

APRIL 2008

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

GOURIKWA POWER STATION CONVERSION AND TRANSMISSION INTEGRATION PROJECT

WESTERN CAPE PROVINCE

CONVERSION OF THE EXISTING GOURIKWA POWER STATION
(AN OPEN CYCLE GAS TURBINE (OCGT) PLANT)
TO A COMBINED CYCLE GAS TURBINE (CCGT) PLANT
AND
CONSTRUCTION OF AN ASSOCIATED
400kV TRANSMISSION POWER LINE FROM
GOURIKWA POWER STATION TO PROTEUS SUBSTATION

AN Eskom INITIATIVE

BACKGROUND INFORMATION DOCUMENT



SUSTAINABLE
FUTURES ZA



Eskom Holdings Limited is investigating the conversion of the 5 units at the existing Open Cycle Gas Turbine (OCGT) plant at Gourikwa Power Station to a Combined Cycle Gas Turbine (CCGT) plant in order to increase the generating capacity of this existing power station by approximately 400MW. The proposed conversion involves the addition of steam turbines to the existing gas turbine plant, and will be established on the same site as the existing Gourikwa Power Station.

Eskom is also proposing the construction of a 400kV transmission power line between the Gourikwa Power Station and the existing Proteus Substation to transmit the additional power generated at this power station into the national electricity grid.

The Gourikwa Power Station conversion and associated transmission integration project can be seen as a third phase of the original Gourikwa OCGT power station project. The construction of the initial OCGT units (i.e. the 3 units now in operation) was the first phase of the project. The second phase of the project (currently under construction) involves the expansion of the power station by adding another 2 OCGT units.

The nature and extent of this project is explored in more detail in this document.

Aim of this background information document

This document aims to provide you, as an interested and/or affected party (I&AP), with:

- » an overview of the proposed Gourikwa conversion project proposed by Eskom.
- » an overview of the Environmental Impact Assessment (EIA) process and studies being undertaken to assess the project.
- » details of how you can become involved in the EIA process, receive information, or raise issues, which may concern and/or interest you.

Policy planning and Eskom

Eskom is responsible for the provision of reliable and affordable power to its consumers in South Africa. The decision to expand Eskom's electricity generation capacity is based on national policy and informed by on-going strategic planning undertaken by the national Department of Minerals and Energy (DME), the National Energy Regulator of South Africa (NERSA) and Eskom. Through this planning process, the long-term view of electricity demand and supply in South Africa is forecasted and assessed, and the framework for Eskom and South Africa to investigate a wide range of supply- and demand-side technologies and options is provided.

National Energy Policy, NEMA, Energy Efficiency Strategy and Renewable Policy

DME:
National Integrated Energy Plan

NERSA:
National Integrated Resource Plan

Eskom:
ISEP

EIA



Considering the Government's Accelerated and Shared Growth Initiative for South Africa (ASGI-SA) targets and load growth currently being experienced, South Africa will require additional power in the next five years. To supply this additional demand in the medium term, a variety of options such as demand side management, co-generation non-Eskom generation and gas-fired plants (open cycle and combined cycle) continue to be investigated by Eskom in addition to conventional long-term supply options (such as coal and nuclear fuel plants).

As one of its increased electricity supply options, Eskom is proposing the conversion of the OCGT units at the existing Gourikwa Power Station (near Mossel Bay) as well as the Ankerlig Power Station (near Atlantis) in the Western Cape to Combined Cycle Gas Turbine (CCGT) units. Due to the medium-term forecast in the demand for electricity (until approximately 2014) and constraints associated with meeting this projected demand, the conversion of these OCGT units to CCGT units is one of the few options available to Eskom to manage the projected demand in the medium-term.

