Eskom Fact sheet

ANKERLIG AND GOURIKWA GAS TURBINE POWER STATIONS

Why the Open Cycle Gas Turbine (OCGT) project?

During 2004 it became apparent that Eskom, as electricity supplier of last resort, would have to come up with a solution that had a very short lead time in order to have enough electricity to get through the winter peaks of 2007. After intense investigations the technology that was identified as the most viable was that of the Open Cycle Gas Turbine. There are a number of reasons for this:

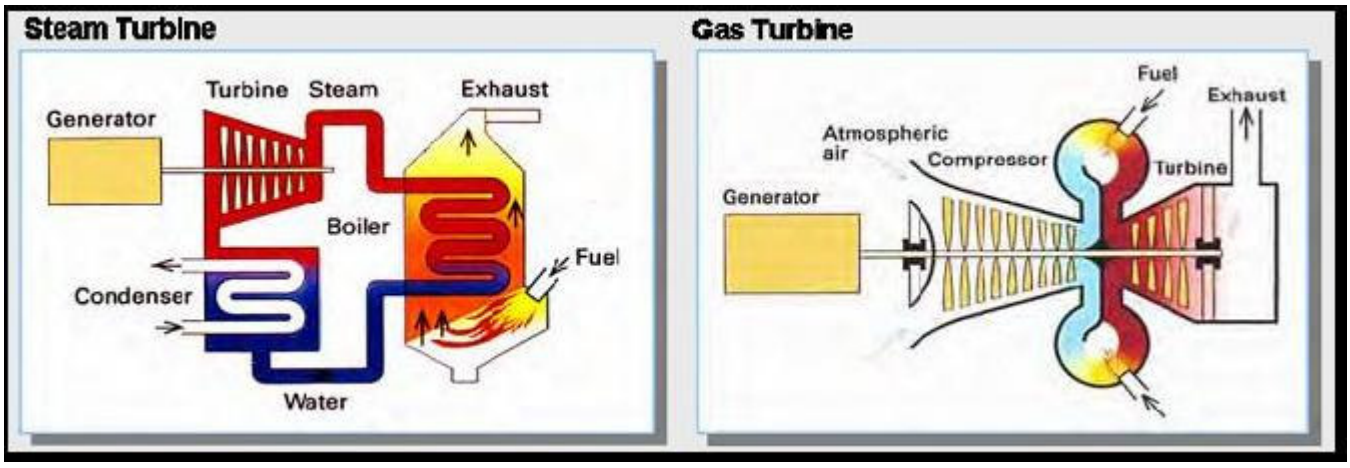
1. The technology has been used extensively all over the world and is readily available
2. Stations can be erected in a lead time of 2 – 3 years as opposed to the larger coal and nuclear stations that require 8 – 10 years lead time.
3. This type of technology has a proven track record
4. There are numerous suppliers in the world

Sites were selected at Atlantis, near Cape Town, and in Mossel Bay. After consultation with local communities, the power stations were named Ankerlig and Gourikwa. Construction, in each case, was carried out in two phases – on adjacent sites. Construction began during 2006 and the second phase was successfully completed during early 2009. Both stations have already been used extensively to help meet the demand for electricity.

What is OCGT technology?

Open cycle gas turbines can be fuelled by either natural gas or liquid fuel (kerosene or diesel). The hot, high velocity gas used to turn the turbines is exhausted into the atmosphere. In Combined Cycle Gas Turbine (CCGT) technology, the exhaust gases are used to heat water that provides steam to turn a second turbine. The CCGTs are more efficient but the capital investment is greater.

The Ankerlig and Gourikwa OCGTs are of a similar technology to that used in the aviation industry, only designed for industrial use. The turbine-generator and control units are housed in all-weather, painted steel enclosures, with the exception of Ankerlig Phase 2, which is enclosed in a single, steel clad machine hall. An entire unit occupies an area of approximately 75 m x 25 m with the turbine-generator module erected on a reinforced concrete plinth.



Energy Transfer in Turbines (Courtesy of Siemens)

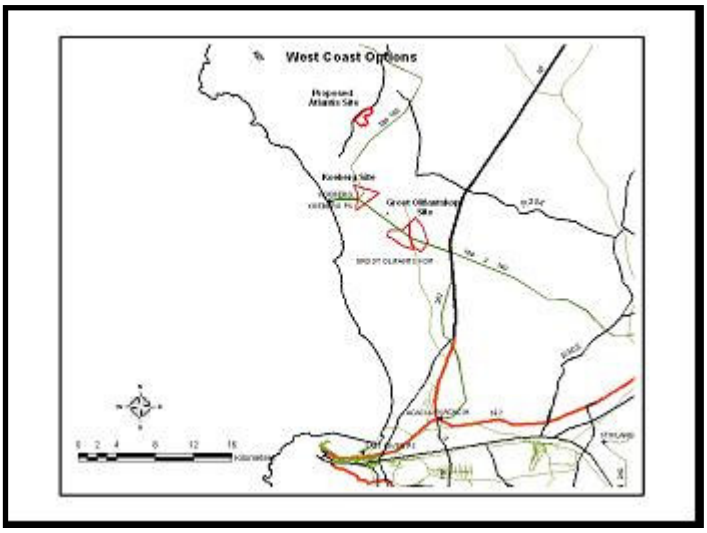
How does it work?

