

## Medupi Power Station

Medupi is a greenfield coal fired power plant project situated in Lephalale, comprising of six units with a gross nominal capacity of 800MW each, resulting in a total capacity of 4 800 MW. Construction activities commenced in May 2007, with the first of the six units of the power plant planned for commissioning by mid-2012. Each of the remaining 5 units will be commissioned at approximately eight monthly intervals thereafter.

The power station will be the fourth largest coal plant in the world, and will be the biggest dry-cooled power station in the world. The boiler and turbine contracts for Medupi are the largest contracts that



Eskom has ever signed in its 87-year history. The planned operational life of the station is 50 years.

As part of its skills development strategy, Eskom appointed Parsons Brinckerhoff Power as its construction execution partner responsible for the construction and commissioning of the new plant. The turbine,

boiler and civil contracts have been placed, which constitute approximately two thirds of the total project value, are major components of the multi-package contract strategy.

During construction some 350,000 tons of reinforced concrete will be poured. The Medupi boiler house will stand approximately 130 meters in height. Job creation is expected to peak at 8 000 direct jobs during construction. Lephalale's Gross Domestic Product (GDP) is expected to increase by approximately 95% per year as a result of the construction activities. The power station will directly grow SA's GDP by approximately 0.35% per year. Approximately 40% of the project cost is expected to be spent locally.

The initial investment decision for this base-load power station was made in 2005. Formerly known as Project Alpha, this power station has been named Medupi which means "rain that soaks parched lands, giving economic relief".

This project incorporates super critical technology, which is able to operate at higher temperatures and pressures than previous generation boilers and turbines, and most importantly operate with greater efficiency. The supercritical design is a first for Eskom, and with the higher efficiency will result in better

use of natural resources, for example, water and coal, and will have improved environmental performance.

The uniqueness of this project lies on that Medupi is being built backwards, opposite of the traditional practice of Eskom of starting with Unit 1 and ending with Unit 6. This distinguishing approach is the result of the rock conglomeration on the southern side which is excavated and reused as the engineering fill on the northern side.

The site was formerly the farm Naauw Ontkomen and was bought from Kumba Coal (Pty) Ltd - now known as Exxaro Coal (Pty) Ltd. The site measures 883 hectares and was previously used for game and cattle grazing.

The construction of Medupi Power Station will have a major impact on the lives and the economy of the small community in Lephalale as homes and a social infrastructure are being developed to serve the thousand of contractors working on site in this small yet special community.

## **Why in Lephalale?**

Eskom undertook screening and feasibility studies in order to determine the most viable plant location option for Medupi power station. Assessment criteria included:

- availability and accessibility of primary resources, such as water and coal
- ability of the new power station to connect to the existing Eskom network/grid
- environmental acceptability
- cost of production.

Eskom ranked the Waterberg Coalfields and the Lephalale area in the vicinity of the existing Matimba Power station as the most favourable option for the establishment of a new coal-fired power station due to *inter alia*:

- land availability in close proximity to the primary coal source
- properties of coal in the area are well known due to the experience acquired through the existing Matimba Power Station
- competitive coal prices
- availability of alternative ash disposal options

## **Contracts to be placed**

The chosen contracting strategy is multi-contract, with 38 contract packages approved. To date we have awarded 22 contracts, we have 9 contracts in the market and the remainder 7 contracts of the 38 packages 7 contracts are not yet in the market.

Some of the major and minor contracts that have been awarded for Medupi project thus far include:

- enabling/construction site facilities with Roshcon placed 3 July 2007
- steam turbine generator contract with Alstom placed 30 September 2007
- boiler, bag filter and auxiliary bay contract with Hitachi placed 30 October 2007
- generator transformers contract with Siemens Limited placed 22 February 2008
- main civil contract with MPS-JV (Murray & Roberts, Concor and Grinaker LTA) placed 9 May 2008
- communications systems contract with Eskom Telecommunications placed 19 September 2008
- transformers with Siemens placed 22 November 2008
- water treatment plant contract with Aqua Engineering placed 9 March 2009
- electrical power installation contract with Actom placed 1 August 2009
- coal overland conveyor contract with Rula Bulk Materials placed 1 August 2009
- medium voltage switch gear with Actom placed 1 August 2009
- chimney and silos contract with Karrena/Concor-JV placed 11 Aug 2009
- low pressure services with LP Services Consortium placed 23 September 2009
- dust handling and conditioning contract with Clyde Engineering placed 4 November 2009
- control and instrumentation contract with Alstom placed 6 November 2009
- reservoirs (clean and dirty water dams) with Civcon/G4-JV placed 9 November 2009
- coal stockyard equipment contract with Thyssen Krupp placed 16 November 2009
- terrace coal and ash systems contract with ELB Engineering Services placed 28 February 2010
- laboratory contract with Siemens Limited placed 28 February 2010
- UPS (DC System) with Standby Systems placed 1 March 2010
- lower voltage switchgear with General Electric placed 31 March 2010
- ash dump equipment and ash overland conveyor placed 31 March 2010

Some of the contracts yet to be placed with the project amongst other includes:

- Information technology
- Hydrogen plant contract
- Diesel generator
- Rail siding
- Clarifiers
- Buildings
- Technical building equipment



## Project milestones

The environmental impact assessment for this station was undertaken and a positive record of decision was issued by the Department of Environmental Affairs and Tourism in 2006. The Minister of Environmental Affairs and Tourism considered the appeals lodged against the decision, and confirmed the positive record of decision at the beginning of May 2007.

