6. ALTERNATIVES

In terms of the Environmental Impact Assessment (EIA) Regulations, feasible alternatives should be considered within the Environmental Scoping Study. All identified, feasible alternatives should be evaluated in terms of social, biophysical, economic and technical factors.

6.1. Strategic Alternatives

Strategic alternatives refer to those alternatives that were considered at a higher level than this project-level EIA, e.g. the alternative geographical regions for the location of a new power station in South Africa, that were considered and assessed prior to the inception of this EIA process. Similarly, alternative methods of generating electricity were identified and have been addressed as part of the Integrated Energy Planning (IEP), the National Integrated Resource Plan (NIRP) from the National Energy Regulator of South Africa (NERSA), and the Integrated Strategic Electricity Plan (ISEP) undertaken by Eskom (refer to Chapter 1 of this Report). This strategic evaluation concluded that the gas turbine technology is the only technology that is able to utilise the UCG fuel source. Alternative methods of generating electricity will not be considered further as part of this study. This Scoping Study therefore considers a number of other alternatives including siting, plant layout, access, water supply and technology alternatives as well as the do-nothing alternative (discussed below) considered in terms of the proposed Combined Cycle Gas Turbine (CCGT) power plant in the Amersfoort area, and does not evaluate any other power generation or storage options being considered by Eskom.

6.2. The 'Do Nothing' Alternative

The ‘do-nothing’ alternative is the option of not establishing a CCGT power plant in the Amersfoort area, Mpumalanga Province.

Electricity cannot be stored in large quantities and must be used as it is generated. Therefore, electricity must be generated in accordance with supply-demand requirements. The demand for electricity in South Africa is currently growing. This growing electricity demand is placing increasing pressure on Eskom’s existing power generation capacity. South Africa is expected to require additional peaking capacity (i.e. times of peak demand for electricity) and baseload capacity in the medium- to long-term, depending on the average growth rate. This has put pressure on the existing installed capacity to be able to meet the energy demands into the future, particularly during peak electricity demand times.

The “do-nothing” option will result in Eskom not being able to fulfil its mandate and meet the projected growth in demand for electricity. This has serious short- to medium-term implications for socio-economic development in South Africa. This potential negative economic impact is considered to be significant.

Therefore, the “do-nothing” option is not seen as a feasible alternative for the project, and hence is rejected as a feasible alternative. The “do-nothing” option will not be considered further in this process.

6.3. Site Alternatives

Based upon the screening/site selection study described in Chapter 5 (Site Selection Summary), a total of ten candidate sites were identified for the possible location of the CCGT power plant and associated infrastructure. With further input from the technical team, four sites were eliminated as they were located in the area earmarked for future UCG operations/expansion. Six alternative sites were then selected as being potentially the most viable of all the candidate sites investigated. These six sites will be investigated in more detail during this Environmental Scoping Study, from which three sites will be further studied in the EIA phase.

The six (6) sites are illustrated in Figure 5.5 in Chapter 5.

6.4. Layout Alternatives

To date, no potential layouts have been proposed for the alternative sites. Alternative power station layouts will be informed by the results of the various specialist studies engaged in the EIA process.

6.5. Technologies Alternatives

6.5.1. Cooling Technologies

With respect to the main cooling systems, the proposed CCGT plant may either be wet-cooled or dry-cooled. Dry-cooled systems are less water intensive than wet-cooled systems. Due to imperative for water conservation in the region, wet cooling will not be considered further in this EIA.

There are two types of equally proven dry cooling systems, namely direct dry cooling and indirect dry cooling - .

In the direct dry system, the turbine exhaust steam is piped directly to the air-cooled, finned tube, condenser. The finned tubes are usually arranged in the form of an 'A' frame or delta over a forced draught fan to reduce the land area. The steam trunk main has a large diameter and is as short as possible to reduce pressure losses, so that the cooling banks are usually as close as possible to the turbine (see Figure 6.1 below).

