2. DESCRIPTION OF THE PROPOSED PROJECT

In order to be able to adequately provide for the growing electricity demand, Eskom propose to construct a new power station with a maximum capacity of 4 800 MegaWatts (MW) in the Lephalale area in the vicinity of the existing Matimba Power Station. The power station will be coal-fired, and coal will be sourced from local coalfields.

2.1 The Proposed Power Station

The Power Station is proposed to ultimately have a maximum installed capacity of up to 4800 MW (6 x 800 MW units), but the first phase to be constructed and operated will be approximately half that installed capacity (i.e. 3 x 800 MW units). The exact output will depend on the specification of the equipment installed and the ambient operating conditions. The footprint of the proposed new power station is still to be determined through final engineering and design, but has been indicated by Eskom that the new facility will be similar in size (ground footprint) to the existing Matimba Power Station. The power plant and associated plant (terrace area) would require an area of approximately 700 ha, and an additional estimated 500 - 1000 ha would be required for ancillary services, including ashing facilities (alternate ash disposal options are, however, currently being investigated).

It is envisaged that the proposed power station will utilise a range of technologies pertaining to cooling, combustion and pollution abatement. The environmental studies undertaken will attempt to assist with the determination of these. The proposed power station will be a dry-cooled station. The use of dry-cooled technology is necessitated as a result of the water availability in the area. The power station would be a zero liquid effluent discharge station, particulate emissions will be less than $50mg/Sm^3$ and due to the relatively low sulphur content of the coal Sulphur dioxide emissions will not have a significant impact. Gaseous emissions will be monitored and the need for emission reduction technology will be established in this EIA.

It is anticipated that the power station would source coal from the local coalfields, and it would be delivered to the power station via conveyor belts. The Grootegeluk Colliery, which also services the existing power station, is located to the immediate west of Matimba Power Station. An estimated 7 million tonnes per year of coal is required in order to supply the proposed power station.

The Power Station is proposed to be constructed and commissioned in phases in order to meet the growing demand of electricity. Appropriate technology alternatives have been investigated by Eskom from a technical and economic feasibility perspective through pre-feasibility studies. All Eskom's existing operational coal-fired power stations utilise pulverised fuel technology (PF). The first phase of this proposed power station will consist of 3 units, each with a nominal installed capacity of between approximately 700 and 800 MW, pulverised fuel combustion. The second phase (timing, capacity and technology) will be decided upon in due course through the Eskom approval processes. The preferred technology will be nominated based on the findings of Eskom's feasibility studies (technical and economic). The decisions regarding technology alternatives will determine the number of units required and exact output, as this is dependant on the specification of the equipment and the ambient operating conditions.

The proposed power station would be similar to the existing Matimba Power Station in terms of operation, design and dimensions. The power station structure would be approximately 130 m high and approximately 500 m wide. The required stacks would be approximately 220 m in height. Direct-cooling technology will be applied, hence no cooling towers will be constructed. Other related infrastructure would include a coal stockpile, conveyor belts, and an ash dump, with infrastructure such as transmission lines being planned to integrate the station into the national electricity grid. The EIA for the Transmission lines is a separate process and has been initiated. The proposed power station layout plan is included in Appendix A.

The two feasible technology alternatives were considered for the Proposed Power Station namely *Pulverised Fuel Combustion (PF) a*nd *Fluidised Bed Combustion (FBC).* PF combustion technology is the preferred technology for the first phase, and the feasibility of using FBC combustion technology for the second phase of the project, is still being considered.

Technology alternatives are discussed further in section 2.4.

2.1.1 How is electricity generated?

The process of generating electricity within a power station can be summarised as follows:

- **Fuel:** Coal is fed from the coal mine to a stockpile at the power station via conveyor belts. Coal is fed into pulverising mills which grind the coal to dust. A stream of air blasts this powdered coal to the boiler burners in the furnace where it burns like a gas. More coal is required with increased capacity.
- **Boiler:** Heat released by the burning coal is absorbed by many kilometres of tubing which form the boiler walls. Inside the tubes, water is converted to steam at high temperature and pressure.

