1. INTRODUCTION

Eskom Holdings Limited (Eskom) is responsible for the provision of reliable and affordable power to South Africa. Electricity cannot be stored and must be used as it is generated. Therefore, electricity must be generated in accordance with supply-demand requirements. Eskom's core business is in the generation, transmission (transport), trading and retail of electricity. In terms of the Energy Policy of South Africa "energy is the life-blood of development". Eskom currently generates approximately 95% of the electricity used in South Africa. Therefore, the reliable provision of electricity by Eskom is critical for industrial development and related employment and sustainable development in South Africa.

1.1. The Need and Justification for the Proposed Project

It is important that the investment decisions taken by Eskom are based on, and in support of, the energy related strategic policies and plans of South Africa and integrate and consider the impact of the developments (both positive and negative) on economic development, environmental quality and social equity.

These policies and plans are based on the availability of energy resources, technology and the environmental opportunities and constraints of the region.

Virtually all South African (and many African) electricity users are dependent on Eskom to supply that electricity but Eskom is not free to supply that electricity as it sees fit. As a state-owned company Eskom's principal shareholder is government. Government in turn controls what Eskom does in a variety of ways – firstly through the appointment of Eskom's Board of Directors and secondly through a range of policies, strategies and plans that are principally lead by the Department of Minerals and Energy (DME). In addition Eskom is controlled by independent regulators including the National Energy Regulator of South Africa (NERSA) and the National Nuclear Regulator (NNR). These independent regulators serve to protect the public interest and, in the case of the NERSA dictate the prices that Eskom can charge for electricity, what types of facilities can be established to generate, transmit and distribute electricity, together with a range of other controls.

Within this framework Eskom also needs to respond to a growing electricity demand. In particular there is a need to establish new generation capacity in South Africa within the next several years. That generation capacity can be met through the harnessing of different energy sources and the application of a number of different technologies. These technologies differ markedly though, in their generation costs, suitability for the South African environment and state of commercial development. The choice of generation technology is thus multi-faceted and complicated and has to happen also within the context of the policy

framework described above, as well as within the legal/regulatory framework that has a bearing on these activities.

Integrated Strategic Electricity Planning (ISEP) is the way in which Eskom decides by how much the demand for electricity is likely to grow and how best to meet and manage that demand. It is estimated that over a 20-year horizon the costs and investments associated with meeting and managing that demand are in excess of R120 billion (present value). That planning provides economically and environmentally acceptable options for flexible and timely decision-making, considering Eskom's and shareholder's objectives. With moderate growth in demand for electricity, additional supply-side options are anticipated for commercial service from 2006.

Eskom has also entered into a demand-side management programme in order to defer the commissioning of new plants. The most attractive supply-side option is the return to service of the mothballed plants referred to as the Simunye Power Stations, which were placed in reserve storage during the period of high excess capacity on the Eskom system (e.g. Camden Power Station). Eskom has also investigated a variety of options, including conventional pulverised fuel plants, pumped storage schemes, gas fired plants, nuclear plants (PBMR and other), greenfield fluidised bed combustion technologies and renewable energy technologies (mainly wind and solar projects). There are also potential power plant development projects external to South Africa which could form part of power trading within the Southern African Power Pool (SAPP).

Eskom's renewable energy strategy supports the South African Government's white paper on renewable energy. Eskom is committed to investigate and evaluate the options for the diversification of the energy mix over time (including renewable energies).

All renewable energy resources available in South Africa will be evaluated for their applicability to Eskom. Eskom's strategy will have to be updated as Government policy is finalised.

A number of research demonstration facilities continue to be operated as part of Eskom's renewable energy research programme. These included the operation of Southern Africa's first wind energy demonstration facility in the Western Cape, which was opened in 2003. In addition, Eskom conducted a number of pilot projects to assess issues related to the green power market in South Africa.

Eskom has been involved with renewable energy technologies for some time, through various non-grid electrification initiatives. The programme's ultimate objective is to evaluate whether large scale, renewable electricity generation is a viable supply-side option for Eskom and South Africa. The four areas addressed by the programme are biomass, solar thermal, wave and wind energy.

The successful use of renewable energy technology in South Africa still requires extensive investigation, but the Concentrating Solar Power (CSP) technology has been identified as potentially being viable and capable of being employed on a large scale. In order to meet the future energy needs, Eskom is currently assessing the feasibility of constructing a Concentrating Solar Power (CSP) Plant in the Northern Cape Province.

