Eskom	Scope of Work	Grootvlei Power Station

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1. INTRODUCTION

The Automation System at Grootvlei Power Station known as the Distributed Control System (DCS) and its associated sub-systems were upgraded during the Return to Service between 2006 and 2011 to a discrete Control and Instrumentation system. These systems allowed for remote plant operation, monitoring and protection, coupled to this was the ability for the plant information to be available to business network for planning, auditing and process analysis.

Grootvlei Power Station utilises two different control system for Boiler & Turbine control, thus the Boiler is equipped with the Honeywell DCS whilst the Turbine is equipped with the MAUELL system.

These system needs to communicate to each other in order to ensure proper control and operation between boiler and turbine. The communication between these two systems was achieved by using an industrial automation protocol called OPC. OPC stands for OLE for Process Control, where OLE refers to Object Linking and Embedding. The implementation of this communication protocol was implemented in a redundant manner; this means that each unit has two servers running in parallel. This was done to improve reliability and availability of the system. These servers are industrial Personal Computers with additional hardware and software.

In 2014, a project to replace the OPC servers and the Backup HMI was successfully implemented. This was done as part of the C&I equipment Lifecycle support from the control system Original Equipment Manufacturer (OEM) and is in line with OEM recommendations and recommendations from the Eskom Generation C&I strategic report. The current OPC servers and Backup HMI have been in-service for over 7 years (replaced in 2014) and have passed their planned replacement interval of 3-6 years. The reliability of these components has drastically reduced as there have been intermittent failures experienced recently.

In March 2023, GE informed Grootvlei Power Station that the MAUELL control, protection system and its sub-systems (OPC servers, back-up HMI and process network systems) is obsolete and no longer supported with replacement parts or any other maintenance services and that MAUELL was exiting the business. This meant that Grootvlei Power Station would not get any technical support, replacement parts or any other maintenance services from MAUELL or its' sole agent/distributor (GE) in the event of major system failure or technical difficulties.

The station does not have spares for the OPC interface servers, common HMI server and engineering server. Failure of the OPC servers will result in load losses and potential forced downtime since the turbine will not respond to boiler demands. The currently installed OPC servers do not comply with the latest Microsoft Windows DCOM hardening security updates. Honeywell OT servers have been upgraded to the latest Microsoft Windows operating system where the DCOM security patch came embedded to the operating system. This has led to the continuous communication failure between the boiler and turbine control functions, whereby the unit will sometimes fail to load or de-load, failure of the turbine run up. These failures pose a high risk to the continued operation of the station.

As indicated in the notice provided by Microsoft, the term "DCOM Hardening" has recently been associated with Microsoft's planned changes for DCOM in Windows to address security vulnerability CVE-2021-26414, which was announce mid-2021. Microsoft's updates will require a more stringent level of authentication when OPC client applications connect to OPC server.

The problem is that most OPC client and server applications are hard coded to only send the necessary information for the less stringent authentication requirement, until now. Software vendors and developers of OPC applications will need to address this and include the necessary modifications in a software

update/release to meet the new authentication requirements. Until then, the effect of the Microsoft changes means that if you are using DCOM for networking and you apply the patch, your OPC connections might fail.

In late 2021, Microsoft announce the new security requirements that requires the users who wish to continue using the OPC classic infrastructure that relies on the DCOM based communication to shift to other alternatives in order to maintain communication connectivity. Various mitigations were proposed by Microsoft as a workaround solution for the DCOM related issues, however, this necessitated the OEM to make changes to their OPC software applications and to conduct rigorous testing to ensure proper data communication connectivity.

According to Eskom Generation C&I Refurbishment Execution Strategy document (559-123589005), C&I obsolete systems can undergo two main types of retrofits, namely:

1) Full retrofit where all components from field instruments, junction boxes, multicore cables and the control cubicles and control room are replaced, or.
2) An upgrade or migration, where most of the field infrastructure including cabling and some control cubicles are kept and only certain modules, computer hardware and software of the control system is replaced.

The vendors of modern control systems follow the industry standards when designing their systems to ensure that they use standard protocols for interfacing with other systems, however, the control system vendors may further incorporate proprietary applications into their systems which may make it difficult to find alternatives solutions for obsolete systems such as virtualization, data connectivity using OPC protocols etc. There are industrial control system vendors who have the capabilities of decoupling the installed digital control systems from the obsolete based Operating systems and automation hardware systems. However, this exercise requires that detailed technical analysis, testing into these alternate solutions be conducted system by system as there could be no solution suitable for all systems.