- **Steam turbines:** This superheated steam passes to the turbines where it is discharged onto the turbine blades. The energy of the steam expanding in the turbines causes the turbine to spin.
- **Generator:** Coupled to the turbine shaft is the rotor of the generator. The rotor is a cylindrical electromagnet which spins inside large coils of copper to generate electricity.
- **Transmission:** The electricity that has been produced passes from the generator to a transformer where the voltage is raised to the transmission voltage of 400 kV.
- **Cooling:** After exhausting its energy in the turbines, the steam in the boiler water circuit is required to be condensed so that it can be pumped back to the boiler for reheating.

2.2 Project Alternatives

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

A key challenge of the EIA process is the consideration of alternatives. Most guidelines use terms such as 'reasonable', 'practicable', 'feasible' or 'viable' to define the range of alternatives that should be considered. Essentially there are two types of alternatives:

- incrementally different (modifications) alternatives to the project; and
- fundamentally (totally) different alternatives to the project.

Fundamentally different alternatives are usually assessed at a strategic level, and EIA practitioners recognise the limitations of project-specific EIAs to address fundamentally different alternatives. Electricity Generating alternatives have been addressed as part of the National Integrated Resource Plan (NIRP) from the National Electricity Regulator (NER) and the Integrated Strategic Electricity Plan (ISEP) undertaken by Eskom which is in line with the NIRP. Environmental aspects are considered and integrated into the NIRP and ISEP using the strategic environmental assessment approach, focussing on environmental life-cycle assessments, water-related issues and climate change considerations. The Environmental Scoping Study, thus, only considered alternatives considered in terms of the proposed new coal-fired power station in the Lephalale area, and did not evaluate any other power generation options being considered by Eskom.

2.2.1. The 'Do Nothing' Alternative

The 'do-nothing' alternative is the option of not establishing a new coal-fired power station at a site in Lephalale, Limpopo Province.

The electricity demand in South Africa is placing increasing pressure on Eskom's existing power generation capacity. South Africa is expected to require additional peaking capacity by 2007, and baseload capacity by 2010, 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. The 'do nothing' option will, therefore, result in these electricity demands not being met in the short-term. This has serious short- to medium-term implications for socio-economic development in South Africa.

Without the new proposed coal-fired power station in Lephalale, an alternative means of generating an additional 4 800 MW capacity would be required to be sought from another power generation source. Such alternatives include amongst others, Combined Cycle Gas Turbine, regional hydro power, investigating and promoting energy efficiency, researching and demonstrating renewable energy, this includes a 100MW solar thermal plant, in the longer term Nuclear and the optimal use of operating power stations.

Eskom have identified that a wide range of capacity options are required to be developed simultaneously in order to successfully meet the future electricity needs of South Africa. Alternative energy sources such as gas and wind power may have benefits in terms of some biophysical and social aspects, but must be considered in terms of quality and quantity of supply, cost, efficiency, available timeframes and associated environmental impacts.

Without the implementation of this project, the electricity network will not be able to function at full capacity, and the greater power supply will be compromised in the near future. This has potentially significant negative impacts on economic growth and social well-being. Therefore, the no-go option is not considered as a feasible option on this proposed project.

2.3 Location Alternatives for the Establishment of a New Coal-fired Power Station within South Africa

In determining the most appropriate sites for the establishment of a new coal-fired power station within South Africa, various options were investigated by Eskom. This site selection process considered the following criteria:

* Sufficient proven coal reserves for a power station operational life of at least 40 years. The level of confidence for these coal reserves needs to be

high. Once there is confidence that the coal field is acceptable, it must be possible to deliver the coal to the proposed power station in an acceptable time period, in volumes as required by the power station. The quality parameters of the coal must be acceptable and fairly constant over the life of the proposed power station.

