# ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED ESKOM NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE

**EIA: 12/12/20/944**

# BACKGROUND INFORMATION DOCUMENT

# AND

# INVITATION TO PARTICIPATE

This document introduces the proposed Eskom Nuclear Power Station project and the statutory environmental process to interested and affected parties and the general public and invites your participation.

## PURPOSE OF THIS DOCUMENT

The purpose of this Background Information Document (BID) is to provide you with information about the proposed project, and to obtain comments and contributions from you as an Interested and Affected Party (I&AP) with regard to potential impacts on the environment. You are invited to register as an I&AP and to assist the EIA Team in identifying possible impacts and to make suggestions for mitigation.

This BID document will help I&APs to:

- Determine if they are interested and/or affected by the proposed project.
- Better understand the project in order to be able to provide comment.
- Understand the environmental authorisation process so that they are able to participate effectively.

## INTRODUCTION

The Eskom Conversion Act, 2001 (Act No. 13 of 2001) establishes Eskom Holdings Limited (Eskom) as a State Owned Enterprise (SOE), with the Government of South Africa as the only shareholder, represented by the Minister of Public Enterprises. The main objective of Eskom, as indicated in the Memorandum of Association required by the Eskom Conversion Act and the Companies Act, 1973 (Act No. 61 of 1973) (as amended), is to "provide energy and related services including the generation, transmission, distribution and supply of electricity, and to hold interests in other entities".

In October 2004, the South African Cabinet decided that Eskom would build at least 70% of the electricity generating capacity required in the next two decades[1].

In all countries, energy is essential for sustainable development. In many countries, including South Africa, economic growth and social needs are resulting in substantially greater energy demand, even taking into account continuing and accelerated energy efficiency improvements. Electricity demand is growing faster than overall energy demand. Electricity is simply cleaner, and is more flexible and more convenient for many consumers, which is resulting in greater usage than in the past. In many applications – for example financial and banking, medical and health care, telephone and cellular phone networks, transport (harbours, airports, railways, traffic control and management, petrol-filling stations) - electricity is essential. It is now common knowledge that the demand for electricity in South Africa is rapidly growing and that South Africa needs to expand its electricity generating capacity.

In South Africa, there is a requirement for more than 40 000 Megawatts (MW) of new electricity generating capacity over the next 20 years. This additional generating capacity could come from a variety of energy sources, for example coal, liquid fuels, gas turbines, natural gas, uranium (nuclear), hydro and pumped storage schemes, wind and solar energy. Eskom evaluates all energy sources available to South Africa in determining an optimum mix for electricity generation.

This EIA entails the construction and operation of a Conventional Nuclear Power Station and associated infrastructure in the Eastern, Northern or Western Cape areas. The sites, which will be investigated during this Environmental Impact Assessment, have been identified based on previous site investigations undertaken since the 1980s.

[1] DPE Minister address to Parliament, 15 April 2005

## STRATEGIC BACKGROUND

The total demand for electricity in South Africa is not constant and varies on a 24-hour basis, with peak demand in the early morning and in the late afternoon / early evening. Similarly it varies on a weekly basis, with the demand during the working week being higher than over the weekends. In most areas, the demand in winter is higher than in summer periods. To optimally meet the total demand, it is thus necessary to have both "base load electricity generating power stations[2]" as well as "peaking electricity generating power stations[3]". This is achieved by harnessing different energy sources and applying appropriate technologies. The technologies differ markedly in their generation costs, performance and utilisation characteristics, their suitability for the South African environment and their state of commercial development. The choice of generation technology is thus multi-faceted and complex. It is conducted within the context of the framework of a multitude of South African policies (for example energy, environmental, Accelerated Shared Growth Initiative for South Africa (ASGISA) and water policies), the legal and regulatory framework, South Africa's international obligations. It also takes into account the required mix of generating technologies to optimally meet the daily, weekly and seasonal variation in demand for electricity.

Base load capacity forms the major component of the more than 40 000 MW of new generating capacity that is required in the next 20 years. However, only a few energy sources are suitable for base load power stations. The primary energy sources in South Africa that are suitable and available in sufficient quantities are coal and uranium.

The economic lifetime of electricity generating power stations is very long – on average 40 to 50 years. It is thus critical when determining the optimal mix of electricity generating power stations to take into account the contribution that new power stations will make to sustainable development in South Africa.

