

**GOVERNMENT OF INDIA
MINISTRY OF COAL**

**RAJYA SABHA
UNSTARRED QUESTION NO. 2423
ANSWERED ON- 10.08.2026**

TECHNOLOGICAL MODERNISATION OF THE COAL SECTOR

2423 SHRI VINOD SHRIDHAR TAWDE:

Will the Minister of COAL be pleased to state:

- (a) whether Government has undertaken measures for technology upgradation to promote digitalisation, automation and safety in coal mining operations;
- (b) the initiatives taken for adoption of advanced technologies, including AI, IoT, 5G-enabled systems, predictive analytics and digital logistics management;
- (c) whether Government has formulated a roadmap for scaling up clean coal technologies, including coal gasification, carbon capture and biomass co-firing; and
- (d) the steps taken to promote wider deployment of these technologies to improve productivity, operational efficiency, worker safety and environmental sustainability?

ANSWER

**MINISTER OF STATE FOR COAL & MINES
(SHRI SATISH CHANDRA DUBEY)**

(a): The major initiatives undertaken by the coal companies to promote digitalisation, automation, mechanisation and enhanced safety in mining operations include:

1. For blast-free mining, advanced mass production technologies like Continuous Miner, Surface Miner, and High-wall mining machine for safer operations have been deployed
2. Mechanised drilling, resin-based bolting, and advanced strata monitoring devices have been installed in underground mines.
3. Gas chromatographs are used to increase the precision of mine air sampling.
4. Integrated Command & Control Centre has been established with AI-enabled monitoring and surveillance System for real-time monitoring of operations and detection of potential hazards.
5. Environmental Tele-Monitoring System and Local methane Detectors are installed in underground mines providing continuous real-time monitoring of Carbon Monoxide, Methane, Oxygen, Temperature.
6. Digital Vocational Training Certificates for monitoring the training status and competency records of contractual workers deployed in mines.
7. To enhance operational safety, advanced safety technologies in Heavy Earth Moving Machinery, including Proximity Warning System, Automatic Fire Detection & Suppression System, Operator Fatigue Monitoring System, and Rear-view/ 360° Camera System have been provided.
8. Simulator-based training for HEMM operators is being undertaken.

Coal India Limited (CIL) has undertaken technology upgradation and digitalisation in its infrastructure projects, particularly coal washeries, First Mile Connectivity (FMC) projects and mechanised coal handling systems, to improve productivity, operational efficiency, safety, coal quality and environmental sustainability.

(b): Major initiative taken by the coal companies for adoption of advanced technologies, including AI, IoT, 5G-enabled systems, predictive analytics and digital logistics management. The major initiatives include:

- Providing an intelligent digital platform capable of supporting AI, advanced analytics, and automation through SAP S/4HANA, following the successful migration from SAP ECC to SAP RISE in CIL.
- AI-based CCTV Video Analytics-enabled Integrated Command and Control Centre for real-time anomaly detection for Surveillance, Safety & Security in CIL.
- Deployment of AI-based Safety Analytics Dashboard using AI/ML for analysis of mine safety violations and proactive safety monitoring.
- Pilot implementation of DIGICOAL (Industry 4.0) for digital monitoring of mining operations in seven mega mines of CIL.
- Deployment of RFID-enabled Weighbridge Automation and GPS/GPRS-based Vehicle Tracking Systems (VTS) for automation and real-time monitoring of coal dispatch and transportation.
- Implementation of smart mine pilot projects using 5G technology at Amlohri Coal Mine, Northern Coalfields Limited.

(c): To scale up clean coal technologies and to develop a supporting ecosystem in the country, the Government has launched two financial incentive schemes with outlays of ₹8,500 crore and ₹37,500 crore to promote coal/lignite gasification projects in the country.

Under the ₹8,500 crore Scheme for Promotion of Coal/Lignite Gasification, projects incorporating Carbon Capture, Utilisation and Storage (CCUS) technologies are provided an additional 10% weightage during evaluation.

The Ministry has also undertaken innovation and research initiatives, including hackathons on coal gasification and carbon capture technologies, to promote the development and deployment of clean coal technologies.

(d): Coal gasification enables cleaner and more efficient utilisation of domestic coal resources by converting coal into synthesis gas (syngas), which can be used for the production of chemicals, fertilisers, hydrogen and other value-added products. Further, the integration of Carbon Capture, Utilisation and Storage (CCUS) technologies has the potential to reduce emissions and promote environmental sustainability. These initiatives are expected to improve productivity and operational efficiency through the indigenous production of value-added products and the cleaner utilisation of coal resources.

Coal companies have taken the following steps to improve productivity, efficiency and environmental sustainability by using blast-free mining technologies:

- Deployment of surface miners eliminates drilling, blasting and crushing activities, thereby reducing pollution associated with these operations, including improved safety.
- Deployment of Continuous Miners in underground mines to introduce blast-free mining technology and minimise blasting-induced vibrations and stable roof, causing a safe mining environment. Highwall mining technology has also been introduced to facilitate blast-free coal extraction.
