE – NEW DELHI
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With the kind support of CPSI
According to the International Energy Agency (IEA), almost a quarter of a billion people in India live without any access to electricity. Those who have access experience regular supply disruptions that necessitate expensive and heavily polluting diesel back-up generators. Similarly, the IEA notes that India’s per-capita energy consumption is far lower than the world average. For instance, the IEA’s World Energy Outlook 2015, reports that residential consumption in Bihar, India’s third largest state, is around 50 kilowatt-hours (kWh) per capita per year; a figure consistent with running a fan, mobile phone and two fluorescent light bulbs for less than five hours per day. It is therefore unsurprising that the Government has made it a priority to reduce the impact of energy poverty.

Looking ahead – in addition to resolving the challenges of energy poverty – trends including robust economic growth, an expanding middle class, rising manufacturing base and a growing urbanised population are forecast to continue and will lead to rising demand for energy.

As a consequence India will require all sources of energy to meet growing demand. While investment in intermittent renewable sources of electricity is forecast to rise in the coming years, far greater levels of spending have been committed to coal-fired power generation indicating a significant role in the energy mix over the long-term. For India, electricity produced from coal-based power plants is 30% cheaper than electricity produced from renewables (and 16% cheaper than domestic natural gas). The link between access to affordable power from coal, economic growth and prosperity is clear. It is for this reason that coal has been identified as the ‘pillar’ for the Government’s mission of 24x7 affordable and environmentally friendly ‘Power for All’ by 2022.

Equally, however, as noted by Mr Goyal in his forward for the conference, coal faces several concurrent challenges. These can be broadly categorised into two themes: production and consumption. In the recent past, there has been a significant level of growth in domestic production. In the longer term, however, fundamental challenges exist and must be addressed in order to ensure they do not put a constraint on production efficiency. Moreover, the delivery of the Paris Agreement (and its rapid adoption by countries) has provided an impetus to reduce emissions linked to fossil fuels. In a clear indication that coal can be used in a manner consistent with GHG reduction goals, India was one of the many countries that identified a role for cleaner coal technology in their Intended Nationally Determined Contributions (INDC). Recognising India’s growing role in the international coal market, a detailed assessment of developments is of critical importance. For this reason, the World Coal Association – the global industry network for coal, formed of coal producers, allied companies and stakeholders – with the support of the Coal Preparation Society of India hosted ‘Sustainable Energy Development: Opportunities and Innovation for Indian Coal.’ The conference considered the technological,
policy and financial requirements to ensure the sustainable development and deployment of coal mining and generation technologies.

Through contributions from expert speakers, plenary sessions and working group discussions, the conference began the process of:

• Identifying strategies and partnerships to meet coal production targets

• Establishing a vision of pathways for cleaner coal technology deployment

• Discussing the required actions for the implementation of a sustainable coal strategy.

The conference (and this briefing which captures proceedings) examines some of these issues. Clearly it is a work in progress with more to follow.

The environmental benefits of deploying cleaner coal technology in India

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Sustainable Energy Development: Opportunities and Innovation for Indian Coal featured three sessions: a programme of plenary talks by senior energy stakeholders to provide background, strategies for promoting sustainable coal mining practices and their view on a sustainable coal pathway. This was followed by two themed discussion groups.

The following section provides an overview of the plenary.
The conference began with a high-level scene setting discussion from senior energy stakeholders who discussed their vision of a sustainable mining future and cleaner coal pathway.

Panellists unanimously endorsed a continuing role for coal to resolve energy poverty and power economic development. It was noted that resolving issues within the Indian coal sector would translate across the economy.

Coal Secretary, Anil Swarup, provided an assessment of recent coal production. Mr Swarup noted that while production in the recent past has grown significantly maintaining increased level of production will be difficult to achieve. This opinion was supported by the panel who noted the need to modernise production processes through mechanisation, operational efficiency and improved safety standards.

Recently higher production levels have resulted in a surplus of coal stocks. Speakers noted, however, this was not a symptom of lack of demand from the economy, but rather a signal of the fundamental challenges utilities have in deliver electricity. Panellists called for the government to prioritise power market reform.

The panel identified that India’s current coal-fired power fleet falls below global standards in terms of efficiency and pollution controls. Transitioning to high efficiency low emission (HELE) technology will ensure India is able to meet environmental and energy access goals. The panel encouraged the government to direct the coal cess toward investment in HELE coal deployment.

It was also noted that technology transfer and international funding will be important to encourage increased deployment.

While the future role of carbon capture and storage (CCS) was raised it was generally accepted that presently this was not a particularly plausible option due to cost challenges. Although the panel did note that commodifying captured carbon to provide a revenue stream could encourage deployment.