* Cost of fuel is a critical consideration since it impacts long term electricity pricing and the economics of each project. The geology of the coal field and the infrastructure needed to mine the coal are important cost factors.
* Sufficient quantities of water have to be available in the area, or it must be relatively easy and quick to transfer sufficient quantities of water to the area. The cost of the water must also not be prohibitive.
* Suitable and sufficient land on which to build the proposed power station must be available as close as possible to the coal source. Numerous factors are important here, for instance the geotechnical study results indicating the suitability of the foundation conditions for the new plant.
* The distance to the nearest existing Transmission High Voltage network has to be evaluated. The cost of integrating into the existing network, the strengthening of that network and whether the upgrading of this network falls in line with the long term electrification plans for the area.
* The area where the proposed power station is to be located must preferably be an area where the airshed (air quality) is not already degraded. Whilst it is possible to mitigate atmospheric pollution, it is still preferable to avoid already highly stressed locations/airsheds. Should flue gas desulphurisation be required, the availability and cost of sufficient sorbent supply is an important consideration.

All of the above factors were translated into financial figures and a levelised cost for each location option was obtained. The 3 different coal options, at different locations, showed different calculated cost figures for capital expenditure, operating & maintenance expenditure and fuel cost, finally leading to a direct power cost for each option.

These costs were then adjusted taking into account the following factors:

* Inherent project risk
* Stage of project development uncertainty premium
* Diversification benefit, and
* Impacts from transmission integration

The total adjusted cost figure for each location option was then considered. The evaluation confirmed that all three location options were appropriate for further investigation. The EIA for the Lephalale was initiated in 2005 and the EIA for the other two sites in 2006.

2.4 Site Alternatives Identified within the Lephalale Area for the Establishment of a New Coal-fired Power Station

A strategic analysis was undertaken by Eskom in order to identify feasible alternative sites for the establishment of the proposed new power station (terrace) and associated infrastructure within the Lephalale area. This analysis considered technical, economic and environmental criteria. From a high-level screening study undertaken in 1998, it was concluded that there was the potential to establish a new power station in close proximity to the existing Matimba Power Station. In order to minimise the technical and environmental costs associated with the transportation of the fuel source to the power station, it was determined that the most feasible sites would be close to the existing Grootegeluk Mine. Criteria in terms of sterilisation of coal resources and major risks to the operations of the Mine or existing power station were also taken into consideration.

A significant concern in terms of the siting of a new power station in close proximity to the existing Matimba Power Station was the risks associated with interference from the cooling system of one power station on the other. In this regard significant analysis was necessary to determine the potential influence of the proposed power station on the existing Matimba Power Station, and vice-versa prior to finalising the alternative sites identified for investigation.

In addition to the above technical and economic criteria, the selection of potential sites was significantly influenced by the position of two major fault lines within the study area, i.e. the Eenzaamheid and Daarby Faults. In the case of the Daarby Fault the level of coal drops by 300 m from the sub-surface coal found at Grootegeluk Mine. It is considered unlikely that in the life of the power station there will be any mining operations in this area due to the logistics of mining and hence the temporary sterilisation of the land on this site for the life of the power station, and this is not considered to be a limiting factor. No coal exists south of the Eenzaamheid fault.

The sites adjacent to the mine pit were all evaluated, and it was concluded that there were no fatal flaws associated with the farms Eenzaamheid, Nauwontkomen, Nelsonskop and Appelvlakte. Therefore, these were considered for the establishment of the power station and associated plant (terraced area). The farm Hanglip was considered to be flawed for various reasons, including the fact that the site is currently congested with transmission lines. The Eskom-owned properties of Zongezien and Peerboom were not identified as suitable sites through this analysis mainly as a result of their distance from the existing Mining operations and their location close to existing and planned residential development.

It was further concluded that any other site would be significantly more distant from the mine pit than the four previously identified sites. As such these sites would only be considered at a later stage for the power station development should all four of the identified sites be found to be unsuitable through detailed environmental and technical evaluations.