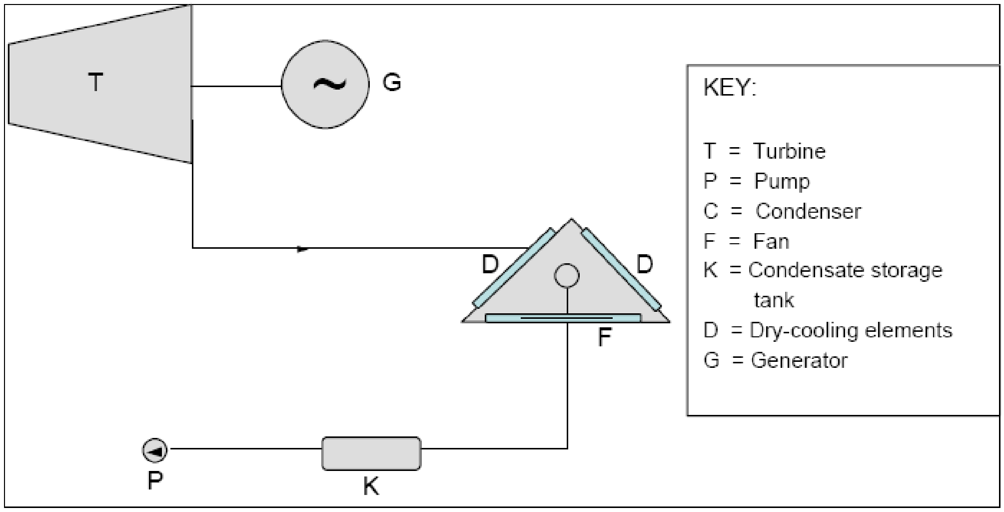

Figure 6.1 Showing a direct dry cooling system

Indirect dry cooling systems have a condenser and turbine exhaust system as for wet systems, with the circulating water being passed through finned tubes in a natural draught cooling tower. The water pipework allows the towers to be sited away from the station. The indirect system also uses a cooling tower and water (see Figure 6.2). Heat is conducted from the water through the "A – frame" bundles of cooling elements arranged in concentric rings inside the tower. The cooling water flows through these elements, cools down as the cold air passes over them and returns to the condenser. This is referred to as a closed system as there is no loss of water due to evaporation.

Eskom embarked on the direct and indirect dry cooling systems in its endeavour to conserve the county's limited water supplies. Although the expense involved in the construction and operation of a dry cooling system is greater than a conventional wet cooling system, depending on availability water resources may influence any such in determining the choice between the two technologies.

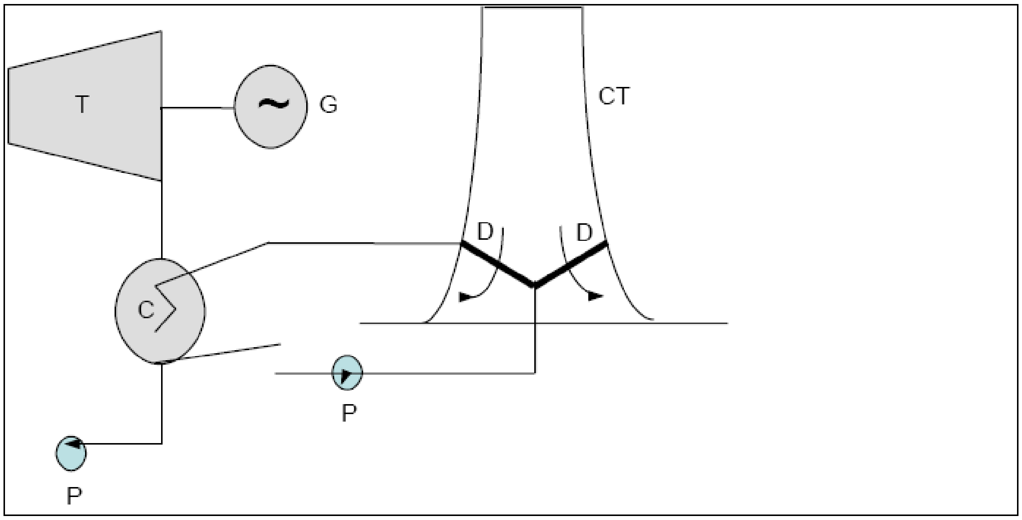

Figure 6.2 Showing a typical indirect dry cooling system

Eskom is currently investigating which dry-cooling system will be utilised at the proposed CCGT power plant.

6.5.2. Air Quality Abatement Technologies

The CCGT is considered cleaner burning technology, although some emissions such as oxides of sulphur, oxides of nitrogen and greenhouse gases (e.g. carbon dioxide) may be emitted. The proposed CCGT power plant will have appropriate air quality abatement technologies to comply with relevant applicable air quality legislation. To this end, various air quality abatement technologies will be investigated as part of the EIA phase.

6.6. Pipeline Alternatives

6.6.1. Fuel Supply Pipeline

Fuel supply will be provided in the form of a high quality burnable gas. The fuel transportation routes have not been determined at this stage, but will be identified, in the form of corridors, in the EIA phase of the project.

6.6.2. Water Supply Pipeline

Water supply to the CCGT power plant will be *via* a pipeline from the quota allocated to the existing coal-fired Majuba Power Station. The exact length and route of the alignment of the proposed pipeline is not known at this stage although it is envisaged that this pipeline would not be more than 10 km in length. A more detailed description and assessment of proposed alignments will follow in the EIA phase, in the form of corridors.

6.7. Alignment of Access Roads

Both existing and new access roads will be used or constructed to link the proposed CCGT power plant with the transport network. The alignment of these access roads will be inclusive of temporary and permanent roads. Details regarding the various access road alignments or corridors are not available at this stage of the process but will be designed at a later stage and used to inform the EIA phase studies.

6.8. Construction Village

The exact positioning of the construction village is not decided at this stage. However, impacts associated with the construction village will be studied at the EIA phase.