

Description of Request	<p>This request seeks to issue an RFP for engineering software tools that can render flow and heat transfer simulation (flow condition is multi-phase gas & liquid) as well as component design and analysis of complex systems in a steady & transient state to maximize plant performance output.</p> <p>This includes provision and implementation of seven nuclear certified engineering software licenses, training, remodelling services, and maintenance & support services over a 5 year period.</p>
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1. High level background

Over the past 10 years, mechanical engineers within the Generation Division have been using Flow Modelling & Simulation technology platforms to study how systems will behave in the real world, where liquid and gas are the driving factors. Engineers have been enabled to model power plant systems for operational functionalities and perform component design & analysis under both steady state and transient conditions, whilst relaying the overall effect of changing specific properties on components of a plant. Furthermore, these technologies have capacitated engineers to examine possible variations in engineering designs and optimization of systems to maximize plant performance output.

The Two Phase Flow Modelling & analysis tool has become an integral part of Generation Engineering and Koeberg Power Station operations. It has enabled engineers to perform complex thermal-fluid analyses, component design, and plant performance forecasting and supports these critical tasks in the following manner:

- **Thermal-Fluid Analysis:** Detailed analysis of power plant thermal fluid systems including multi-phase (water-steam) fluid through boilers, turbines, pumps, valves, heat-exchangers, piping, orifices, nozzles and storage systems across Eskom's power plant fleet, enabling key parameter determination such as pressure, temperature, and mass flow.
- **Component Design and System Modelling:** Used for designing components, analysing performance, and simulating operational behaviour under both steady-state and transient conditions.
- **Operational Decision Support:** Plays a vital role in forecasting plant performance, especially in predicting Partial Load Losses (PLL) using simulating and modelling to resolve plant issues.

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2. Scope of work/Business requirements

2.1. Provide detailed description and volumes of the product/service requested:

- Eskom requires provision of **seven** perpetual software licensed tool that is nuclear accredited and compatible with other design and operation calculation tools via API that Eskom has adopted.
 - The system ought to facilitate an open API that ensures seamless interconnectivity, extending beyond specified calculation applications like Mathcad, MATLAB, ANSYS, American Flow Technology (AFT), Engineering Equation Solver (EES), Caesar and ROHR2.
 - The tool must meet nuclear quality level certifications ASME NQA-1 or equivalent standards and compliance with NNR RG-0016 (Guidance on the Verification and Validation of Evaluation and Calculation Models used in Safety and Design Analyses) for modelling and analyses of nuclear power plant safety classified components and systems.
 - The tool must model multi-phase flow and heat transfer accurately including mass, energy and momentum balances. The tool must, have the ability to perform steady-state and transient simulations for individual components and power plant systems as required.
 - Furthermore, the tool should support custom-developed models (such as, access to accurate and customizable "plug and play" Rankine cycle components) and advanced libraries (such as, for Coal Boiler and Turbine plant components, advanced solver calibration for slurries and transient simulation functionality).
 - Additionally, it must be able to provide detailed analysis tools for power plant components and support custom modelling, particularly for specialized equipment.
- The provision must include software license tool implementation costs, training costs as well as migration costs to remodelling the current models to the new replacement tool
- There are approximately 500 simulation models that exist within Generation that which will require remodelling using the new tool.
- The license installations are envisaged to run on a single centralized license server, and a shared access with an option for offline use.
 - An indication of minimum hardware specification requirements essential for optimal tool function is required to accompany the proposed tool.
- The required licenses should be available for perpetual use and must be accompanied by a five-year maintenance and support services.
- The tool must be supported by comprehensive training programs to upskill Eskom engineers and detailed documentation to ensure a smooth transition and continued effective use.

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2.2. Licence Management for Maintenance and Support:

- The tool must be backed by robust maintenance and support services, ensuring timely updates, bug fixes and technical assistance. *Refer to Section 3 below for Service Level requirements.* The services include:
 - Provision of the latest version of the software including updates all updates for the duration of the contract
 - Onsite support for resolution of all issues that are related to licenses
 - Monitoring and provision of usage reporting of the tool
 - Remote and 1st line onsite support for all technical challenges and queries associated with the software and modelling
- Additionally, maintenance and support services are required to be provisioned for the licenses over a **five year** period.
- Support services for the new software tool will be required at Megawatt Park and all Generation Sites enlisted below:
 - Koeberg Power Station
 - Duvha Power Station
 - Tutuka Power Station
 - Matla Power Station
 - Lethabo Power Station
 - Camden Power Station
 - Kriel Power Station
 - Arnot Power Station
 - Hendrina Power Station
 - Medupi Power Station
 - Kendal Power Station
 - Kusile Power Station
 - Majuba Power Station
 - Matimba Power Station
 - Grootvlei Power Station

2.3. Training/Transfer of skills:

- a. Provide comprehensive fundamental training course on Fundamentals in Thermal Fluid System Modelling for all users to ensure proficiency in using the newly acquired software tool. There are +/- 150 mechanical engineers across the Generation business that may need exposure to the replacement tool
- b. Conduct bi-annual classroom-based training sessions, covering both basic and detailed levels of the Two-Phase Gas/Liquid Flow Modelling Tool.
- c. Offer both initial training sessions and ongoing training resources to support continuous learning and skill development.
- d. Training is required to be classroom-based, with adequate planning done to cater for engineers that are spread across the country.

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3. Service Level Agreement requirements

The application has been classified as Business Critical and requires 8*5 monitoring of the environment. The MTTR (Mean time to resolve and respond) to incidents are outlined below;

Service	Service Description	Service Metric	Service Target				
Support	Maintenance enhancement of applications	Delivery of the enhancement according to the implementation plan	95%				
			Investigation and Resolution of application incidents				
			System Classification	Priority	Metric		Target
					Mean Time to Respond (acknowledge)hrs	Mean Time to Resolve hrs	%
			Business Critical	P1	3	10	100
	P2	4	12	99			

System importance to business has been classified as highlighted in red in the table below:

System Importance to Business	Safety & Revenue Critical Tier 0	Mission Critical Tier 1	Business Critical Tier 2	Business Essential Tier 3	Normal Tier 4
Eskom Definition	Failure of system function may result in injury or death to human beings and/or significant loss of revenue	Vital to the functioning of an organization and the accomplishment of its mission	Without which the business can still continue operations for a pre-defined time period	Without which the business can still continue operations for after 5 days	Without which the business can still continue operations for up to a month
Time loss / RTO	<8 hours	< 24h	<48 hours	<5 days	>5days
Data Loss / RPO	0	0	<24 hours	<24 hours	>5days

Note:

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RTO: Recovery Time Objective

RPO: Recovery Point Objective

4. Approvals:

End user / requestor:	Name:	Mathodi Molebalwa
	Designation:	Portfolio Manager
	Date:	17.09.2024
	Signature:	
Product Delivery Manager:	Name:	Lizle de Kock
	Designation:	Middle Manager, Product Delivery Manager
	Date:	2024/09/17
	Signature:	