“TECHNOLOGY TRANSFER AND INTERNATIONAL FUNDING WILL BE IMPORTANT TO ENCOURAGE INCREASED DEPLOYMENT.”
In 2016, India’s coal production was 612 million tonnes (MT), 15 MT higher than 2015, this positioned India as the world’s third largest coal producer after China and the US. In order to support the dual aims of rising energy demand and lowering coal imports, the government has prioritised local coal production and set a target of 1.5 billion tonnes of coal production by 2020. For the Government to meet this ambitious target, all stakeholders will be required to improve efficiency and raise production. Land acquisition, skill development and capacity building are among the key challenges to reaching coal production targets. In this session industry representatives discussed strategies and development models that could be employed by local producers to ensure maximum production efficiency. Discussion fed into the development of recommendations that are included at the end of this briefing.

As in other locales, land acquisition and issues pertaining to the environment will be central considerations to be negotiated as producers seek to increase production levels. Martin Christie, Executive Director of BetterCoal detailed how the initiative has ensured continuous improvement of sustainability performance in the coal supply chain for European utilities through the development of a new mining standard – the ‘Bettercoal Code’. Launched in 2013, to assess ethical, social and environmental performance of suppliers the information is used by utilities in their respective due diligence processes and purchasing decisions. The Code aims to ensure mines improve their performance and practices through continuous improvement plans.

Examining a similar theme, Neena Singh Partner at ERM, a leading provider of environmental,
health, safety, risk, social consulting services and sustainability related services, considered issues related to environmental performance. Ms Singh logically argued that policy to increase the scale and number of coal mines will be a land intensive endeavour and that producers must consider at the inception stages how best to manage environmental risk. It was noted that the key coal producing areas of Dhanbad, Talcher, Singhrauli have previously been identified by the Ministry of Environment, Forest and Climate Change as ‘critically polluted areas’. In 2011, the Ministry of Mines developed a new ‘Sustainable Development Framework’ (SDF) that aimed to address sustainable development issues in mining. While originally applicable to commodities other than coal, the law has issues and principles that are equally applicable to the coal sector. In particular Ms Singh noted:

- **Principle 2**: Strategic Impact Assessment in Key Mining Regions – assessing inter lease and cumulative impacts, taking decisions on planning and infrastructure. Taking cluster approach for small mines. Study done at periodic intervals. Disclosed through public consultations.

- **Principle 4**: Key focus on addressing social impacts. Moving towards a consent approach on land and community resources. Livelihood restoration given a clear and unambiguous focus.

- **Principle 5**: Benefit sharing.

- **Principle 6**: Mine closure and Post Closure- more onus and liabilities- longer term responsibility (post closure liabilities).

Ms Singh reported that companies are currently assessing their situations with some miners raising concerns having the capacity to be able to meet the requirements.

Peabody Energy’s Senior Vice President, Global Government Affairs Michael Flannigan, highlighted best practice in his contribution to the session which focussed on health and safety. According to Mr Flannigan health and safety considerations were a central value that was embedded in the company’s mission ‘to create superior value as the leading global supplier of coal, which enables economic prosperity and a better quality of life’. Mr Flannigan argued three fundamental focus areas ensured Peabody transitioned from simply compliance to a culture of care:

- **Leadership**: Outstanding leadership, where we model the Peabody leadership competencies to drive a culture of safety and a culture of fairness, honesty, respect and trust in the organization and always demonstrating the courage to do what is right.

- **Effective safety and health risk management**: Which includes setting and following Peabody standards regarding safety and health hazards and remaining constantly vigilant in order to manage and control hazards by using tools like SLAM (Stop Look Assess and Manage).

- **Assurance**: Verifying and validating that we are doing what we said we would do, that our behaviors and practices align with our stated expectations and that it is delivering the results we want.

Health and safety will be a central consideration with plans to increase mechanisation in order to achieve coal production targets. As cited by previous speakers, Coal India and other producers will face land acquisition and environmental challenges when expanding the scale and number...
of mines. In part this explains why the government has prioritised the expansion of underground mining techniques. Dean Thornwell, President at Joy Global Eurasia provided an overview of a pathway to deploying modern underground mass production technologies.

