

1 Background

Generation seeks to improve power station performance and reduce lifecycle cost of maintenance through a programme of digitalisation that achieves and increases the maturity of capabilities designed to achieve its maintenance objectives.

The Generation Maintenance Digitalisation Programme (GMDP) will be a programme consisting of multiple projects and other coordinated activities that span the entirety of Generation Maintenance¹ over a couple of years. The GMDP seeks to disrupt the status quo of outdated and inefficient maintenance information and technology business practices and replace it with fit for purpose applications, analytics and practices on a cost-benefit basis, leveraging heavily on existing infrastructure and investment in people.

During this first phase external expertise is required to initialise the programme and provide the framework for projectisation, governance and decision making, continuous improvement of information management practices and identifying the technologies and applications that will enable effective maintenance in various key process areas in maintenance.

The outcome of this first stage is a documented capability maturity framework and roadmap depicting:

- Capability maturity criteria, current and targeted capability levels per process as well as industry benchmark capability levels.
- A set of business cases targeting specific maturity levels of key process areas with accompanying cost-benefit analysis.
- Technology paths that describe changes to existing applications or proposed new leading quadrant applications and hardware to enable targeted maturity levels.
- High level plans describing phasing and dependencies based on international experience.

The second and subsequent phases of this programme are completely dependent on the size and affordability of closing the gap defined during the first phase.

2 Outcomes

This scope of work relates to Phase One of the Generation Maintenance Digitalisation Programme. The goal of this phase is to create certainty regarding the time, cost and benefits of achieving maturity levels of the processes designed to achieve maintenance objectives.

The scope of work is intended to deliver the following outcomes:

1. All existing maintenance processes target specified maintenance effectiveness outcomes and objectives and all maintenance outcomes and objectives have processes identified to achieve them.
2. All maintenance processes and their capability maturity levels are allocated to progressive development stages and the current process capability levels are known.
3. The current capability levels of information flows that enable the measurement of maintenance objectives are known per maintenance process.
4. The current capability levels of infrastructure and applications to enable the information flows are known per maintenance process.
5. The current capability levels of people using applications to facilitate information flows are known per maintenance process.
6. The desired capability maturity levels per maintenance process and power station are specified.
7. Investments in maintenance digitalisation are justified based on the achievability of closing the gap between the current and desired capability maturity levels.

¹ See Table 3 in Addendum B for the list of power stations

3 Scope of Work

The scope of work is divided into six key deliverables.

3.1 Deliverable One - Maintenance Objective Hierarchy

- a) A hierarchy of generic maintenance objectives and key result measurements that support the Generation maintenance outcomes and maintenance effectiveness criteria.
- b) The existing maintenance objectives, key results and targets per cluster, station or business unit (where available and applicable), referenced to the generic objectives hierarchy.

3.2 Deliverable Two - Capability Maturity Model

- a) Identify existing Generation processes or activities capable of delivering the generic maintenance objectives. The process areas within the scope of the programme are listed in Table 2 in Addendum A.
- b) Identify gaps in existing processes or missing processes or activities required to achieve the generic maintenance objectives and propose high level processes, activities, process objectives and key results to close the gaps.
- c) Generation proposes that seven generic capabilities are required to achieve the business objectives. These capabilities are listed in Table 1 - Capabilities below. Identify or expand the generic capabilities (according to best practice) if needed.

Table 1 - Capabilities

Group	Capability
Processes	Processes to achieve objectives
	Principles, policies and procedures to implement processes and decisions
	Roles and decision authority
People	People, skills and competencies to execute processes and make decisions
	Culture and behaviour to motivate and shape practices
Technology	Information flows to enable processes, measure achievement of objectives and support decisions
	Technology, infrastructure and applications to enable information flows

- d) Specify a capability scale with levels ranging from no capability to best practice capability that can be applied to all capabilities and processes.
- e) Develop evaluation criteria per process and/or capability, that when evaluated, positions the capability levels of each process on the capability scale.
- f) Specify development stages of maintenance processes comparable to leading international models or references, such that achieving capability levels of processes of the same development stage is a requisite for achievement in the next development stage.
- g) Allocate each capability level of each process to a development stage. The maturity scales of processes of the same development stage must therefore be comparable.