South Africa ratified the United Nations Framework Convention as a developing country and thus has no requirements at present to reduce green house gas emissions. South Africa has also recently acceded to the Kyoto Protocol and as such is eligible to participate in the Clean Development Mechanism (CDM). South Africa is also particularly vulnerable to the adverse impacts of climate change, both due to impacts on the weather patterns in Southern Africa and impacts on the economy as a result of the response measures taken by developed countries.

Eskom has a number of current initiatives, which promote greenhouse gas emissions reductions. These include demand side management programmes and internal efficiency programmes. Future supply side options are highlighted in the sections on Integrated Strategic Electricity Planning (ISEP) on renewable energy. Eskom is actively exploring potential CDM opportunities and CDM is one of a number of mechanisms which can assist with the transfer of new technologies as well as addressing socio-economic issues. Some further background on CDM and the South African mandate is as follows:

- South Africa ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol, the enabling mechanism for the convention, in August 2002.
- The Kyoto Protocol provides for flexibility mechanisms including the Clean Development Mechanism (CDM).
- The CDM is a project-based instrument that allows public or private entities to invest in Green House Gas (GHG) mitigating activities in developing countries and earn abatement credits called Certified Emissions Reductions (CERs).
- These CERs can be traded on an open market.
- The CDM is the only mechanism through which SA could participate in the international carbon market.
- The mechanism is important to developing countries as it provides a sweetener for attracting foreign investment in projects that are sustainable.
- It is also important for providing additional (although small) financing for projects of this nature.

The CDM Requirements with regards to the CSP Project include the following:

- Requirements defined by the international process include:
  - Projects must result in real, measurable and long-term emission reductions, as certified by a third party agency.

  - Emission reductions must be additional to any that would occur without the project.
  - Projects must be in line with sustainable development objectives, as defined by the national government. In SA this is the DME which is the designated national authority (DNA) for the CDM.
- The CSP qualifies as a CDM project as it meets all these international requirements.
- Importantly the CSP also meets the South African sustainable development criteria as defined by the DNA.
- The CSP will potentially reduce 367 000 tCO_2/ annum compared to what would have occurred without the project.
- Current market estimations for CERs are anywhere from 5 to 15 Euro per ton of CO_2.

1.2. Overview of the Proposed Project

The project involves the proposed establishment of a new concentrating solar power plant and associated infrastructure in the Northern Cape Province. The power station is proposed to operate at an installed capacity of approximately 100 MW. The exact output will depend on the generating technology utilised, the specification of the equipment installed, and the ambient operating conditions. The potential impacts associated with the maximum output of 100 MW have been evaluated within the environmental studies.

The footprint of the proposed new concentrating solar power plant is approximately 4 square kilometres of terrain with little relief to satisfy the construction needs. The key factor, however, is the amount of thermal storage required, as this determines the number of heliostats to be installed.

It is envisaged that the proposed power plant will utilise dry cooling technology as a result of unavailability of water in the proposed area; but alternative cooling technologies are being investigated. Dry-cooled technology reduces the total amount of water consumed at power stations when compared to conventional wet-cooling systems. According to design specification, the dry-cooled station would utilise approximately 200 000 cubic metres of water per year.

The CSP plant is required to be sited on a technically feasible site. A Pre-Environmental Scoping Study (an environmental screening study) – undertaken by independent consultants - together with Pre-Feasibility Study undertaken by Eskom, considered land availability and land use capability, fuel availability and costs and other related aspects. Through this study, Northern Cape Province was identified as a feasible locality for the establishment of the CSP plant. In addition to the above aspects, the Northern Cape Province has one of the highest solar potential values (figure 1.1) in the world, with a Direct Normal Insolation (DNI) level of approximately 2900 kWh/m^2 per year.