Transportation is a commonly sighted potential inhibitor to meeting coal production targets. Coal production in India is currently concentrated to the east (Odisha, West Bengal and Jharkhand), while almost of half of capacity is in the northern and western regions. This geographical mismatch is expected to continue in the coming years through as the major centres in the northern and western regions increase energy demand. Rail transport has a comparative advantage over road in terms of energy consumption (75–90% of road costs), financing costs (80% of road costs) and CO2 emissions (20% of road costs)\(^1\). Yet according to a recent PwC report, only around 55% of CIL and 70% SCCL coal is transported through railway lines. Clearly, rail will be required to play a larger role as India seeks to meet higher production targets. In part this explains why in December 2012, the Ministry of Railways introduced a policy on participative models for railway connectivity and capacity augmentation. The policy seeks to encourage public-private participation through last-mile connectivity to ports, large mines and clusters of industries. A potential model commonly cited by commentators that India could follow, is the privatisation of rail freight infrastructure in the Australian state of Queensland. George Lippiat, Vice President Strategy, from Aurizon detailed how the state government decided to privatise the rail freight operation in 2010 to encourage private investment in the coal transport network. According to Mr Lippiat, several key metric improvements continue to improve post-privatisation including a 43% increase in locomotive productivity (FY2013 v. FY2016). For Australia, privatisation has led to significant improvements in operational efficiency in coal production which could provide lessons for the Indian context.

PwC’s Mining & Metals Associate Director Pukhraj Sethiya provided the concluding remarks for the session with an overview of the organisation’s recent report ‘Bridging the gap: Increasing coal production and sector augmentation’. Mr Sethiya provided a synopsis of the report which detailed some of the steps the Indian Government could take to smooth land acquisition, easy availability of water, augment infrastructure for logistics, develop coal washeries, capacity building and skill development.

Recognising the need to integrate sustainability across the entire coal business model, the conference moved to consider support for new technologies and support for coal utilisation.

The Indian government’s policies to meet the growing need for electricity are focused on developing large-scale coal-fired power plants.

Over the next 25 years, electricity demand in India is forecast to grow at over 4% per year. Under its New Policies Scenario, the IEA estimates that installed coal capacity will reach almost 500 GW by 2040 (more than three times the 2012 installed capacity).

The dominance of coal in India's energy mix can be attributed to two key factors: affordability and access. Although the competitiveness of renewables and gas fired technology is likely to improve over time, coal is expected to remain the most affordable option through to 2035, driven by low domestic coal prices and limited gas availability.

Since 2010, approximately 87 GW of new coal capacity has been added to the grid, of which 61 GW has been subcritical. By 2018, an additional 88 GW of new coal capacity is forecast to come on-line, with 32 GW of this subcritical. In addition, India currently has a further 292 GW of coal capacity in the planning stages. The IEA estimates that India will require around USD1.2 trillion investment in power generation through 2040. As indicated by India’s INDC there are clear emission reduction benefits to deploying HELE coal, accordingly this panel session concentrated on developing a vision of pathways for cleaner coal technology deployment.

Over the coming years, there are many nascent cleaner coal solutions that India could capitalise upon, including carbon capture use and storage (CCUS). Aniruddha Sharma, Chief Executive Officer of Carbon Clean Solutions argued that by exploiting cleaner coal opportunities, India stood to benefit not simply through a reduction in emissions but also increasing profitability. In October 2016, Carbon Clean Solution’s launched a project to capture more than 60,000 tonnes of CO₂ from a 10MW coal-fired power station near Chennai, India, creating the subcontinent’s first “zero-emission” coal plant. The captured CO₂ is expected to be commodified and has potential fuel, chemical construction and agricultural uses. Mr Sharma concluded that CCUS could allow India a competitive advantage in key materials such as cement by producing ‘cleaner products’.

Rapid economic growth drives the processes of urbanisation and industrialisation. However, in the recent past, while these developments have raised social and economic indicators, they have also been associated with air quality issues. Recent commentary, particularly in the lead-up to the Paris Agreement, has tended to focus on reducing carbon emissions. While no doubt, this is an important policy priority, it should not lead to other emissions being ignored. Lesley Sloss from the IEA Clean Coal Centre discussed the initial findings from a paper due out later this year which examines the potential for retrofitting emissions control technology in emerging markets, including India. Ms Sloss argued

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that various perspectives existed within local contexts, such as regulators who wish to achieve maximum emission reductions and coal-fired power plant operators who wish to comply while remaining competitive. While noting the opportunities that existed for India, Ms Sloss also noted several challenges stakeholders faced in managing emissions, including high ash coals; water availability; plant age; and power demand making retrofitting periods an issue. Ms Sloss identified several needs that India must negotiate, such as monitoring training and equipment standardisation; boosting national skill sets and expertise and funding.

Session Three concluded with a presentation by Sajal Ghosh, Associate Professor, Management Development Institute. Doctor Ghosh confirmed that deploying cleaner coal technologies is the best option to ensure India will be able to provide accessible, on-gird and affordable electricity. Mr Ghosh detailed how his research indicates that a ‘high’ penetration of cleaner coal technologies could reduce emissions intensity by a third with only a marginal increase to the price per megawatt hour (against the reference scenario). In addition to attempting to quantify the emissions reduction potential, Dr Ghosh concluded by discussing a potential pathway to encourage the deployment of HELE technologies, including the potential for a regulatory coal body and power market reform.
Using its growing international influence, India – with the support of other coal stakeholders – should seek to promote the continuing use of coal in international/regional forums and initiatives. This may include development of an international coal initiative.

