

The Republic of South Africa
Department of Mineral Resources and Energy

REQUEST FOR INFORMATION
IN RESPECT OF THE
NUCLEAR NEW BUILD POWER PROCUREMENT PROGRAMME



**mineral resources
& energy**

Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

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1. Disclaimer

This Request for Information (RFI) is issued solely for information and planning purposes and does not constitute a solicitation of bid.

While all reasonable care has been taken in preparing this Document, the information has been prepared by the Department Mineral Resources and Energy of the Government of the Republic of South Africa ("**the Department**") in good faith, based on information obtained from various sources. However, neither the Department nor any of its advisors accept any liability or responsibility for the adequacy, accuracy or completeness of any of the information or opinions stated herein.

Save where expressly stipulated otherwise, no representation or warranty (whether express or implied) is or will be given by the Department or any of its officers, employees, servants, agents, advisors or any other person with respect to the information or opinions contained in this Document.

The Department reserves the right to amend, modify or withdraw this Document or any part thereof, or to terminate or amend any of the procedures, processes or requirements detailed in this Document at any time, without prior notice and without liability to compensate or reimburse any government, organisation or person pursuant to such amendment, modification, withdrawal or termination.

The Department reserves the right to adopt any proposal made by any person responding to this Document at any time and to include such proposal in any documents which may or may not be made available at any stage in the design of the Nuclear New Build Power Procurement Programme to any other persons responding to this Document, without the obligation or liability to pay any compensation or reimbursement of any nature to any government, organisation or person pursuant to such adoption. The terms and conditions set out in this Document are stipulated for the express benefit of the Department and, save as expressly stated to the contrary, may be waived at the Department's sole discretion at any time.

This Document is provided solely for the purpose set out herein and is not intended to form any part or basis of any investment decisions by the Respondent, its shareholders, members or its lenders. Each person that accesses this Document

must make its own independent assessment of the Project in respect of which it intends submitting a RFI Response, taking such advice (whether professional or otherwise) as it deems necessary.

If a portion of the information to be supplied is considered commercially sensitive by the respondent, the Department will consider entering into an appropriate non-disclosure agreement.

No Respondent, its shareholders, members, contractors, suppliers or lenders shall have any claim against the Department, its officers, employees, servants, agents or Transaction Advisors, under any circumstances whatsoever, arising out of any matter relating to the design of the Nuclear New Build Power Procurement Programme, any ancillary matter relating thereto or this Document of any nature whatsoever, including where such claim is based on any act or omission by the Department, or any of its officers, employees, servants, agents or Transaction Advisors of any nature whatsoever, or where such claim is based on the content of, or any omission from, this Document of any nature whatsoever.

- 2.7 **"Consents"** - all consents, permits, clearances, authorisations, approvals, rulings, exemptions, registrations, filings, decisions, licences, required to be issued by or made with any Responsible Authority in connection with the performance of any of the Construction, Operation and maintenance of the Facility by the Project Company;
- 2.8 **"Distribution System"** - a distribution network of a Network Owner which operates at a nominal voltage of 132 kV or less, as described in any code in respect of electricity distribution published by NERSA from time to time;
- 2.9 **"Document"** - this explanation and request for information document for the Nuclear New Build Power Procurement Programme;
- 2.10 **"Electricity Regulation Act"** - the Electricity Regulation Act No. 4 of 2006;
- 2.11 **"Energy Output"** - the electrical energy generated and expressed in megawatt-hours ("MWh"), delivered to the Power Delivery Point;
- 2.12 **"IRP"** - the Integrated Resource Plan issued by the Minister under Notice No. 42784 dated 18 October 2019 in Government Gazette 1360, pursuant to the Electricity Regulation Act;

- 2.13 **"Load Factor"** - is the ratio of the Energy Output in any given hour to the potential Energy Output that was available for dispatch;
- 2.14 **"Nuclear Power Plant"** a Power Generation Facility intended to provide Capacity baseload power and/or Energy Output consistently with at the Nuclear Installation Site comprising all plant, machinery and equipment, all associated buildings, structures, roads on the Installation Site that are not national, provincial or municipal roads, and other appurtenances, and the necessary infrastructure to connect to the System;
- 2.15 **"Minister"** - the Minister of Mineral Resources and Energy,
- 2.16 **"NNRA"** National Nuclear Regulator Act, Act no 47 of 1999
- 2.17 **"NERSA"** - the National Energy Regulator of South Africa, established pursuant to Section 3 of the National Energy Regulator Act No. 40 of 2004;
- 2.18 **"Network Owner" or**
"Grid Owner"- any legal entity responsible for distributing electricity through a Distribution System or the Transmission System;

