

A decorative graphic on the left side of the slide, consisting of three overlapping circular frames. The top frame shows a close-up of solar panels. The middle frame shows a large industrial facility with several tall, cylindrical cooling towers and a body of water in the foreground. The bottom frame shows a worker in a safety harness and hard hat working on a high-voltage power line tower, with a helicopter visible in the background.

Joint Portfolio Committee on Public Enterprises and Mineral Resources and Energy

Briefing on SGR Project and Related Questions

2 November 2022

This presentation is intended to engage on the following topics:

- + SGR Project,
- + Perspective on SRG Project Management,
- + Outage 126 readiness
- + Long Term Operation
- + Related Issues

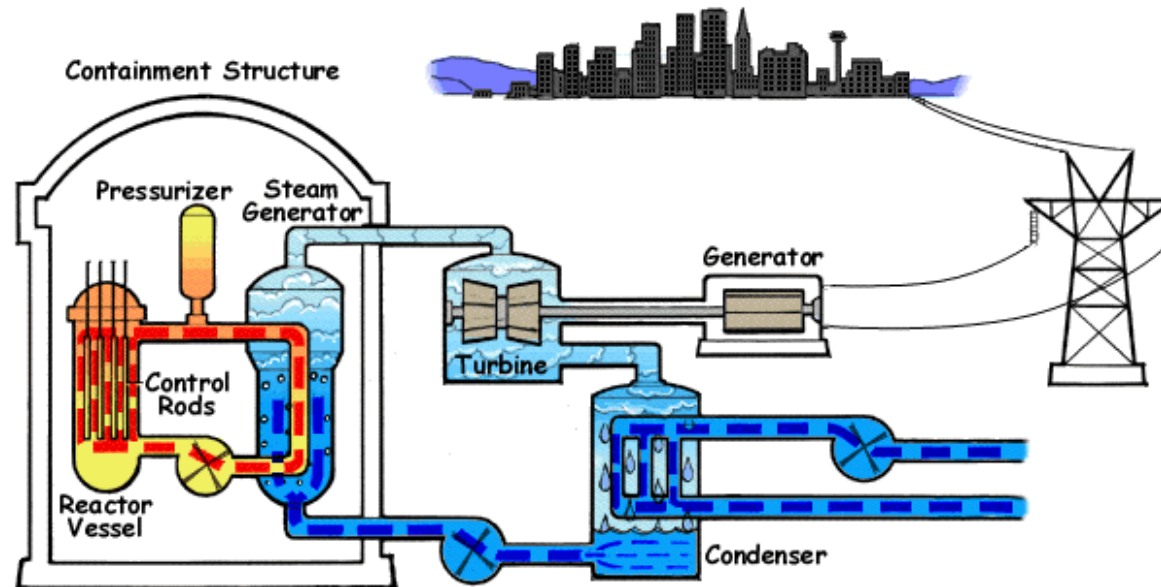


This section on the SGR project aims to address the following:

- + SGR - need
- + SGR - project scope
- + SGR - timeline
- + Outage 225 details
- + Impact of deferral

