

## HOW DID SOUTH AFRICA COME TO THE FOREFRONT?

**A**lmost 90 percent of South Africa's electricity is generated in coal-fired power stations, with one large nuclear station (Koeberg near Cape Town) providing about five percent. A further five percent is provided by hydro-electric and pumped storage schemes.

There are few, if any, new economic hydro sites in South Africa that could be developed to deliver significant amounts of power. The country's natural gas resources are also too limited to qualify as a viable option for power generation.

In view of this, the South African power utility giant Eskom has been investigating the pebble bed technology since 1993 as part of its Integrated Electricity Planning process. These investigations, which included an evaluation of the technical performance and economic merits of the project, concluded that the PBMR technology should be considered as a possible option for future South African electricity supply as it offered a cost-effective option with short construction lead-times.

In 1993, Eskom acquired a license from HTR GmbH to further develop the technology and exploit it for its own use. In 1995, Eskom commissioned a pre-feasibility study, followed by a techno-economic study in 1997. These studies showed considerable technical and commercial merit for the PBMR technology as a future source of base load energy in South Africa. By mid-1998 the project had progressed to a full-scale engineering design phase.

In 2000, a PBMR company was formed between Eskom, the Industrial Development Corporation of South Africa (IDC), British Nuclear Fuels and the US utility Exelon to build and market PBMR-based power plants. In April 2002, Exelon decided not to invest further in the development of the PBMR technology to allow it to focus on its core business of operating power generation plants and broking power sales.

The feasibility study and associated work, which was completed at the end of 2002, found that the technology was viable. It found that the PBMR power plants would represent the lowest levelised cost option in 11 of 14 major markets analysed, while being competitive in the remaining three.

Since the technology has not previously been commercialised, the intention is to build and operate a single module at Koeberg to serve as a demonstration plant and a launch platform for local and international sales; and an associated fuel plant at Pelindaba near Pretoria. Successful completion of the demonstration phase will be followed by commercialisation, with Eskom earmarked to be the first customer.

To this end, a comprehensive environmental impact assessment (EIA) was conducted for the project, followed by the issuing of a positive Record of Decision (RoD) on the EIA by the Director General (DG) of the Department of Environmental Affairs and Tourism (DEAT). The 30-month EIA process included extensive public participation and extended periods for comment during the scoping and EIA phases.

However, the anti-nuclear activist group Earthlife Africa filed an application to have the RoD overturned. In January 2005, the Cape High court ruled in favour of Earthlife Africa and set aside the RoD. The judge ruled the Director General of the Department of Environmental Affairs and Tourism has to allow Earthlife Africa and other stakeholders to make written submissions which the DG has to consider before making a new decision. The judge added, however, that it was clear from the evidence on record that the DG's decision was preceded by a protracted process, involving public participation on a wide scale and that, by an large, the "process was conducted in a manner that was thorough and fair".

While the court ruling has delayed the conclusion of the EIA process, it would not necessarily affect the overall project schedule, namely for construction to start in 2007 and for the demonstration plant to be completed by 2010. Considerable progress has also been made in the preparation of the Safety Analysis Report (SAR) that would underpin the application for a construction license from the South African National Nuclear Regulator.

At the end of 2004, a significant amount was allocated to the project by the Minister of Finance, Mr Trevor Manuel. This enabled PBMR to secure the contracts for the development of key components such as the turbine machinery (being developed by Mitsubishi Heavy Industries of Japan) and a helium test facility (HTF) at Pelindaba. The HTF is a high-temperature, high-pressure rig which will test the complete helium cycle system for the PBMR. It will also simulate the fuel-handling, reactivity control and shut-down systems.

Further Government support came from the South African Minister of Public Enterprises, Mr Alec Erwin, who stated an intent to eventually produce 4000 MW to 5000 MW of power from pebble bed reactors in South Africa. This equates to between 20 and 30 PBMR reactors of 165 MW each. Mr Erwin said the PBMR would place the country at the forefront of energy technology. "The project is now factored into our future energy planning, and we are negotiating a major intention-to-purchase agreement between Eskom and the PBMR company," he said.

In March 2005, PBMR (Pty) Ltd and the Chinese developers of pebble bed technology, Chinergy Co of Beijing, entered into a Memorandum of Understanding (MOU). The main objective of the MOU is to pursue the potential benefits which could be realized through cooperation for the High Temperature Reactor (HTR) demonstration projects in China and South Africa, as well as for the commercialisation of these reactor systems thereafter.

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