BANGLADESH

By a Special Contributor
and the section on coal by Barry Edwards of
IMC International, London, UK

Bangladesh, formerly East Pakistan until it seceded from its union with West Pakistan in 1971, is one of the world's most overpopulated and poorest countries. Sandwiched between India and Burma on the Bay of Bengal, Bangladesh covers an area of some 144,000 km^2, and much of it comprises the deltas of large rivers (the Ganges and Brahmaputra). Many people are obliged to live on land that is prone to flooding during the monsoon season, and there are other natural hazards such as cyclones and drought in the northern part of the country. As much as one third of the 133 million population are under 14 years of age and two thirds of the workforce are engaged in agriculture, mainly growing rice.

GDP in terms of purchasing power parity grew by 4.4% last year to US$239 billion or US$1,700 per head of population, with services contributing 46%, agriculture 35% and industry 19%. It is estimated that some 40% of the 65 million workforce were unemployed. The government spent around US$6.8 billion last year but it achieved revenues of only US$4.9 billion. Exports were worth US$6.2 billion but imports were closer to US$8.5 billion and the country's total external debt has grown to US$16.5 billion.

Bangladesh's mineral resources are poorly developed. Proven reserves of natural gas exceed 300 billion m^3, sufficient to support current domestic needs for almost 200 years. Annual output is around 2.5 billion m^3. The US company Unocal Corp. has made a large investment and has identified 150-200 billion m^3 of natural gas in the northeast and would like to export gas to India. This is under consideration although the government insists that Unocal must first satisfy all domestic requirements and ensure that reserves are sufficient to last for 50 years.

Substantial reserves of coal, estimated at 1,000 Mt, have been identified in the Jamalganj and Rajshahi areas but they are deep deposits and, until recently, their development has been beset by technical/economic problems.

Coal-mining prospects were first identified in northwest Bangladesh in the 1970s. Since then, drilling by the Bangladesh Geological Survey has expanded finds in various areas of the Dinajpur region. These are summarised in Table 1.

BHP invested in several prospecting licences during the 1990s and identified coal deposits beneath the town of Phulbari. Subsequent scoping studies indicated potential for open-pit operations, with an output of 3-4 Mt/y of bituminous coal suitable for power generation of up to 1 GW capacity. However, the studies identified major potential technical and environmental problems, not least the lowering of the water table and associated subsidence

effects for a distance of 12 km from the mine site in what is a premium rice-growing area. To date, the Government of Bangladesh has not received this prospect with enthusiasm.

In the late 1980s, a deep mine prospect was identified at Barapukuria, some 7 km north of Phulbari. A techno-economic feasibility study was undertaken by Wardell Armstrong under UK overseas development funding. The study was not favourable, in terms of technical or economic outturn, reflecting a conservative approach to mining whilst working under a substantial water body. The Bangladesh Mine and Minerals Corp. (Petrobangla) then turned to the China National Machinery Import and Export Corp. (CMC) for assistance in developing the prospect. Under the Chinese experience of working under water bodies a further feasibility study was undertaken in 1991-92 and this indicated both technical and financial feasibility. Design proposals were developed into a fixed price, lump sum design-and-build contract which was signed in 1995. Funding is through a supply credit of US$124 million, with the balance of US$70 million provided by the Government of Bangladesh.

International Mining Consultants of the UK was engaged to assist with the contract negotiation and to provide overall project management assistance throughout the implementation stage. Two shafts were sunk to a depth of some 320 m using freezing techniques. The mine was designed with two fully-mechanised retreat longwall faces and an output of 1.2 Mt/y. The main seam varies from 30-42 m in thickness and is planned to be mined in eight slices, either by longwall or continuous miner operation in the second and subsequent slices.

Initial water problems were encountered in the pit-bottom development, resulting in a total mine inundation. Following a design promoted by IMC, these problems were overcome and development is now proceeding smoothly and within budget. Consistent with Chinese philosophy, some 20 km of mine access roadways have been developed and mine infrastructure completed. Access into the coal is well advanced and installation of the first longwall face was on schedule for August 2003, with production in October 2003.

IMC's services have been extended to assist with the negotiation of a production and management contract for the first six years of production. It is anticipated that at the end of six years, a Bangladeshi mining skills base will have been developed. The majority of coal production will be dedicated to power generation and a mine-mouth 250 MW power station is currently under construction.

At present, attention is being focused on the Kalishpier coal prospect which offers the opportunity of another deep mine development close to Barapukuria. The speed of development will depend on the experience gained at the Barapukuria mine, this being the first deep coal mine in Bangladesh, but is tentatively scheduled for 2003-04.

Bangladesh does not have any significant reserves of hard rock suitable for building aggregate, apart from an underground deposit at mineable depth at

Maddharapa, some 20 km from Barapukuria. A mine has been designed under a supplier's credit agreement with North Korea and is currently under construction to access hard basement rock. Both access shafts and significant underground strategic development has been competed as preparations are under way to install the production infrastructure equipment.

There are large resources of beach sands along Bangladesh's 550 km coastline and some 17 areas have been identified as containing monazite, ilmenite, rutile, zircon and magnetite.

Table 1

Prospect Location	Steam thickness (m)	Cumulative depth (m)	Deposit (Mt)	Year of Discovery
Barapukuria, Dinajpur	36	118-509	300	1985-87
Kalashpir, Rangpur	4	257-483	685	1989-90
Phulbari, Dinajpur	1	150-300	350	1997
Dighipari, Dinajpur	1	328-307	Not determined	1994-95