The conversion of the 5 units at the Gourikwa Power Station and the 9 units at the Ankerlig Power Station will increase the generating capacity of the OCGT units within the Western Cape by a maximum of approximately 1 120MW (i.e. ~400MW at Gourikwa and ~720MW at Ankerlig). This is achieved by increasing the efficiency of the gas turbine plant (i.e. more power generated and sent out, for the same amount of fuel used at the same operating regime). Overall thermal efficiency is therefore increased from approximately 34% for the current OCGTs to approximately 50% to 55% for the proposed CCGT plant, depending on the operating regime of the plant.

The subject of this document is the conversion of the OCGT units at the Gourikwa Power Station to CCGT units, and considers a maximum capacity increase of 400 MW. The Ankerlig Power Station conversion project is the subject of a separate EIA process.

As electricity cannot be readily or inexpensively stored, it is therefore required that electricity must be efficiently transmitted from the point of generation to the end user. Transmission capacity is required to keep up with both electricity generation capacity and electricity demand. Therefore, in order to integrate the additional power generated at the Gourikwa Power Station into the national electricity grid, the construction of a new 400kV transmission power line between the Gourikwa Power Station and the Proteus Substation will be required.

What does the Conversion Project Entail?

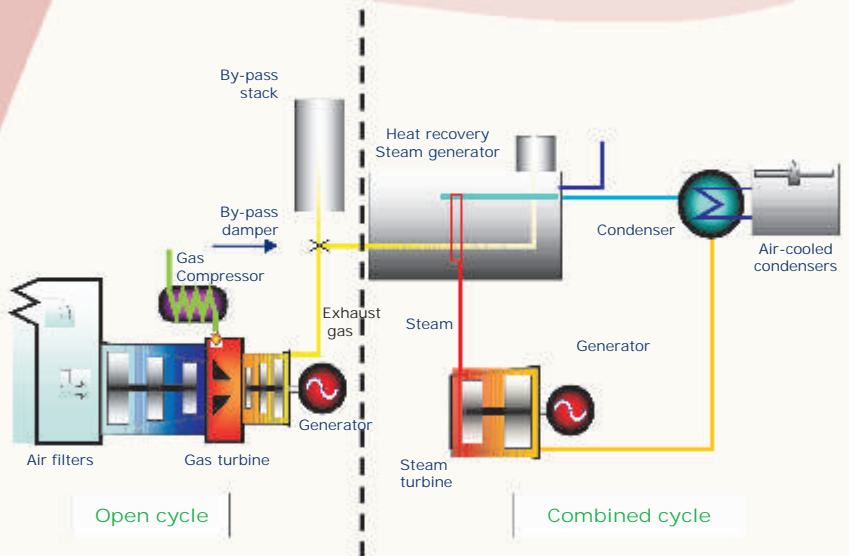
The existing Gourikwa OCGT Power Station is located adjacent to the PetroSA Gas to Liquid (GTL) facility near Mossel Bay (refer to the attached map). This power station comprises 5 OCGT units (i.e. 3 existing OCGT units, plus 2 additional OCGT units under construction) each with a nominal capacity of ~150MW, resulting in a total nominal capacity of 750MW for the power station. Each OCGT unit consists of one gas turbine driving an electric generator.

The concept of converting the OCGT units to CCGT units is to utilise the heat energy from the exhaust of the gas turbine to drive a steam turbine, instead of this heat energy being exhausted and lost to the atmosphere (as is the current scenario). Simply stated, this can be achieved through the following (and is illustrated in the figure below):

- » When the hot gas exits the gas turbine as exhaust gas, it has a temperature of up to 600°C. This heat energy is transferred to water in the heat recovery steam generator, instead of being exhausted to the atmosphere.
- » The heat is used to generate steam (water vapour), which powers the steam turbine to produce mechanical energy.
- » The resulting mechanical energy is transferred to a generator, where it is converted into electricity (i.e. electrical energy).
- » A condenser converts exhaust steam from the steam turbine back into saturated water through a cooling process.

Conversion of the units to CCGT is undertaken to increase cycle thermal efficiency. It is estimated that each converted unit will produce approximately 80MW additional capacity, i.e. approximately 50% more than a standard OCGT unit. Therefore, a maximum of an additional 5 x 80MW (400MW in total) increase in capacity is foreseen from the OCGT to CCGT conversion. The total nominal capacity of the Gourikwa Power Station will, therefore, be 1 150MW.