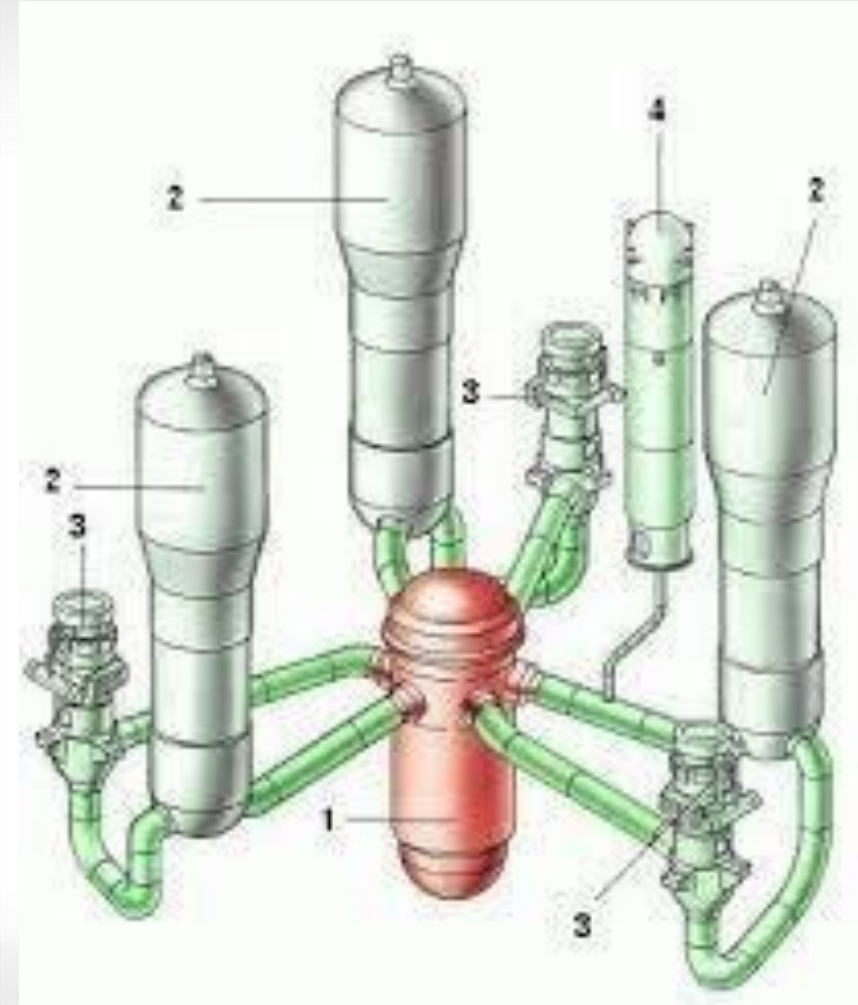


- The steam generators **form the boundary between the Primary circuit** (which contains the reactor) and the **Secondary steam circuit** (that drives the turbine)
- The original material use to manufacture the tubes **was found to be susceptible to cracking**. Impacted whole industry, which Eskom has managed safely through lowering the primary temperature and accepting a rigorous inspection program which requires thorough inspections of the tubes each outage.
- However Eskom believes the original steam generators need to be **replaced for extended Long Term Operation**.



The scope of the SGR project involves:

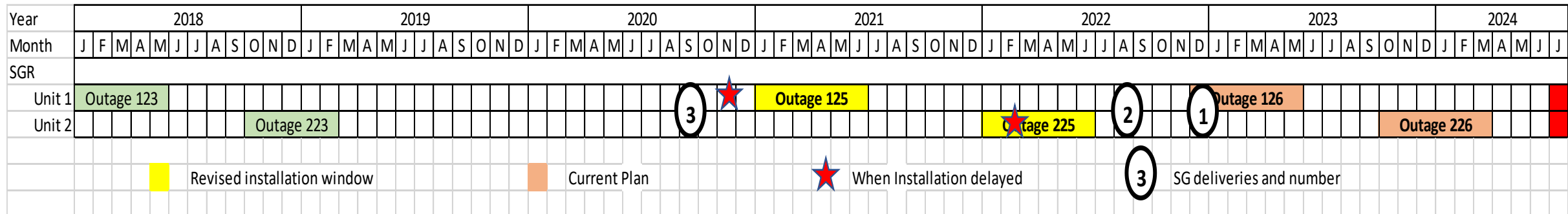
- Manufacturing the **6 new steam generators**
- **Performing the design studies** to accommodate the new SG's and all the associated plant changes.
- **Perform all the safety studies** to demonstrate the reactor and fuel can operate the safely under the new conditions.
- **Detailed cutting, rigging and welding plans** to remove and install replacements into the primary and secondary circuits.
- **Obtaining Regulatory approval** for the different activities.
- **Integrating all activities** into the outage schedule.
- **Ensuring the availability of all the support and facilities needed** during execution.
- Then **finally cutting out and welding in the new steam generators** and performing the required nuclear inspections.



There are three steam generators per unit

SGR - project timeline reflecting the delays

- ❑ **Original installation was in 2014** contracted for installation starting in 2018.
- ❑ Eskom **rejected the conical forgings from France** – which had to be re manufactured. This delayed the installation from outages x23 to outages x25 (2021 and 2022)
- ❑ As a result, **Eskom implemented delay damages as per the contract** – which stopped the contractor's cash-flow for a substantial period. **(20% of contract value)** The loss of cash flow was the main contributor to the strained relationship with the contractor.
- ❑ **SGR was withdrawn from 125** prior to the start of the outage because the design / safety case and installation packages were not ready. **Deferred to Outage 126.**
- ❑ **SGR was withdrawn from outage 225 during the outage**, due to the risk of significant outage delay due to the lack of an agreed installation plan between Eskom and the contractor. **Deferred to Outage 226.**