A central goal of sustainable development is to maintain or increase the overall assets (natural, man-made and human or social assets) available to current and future generations, while minimizing consumption of finite resources and not exceeding the carrying capacities of ecosystems.

The use of nuclear power broadens the natural resource base usable for energy, and particularly electricity production, increases human and man-made capital, and, when safely handled, has little impact on ecosystems. Nuclear power produces virtually no sulphur dioxide, particulates, nitrogen oxides, volatile organic compounds (VOCs) or greenhouse gases (GHGs). Over the full life cycle – from mining of the uranium, iron ore and other minerals, manufacture of the components and construction of the power station, operation and maintenance of the power station through to decommissioning of the station and the management and disposal of waste – nuclear power emits less than 11 grams of carbon equivalent per kilowatt-hour ($gC_{eq}/kWh$)[4]. This is the same order of magnitude as wind and solar power including construction and component manufacturing, and two orders of magnitude below (i.e. one hundredth of) the average for coal, oil, and natural gas. Nuclear power thus has the potential to make a substantial contribution to sustainable development and a significant contribution to reducing South Africa's greenhouse gas emissions. Due to South Africa's rich resources of uranium, it makes sense for Eskom to utilise this energy source.

The Eskom Board has thus approved the investigation of up to 20 000 MW of nuclear capacity over the next 20 years. The initial phase of this investigation will concentrate on one nuclear power station

[2] "Base load electricity generating capacity" refers to power station technology designed specifically to generate electricity continuously for all hours.

[3] "Peaking electricity generating capacity" refers to power station technology designed specifically to generate electricity during periods of very high demand for electricity, normally on weekdays from 07:00 to 09:00 and 18:00 to 20:00

[4] Greenhouse gas emissions from energy systems: Comparison and overview Dones *et al.* 2003

of approximately 4 000 MW, with provision being made for future expansion, as, when and if appropriate.

**SITE SELECTION**

Thermal power stations, whether coal-fired, gas, oil or nuclear, require large quantities of water for cooling purposes. However, South Africa is a water stressed country, which poses challenges for the supply of water. For example, Eskom's coal-fired power stations are located near to the coal fields, which are situated inland, in order to minimise the transportation of the coal.

Large nuclear power stations, such as the Koeberg type, which do not need to be close to the source of their fuel (uranium) are therefore ideally located at the coast to use sea water for cooling. Such stations do however require specific geological conditions for safety reasons and similarly licensing authorities require population and infrastructure management measures to be in place for effective emergency planning.

Accordingly, in the early 1980s, Eskom considered it prudent to commission extensive (desktop) and intensive (field) pre-feasibility studies in order to identify sites in South Africa that would be suitable for possible future nuclear power generation. Subsequently, the Eskom Nuclear Site Investigation project, lead by a team of independent consultants, investigated sites along the South African coastline. Based on various social, economic and environmental criteria the following potential sites were identified:

- Thyspunt (Eastern Cape, located West of Port Elizabeth near Cape St Francis)
- Bantamsklip (Western Cape, located 10 km south-east of Pearly Beach)
- Duynefontein within the existing Koeberg Power Station site (Western Cape, located adjacent to the existing Koeberg Power Station, Cape Town)
- Brazil (Northern Cape, located in the Kleinsee/Port Nolloth area)
- Skulpfontein (Northern Cape, located in the Hondeklipbaai/Kleinsee area)

The potential generating carrying capacity varies for each site. Subsequently, the maximum generating capacity that is considered practical for each individual site will be evaluated as part of the Environmental Impact Assessment (EIA).

**[INSERT STUDY AREA MAP]**

***Figure 1: Map indicating the locations of the proposed Conventional Nuclear Power Station sites.***

**PROJECT DESCRIPTION**

Eskom proposes to construct a nuclear power station of the Pressurised Water Reactor type technology. In many ways the structure of the nuclear plant resembles that of a conventional thermal power plant. The difference between such plants is in the manner in which heat is produced. In a fossil plant, oil, gas or coal is fired in the boiler, which means that the chemical energy of the fuel is converted into heat. In a nuclear power plant, however, energy from the fission chain reaction is utilized. Cooling water for the nuclear power station will be utilised directly from the sea.