Through this analysis, the farms Appelvlakte, Nelsonskop, Eenzaamheid and Nauwontkomen were identified as suitable sites for the establishment of the power station or ancillary infrastructure. In addition to these sites, Droogeheuvel, Zongezien, Kromdraai and Kuipersbult were also identified as additional suitable sites for the establishment of ancillary infrastructure and possibly a temporary construction camp.

The Environmental Scoping Study evaluated all eight farms and nominated the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ as the preferred farms for the establishment of the power station and ancillary infrastructure respectively. These two farms have undergone detailed investigation during the EIA phase of the project, the results of which are included in Chapters 6 – 15.

2.4.1 Road and Conveyor Belt Alternatives

Due to the outcome of the Environmental Scoping Study, additional alternative studies were required with regards to ancillary infrastructure. The nomination of the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ for the establishment of the proposed power station and ancillary infrastructure resulted in the need to identify and evaluate alternative alignments for a coal supply conveyor as well as the re-alignment of the Steenbok pan road. These alternatives are illustrated in Figure 2.1 and are evaluated as part of the detailed assessments undertaken by the specialist team.

- *Road realignment*

  The nomination of the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ has resulted in the need to re-align the Steenbokpan road. Two alternatives were identified and evaluated. The northern alternative deviates from the existing Steenbokpan road in a northwesterly direction following the northern boundries of the farms Naauwontkomen 509 LQ and Eenzaamheid 687 LQ until it intersects the existing Steenbokpan road to the west of the farm Eenzaamheid. The southern alternative deviates from the existing Steenbokpan road turning off in a southeastern direction following the southern boundary of the Farm Naawontkomen, the alignment turns north to follow the boundary between the farms Eenzaamheid and Naauwontkomen and then turns west to align with the northern alternative. Figure 2.1 illustrates the northern and southern alternatives of this realignment.

- *Conveyor Belt Alternatives*

  Two conveyor belt alignments were identified. The eastern alignment runs from the Grootegeluk mine in a south-easterly direction along the existing railway line, turning southwards towards the farm Naauwontkomen 509 LQ. The western alignment follows a shorter alignment cutting through the farm Enkelbult and Turfvlakte in a southerly direction towards the farm Naauwontkomen 509 LQ. Figure 2.1 illustrates the eastern and western alternatives for the conveyor belt.