SGR Manufacturing and Delivery

- ❑ Besides the manufacturing quality defect with the forgings, Covid-19 had a significant impact on the manufacturing schedule.
- ❑ **5 of the 6 (total)** Steam Generators have been **delivered** to Koeberg
 - Steam Generators **1, 2 and 3** delivered to Koeberg (**September 2020**) and have been prepared for Unit 2,
 - Steam Generators **4 and 5** safely **delivered** to Koeberg (**August 2022**) being prepared for Unit 1
- ❑ Manufacturing of Steam Generator 6 is in final stages and is **to be delivered to Koeberg by December 2022** (Delivery delay due to it being **dropped during manufacturing**)

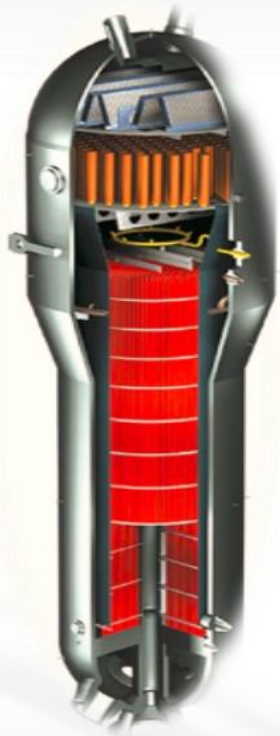


Dropped SG

- ❑ On 16 March 2019, one support on the stand on which the lower sub-assembly of SG “6” was resting, broke. The sub-assembly slipped off on the roller support, falling a distance of about 500mm.
 - ❑ Minor damage to RSG shell at impact areas → **no repair other than light grinding of the surface marks was required**
 - ❑ Damage to Anti-Vibration Bars (AVB) clamps → **cutting and re-welding of the c-clamps**
 - ❑ Potential plastic deformation of 15 AVBs and 22 Anti Vibration Bars end to retaining ring welds → **No repairs were performed; no tube integrity concerns**



Eskom acceptance of the Steam Generator has been based on expert review of the Framatome justification by internal Eskom and independent industry experts, which have been accepted by the Regulator



OSGIF

Original Steam Generator Interim Storage Facility buildings have been completed. **NNR License in progress .**



CAF (Access)

Containment Access Facility (CAF) **building complete – security access system being installed.**



