

**Project title:**

Development of feasibility assessment model for adaptation of underground coal gasification technology in the North-East Region of India

**Project No.:**

GAP/ME/MCIT/93/2012-13

**Executive Summary:**

CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad; Indian Institute of Technology, Kharagpur (IIT-Kgp) and CSIR-North East Institute of Science and Technology (CSIR-NEIST), Jorhathave implemented the *S&Tproject* entitled“**Development of Feasibility Assessment Model for Adaptation of Underground Coal Gasification Technology in North East Region of India**”, sponsored byMinistry of Electronics and Information Technology, Government of India. Under this S&T various systems and software have been developed.

**Web-based coal information database for underground coal gasification (UCG)** inNorth East Region (NER) in India has been developed. It is related to the online management of database of coal deposits of NER.The website is designed for helping the people by providing the coal information in north-east region of India along with the worldwide data. The website contains the elementary information such as definition of underground coal gasification, the brief introduction to worldwide coal gasification, status of coal gasification in India, processes used for underground coal gasification, different underground coal gasification models, and detailed information of coal gasification. The web-based platform provides features such as interaction among users, seamless connectivity, globally accessible, easy to edit etc.

**Local methane detection and power cut-off system** has been developed for continuous monitoring of methane and other hazardous gases present in an underground mine. The system consists of sub-units, namely (i) Suck-in fan for sucking air inside the instrument’s sensor chamber from underground mine atmosphere; (ii) Infrared methane sensor for sensing methane concentration present in sensor chamber; (iii) Screen for visual display of methane gas concentration; (iv) Loud audio alarm generator for providing evacuation warning to miners; (v) Auto power cut-off relay for cutting off power supply when methane concentration exceeds the threshold limit; (vi) Detachable battery for operating the instrument in highly explosive areas where normal AC supply is not available or restricted for use; (vii) Remote read out unit for viewing instrument’s reading from a safe distance and storing sensor data properly with date and time for further use as and when required and (viii) Microcontroller unit for controlling the functions of all the sub-units properly and sequentially.

**Integrated gas, strata and environment monitoring**

**system** has been developed. A single device it can monitor fourteen important underground mine parameters. These include seven gases generally found inside a mine (such as methane, oxygen, carbon monoxide, carbon dioxide, nitrogen dioxide, sulphur dioxide and hydrogen sulphide), ambient air temperature, air velocity, humidity, load on a particular point of roof, roof convergence and pressure on pillars. The distinguishing feature of the system is that it cuts-off power supply as soon as the concentration of inflammable gases exceeds respective threshold value and helps averting mine explosion due to gas ignition. This system also generates both audio and visual alarms when each parameter reaches its danger level.

**Equipment and method for determination of *in-situ* gas content of coal** have been developed for evaluation of lost gas, desorb gas and residual gas content. Each of these parts is generally measured or estimated by a different procedure, and then combined to yield the total gas content of coal sample which is known as *in-situ* gas content.

Patents have been filed for the following three technologies namely, (i) Equipment for determination of *in-situ* gas content of coal, (ii) Integrated gas, strata and environment monitoring system for underground mines, and (iii) Local methane detection and power cut-off system. Out of which following two technologies have been transferred for commercialization: (i) Integrated gas, strata and environment monitoring system for underground mines, and (ii) Local methane detection and power cut-off system.