2. SUPPORTING CLAUSES

2.1 SCOPE

The scope of this RFI encompasses the evaluation of the identified technical deviation, conducting technical and financial assessments for all the feasible options, finally selecting, and recommending the most cost-effective and technical acceptable alternative to meet operational requirements.

2.1.1 Applicability

This document will be used as a guideline in order to meet the requirements for the re-engineering of OPC Servers and Backup HMI communication protocol RFI at Grootvlei Power Station.

2.2 NORMATIVE/INFORMATIVE REFERENCES

2.2.1 Normative

As a minimum, the Contractor is expected to comply with the following documents:

[1] 559-123589005 Generation C&I Refurbishment Execution Strategy document

[2] 240-72344727 – C&I Control System Architecture Guideline

[3] ISO 9001 Quality Management Systems

2.2.2 Informative

[4] 32-1034: Eskom Procurement and Supply Management Procedure

2.3 DEFINITIONS

N/A

2.3.1 Disclosure Classification

Controlled Disclosure: Controlled Disclosure to external parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation & Acronym	Description
C&I	Control and Instrumentation
CAPEX	Capital Expenditure
DCS	Distributed Control System
HMI	Human Machine Interface
OEM	Original Equipment Manufacturer
OPC	OLE for Process Control
OT	Operational Technology
PC	Personal Computer
PSGM	Power Station General Manager
RFI	Request For Information
RTS	Return To Service
TCS	Turbine Control System
VDU	Visual Display Unit

2.5 ROLES AND RESPONSIBILITIES

The System Engineer:

- Issue the scope of work for the deficiency.
- Provide technical clarifications to the tenderers.
- Review technical proposals issued for the proposed solutions.

C&I Engineering Line Manager:

- Reviews and assumes functional responsibility of the document

Engineering Middle Manager:

- Reviews and authorises the document

Procurement Manager:

- The Procurement Manager is responsible for ensuring that PRs that are entered in the procurement system are dealt with expeditiously, efficiently and effectively. He/she is responsible

for the performance quality of the procurement function. This includes reduced turnaround times regarding execution of PRs (Purchase Requisition), consolidation of requests to achieve economies of scale, optimisation of savings opportunities where possible, establishing contracts for repetitive LPO (Local Purchase Order) requests, ensuring training and accreditation of self and Procurement Practitioners, liaison with End-users as internal customers, quality assurance of the submissions made to DAA (Delegated Approval Authority) and spot checks on transactions within his/her department.

Procurement Practitioner:

- A Procurement Practitioner manages and/or executes, but not approves, a transaction, procedure or process for procurement/disposals as contained in this Procedure (32-1034) and the Eskom Delegation of Authority Procedure related to the P&SCM (Procurement and Supply Chain Management) process forming part of the Approved Procurement Framework. Once accredited, a Procurement Practitioner approves transactions within the Dual Adjudication Authority space. The Procurement Practitioner is responsible for the procurement process from the receipt of a PR up to the award of a contract/order. Procurement Practitioners also execute modifications to contracts on behalf of End-users.

Contractor:

- Conduct assessments for the deficiency and recommend the technical feasible and financially viable option for the outlined deficiency.

2.6 PROCESS FOR MONITORING.

This RFI shall be governed, controlled, and managed by Eskom Procurement and Supply Management Procedure.

2.7 RELATED/SUPPORTING DOCUMENTS

System Architecture (Refer to Appendices)

3. SCOPE OF WORK

3.1 DETAILED SCOPE

No constraints are placed on the respondents in terms of visitation rights to the site in order to make a proper evaluation of all requirements. “As is status” assessment includes all the activities to ensure that the individual parts of the C&I as well as the C&I system together with its sub-systems, is designed and operates as an integrated and consistent system within itself and together with the rest of the plant.
The “as is assessment” activity includes the respondents’ evaluation work at Grootvlei Power Station. The evaluation is required to determine the “as is” status and condition of the existing systems by participating with the Employer in establishing the new requirements referred to the “as required” for Capability Assessment of Suppliers for commercially available and/or a well demonstrated/proven technology for re-engineering of the current Mauell (interfaced to Honeywell) OPC DA (Data Access) communication protocol for control systems that are impacted by the Microsoft security changes for systems using the Windows operating system and have the OPC classic architecture infrastructure based on DCOM based communication. This will include the integration of the Mauell Backup HMI, Engineering Stations and any of the associated equipment as per the existing Mauell/Honeywell system architecture as per figure 1 & 2 below.