Hot Workshop

Hot Workshop (HWS) **building complete.**



Gas Storage

Gas Bottle Storage facility **completed, and occupancy certificate issued.**



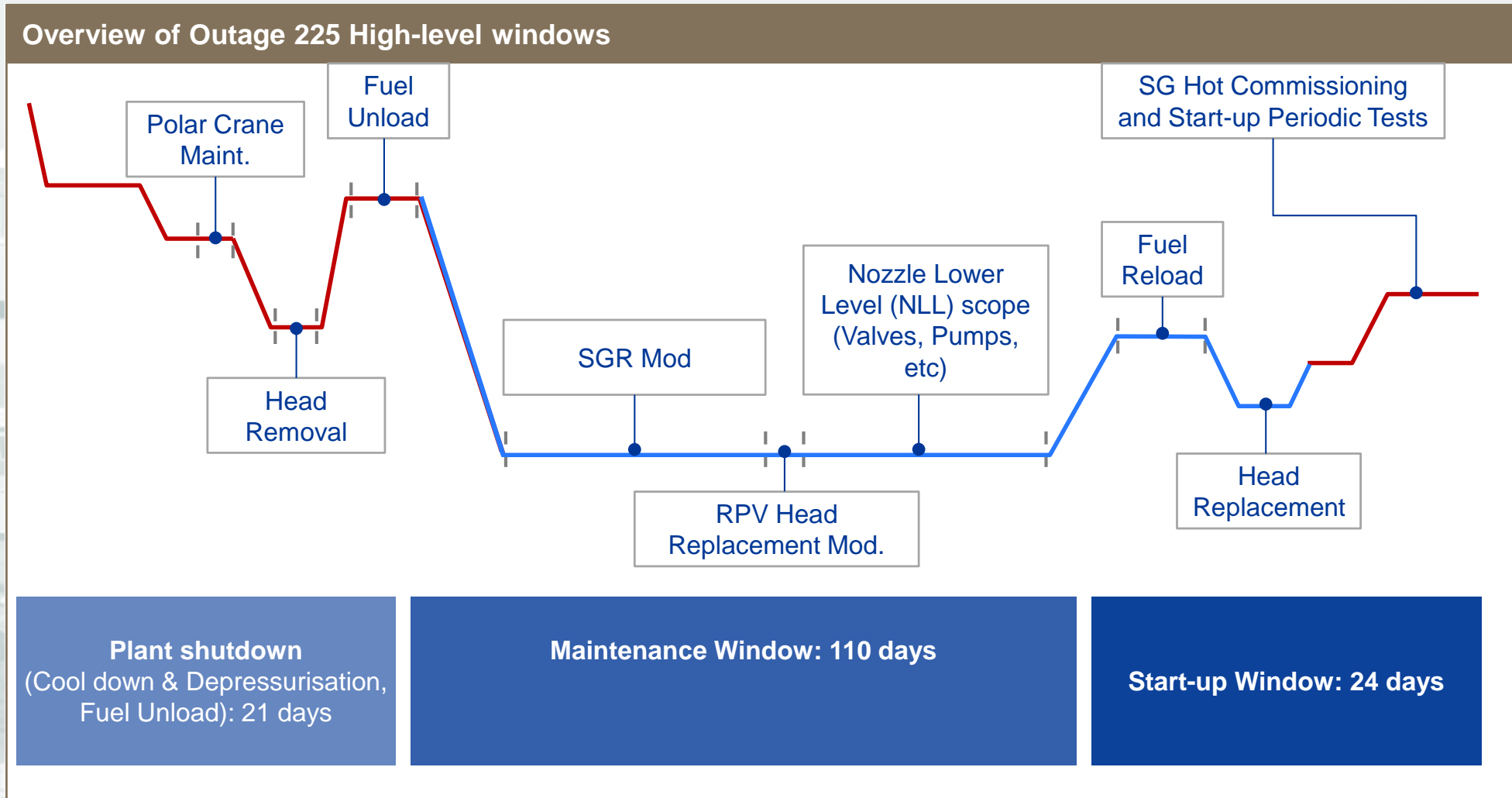
**RSGSF:
Prefabrication**

Replacement Steam Generator Storage Facility (RSGSF) **Complete**
Steam generators 4 and 5 **preparation work is underway** in building.