Although detail design still needs to be completed it is estimated that the entire development will require in the order of 31 ha, including all auxiliary infrastructure. The proposed nuclear power station will include nuclear reactor, turbine complex, spent fuel, nuclear fuel storage facilities, waste handling facilities, intake and outfall basin, and various auxiliary service infrastructure.

***Figure 2: Koeberg Nuclear Power Station***
***Note: Although the plant type has not as yet been decided the above picture provides an indication of the infrastructure that could be associated with the proposed Nuclear Power Station***

Should the proposed project be authorised, it is estimated that the construction of the nuclear power station could commence in 2009/10 with the first unit being commissioned in 2016.

## NUCLEAR LICENSING PROCESS

In addition to the EIA process, which serves to identify, assess and mitigate potential environmental impacts that may be associated with the proposed nuclear power plant, authorisation from the National Nuclear Regulator (NNR) is required to provide for the protection of persons, property and the environment against nuclear damage and to exercise regulatory control related to safety. The NNR establishes standards, based on international practice, limiting the radiation exposure and risk to the public and workforce.

### National Nuclear Regulator (NNR) Legislation

In terms of Section 20 of the National Nuclear Regulator Act (NNRA), 1999 (Act No 47 of 1999), no person may site, construct, operate, decontaminate or decommission a nuclear installation, except under the authority of a nuclear installation licence. Section 21 of the Act makes provision for a person wishing to engage in any of these activities to apply to the Chief Executive Officer of the NNR for such a licence.

### The Licensing Process

The licensing process entails the evaluation of the design, construction, manufacture of component parts, operation and maintenance to ensure compliance with the regulatory standards. The. Applicants for nuclear installation licences must carry out a comprehensive safety assessment and submit this to the NNR for evaluation. Should the safety assessment demonstrate that the installation will comply with the laid down standards, conditions are then set down in the licence which will ensure that the installation is properly constructed, commissioned, operated and eventually decommissioned. The NNR then conducts extensive compliance assurance activities including extensive inspections and review of operating data to ensure that the licensee complies with the conditions of licence.

Similarly to the EIA process the NNR process makes allowance for public participation. The NNR public participation process makes allowance for the discussion on nuclear safety issues. These public participation processes will be conducted separately.

## ENVIRONMENTAL AUTHORISATION REQUIREMENTS

In terms of the National Environmental Management Act, Act No. 107 of 1998 (NEMA) and its EIA regulations published in April 2006, certain listed activities require environmental authorisation before they can proceed. For the proposed ‘Nuclear 1’ project the proposed activities are:

- *(1a) The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where the energy generation is greater than 20 Megawatts and the facility exceeds an area of one hectare;*

- *(1b) The construction of facilities or infrastructure, including associated structures or infrastructure, for nuclear reaction including the production, enrichment, processing, reprocessing storage or disposal of nuclear fuels, radioactive products and waste.*

The proposed establishment of a Nuclear Power Station will also involve additional activities and construction of ancillary infrastructure, which is also identified in the EIA Regulations. These include:

- *The recycling, re-use, handling, temporary storage or treatment of general waste with a throughput capacity of 20 cubic metres or more daily average measured over a period of 30 days, but less than 50 tons daily average measured over a period of 30 days.*
- *The temporary storage of hazardous waste.*
- *The treatment of effluent, wastewater or sewage with an annual throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.*
- *The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland.*
- *The removal or damaging of indigenous vegetation of more than 10 square metres within a distance of 100 metres inland of the high-water mark of the sea.*
- *The excavation, moving, removal, depositing or compacting of soil, sand, rock or rubble covering an area exceeding 10 square metres in the sea or within a distance of 100 metres inland of the high-water mark of the sea.*
- *The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.*
- *The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).*
- *The construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission.*
- *The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.*
- *The transformation of undeveloped, vacant or derelict land to establish infill development covering an area of 5 hectares or more, but less than 20 hectares or; residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare.*
- *Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more.*
- *The route determination of roads and design of associated physical infrastructure, including roads that have not yet been built for which routes have been determined before the publication of this notice and which has not been authorised by a competent authority in terms of the Environmental Impact Assessment Regulations, 2006 made under section 24(5) of the Act and published in Government Notice No. R 385 of 2006.*
- *Construction or earthmoving activities in the sea or within 100 metres inland of the high-water mark of the sea.*
- *Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).*
- *Prevention of free movement of sand within 100 metres inland of the high-water mark of the sea.*
- *Transformation of land zoned for a conservation purpose.*