A compressor sucks air in from the atmosphere and compresses it through a number of compressor stages. Fuel is pumped into a combustion chamber and mixed with the compressed air. The fuel/air mixture is then ignited to form hot high velocity gas. This gas passes through the turbine that turns a shaft connected to the rotor of the generator. The rotor turns inside the stator and electricity is generated. This electricity is then distributed via high-voltage transmission systems to where it is needed.

OCGTs and the environment

Open cycle gas turbines are environmentally friendly as they do not emit any particulates or noxious gasses which contribute to global warming. They do emit a small amount of NOX gas but this is kept within World Bank standards and is not a major polluter.

Ankerlig Gas Turbine Power Station



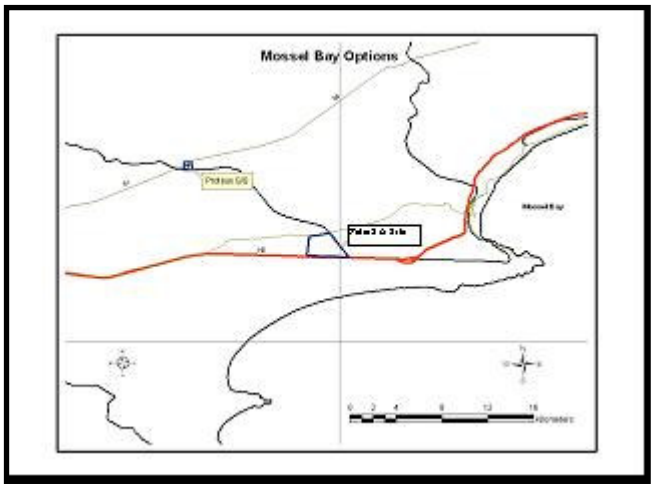
Four potential sites were considered. The chosen site is located in the industrial area of Atlantis in the Western Cape. The site had the advantage of vital infrastructure such as roads, water and sanitation already in place. This assisted in bringing down the time and costs in developing the site.

The first phase comprised 4 units with a design capacity of 149.2 MW each. Construction began in January 2006 and was completed in record time by June 2007. The second phase, which comprised 5 units of 148.3 MW each, started in August 2007. As each unit was completed, during late 2008 and early 2009, it was handed over to the Generation Division for commercial operation. The two phases of the Ankerlig Power Station each function with its own control room and the nine units have a combined nominal capacity of 1 338 MW.

The units use diesel as their fuel source. The fuel is trucked in from a supplier in the Cape Town area. The units have been designed in such a way that they can be converted to Combined Cycle Gas Turbines (CCGT) should natural gas be found in any major quantities on the West Coast.

The name of Ankerlig Power Station is derived from an Afrikaans expression “Om die anker te lig”, which is symbolic of a community that rises above the chains of poverty to experience growth and prosperity.

Gourikwa Gas Turbine Power Station



Three potential sites were considered. The chosen site was located just outside the PetroSA facilities in Mossel Bay, on land that is owned by PetroSA. The PetroSA facility supplies the fuel, which is diesel, via a pipeline. This site also had the advantage of an existing infrastructure.

The first phase comprised 3 units with a design capacity of 149.2 MW each and was completed in June 2007. The second phase was started during September 2007 and comprised 2 units of 149.2 MW each. Both phase 1 and 2 are operated from one combined control room and the five units have a total nominal capacity of 746 MW.

Gourikwa Power Station is named after an ethnic group that lived in the Mossel Bay area.

Operating hours

Both power stations are part of Peaking Generation in Eskom's Generation Division. When required they operate during peak demand periods and emergency situations. These peaks are normally between 06:00 and 08:00 in the morning and 17:00 and 20:00 in the evening. Provision has been made for them to run up to eight hours a day should this be necessary, albeit at great cost.

Connection to the national electricity grid

A major component of the project was the integration of the two power stations with the electricity grid. It required the construction of a substation at each of the stations and 400 kV lines.

Given the urgency of the project, the substations were built in a record time of eight and a half months, as opposed to the norm of 13 to 16 months. In addition, 12 km of 400 kV line were built at Ankerlig and 21 km of line at Gourikwa.

This component of the project utilised local labour for the civil work. Across the project an extensive programme was also implemented to train up and source skills, especially in project management and the more technical, engineering components.

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