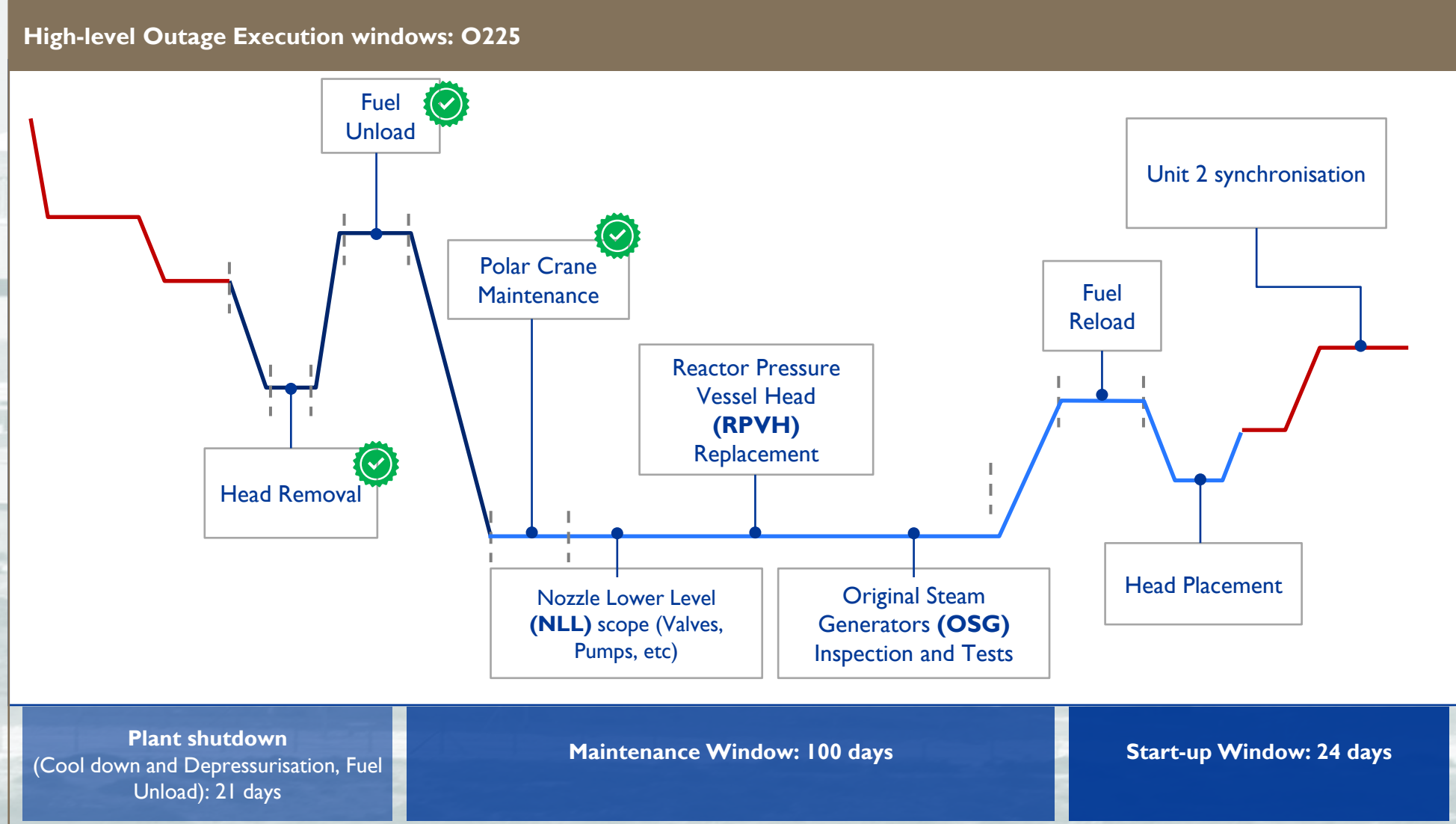


- ❑ Original plan was for the Unit to **connect to the grid on 7 June 2022**
- ❑ **Due to delays that were experienced** there was a need to update the overall outage plan in the initial SGR preparation activities
- ❑ **On 1 March 2022**, the SGR Project team **requested an extension to the installation window from 55 days to up to 109 days**, on top of the delays already experienced due to Framatome. The project team were **unable to provide a realistic plan that could be implemented with confidence** that reflected an acceptable return to service date **due a significant change in the contractor's plan**. The contractor based their sudden increase in duration, which went far beyond the 109 days requested by the project team, on the unavailability of the facilities, which the project team did not agree with.
- ❑ **Based on the lack of an agreed plan**, the high likelihood of a long delay to the return to service of the unit, together with the loss of confidence in the level of readiness / preparation based on delays and issues experience up to that point, **the Chief Nuclear Officer (CNO) made the decision on 3 March 2022 to defer the SGR to outage 226**. The reason was **to protect the return to service date**, which when negotiating the outage window was known to be critical from a network capacity perspective.