- 2.19 **"Peaking Energy"** - the Energy Output produced by generating units that load follow and provide most or all of their Energy Output at times when of high energy demand and turn off at other times;
- 2.20 **"Power Delivery Point"** - the physical point, situated on the high voltage side of the generator transformer of the Power Generation Facility connects to the System (whether or not such point is situated on or off the Project Site), and where the Energy Output is to be delivered to the Buyer and the Power Capacity is to be made available to the Buyer;
- 2.21 **"Power Generation Facility"** - the power generation facility located at the Nuclear Installation Site and comprising all plant, machinery and equipment, all associated buildings, structures, roads on the Project Site that are not national, provincial or municipal roads, and other appurtenances, and the necessary infrastructure to connect to the System;
- 2.22 **"PPA"** - the power purchase agreement entered into between the Seller and the Buyer on or before Commercial Close;
- 2.23 **"Preferred Bidder"** - any Bidder that is selected by the Department pursuant to the Nuclear New Build Power Procurement Programme following qualification and evaluation of the Bid Response submitted by the Bidder;

- 2.31 **“System”** - the Transmission System or the Distribution System, as applicable;
- 2.32 **“Transaction Advisors”** - the firms advising the Department in respect of the RFP and the Nuclear New Build Power Procurement Programme;
- 2.33 **“Transmission System”** - the national transmission system consisting of all lines and substation equipment which operate at a nominal voltage of above 132 (one hundred and thirty two) kV; and

3. Introduction and Purpose

- 3.1 In October 2019, the Integrated Resource Plan, which determines South Africa's energy mix for the 2030 planning horizon, was promulgated. The policy decision of the 2019 Integrated Resource Plan stipulates a capacity for nuclear as part of the energy mix and in particular Decision 8: "*Commence preparations for a nuclear build programme to the extent of 2500 MW at a pace and scale that the country can afford because it is a no-regret option in the long term*".
- 3.2 The South African Nuclear Energy Programme is governed by the following pieces of legislation and policies: Nuclear Energy Policy of 2008; Nuclear Energy Act 46 of 1999; National Nuclear Regulator Act 47 of 1999; the 2005 Radioactive Waste Management Policy and Strategy for the Republic of South Africa and the National Radioactive Waste Disposal Institute Act 53 of 2008.
- 3.3 The Nuclear Energy Policy of 2008 emphasise South Africa's intention to pursue a pressurised water reactor (PWR) power reactor programme and a nationally developed pebble bed modular reactor programme (PBMR). Government therefore intent to use the nuclear power programme as an opportunity to establish a modern nuclear technology industry and achieve self-sufficiency throughout the nuclear value chain. Where viable, government aspires that the nuclear power program be associated with technology and skills transfer and the building of institutional capacity to establish a national industrial capacity for design, manufacture and construction of nuclear energy systems.
- 3.4 Underpinned by the Constitution of the Republic of South Africa and the Public Finance Management Act 1 of 1999 and its regulation, South Africa's Nuclear

Energy Policy of 2008, further provides the following policy principles as drivers for the procurement of a nuclear programme:-

- 3.4.1 “P2. Nuclear Energy shall contribute to economic growth and technology development in South Africa through investment in infrastructure, creation of jobs and the further development of skills workers.”
- 3.4.2 “P6. Nuclear energy shall be used only for peaceful purposes and in conformity with national and international legal obligations and commitments.”
- 3.4.3 “P10. South Africa shall strive to acquire know-how and skills to enable design, development, construction and marketing of its own nuclear reactor and fuel cycle systems. To this end the industrial support base for the nuclear sector shall be developed as appropriate, taking into account the scale of the national programmes. Technology transfer shall be optimised in any procurement of nuclear and related equipment.”
- 3.4.4 “**P3. Nuclear Energy shall form part of South Africa’s strategy to mitigate climate change**”.

The nuclear Energy Policy of 2008 recognises the fact that climate change and pressures on greenhouse gas emissions have resulted in many countries seriously considering the nuclear energy option for electricity generation. This is because nuclear energy’s contribution to greenhouse gases is negligible compared to fossil fuels. Direction in terms of suppliers, operation and maintenance will become increasingly biased towards this technology. South Africa has to be prepared to respond appropriately.