3.3 Deliverable Three – Maturity Benchmark Study

- a) Evaluate the capability levels of all processes for all stations or cluster (in the case of Peaking) according to the evaluation criteria and specify a capability maturity level per process.
- b) Specify the key results and typical characteristics of organisations having reached each development stage along with specific examples related to each of the capabilities.

3.4 Deliverable Four – Target Maturity

- a) Estimate the time, effort and cost required to reach the comparable maturity levels of processes allocated to each development stage.
- b) State the quantifiable and non-quantifiable benefits of reaching the comparable maturity levels per development stage.
- c) Facilitate and workshop the target maturity specification per station or cluster considering the factors that will affect time, costs and benefits per station.

3.5 Deliverable Five – Roadmap of initiatives to reach specified maturity levels

- a) Define the requirements to achieve the targeted maturity levels per station per capability group (process, people, technology) and group the requirements into initiatives.
- b) In the case of technology:
 - a. Technology paths that describe changes to existing applications or proposed new leading quadrant applications and hardware to enable targeted maturity levels.
 - b. List applications or application components, systems and tools (e.g., handheld devices) that have been proven to deliver the requirements.
 - c. List interfaces required to existing or new systems per initiative.
- c) Estimate the cost and duration to deliver the initiatives.
- d) Specify the relationship between initiatives taking into account priority, development sequence, integrations and dependencies.
- e) Create a business case per initiative where required and to the level of detail required.

3.6 Deliverable Six – Specifications for technology implementation

- a) Define the specifications for initiatives identified to implement the required technology components to achieve the desired maturity level. The specifications must be documented in the Eskom Group IT Business Requirements Specifications template and undergo the Group IT review process for acceptance.

3.7 General Requirements

- a) It is required that an agile approach be followed to create the deliverables with weekly sprint reviews, daily scrums and weekly sprint reviews.
- b) Prior to commencement the contractor will submit a project plan that includes the milestones and deliverables per sprint week.
- c) Prior to commencement the contractor will submit a quality management plan that details quality assurance and control outcomes and activities to achieve those outcomes. Prior to starting with each deliverable the Contractor will submit a quality control checklist for that deliverable that will form the basis of evaluating the conformance to requirement of the deliverable.
- d) Stakeholder engagement should be targeted and efficient and given the geographical location of power stations the station visits should be kept to a minimum. The bulk of interactions must occur through Microsoft Teams and targeted surveys are preferred.

4 Considerations for Success

Candidates will do well to consider the following success criteria relevant to the provision of the scope items and provide the necessary information to adjudicate proficiency for each.

4.1 Deliverable One - Maintenance Objective Hierarchy Considerations

The successful candidate can substantiate:

- a) Experience in creating objective hierarchies (following leading approaches such as the OKR approach) and identifying key results or metrics in general but preferably in the maintenance or asset management context.
- b) Application of a proprietary or generic method to create objective hierarchies and associate key results.
- c) Knowledge in applying purpose built or generic software to facilitate the hierarchy and key results development process.

4.2 Deliverable Two - Capability Maturity Model

The successful candidate can substantiate:

- a) Knowledge and experience with process modelling and event-driven process chains.
- b) Working knowledge and experience with ARIS process modelling software.
- c) Knowledge of the processes in the asset management landscape and typical objectives and key results per process.
- d) Knowledge and experience with key capabilities, scales and criteria as specified in the scope of work, specifically focussed on prior experience in applying the criteria to assess capability and maturity levels in a maintenance environment.

4.3 Deliverable Three – Maturity Benchmark Study

The successful candidate can substantiate:

- a) Knowledge and experience in designing and implementing information gathering means to gather information from targeted industry workers at different levels, cognisant of their proficiency with various technological means. This includes as minimum the design, delivery, receipt and analysis of questionnaires or surveys in electronic form.
- b) Knowledge and experience of broad industry themes and technological and process advancement to be able to recognise and position observed capability onto developed capability scales.

