

# ANNUAL WORLD ECONOMIC AND BUSINESS FORUM 2022

April 25-26, 2022 | Webinar

## Operational efficiency of equipment system drives environmental and economic performance of surface coal mining.

**Sheo Shankar Rai**

*Mining Engineering, Institute of Technology (ISM), India*

India's per-capita energy consumption is one of the lowest in the world at 1181 kWh. With 18% of the world's population, India must increase its per capita energy consumption to improve the human development index (HDI). Coal is the main energy resource (estimated at ~ 340.00 billion tonnes) for India due to limited availability of oil and gas. Of the total production of energy, coal accounts for over 50%. India's economic future and prosperity in the near to medium term is dependent on its ability to provide reasonably priced energy to all its people and the industry.

While coal mining in India has huge positive economic impacts on its economic development and provisions of employment, the possibilities of adverse impacts on the environment are equally high. This becomes particularly important when over 95% of coal is produced by surface mining methods leaving behind the environmental footprint.

The negative impact of mining could be controlled through the application of principles of sustainable mining. In order to be sustainable, mining sector of India must adopt scientific mining processes to improve all the three dimensions of sustainable mining – Economic, Environmental and Social.

Improving operational efficiency (OE) of mining processes can ensure sustainable development of coal mining sector. The selection of equipment system and the adoption of efficient mining techniques are critical for achieving operational efficiency of mining. OE has got a direct and positive impact on environmental efficiency (EE), defined in terms of reduction in greenhouse gas (GHG) emissions, and improvement in ambient air quality in terms of reduction total suspended particle (TSP) and fine particulate matters (PM10), and cost efficiency (CE) defined by a reduction in unit operating cost (₹/m<sup>3</sup>).

Application of technology and computer-aided simulation of mining operations can help identify the most appropriate equipment system and innovative mining methods that can achieve the goals of sustainable mining. In a typical case study of a large surface coal mine, application of computer simulation technology, selection of an appropriate equipment system, and innovative mining method and operating plan could bring a 40% gain in OE (measured in m<sup>3</sup>/hr.) of overburden removal which resulted into a gain in EE with an annual reduction of GHG, TSP, and PM10 emission by 26%, 47%, and 52% respectively. The CE improved by over 33% vis-a-vis the existing operating methods and equipment system without infusion of any additional resource.

### Biography

Professor Sheo Shankar Rai is Mining industry professional turned academician with over 27 years of mining industry experience and over 5 years academic and research experience across the mining value chain from exploration through to Mine Design & Engineering, Equipment Maintenance and Operation, Development and Execution of Sustainable Mining Operation etc. During his industry tenure Prof. Rai partnered and worked with top executives of the client companies (mine owners, contractors and equipment OEMs) in mining sector to drive the roll-out and the businesses. Professor Rai's research area is in application of technology for improving productivity, profitability and sustainability of mining operation.