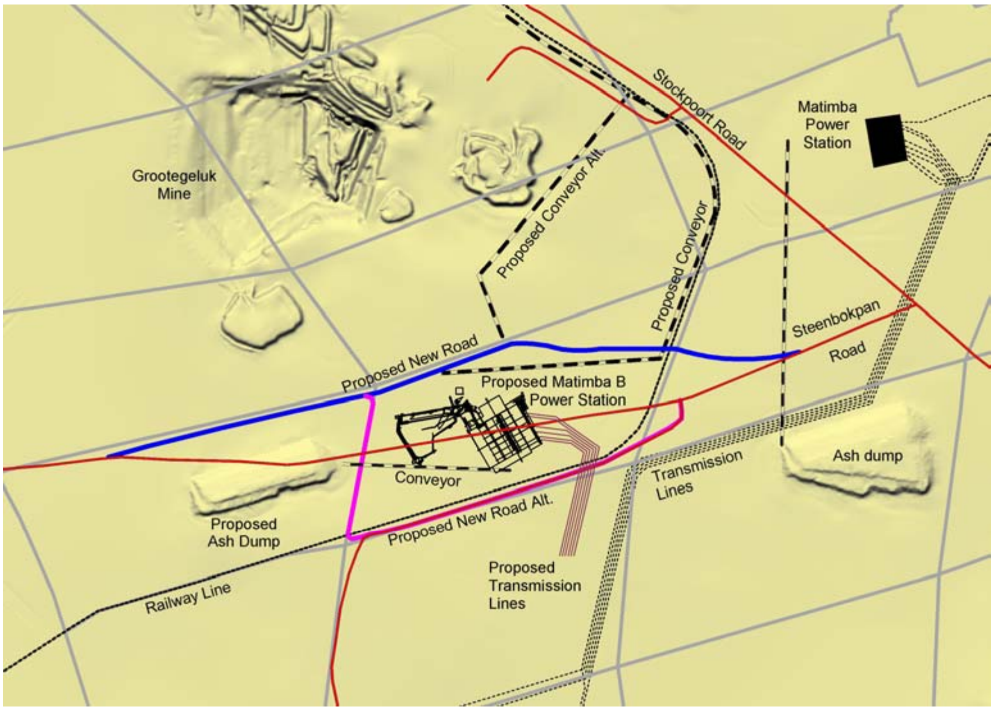

Figure 2.1: Map showing the road and conveyor belt alternatives

2.4.2. Water Supply Pipeline Alignment

The construction phase of the new power station will required significant amounts of water (both potable and raw water), therefore water pipelines will be required for the provision of potable and raw water for this construction phase. It is proposed that the potable and raw water be piped from the existing Matimba Power station (or existing water supply pipelines located close-by) to the new site along the existing ash conveyor servitude, along a section of provincial road (Steenbokpan Road) and into the new proposed site.

Pipelines are recommended for the delivery of potable and raw water as the only alternative would be to provide water via water tankers, however, this would increase the amount of traffic on the road significantly specifically at the peak of construction.

The pipeline is approximately 5 km in length and will traverse over Eskom owned property for the majority of its length. Approximately 1,5 – 2,0 km will traverse over either private land or within a provincial road servitude. Figure 2.2 illustrates the proposed alignment of the pipeline.

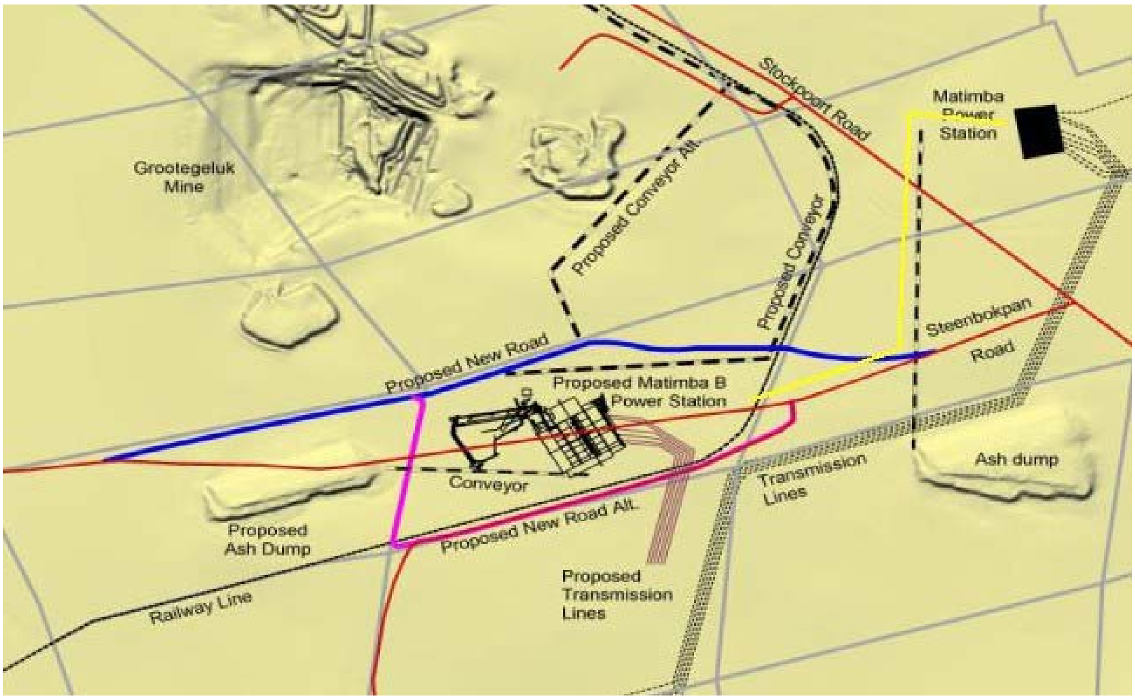

Figure 2.2: A map illustrating the proposed pipeline alignment (yellow line).