4.4 Deliverable Four – Target Maturity

The successful candidate can substantiate:

- a) Knowledge and experience in implementing capability improvement initiatives in order to quantify cost and benefits of progressive capability maturity levels.
- b) Knowledge and experience in depicting, communicating and substantiating capability maturity progression to senior leadership.

4.5 Deliverable Five – Roadmap of initiatives to reach specified maturity levels

The successful candidate can substantiate:

- a) Knowledge and experience in defining technology deployment initiatives to reach targeted capability maturity levels
- b) Broad knowledge of the technology landscape and typical application to processes per capability.
- c) Knowledge of capabilities and integrations required with existing Generation software systems:

OpenText DMS
Extended OpenText for EAM

SAP ECC PM Plant Maintenance
SAP ECC MM Materials Management
SAP ECC CO Cost Objects
SAP ECC PP Production Planning
SAP ECC PPM Project and Portfolio Management
SAP MDG-EAM Utopia Master Data Management
PrimaVera P6 and integration with SAP PM

- d) Knowledge and experience with developing and depicting technology maturity paths that describe changes to existing applications or proposed new leading quadrant applications and hardware to enable targeted maturity levels.
- e) Knowledge and experience of applications or application components, systems and tools (e.g., handheld devices) and their integration related to the following outcomes:

Electronic workflow of documents (using OpenText for EAM).
Embed documents in SAP PM created through integration with handheld devices (such as photos) or bar-coded scanned documents (like invoices, work orders).
Transitioning bills of material from application form (i.e. Excel) to systems format (i.e. Material or Task Bills of Material in SAP).
Recording, quantifying and workflow approval or variations from plan.
Integration of SAP PP and SAP PM.
Integration and use of reference elements and integration with Maintenance Event Builder (MEB).
Integration of the concept of fixed price contracts with SAP PM orders and SAP MM purchase orders.
The recording and integration of working time per work order activity and integration with SAP PM and SAP CO.
The integration between warehouse automation systems and inventory and demand planning systems in SAP, including the use of barcodes or RFID tags.
The issue and retrieval and scanning of shop papers in SAP PM.
The use of mobile devices for maintenance work scheduling and execution as well as issue and recording of inspection tasks to record plant equipment condition.
The use of mobile devices to facilitate and verify the recording of time records related to work activities.
The use of mobile devices to facilitate and verify the recording of equipment condition and measurement readings.
The integration of online and offline equipment condition data into an integrated plant health dashboard.
The use of SAP and other technologies to facilitate the AP913 plant reliability process.
The use of SAP and other technologies to manage the calibration and certification of testing equipment.
The use of SAP to manage the scopes of work of specific outages (shutdowns/turnarounds) based on a master scope of work according to an outage philosophy and strategy.
The use of SAP to record, specify and manage the availability of spares based on the availability and serviceability of subcomponents.
The use of SAP to record and facilitate the subcontracting of maintenance tasks and/or purchase orders.
The use of SAP to facilitate the refurbishment of repairable plant components ex situ.
The use of SAP to facilitate consumption-based planning and inventory replenishment.

- f) Knowledge and experience with estimating the cost and duration of digitalisation initiatives and specifying the relationship between initiatives taking into account priority, development sequence, integrations and dependencies.
- g) Knowledge and experience in creating business cases for digitalisation initiatives and indication of the typical level of detail.

4.6 Deliverable Six – Specifications for technology implementation

The successful candidate can substantiate previous experience and willingness to integrate and work alongside internal customer requirements to specify user requirements for technology implementation.