- 3.5 The Department of Mineral Resources and Energy intends to launch a Nuclear New Build Power Procurement Programme in line with the approved 2019 Integrated Resource Plan to ensure security of supply of energy with affordable, reliable and baseload nuclear power. It is envisaged that the South African Nuclear Power Programme may comprise a blend of base load power combining both conventional PWRs and Small Modular Reactors (SMRs) technologies to a

total of 2500 MW at a pace and scale the country can afford.

- 3.6 The Department of Mineral Resources and Energy is issuing this Request For Information (RFI) to the market to make an assessment of Nuclear Power Plant(NPP) technologies which could be considered under the South African Nuclear Power Programme. For the conventional Pressurised Water Reactors technology they should be currently commercially available. For Small Modular Reactor (SMR) technology, it is expected to be under development (matured to at least prototype/experimental designs) for commercialisation by 2030.
- 3.7 The purpose of this Request For Information (RFI) document is to provide an improved understanding of the experience of different Nuclear Power Plant vendors and obtain information from NPP vendors relating the financial and technical aspects. These will include costing and financing of respective NPP technologies; plant design features; license ability of plant design in South Africa; feasibility for construction at sites in South Africa; and a detailed project management plan; as well as indicative contracting models (such as Engineering Procurement Contract (EPC), Engineering Procurement Contract Management(EPCM), Build Own and Operate(BOO),Build Own and Transfer (BOT) and Build Own Operate and Transfer (BOOT).

4. Summary of Information Requested with respect to the 2500 MW Nuclear Energy Programme

- 4.1 The financing options and related ownership models for such a high capital cost programme is of great importance. Consideration will be given to the complete range of such options in any future South African nuclear build programme.
- 4.2 Due to the significant technology and maturity difference between conventional PWRs and SMRs, respondents could respond to one or more of the said technologies.
- 4.3 The respondents to this RFI should provide the following information and supporting documentation thereto:

A. Conventional Pressurised Water Reactors

4.3.1 Detailed experience of existing domestic and export PWR NPP projects in terms:

- Installed Capacity of NPPs deployed globally;
- Overnight cost, base year and currency of each reactor deployed;
- Construction contract type;
- Plant Ownership and Operation Model;
- Contract price adjustments;
- Contract type (for example fixed price, target price, cost plus, etc.);
- Project Scope of supply;
- Project Schedule; and
- Construction staff numbers.

4.3.2 Detailed experience of lessons learnt from previous nuclear construction programmes (in the last 20 years) in terms of:

- Cost savings (provide details);
- Scope management (mitigating scope creep);
- Schedule management (reduction in project delivery time); and
- Any specific issues that improve or impair the expected time and cost reductions.

4.3.3 Potential Desalination Options with the NPP

- As South Africa has limited fresh water availability the options to use the the design for sea-water desalination should be provided, along with any experience the vendor has with such designs. Information should be supplied as to the impact on the electrical output of the NPP and related economics of such a desalination option.

4.3.4 Impact of Brown Field as opposed to Green Field sites on cost (Opex and Capex);

While the Thyspunt site in Oyster bay (Port Elizabeth) was the preferred site for future nuclear power plants, Eskom was granted a positive record of decision on its

Environmental Impact Assessment for the Duynefontein site (where the Koeberg Nuclear Power Station is located). The potential siting of NPPs on the Duynefontein brown field would therefore translate into shared facilities and resources.

- Provide potential cost reductions related to the Duynefontein site (brown field) as opposed to a green field site such as Thyspunt.

Note that vendors should use publically available information from Eskom's EIA to determine the cost savings, and no contact should be made with Eskom to obtain any further information.

4.3.5 Impact of time spacing of the construction of NPP units

The cost of mobilisation and demobilisation of construction resources has a clear impact on the cost of construction of NPPs.

- Please detail your experience in the impact of sequencing of the NPP units during construction. This is in terms of the periods between commissioning of units, on the overall cost of construction.

4.3.6 Financing solutions and related conditions

Provide detailed information on the possible permutations and conditions related to funding and financing models and mechanisms for the Conventional Power Reactors, taking into account the need to cushion capital costs whilst ensuring affordable tariffs to be passed on to the consumer. Lessons learnt from current and past NPP projects (successes and failures of the model and mechanism) should be shared, and recommendations on most optimal models and mechanisms should be justified in detail.

4.3.7 Localisation, industrialisation, IP and technology transfer and skills development model

Demonstrate the IP and technology transfer extent, skills development and localisation content and industrialisation commensurate with the envisaged Conventional Power Reactor as well as examples of same implemented in other foreign NPP projects.