2.5 Feasible Technology Alternatives

2.5.1 Cooling Technology

The new power station is proposed to be dry-cooled, largely as a result of the limited water supply in the Lephalale area. This technology is less water intensive than power stations utilising conventional wet-cooling systems. The dry cooled systems currently used in Eskom utilise <0,2 l/kWh (litres of water per electricity unit sent out), which equates to approximately 3 million cubic metres of water per annum for a typical 2100 MW installed power station. In comparison, wet cooled systems currently used in Eskom, utilise approximately 1.8 l/kWh, which equates to approximately 27 million cubic metres of water per annum for a typical 2100 MW installed power station. Advantages and disadvantages of dry-cooling technology include:

- *Advantages*
  - ∗ A dry cooled plant shows no visible wet plumes, e.g. fogs, shadow or ice.

* This technology assists with water conservation and thus increases plant-siting flexibility.
* The use of dry cooled units will therefore meet the necessary environmental requirements and subsequent water conservation needs.

- *Disadvantages*
  * Expected 2% loss in nett efficiency[1], making this technology a more expensive option.

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

In a direct dry system, the steam is condensed directly by air in a heat exchanger (air cooled condenser) and the condensate is returned to the steam cycle in a closed loop. Most part of the condensation takes place in the condenser section at a near constant temperature, however 2-4°C below the saturation temperature corresponding to the turbine backpressure. Another section of the heat exchanger serves for condensing the remaining steam with higher air content, therefore it takes place in a gradually decreasing temperature with a significantly lower heat transfer coefficient due to the increasing partial pressure of the air. The air flow is induced solely by mechanical draft at all the existing direct air cooled condensers.

With indirect dry cooling, cooled water from cooling tower flows through recovery hydraulic turbines connected in parallel and is used in preferably a direct contact jet condenser to condense steam from the steam turbine. The condensation takes place practically at the temperature corresponding to the turbine backpressure. The mixed cooling water and condensate are then extracted from the bottom of the condenser by circulating water pumps. A portion of this flow (corresponding to the amount of steam condensed) is fed to the boiler feed water system by condensate booster pumps. The major part of the flow, discharged by the circulating water pumps, is returned to the tower for cooling. The cooling deltas (water-to-air heat exchangers) dissipate the heat from the cycle.

Eskom investigated which dry-cooling system would be utilised and implemented at the proposed new power station, direct dry cooling technology was selected.

2.5.2 Combustion Technology

In terms of combustion technology, the proposed new power station, like the existing Matimba Power Station, is proposed to make use of pulverised fuel (PF) technology, with particular reference to phase one of the proposed project. With

[1] Definition of Nett Efficiency: the total sent out power/heat input

this technology, coal is first pulverised, then blown into a furnace where it is combusted at high temperatures. The resulting heat is used to raise steam, which drives a steam turbine and generator. Recent advances in technology such as the possibility of using a higher efficiency combustion process (supercritical combustion) will result in the new power station's thermal efficiency being up to 40% (compared to approximately 34% of older power stations), resulting in a reduced environmental impact as less coal has to be burned to produce the same amount of energy. The use of PF technology may result in the need to ensure that an emissions control technology is utilised to control emissions such as SO_2. This will be discussed in Chapter 9 (Air Quality Impact Assessment).

2.5.3 Ash Disposal Alternatives

Under normal circumstances, ash disposal at a power plant would require disposal to land i.e. an ash dump. The ash dumps are usually located in close proximity to the power station and ash is transported via conveyor belts for disposal on the dump. This method was the only alternative for Ash disposal considered during the Environmental Scoping Study. However, the possibility exists that in the future Eskom may be able to dispose of ash by ashing back into the pit at the Grootgeluk mine.