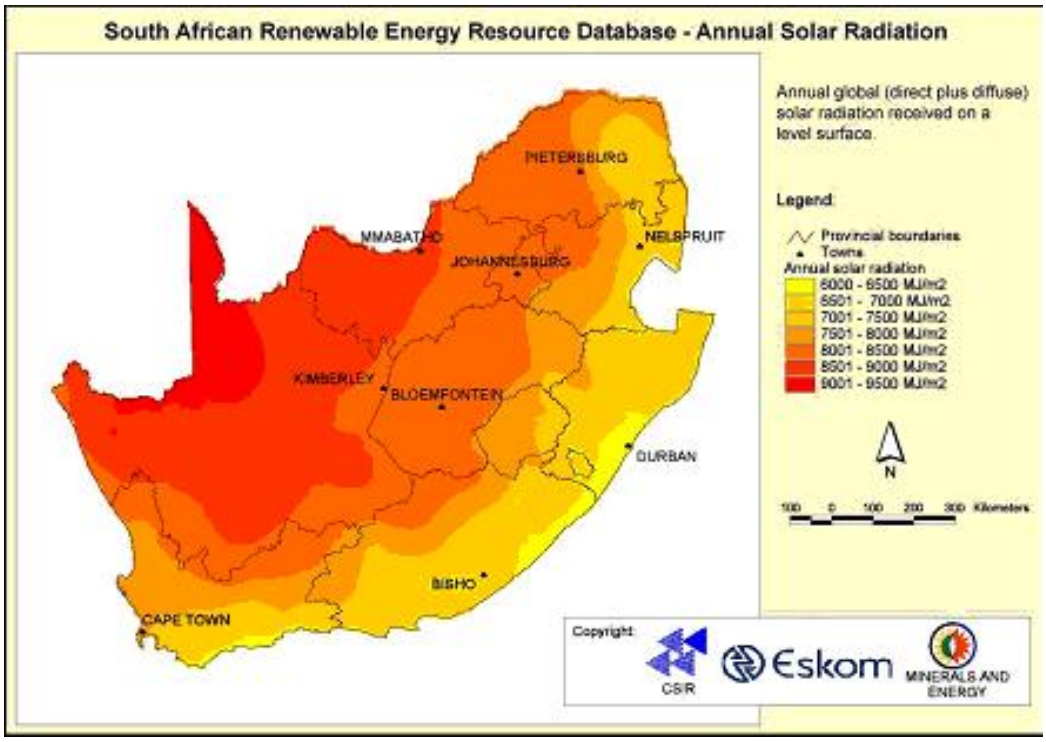

Figure 1.1: Annual incoming short wave radiation for South Africa.

Table 1.1: International Solar Potential relative to South Africa

Location	Site Latitude	Annual DNI (kWh/m2)	Relative Solar Resource
South Africa			
Upington, Northern Cape	28°S	2955	100%
United States			
Barstow, California	35°N	2725	92%
Las Vegas, Nevada	36°N	2573	87%
Albuquerque, New Mexico	35°N	2443	83%
International			
Northern Mexico	26 - 30°N	2835	96%
Wadi Rum, Jordan	30°N	2500	85%
Quarzazate, Morocco	31°N	2364	80%
Crete	35°N	2293	78%
Jodhpur, India	26°N	2200	74%
Spain	34°N	2100	71%

1.3 Environmental Study Requirements

In terms of the Environmental Impact Assessment (EIA) Regulations published in terms of the Environment Conservation Act (No 73 of 1989), Eskom requires authorisation from the National Department of Environmental Affairs and Tourism (DEAT) in consultation with the Northern Cape Department of Tourism, Environment and Conservation (NC DTEC) 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.

Eskom has appointed Bohlweki Environmental (as independent consultants) to undertake environmental studies together with a team of specialists to identify and assess all potential environmental impacts associated with the proposed project. In order to obtain authorisation for all aspects of this project, comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations.

The environmental studies will follow a three-phased approach in accordance with the EIA Regulations published in terms of the Environment Conservation Act (No 73 of 1989) i.e.:

- Phase 1: Environmental Scoping Study (ESS)
- Phase 2: Environmental Impact Assessment (EIA)
- Phase 3: Environmental Management Plan (EMP)

This Environmental Impact Assessment evaluates potential environmental impacts associated with all aspects of the proposed project as identified in the Environmental Scoping Study. In terms of the EIA Regulations, *feasible* alternatives were evaluated within the Scoping Study (refer to Chapter 4 for a summary of this site selection process). The Environmental Scoping study recommended the farm Olyvenhouts Drift as the feasible preferred site for the development, and identified further studies that would be required within the EIA phase of the project. These studies are detailed in Chapters 6 to 15).