Further, outline enablers to the realisation of localisation, industrialisation, IP and technology transfer and skills development within the South African context.

4.3.8 Contracting Approach

Please provide a detailed analysis (including pros and cons) of contracting models for the Conventional Power Reactor with recommendations for the most feasible approach and justifications thereto given the South African context.

B. Small Modular Reactors

4.4 The approved 2019 IRP proposes that the nuclear power programme must be implemented at an affordable pace and modular scale (as opposed to a fleet approach) and taking into account technological developments in the nuclear space. The IRP further advocates for energy system requirements with incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. In addition, lessons learnt from the procurement under the South African Independent Power Producer (IPP) programme as well as preliminary international SMR costing has shown that there can be a business case for modular and smaller power plants.

4.4.1 Provide detailed experience in SMR design, development (prototype/experimental/demonstration plants in place) and timeline to commercial deployment;

- 4.4.2 Furnish detailed technical specification for the SMR design.
- 4.4.3 Provide estimates of resource requirements (financial, human and time) of SMR design and development including nuclear licensing (through different technology readiness levels);
- 4.4.4 Possible funding models.
- 4.4.5 Provide current estimates of capital and operating costs, both for initial unit and serial construction.
- 4.4.6 Provide current outline construction schedule for initial unit and serial construction
- 4.4.7 Estimates of the local content potential in both the initial unit and serial construction, including fuel manufacturing.
- 4.4.8 Degree to which the proposed SMR technology is related to South Africa's previous experience in SMR development (namely PBMR).

- 4.4.9 Provide evident/tangible plans showing willingness to support or collaborate in SMR design and development.

5. Information to be provided by the Respondent in its RFI Response

- 5.1 The Department requests any and all entities or organisations that may wish to submit a Bid Response in the future under a under possible Nuclear New Build Procurement Programme to submit a RFI Response to the Department in terms

of this Document. Submission of a RFI Response is, however, not compulsory to participate in a Nuclear New Build Power Procurement Programme

5.2 The RFI Response submitted should be as comprehensive as possible and include the information requested below for each proposed Project and any supporting documentation in respect thereof.

5.3 All or part of the information provided may be used in the development of solutions, preparation of feasibility studies and/or compilation of technical requirement specifications.

5.4 The Department, in its sole discretion, anticipates engaging with some Respondents who have submitted a RFI Response to discuss their Project with a view to seeking clarity in relation to information contained in the RFI Response.

5.5 **Description of the Project**

5.5.1 Respondents are required to provide as much detail as possible about their Project(s) including the necessary commercial arrangements, which have been put in place or still need to be put in place. Such information will assist the Department in determining the readiness of the market for a possible Nuclear New Build Power Procurement Programme Agreement and may inform the design of a procurement process.

5.5.2 The Respondent will be required to provide the following information about its Project:

5.5.2.1 Name of the Respondent;

5.5.2.2 Name of the Project (a separate RFI Response should be submitted for each proposed location, which would be regarded to be a separate Project);

5.5.2.3 The name and contact details of the person appointed by the Respondent as its representative in the event that the Project Officer wishes to engage on the Project.

5.6 **Additional Information**

5.6.1 The Respondent will not have to pay any monies in order to submit a RFI Response in accordance with this Document.

5.6.2 The Respondent is encouraged to submit any additional information that it is of the view that would assist the Department in the Nuclear New Build Power Procurement Programme.

6. Format and Submission of RFI Responses

6.1 Submission of RFI Responses

6.1.1 To facilitate the preparation of the RFI Response, Respondents may access the following website where the Document can be downloaded at www.energy.gov.za

6.1.2 The RFI Response, must be submitted to the Department during office hours and by not later than the time and date of 10h00 on 15 September 2020, at the following address:

Matimba House
The Department of Mineral Resources and Energy
192 Visagie Street
Pretoria (CBD)
The IPP Office
South Africa

6.1.3 RFI Responses reaching the Department later than the cut-off time and date specified above may, in the Department's sole discretion, be rejected without further consideration.

6.1.4 RFI Responses may be submitted prior to the cut-off time and date specified above, however only complete RFI Responses will receive attention from the Department.

6.1.5 All costs incurred by a Respondent in connection with this Document and the preparation of its RFI Responses shall be borne by the Respondent.