To consider this alternative a detailed evaluation must be completed. Eskom and Kumba will have to consider the results of this study prior to reaching agreement to ash back in the pit. Therefore, a decision was taken that the EIA would evaluate the aspects associated with an ash dump for the proposed power station and the ancillary infrastructure. It is anticipated that the environmental study for ashing back into the pit will be completed prior to the operation of the power station.

Ashing in the pit would lengthen the life of the ashing facility proposed for the new proposed power station. The site layout plan (Appendix A) outlines the 50 year plan for the ashing facility in the event that the only ash on an ash dam applies (i.e. the construction of a 6 unit power station and the disposal of ash to land). The 50 year plan clearly shows that if alternative ashing disposal technologies are not utilised the footprint of the ashing facility would exceed the size of the farm Eenzaamheid and hence require additional land.

The additional requirement for land would involve the potential need for the farm Kromdraai. This farm was evaluated during the Environmental Scoping Study but was not nominated as a preferred site (see Chapter 4). The ecological impacts on this farm were considered of a high significance, however, no fatal flaws were identified. In the event that this additional land is required in the future, (approximately 30 years time) additional detailed studies on this property will be undertaken in order to determine the environmental impacts of the potential expansion of the ashing facility.

2.5.4. Emissions Control Technologies

Since 1995, the approach to air quality management in South Africa was informed and driven by the Atmospheric Pollution Prevention Act (Act No. 45 of 1965) (APPA). This Act was not adequate to facilitate the implementation of the principles underpinning the National Environmental Management Act (NEMA) and the Integrated Pollution and Waste Management (IP&WM) white paper.

The National Environmental Management: Air Quality Act 2004 (Act No. 39 of 2004) (NEMAQA) came into effect on the 11^{th} September 2005. Sections 21, 22, 36 to 49, 51(1)(e), 51(1)(f), 51(3), 60 and 61 are currently excluded. Parts of these Sections pertain to the "licensing" sections of NEMAQA and as stated have not yet been effected. APPA still regulates scheduled activities for 18 – 24 months.

Eskom, the major user of coal in South Africa, has for many years had electrostatic devises or Pulse Jet Fabric filters fitted to their plant to reduce particulate emissions.

The sulphur content of South African coals is relatively low hence the impact associated with these emissions from power stations is limited. The stacks at most of Eskom power stations are designed high enough to emit well above the inversion layer, which improves dispersion, limiting high concentrations at ground level.

As Eskom have proposed to construct an additional power station in the Lephalale area, it is considering the incremental effect of impacts on air quality. Should it be modelled or predicted that sulphur dioxide concentrations at ground level are outside of allowable limits then suitable emission reduction technologies will have to be considered.

Eskom has conducted an extensive review of (SO_2) emission removal. The emission removal techniques include the introduction of a sorbent to effectively remove SO_2.

Eskom assessed the various technologies based on the following criteria: -

- Resource availability (availability of limestone or dolomite)
- Proven technology (the technology must be commercially proven)
- Must effectively reduce source emissions so that ground level standards can be complied with.

- Risk associated with using the technology must be low
- Must be economically viable

The most suitable flue gas desulphurization (FGD) technologies for the proposed power station includes the use of wet or dry (semi-wet) scrubbers. These technologies allow for the introduction of calcium (Ca), which removes the SO_2 through the formation of calcium sulphite ($CaSO_3$) or calcium sulphate ($CaSO_4$).

The following justifications were made following the screening:

- Wet and Semi-dry technologies are commercially proven to remove in excess of 90% SO2 on a scale of 700MWe unit sizing and above.
- Sea-water scrubbing, being the other technology which could be applied in this specific scenario, has been precluded due to logistical constraints of the station position and sea-water location.
- Sorbent injection into the furnace was precluded for this power generating option, due to the fact that it is not commercially proven on large-size units such as those proposed for the new power station.
-

Flue Gas Desulphurisation (FGD) is the process of removing sulphur oxides, primarily SO_2, from the combustion gases (Reinhold, 2004).