In order to obtain advances in other technologies for decoupling obsolete based Operating systems and automation hardware systems from the digital control systems deployed at Grootvlei Power Station, Grootvlei Power Station is inviting suppliers to furnish relevant information on how alternative technologies can be used to re-engineer the Mauell OPC DA (Data Access) communication protocol for the Turbine Control System that is impacted by the Microsoft security changes based on OPC classic DCOM communication. The information provided by suppliers will be used by Grootvlei Power Station to determine the strategy of potentially using these advance technologies in Grootvlei Power Station and to possibly undertake bench scale/pilot plant tests that will demonstrate the applicability thereof.

The scope of the RFI will include the provision of the unit OPC servers as well as the Backup HMI PC/server, installation of the Unit OPC servers (2 PER UNIT) and the Backup HMI PC. This also includes the required operating software, application software, anti-virus software as well as any other software and hardware that might be required to ensure the correct operation of the OPC servers and the Backup HMI PC with the intention of improving the availability and reliability of the OPC server-client interface. The OPC server-client interface must be fully tested for correct functionality, and this must be demonstrated by the contractor before handover.

The scope of the RFI further includes but is not limited to the following information requirements:

- The design, installation, testing, commissioning, training (If any required) and final handing over of a fully functional and redundant OPC server- client interface.
- Reengineer the automatic changeover philosophy of the OPC servers (If possible)
- Supply any other equipment that might be required to ensure the completeness of the redundant OPC server and Backup HMI
- Replacement of the backup HMI PC and the installation of the new Backup HMI PC for redundancy.
- The design, quality management, installation, testing, commissioning and final handing over of a fully functional and redundant Backup HMI.
- Testing requirements for the redundancy of the OPC and the Backup HMI PC.
- Documentation related to design, operation, testing, automatic and manual changeover of the OPC server and the Backup HMI PC, propose preventative maintenance activities, procedures for making backups of the OPC server and the Backup HMI PC as well as any other preventative maintenance procedures that would ensure proper maintenance of the OPC server-client interface as a whole.
- All required software and hardware for the Backup HMI PC, OPC servers.
- Final commissioning requirements of OPC server and the Backup HMI PC.
- O&M Manuals and Engineering Tools requirements post installation.
- Final Handover requirements.

4. AUTHORISATION

This document has been seen and accepted by:

Name & Surname	Designation
Reggy Mali	Chief Engineering Technologist
Mantombi Mkemezulu	C&I Engineering Line Manager
Thabo Montja	Middle Manager Engineering
Nondumiso Buthelezi	Document Control officer

5. REVISIONS

Date	Rev.	Compiler	Remarks
February 2026	0	Reggy Mali	Original document
February 2026	1	Reggy Mali	Original document

6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Reggy Mali

7. ACKNOWLEDGEMENTS

- N/A

8. APPENDIX

FIGURE 1: MAUELL/HONEYWELL OPC REDUNDANCY SETUP

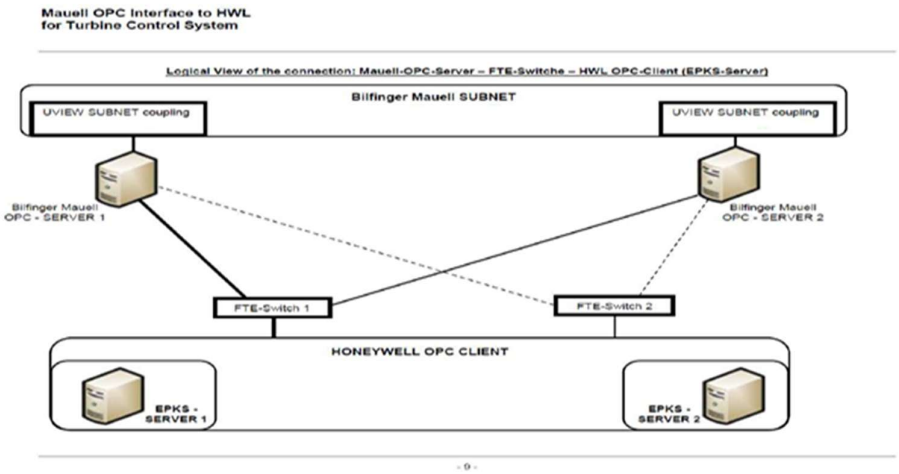

FIGURE 2: MAUELL/HONEYWELL OPC INTERFACE SETUP