6.2 Copies of the RFI Response

6.2.1 Each RFI Response is required to be delivered to the Department by way of:

6.2.1.1 2 (two) hard copies of the entire RFI Response; and

6.2.1.2 1 (one) soft copy of the entire RFI Response, and the documents contained therein must be:

6.2.1.2.1 in Microsoft Word format, version 2007 or later, save where the document cannot be accessed by Microsoft Word, in

which event the document must be provided in a PDF format, or in Microsoft Excel format, version 2007 or later; and properly indexed, readable and capable of being opened.

6.2.1.2.2

6.3 **Format of RFI Responses**

6.3.1 The Respondent is requested to complete the RFI Response and provide all the information required in this Document and address each and every item in paragraph 5 (*Information to be provided by Respondents in their RFI Responses*) of this Document.

6.3.2 All pages should be numbered consecutively from beginning to end and there should be a detailed index to the entire RFI Response.

6.4 **Language of the RFI Response**

6.4.1 The RFI Response and all documents forming part of it shall be in English.

6.4.2 Any printed literature submitted with a RFI Response may be in another language so long as it is accompanied by an English translation (made by an accredited translator) of the entire document.

6.4.3 For the purpose of interpretation of the RFI Response, the English translation provided shall govern.

6.4.4 All correspondence and any other documentation and oral communication exchanged between the Respondent and the Department shall be in English.

6.5 **Identification and Sealing of the RFI Response**

6.5.1 The Respondent shall state as a reference on the top right hand corner of the cover page of the RFI Response "RFI Response Nuclear New Build Power Procurement Programme ", as well as state its name, address, and the proposed name of its Project.

6.5.2 The Respondent shall wrap or file each RFI Response (comprising 2 (two) hard copies and 1 (one) soft copy) separately but should provide all copies in one envelope or wrapping.

6.6 **Signing of the RFI Response**

The Respondent shall be required to provide a signed letter confirming the accuracy and completeness of its RFI Response.

6.7 Further Information

6.7.1 The Department reserves the right to seek additional information from the Respondent regarding its RFI Response, as it may, in its sole discretion, determine, whether such information has been requested under this Document or otherwise, and may require the Respondent to make oral presentations for clarification purposes or to present supplementary information, in respect of its RFI Response if so required by the Department.

6.7.2 The Respondent may, following the submission of a RFI Response for their Project, be requested to engage with the Department and / or other relevant government stakeholders, including the Eskom Holdings as the buyer to discuss matters relevant to its Response. Any meetings are likely to take place at the DMRE offices, which is at the following address:

Matimba House
192 Visagie Street
Pretoria (CBD)
South Africa

7. Contact with the Project Officer

All queries and requests for clarification in respect of this Document must be addressed to the Project Officer and emailed to rfinuclear@dmre.gov.za

The Respondent must give the name and contact details of the person whom it appoints to undertake all contact with the Project Officer in its RFI Response, as provided for in paragraph 5 (*Information to be provided by Respondents in their RFI Responses*) above.

After the submission of its RFI Response, the Respondent may only communicate with the Department through such person and the Department shall be entitled, at its sole discretion, to disregard any communication from the Respondent, that does not come from such contact person, and that does not go directly to the Project Officer. Once the Respondent has been issued with a unique project identification number for the Project this is to be used in all communications with the Department.

8. Requests and clarifications

The Respondent may request clarification on any item contained in this Document by not later than 7 (seven) days before the cut-off date for the submission of RFI responses specified in paragraph 6.1.2 above.

All queries and requests for clarification in respect of this Document must be addressed to the Project Officer and emailed to rfinuclear@dmre.gov.za. E-mailed or oral requests and queries addressed to persons other than the Project Officer, at the aforementioned address, will not be entertained and will not receive a response.

The Department and its Transaction Advisors will endeavour in good faith to respond to all reasonable written queries and requests for clarification raised by the Respondent.

Annexure A: Response Form

PART A			
RESPONSE SHEET IN TERMS OF A REQUEST FOR INFORMATION			
To be completed by the supplier			
To	rfinuclear@dmre.gov.za	Date	
Attention	Z. Mbambo		
Tel no	012 406 8000/7665	Fax no and /or e-mail address	
From <i>[insert the registered full legal name of the company]</i>		Address	
Address (<i>insert the physical address of the company</i>)			
Sender <i>[insert the full name of the sender at the company]</i>			
Description of the goods	THE REQUEST FOR INFORMATION FOR THE 2500MW SOUTH AFRICAN NUCLEAR NEW BUILD PROGRAMME		