The official sod-turning ceremony was held at the construction site on 14 August 2007. The then Minister of Public Enterprises, Mr Alec Erwin, and the Premier of Limpopo Province, Mr Sello Moloto, were in attendance.

Medupi terracing work done by Roshcon commenced in May 2007. The Medupi first civil concrete pouring took place on 18 July 2008. The first air cooled condenser concrete slip forming commenced on 31 October 2008. The columns are approximately 40m in height, 4 meters in diameter and there are 125 columns for the 6 X 800MW units.

The Department of Labour sent a team of 15 labour inspectors on the 18 May 2009 to audit all contractors on site to ensure compliance with labour laws and related regulations.

The lift shaft for Unit 6 was completed on the 4 August 2010 and was officially opened by the Minister of Public Enterprises, Mrs Barbara Hogan on the 17 August 2009. The lift shaft stands at 120 metres high, having used a total quantity of 2000 cubic metres of concrete and 575 tons of steel to construct.



The setting of the first boiler column by Hitachi was held 16 January 2010 which marked the commencement of the constructions of the boiler. These six boilers houses will each stand at approximately 130m high.

The south chimney outer shell (or windshield), which stands out at 213 metres high was completed on the 12 May 2010. The quantity of concrete casted on the chimney base totalled 1828,5 cubic meters and for the chimney shell totalled 6648,5 cubic meters. The outer shell of the chimney will enclose 3 flue cans which protrude 7 metres outside the chimney opening making the whole structure 220 metres. The chimney dwarfs by far the height of the two 120 metres lift shafts and the 40 metres high air cooled condensers columns for Unit 6 and 5.

Variety of visits to the project site were made, which includes amongst others, African Development Bank and World Bank visited the project on the 19 April 2010, Maintenance and Operations Committee for Mozambique, Eskom and Botswana on the 5 May 2010 and prospective investors on the 10 May 2010.

## Environmental facts

An environmental management plan (EMP) is crucial to every new build project that Eskom tackles. National legislation requires that all new build projects are authorized for construction and operation in terms of the National Environmental Management Act. The authorization includes the need for an EMP. Eskom appoints an independent consultancy to perform an environmental impact assessment, which involves the bio-physical, social and economic tripod of issues which encompass social, historical and natural impact of the project.

The Minister of Environmental Affairs and Tourism approved the project from an environmental perspective and construction started in May 2007.

During the clearing of the site – some 840 hectares – many environmental factors were highlighted. A visual beacon on the site is a baobab tree which is believed to be a few hundred years old. The team immediately made plans to preserve this beautiful tree. A lengthy process was put in place to relocate it and plant it where the entrance to the power station will ultimately be. It was pruned before moving, including a 10-day preparation for transplanting. The aim was to keep the tree as a 3-stem unit for aesthetic purposes. This involved cranes and a truck being employed to move the tree and replant it, under the guidance of a tree expert.



Apart from this baobab, many nationally and provincially protected trees were either replanted or transported to a special nursery at the adjacent Matimba Power Station. This included species such as

camel thorns, shepherds trees, leadwoods, tamboti and marulas.

Not only trees are being cared for but some game as well. Approximately 20 animals were relocated to an Eskom game reserve close by. Game animals included impala, two nyala, a gemsbok, eland and kudu. There is also a programme to catch and relocate all snakes found on site by a local professional snake



catcher, including educational talks with caught snakes to workers. So far over 60 snakes have been caught and relocated, including other reptiles, birds, etc. Snake species include puffadders, black mambas, Egyptian cobras, boomslang and Mozambican spitting cobras.

The clearing of such a huge area involves massive amounts of vegetation and topsoil.

This was preserved to be used for rehabilitation of the existing Matimba Power Station ash dump and possibly some of the Grootegeluk Mine spoil dumps.

Medupi Power aspires to the highest possible standards of environmental performance. This transcends aspects from conservation to mundane matters such as visual impacts and dust monitoring. To further empower construction personnel to world class performance; the Medupi Power Station is interrogated by a series of independent external and internal audit processes. These provide an objective overview of current performance and areas of improvement.

In addition to being one of the first coal fired stations in the Eskom fleet to deploy supercritical technology, Medupi will also be one of the first to include abatement technology such as flue gas desulphurisation. It will also include pulse jet fabric filters and low NOx burners. All of this will have an effect of reducing the environmental impact of its air quality emissions. Medupi will similarly be the first power station in the fleet to implement lining for its ash dams.

Environmental education also forms an integral part of the project. Local people are constantly given information about their environmental impacts and fauna and flora on site as they work. The Medupi EMC (local Environmental Monitoring Committee) has been involved in monitoring the project and continues to do so.