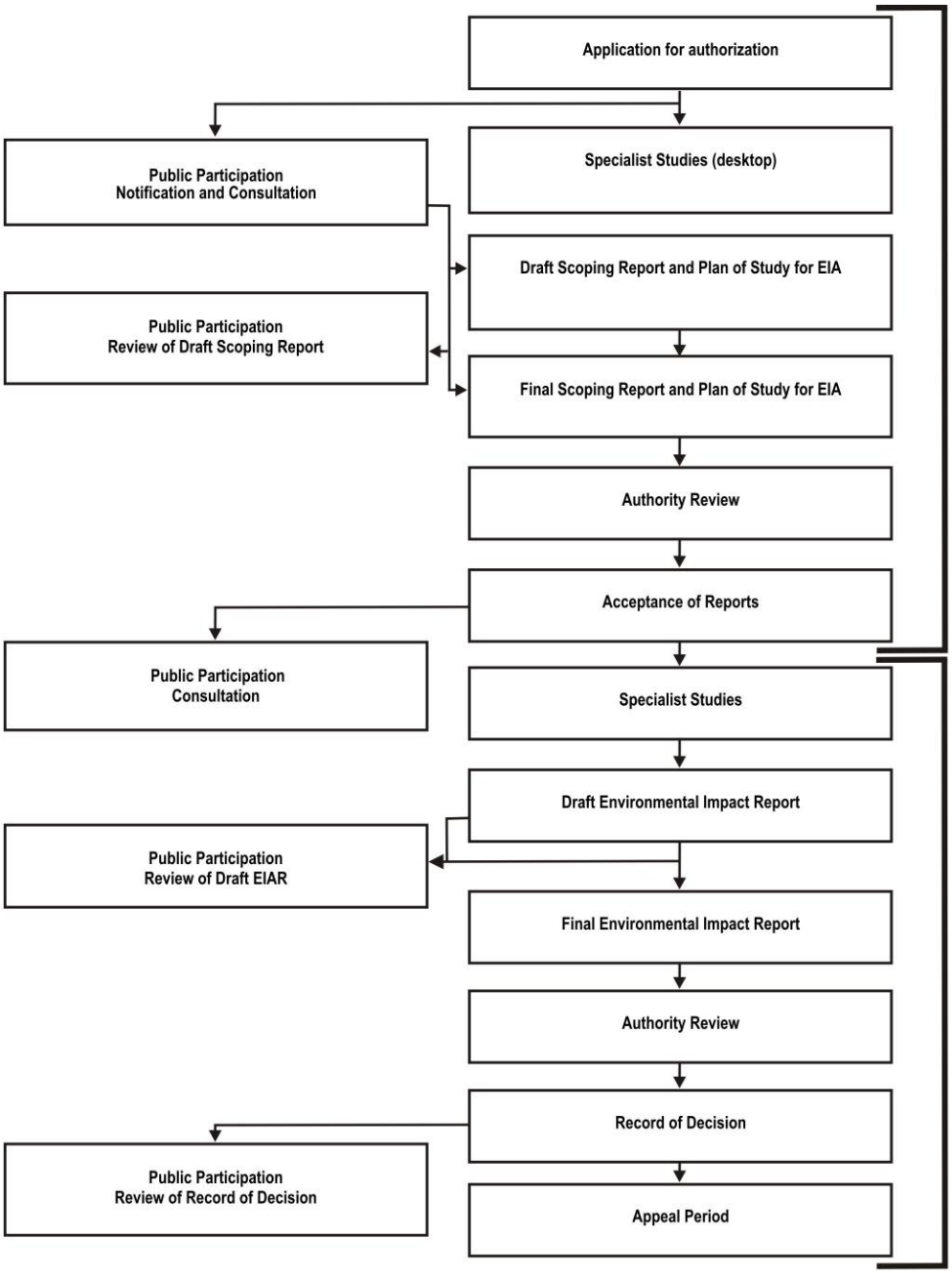


**Figure 2: Diagram of the Environmental Assessment Process showing the Scoping and Impact Assessment Phases and their components (including public participation opportunities).**

Authorisation in this case has to be granted by the National DEAT in consultation with the provincial environmental authorities. An application for authorisation for the Conventional Nuclear Power Station was submitted to Environmental Authorities in May 2007. The process of environmental assessment that will be followed is shown in Figure 3.