Addendum A

Table 2 - Key Process Areas in Maintenance

Key Process Area	Process	Process Outcome
Lead and Manage	Lead the Organisation	Asset Management Policy
		Strategy and Objectives
		Business Planning
		Decision-Making Authority
		Professionalism
		Leadership Development
		Organisational Culture
		Stakeholder Engagement
		Change Management
		Communication
	Manage the Organisation	Organisational Structure
		Roles and Responsibilities
		Policies and Procedures
		System and Component Ownership
		Speciality Teams
		Succession Planning
Management Systems	Management Review	Independent Oversight
		Self-Assessment
		Benchmarking
	Corrective Action Programme	Corrective Action Programme
	Incident Prevention	Abnormal Event Investigations
		Human Performance
	Safety and Compliance	Statutory Requirements incl. FFR
Maintenance Basis	Risk Management	Risk Management
	Operating Experience	Operating Experience
	Maintenance Strategies	Maintenance Bases
	Scopes of Work	Outage Scopes of Work
		Online Scopes of Work
		Risk Based Inspection
	(AP913) Equipment Failure Prevention	Performance Criteria and Monitoring Parameters
		AP913 Custodian
Work Planning	Work Order Management	Work Management
		Work Order Management
		Preventive Maintenance Management
		Corrective Maintenance Management
		Condition Based Maintenance Management
		Stock refurbishment

Key Process Area	Process	Process Outcome
Work Planning	Work Package Preparation	Work Package Preparation
		Task Description and Sequencing
		Material, Service and Skills Requirements per Task
		Baseline risk assessment
		Quality control requirements
		Post maintenance testing
		Task History Requirements
Work Scheduling	Emergent Work	Online work prioritisation
		Work variation process
	Schedule Work	Resource Levelling
		Online work scheduling
		Opportunity schedules
	Work Integration	Outage scheduling
		Outage schedule integration
Work Execution	Execute Work	RBI Integration
		Work Preparation
		Quality Control
		First Line Supervision
		Safety
	Close-out Work	Housekeeping
		History Capturing
Performance Monitoring and Digitalisation	Performance Monitoring	Post Job Critique
		Objectives and Key Results Coordination
		Performance Monitoring
		Simulation and Forecast
	Digitalisation	Performance Improvement
		Process Modelling
		Information Flow Modelling
Services and Materials	Services and Partnering	Technology and Application Ownership
		Deliver Digitalisation
	Warehouse and Inventory	Manage Services for Activities
		Manage Partnering for Activities
		Inventory Management
Technical Competence	Warehouse and Inventory	Warehouse Management
		Replenishment Budgeting
Resources & ABC	Technical Skills	Technical Skills Development
	Technical Competence	Technical Competence Management
	Training Material	Technical Training Material Custodian
Resources & ABC	Resource Management	Resource Strategy
	Costing and Budgeting	Zero Based Budgeting
		Activity Based Costing

Addendum B

Table 3 – List of Power Stations

Power Station	Nearest Town	Power Station	Nearest Town
Nuclear Power Station			
Koeberg	Cape Town, Western Cape		
Coal Fired Clusters			
Cluster One			
Grootvlei	Balfour, Mpumalanga		
Kendal	Ogies, Mpumalanga		
Kusile	Emalahleni, Mpumalanga		
Lethabo	Vereeniging, Gauteng		
Matla	Kriel, Mpumalanga		
Cluster Two			
Arnot	Middelburg, Mpumalanga		
Hendrina	Hendrina, Mpumalanga		
Matimba	Lephalale, Limpopo		
Medupi	Lephalale, Limpopo		
Tutuka	Standerton, Mpumalanga		
Cluster Three			
Camden	Ermelo, Mpumalanga		
Duvha	Emalahleni, Mpumalanga		
Komati **	Middelburg, Mpumalanga		
Kriel	Kriel, Mpumalanga		
Majuba	Volksrust, Mpumalanga		
Peaking Cluster *			
Gas Fired		Pumped Storage	
Acacia **	Cape Town, Western Cape	Drakensberg	Bergville, Kwazulu Natal
Ankerlig	Atlantis, Western Cape	Ingula	Ladysmith, Kwazulu Natal
Gourikwa	Mosselbay, Western Cape	Palmiet	Grabouw, Western Cape
Port Rex **	East London, Eastern Cape		
Hydro		Wind	
Gariep	Gariepdam, Northern Cape	Sere**	Koekenaap, Western Cape
Van der Kloof	Vanderkloof, Northern Cape		

* Note: In terms of management and staff engagement, the Peaking stations are treated as a cluster similar to what the individual coal fired stations are treated

** Station excluded from the scope