Simplified schematic CCGT diagram

The primary components of the conversion project include the following:

- » A heat recovery steam generator (HRSG) will be added to the gas turbine to recover waste heat, to drive the steam turbine cycle.
- » A condenser which converts exhaust steam from the steam turbine back into water through a cooling process.
- » Depending on the configuration, a bypass stack for the CCGT, anticipated to be approximately 60m in height will be associated with each HRSG.
- » Water treatment plant (for treatment of potable water and production of demineralised water (for steam generation)).
- » Dry-cooled technology consisting of a system of air-cooled condenser fans situated in fan banks approximately between 25-30m above ground.
- » Additional fuel storage facilities and associated off-loading and other related infrastructure to cater for the increased fuel requirements associated with the higher load factor (i.e. longer operating hours or a mid-merit operating regime¹). The CCGT units can be both liquid fuel-fired or natural gas becomes available.
- » A water tank with a holding volume of ~2.5 million litres (i.e. water storage for ~5 days of operation).

Water will be required for the CCGT power generation process and for cooling. The feasibility and availability of various water resource options are currently being investigated with PetroSA, including the use of treated water, effluent and/or stormwater from the PetroSA facility. A preferred option will be nominated with the agreement of PetroSA for implementation based on technical, environmental and economic constraints. The water will be piped to the power station from PetroSA via a new water pipeline proposed to be constructed parallel to the existing fuel pipeline between the two facilities.

Eskom also propose the construction of a new dedicated access road to the Gourikwa Power Station. The power plant currently shares an access road with PetroSA. The proposed access route is directly off the N2, and is reflected on the attached map.

¹ Mid-merit capacity is during the daytime from about 6 am to about 10 pm on weekdays.

Integration of the CCGT Power Station into the National Grid

Eskom Holdings Limited is proposing the construction of a 400kV transmission power line between the Gourikwa Power Station and the existing Proteus Substation (located approximately 11 km north-west of the power station) to transmit the additional power generated at this power station to the national electricity grid.

Technically feasible alternative transmission power line alignment corridors have been identified for investigation within the EIA process. These are reflected on the attached map. Through the EIA process, a preferred alternative transmission power line corridor will be nominated. The procurement of servitudes will be through a negotiation process with each affected landowner and will be subject to the project being authorised by DEAT. The process of servitude negotiating is independent of the EIA process.

Summary

In summary, the components of this project are as follows:

1. Conversion of 5 OGCT units to CCGT units at Gourikwa Power Station
2. Construction of a new water pipeline between the PetroSA facility and Gourikwa Power Station
3. Construction of a new access road to Gourikwa Power Station
4. Construction of a new 400kV power line between Gourikwa Power Station and Proteus Substation

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998), Eskom requires authorisation from the National Department of Environmental Affairs and Tourism (DEAT) (in consultation with the Western Cape DEA&DP) for the undertaking of the proposed project. In order to obtain authorisation for this project, comprehensive, independent environmental studies must be undertaken in accordance with the EIA Regulations. This project has been registered with National DEAT under Application Reference numbers 12/12/20/1141 (power station conversion) and 12/12/20/1142 (proposed transmission power line).

An EIA is an effective planning and decision-making tool. It allows the environmental consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issue(s) reported on in the EIA report as well as dialogue with affected parties.

Eskom has appointed Savannah Environmental, as independent consultants, to undertake a Scoping and Environmental Impact Assessment to identify and assess all potential environmental impacts associated with the proposed project for the area as identified, and propose appropriate mitigation measures in an Environmental Management Plan (EMP). As part of these environmental studies, I&APs will be actively involved through the public involvement process being undertaken by Sustainable Futures.

The phases of an EIA are:



What are the potential environmental impacts associated with the proposed project?