Coal is a critical enabler in the modern world. It provides 41% of the world’s electricity and is an essential raw material in the production of 70% of the world’s steel and 90% of the world’s cement. This helps to explain why 19 countries representing 44% of the world’s emissions submitted climate pledges that recognised a role for cleaner coal technology. Therefore India’s continued use of coal does not make it an outlier.

Despite this, however, in the recent past coal has been marginalised in international development and climate forums. For instance, the World Bank and the European Bank for Reconstruction and Development have adopted policies that seek to limit funding for coal-based power generation to “rare circumstances”. A more rational approach towards funding project coal projects – as developed by the OECD and African Development Bank – is required. Without doubt, over the coming decades, coal will continue to be deployed; the challenge will be to influence developers to adopt the most efficient technology options. Restricting support based on fuel, rather than on a technology basis will bring unintended consequences. As argued by the IEA’s 2014 World Energy Investment Outlook countries that build new capacity will be less inclined to select the most efficient designs because they are more expensive, consequently raising CO₂ emissions and reducing the scope for the installation of CCS’.

India’s economic rise will bolster its already prominent international profile. Already India plays an influential role in a number of initiatives related to climate and energy. In addition to UN processes, India is a leading participant in a number of other regional forums, such as: the Bay of Bengal Initiative for Multisectoral Technical and Economic Cooperation (BIMSTEC), G-4, G-15, G-20, G-24, G-77, India Brazil South Forum (IBSA), Indian Ocean Region-Association for Regional Cooperation (IOR-ARC), Shanghai Cooperation Organisation (SCO), and the South Asian Association for Regional Cooperation (SAARC).

India is therefore well-placed to advocate for a more balanced approach to recognising the role of coal in international energy and climate discussions. Opportunities for co-operation exist far beyond downstream coal users and include countries that export coal and thermal technology. Scope exists to formalise the current ad hoc co-operation between India, Australia and Japan.

Economic development, energy access and climate goals are not competing priorities. Coal has always been a critical enabler of development in the modern world – this is not going to change over the coming decades. Coal stakeholders, including India, should work to promote the positive contribution of coal in international energy and climate discussions.

Indian coal producers, particularly Coal India, should seek to access opportunities from international expertise to ensure continuous improvement in safety and sustainability.

The targeted increase in production levels of Indian coal companies rests on the foundation of several safety and sustainability elements, including an uncompromising commitment to safety, modern
cutting edge mining techniques and improving environmental performance. Over the coming decades, the story of Indian coal production should be one of continuous development and improvement in technologies and practices. Concerns about the environmental and social consequences of coal mine development may result in increased opposition to the industry in local communities. As such, coal producers should seek to emulate best global practice to ensure best-in-class mining.

There are a number of global initiatives designed to improve and demonstrate business commitment to sustainability and safety. Indian coal producers can send a strong signal of their commitment to operational excellence at mine sites by endorsing the WCA's Sustainable Mining Practice and Commitment to Safety policy statements. Indian coal producers could benefit from the sharing of knowledge and expertise from a diverse group of leading figures in the coal industry. All members of the World Coal Association are expected to work towards best practice in sustainable development and are encouraged to utilise tools endorsed by external sustainability initiatives. The WCA and its members share knowledge wherever possible and work cooperatively to ensure this happens.

**India is to continue to promote improvements in thermal efficiency as a mitigation strategy by working with the WCA to support implementation of the PACE initiative**

India’s Intended Nationally Determined Contribution (INDC) submitted in the lead-up to last year’s COP21 indicated a commitment to emission reductions while balancing the aims of universal access to energy, energy security and social and economic development. Cleaner coal technology is at the foundation of this pledge with India committing to improving the efficiency of existing facilities and transitioning toward the deployment of supercritical technologies.

“**THE WCA SUPPORTS INDIA’S TRANSITION AWAY FROM OLDER, LESS EFFICIENT SUBCRITICAL TECHNOLOGY.**”

Given that these HELE facilities emit 25-33% less CO₂ and significantly reduce or eliminate emissions, such as oxides of sulphur and nitrogen, and particulates this is an important step in the right direction. Looking ahead, India should continue to prioritise improvements to thermal efficiency, particularly promoting deployment of ultra-supercritical coal technology. This could be financed through the cess of coal that was also announced as part of India’s INDC.

The WCA supports India’s transition away from older, less efficient subcritical technology. We recognise that this will require international financial, technological and other kinds of support to accelerate deployment of HELE technology. To this end, WCA has proposed the establishment of a Platform to Accelerate Coal Efficiency (PACE) and stand ready to work with India and international partners to support its implementation.