The construction and operation of the required Transmission Power lines will be subject to a separate environmental authorisation process. However, it should be noted that the processes will run as far as practical in parallel with this EIA. All information will be shared with the public as it becomes available.

## ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

ARCUS GIBB (Pty) Ltd (ARCUS GIBB) has been appointed by Eskom as the independent Environmental Assessment Practitioner to conduct the environmental assessment process for the proposed Conventional Nuclear Power Station. This will be done in terms of the legal requirements of the National Environmental Management Act, 1998 (Act No 73 of 1998) and Government Notices R385, R386 and R387 of 2006.

The following specialist studies will be commissioned as part of the EIA investigations:

- Climatology
- Geotechnical and Geology (marine and land)
- Marine Biology
- Air Quality and Health Risk Assessment
- Noise
- Visual and Aesthetics
- Fauna (Invertebrates)
- Fauna (Vertebrates)
- Flora (South Coast)
- Flora (West Coast)
- Freshwater Ecology
- Archaeology and Heritage
- Hydrology
- Socio Economics
- Oceanography
- Traffic and Transportation

*Curricula Vitae* of independent specialists and reviewers are available on the project website (www.eskom.co.za/eia).

Issues identified during Scoping that require further investigation will be dealt with during the Impact Assessment.

## PRELIMINARY LIST OF ENVIRONMENTAL ISSUES

A number of potential environmental issues have already been identified and are listed here to assist I&APs to better understand the investigations to be undertaken as part of the environmental assessment process.

Potential environmental issues are:

- Air pollution .
- Aesthetic or visual impacts arising from the nuclear power station during construction and operation.

- Benefits of development to the local and regional economy.
- Impacts on fauna, flora and avi-fauna.
- Potential safety impacts.
- Potential traffic impacts during construction of the power station.
- Potential nuisance impacts during construction, e.g. dust.
- Pollution and waste management.
- Social and socio-economic impacts during construction related to influx of construction workers during the construction and operational period.
- The contribution (or not) of electricity supply to sustainable development.

All significant issues identified during Scoping will be collated into an Issues and Response Report and will be included in the Scoping Report.

## I&AP REGISTRATION

In terms of the EIA regulations, this proposed project requires assessment and communication of potential environmental impacts of activities based on the procedure as described in Sections 27 to 36 of the Regulations R385 of April 2006.

I&APs are requested to register to ensure that they are sent all relevant correspondence and are notified of important dates for meetings and when project documents will be available for comment.

**Who are I&APs?**

**Any person or group of people concerned with, or affected by an activity and its consequences. This includes the authorities, local communities, investors, workers, customers and consumers, environmental interest groups and the general public.**

## INVITATION TO PARTICIPATE

The Environmental Assessment Process includes opportunities for you to be involved in the decision-making process. Your comments are important in identifying issues that will help focus the process and enhance decision-making. Your comments will be addressed and included in an Issues and Response Report, which will accompany the Scoping and Environmental Impact Reports. DEAT, as the decision-making authority, will review the reports to check that issues have been adequately addressed in the assessment process. Please make use of the following opportunities for participation:

- Examine and respond to information provided in this Background Information Document, at meetings, on the website (www.eskom.co.za/eia) and in the draft Scoping and Environmental Impact Reports.
- Register as an Interested and Affected Party in order to receive information and to record your comments.
- Complete the Comments Sheet and return by hand, mail, fax or email.
- Attend meetings and workshops to obtain further information, interact with the project team and raise issues and concerns. Details of meetings and workshops will be communicated at the appropriate time.

- Attend Focus Group Meetings held with various interested and affected parties to discuss the proposed projects. Details of meetings will be communicated at the appropriate time.
- Contact the Public Participation Office to obtain further project information and raise issues and concerns.

It is important that you take note of the deadlines for submission of comments during the environmental assessment process.

**I&AP Comment**

**It is best to submit comment in writing via post, fax or email, either using the Comment Sheets provided or your own format. You may also provide verbal comment at meetings.**

**PUBLIC PARTICIPATION OFFICE CONTACT DETAILS**

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