A number of potential environmental impacts associated with project have been identified, and will be assessed through the following specialist studies for the specific project components:

- » Impacts on noise and air quality
- » Impacts on ecology, fauna and flora
- » Impacts on avifauna
- » Impacts on heritage sites
- » Impacts on visual quality and aesthetics
- » Impacts on the social environment

Specialist studies will be undertaken in two phases:

1. A desk-top Scoping Study, wherein potential issues associated with all alternatives identified will be evaluated and a preferred alternative nominated for consideration in the EIA phase.
2. A detailed assessment of potentially significant impacts associated with the nominated preferred alternative identified in the Scoping Phase. Practical and achievable mitigation measures will be recommended in order to minimise potentially significant impacts identified. These recommendations will be included within a draft Environmental Management Plan (EMP).

Specialist studies will be informed by existing information, field observations and input from the public participation process. As an I&AP, your input is considered an important part of this process, and we urge you to become involved.

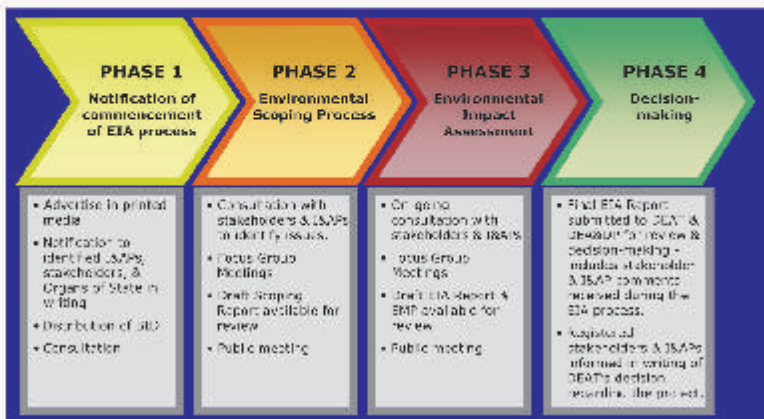
Public Involvement Process

The sharing of information forms the basis of the public involvement process and offers you the opportunity to become actively involved in the EIA from the outset. Comments and inputs from I&APs during the EIA process are encouraged in order to ensure that potential impacts are considered within the ambit of the study.

The public involvement process aims to ensure that:

- » Information containing all relevant facts in respect of the application is made available to I&APs for review.
- » Participation by potential I&APs is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the application.
- » Adequate review periods are provided for I&APs to comment on the findings of the draft Scoping and EIA reports.

In order to ensure effective participation, the public involvement process includes the following steps:



Your responsibilities as an I & AP

In terms of the EIA Regulations, your attention is drawn to your responsibilities as an I & AP:

- » In order to participate in this EIA process, you must register yourself on the project database.
- » You must ensure that any comments regarding the proposed project are submitted within the stipulated timeframes.
- » You are required to disclose any direct business, financial, personal or other interest which that you may have in the approval or refusal of the application for the proposed project.

How to become involved

1. By responding (by phone, fax or e-mail) to our invitation for your involvement which has been advertised in local and national newspapers.
2. By returning the attached Reply Form to the relevant contact person.
3. By attending the meetings to be held during the course of the project. As a registered I & AP you will automatically be invited to attend these meetings. Dates for public meetings will also be advertised in local and regional newspapers.
4. By contacting the consultants with queries or comments.
5. By reviewing and commenting on the draft Scoping and EIA Reports within the stipulated 30-day review periods.

If you consider yourself an I & AP for this proposed project, we urge you to make use of the opportunities created by the public involvement process to provide comment, or raise those issues and concerns which affect and/or interest you, and about which you would like more information. Your input into this process forms a key element of the EIA process.

By completing and submitting the accompanying Reply Form, you automatically register yourself as an I & AP for this project, and are ensured that your comments, concerns or queries raised regarding the project will be noted.

Comments and queries

Direct all comments, queries or responses to:

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E-mail: swjohnston@mweb.co.za

To view project documentation, visit

www.savannahsa.com
or
www.eskom.co.za/eia