- *Wet process*

  In the wet FGD process, flue gases are brought into contact with an absorber (scrubber). The SO_2 reacts with the absorbent (Ca) or dissolves into the solution to form a $CaSO_3$ or $CaSO_4$ slurry.

  Wet scrubbers are most widely used throughout the world and are proven to reach 90% SO_2 removal.

  The Ca slurry sorbent allows for the removal of SO_2 through the reaction: -

  $$CaCO_3 + SO_2 = CaSO_3 + CO_2$$

  The calcium sulphite ($CaSO_3$) waste product can be oxidised to form gypsum (hydrated calcium sulphate ($CaSO_4$ – $2(H_2O)$), which may have commercial value.

  Alternatively the generated waste can be dewatered (for some water reclamation) and mixed with flyash for deposition on a waste site.

  This process is water intensive.

- *Dry process*

  In a dry absorption system, only 60% of the water used in the wet process is required to dissolve or suspend the reacting chemical. This process does, however, have a higher chemical consumption and has lower efficiencies.

  This technology is proven but not as popular as wet process FGD. The dry process is capable of 90% SO_2 removal.

  This technology is more suitable to retrofit existing power stations but has high operational costs.

  Typical dry scrubber processes include circulating fluid bed (CFB) or spray dry FGD. The CFB process is more beneficial as it has less moving parts and can remove 90% SO_2.

- *Water consumption on FGD systems*

  A dry FGD system uses 0.092 /kWh less than a wet FGD system.

  On a typical dry-cooled power station, water consumption would increase from approximately 1.55 Mm^3/annum without wet FGD, to approximately 4.76Mm^3/annum with wet FGD, i.e a three-fold increase in water consumption, in an area that is already water-stressed.

- *Ca (sorbent) Sources*

  Lime is required for the dry process and limestone or calcrete can be utilised in the wet process. Eskom has conducted a study and identified possible sources of calcium for the proposed power station.

  The source, if required, must be able to supply the necessary calcium for a period of 35 years.

  - A source of calcrete has been identified in Lephalale, which would require further investigation to confirm the quantity and quality of sorbent available and following this a mining authorisation.
  - A source of limestone has been located at Kraalhoek and Dwaalboom, some 180 km from Lephalale.

  The only source of lime is from Lime Acres, some 850 km from the proposed power station.

Studies conducted by Eskom have indicated that Wet FGD (a gypsum process) is the preferred sulphur abatement/reduction technology for the first phase of the project, based on life cycle costs, whilst the decision on sulphur abatement technology for the next phase of the project is still being taken.

- *FGD Economics*

  The capital cost for the installation of a wet FGD system on a typical 3-unit (3x700-800 MW units) PF plant would be approximately R5,000 M and on a typical 6-unit (6x 700-800 MW units) PF plant approximately R8,000 M. This translates into an increase of approximately 20% on overall capital costs.

  The operating costs of such a Wet FGD plant (associated with water, sorbent, waste management, plant operation and maintenance) would translate into an increase of approximately 10% in overall operating costs.

- *Environmental Impacts*

  The potential environmental impacts of FGD in relation to this project include the following:

  * Increased Carbon dioxide emissions (this technology will lower the efficiency of the power station through the use of electricity and it also produces additional Carbon dioxide)
  * Increased water use
  * Increased effluent
  * Increased resource use
  * Increased solid waste
  * Visual impacts (wet plume due to FGD)
  * Traffic and transport impacts
  * Increased land-use

  The above impacts are discussed within the report in Chapters 9, 6, 10 and 13 respectively. The Environmental Impact Assessment will assess the use of wet or dry FGD in order to inform the technical and economical decisions that will be required in the event that an emission control technology is required.