Original Outage 225 -schematic



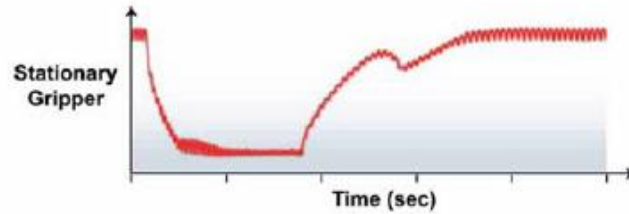
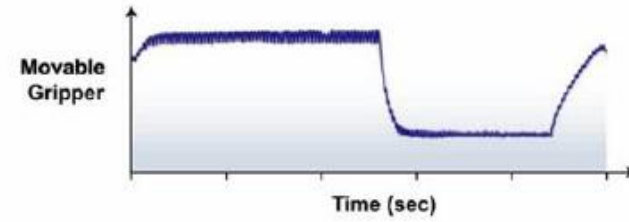
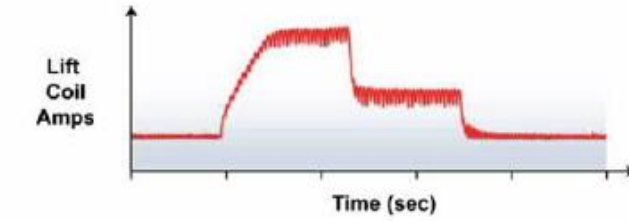
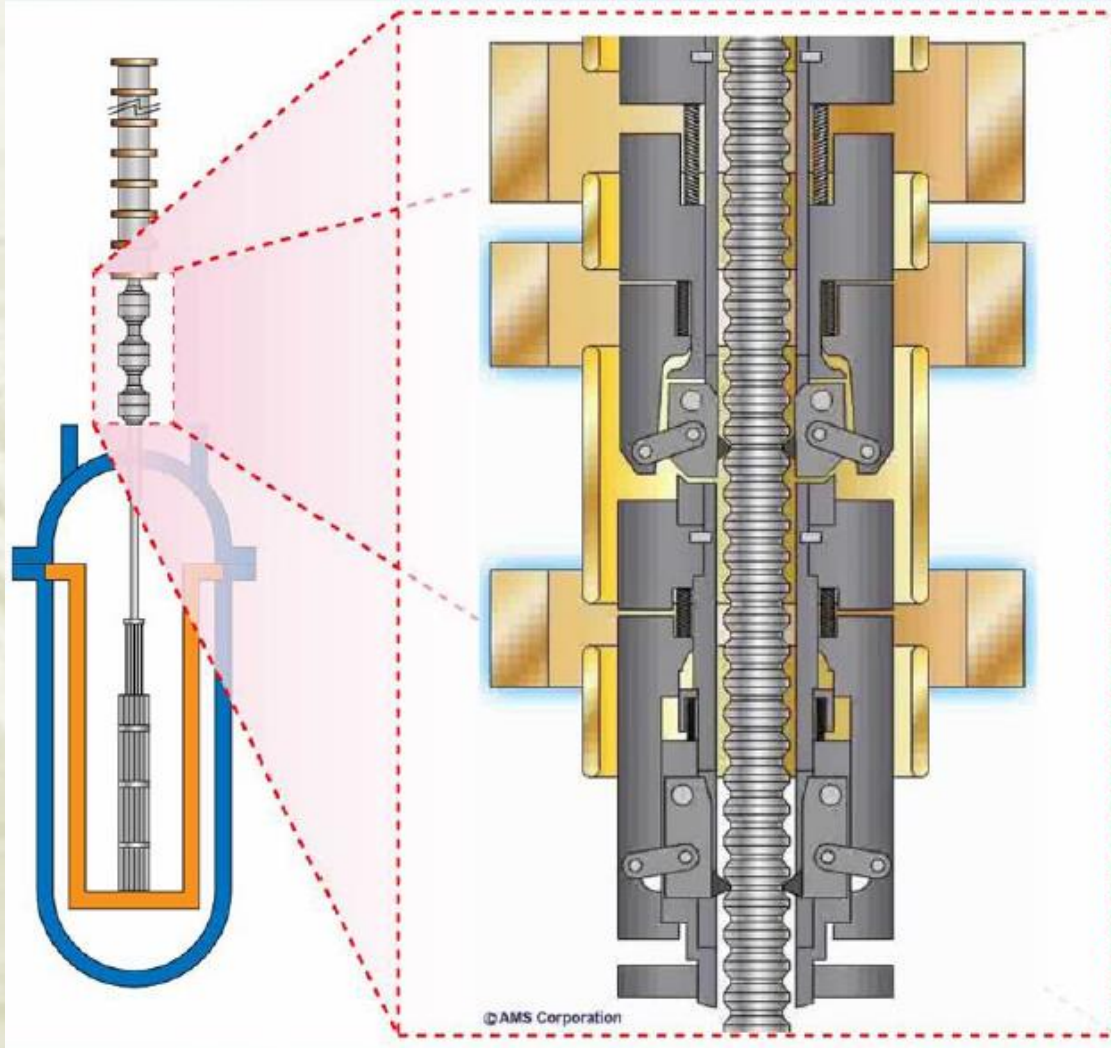
Revised Outage 225 -schematic





- ❑ **The planned work included a large maintenance work scope, several plant refurbishment modifications, as well as the additional steam generator inspections to confirm the operability of the existing steam generators for the next cycle, and the Reactor Pressure Vessel Head Replacement.**
- ❑ During the plant commissioning (end of the maintenance window) and the start-up phase, **several defects emerged which had to be addressed.** Once in the commissioning / start-up phase, emergent defects have a direct impact the outage duration as each defect needs to be resolved before the plan can continue. Thus, the **commissioning / start-up phase took significantly longer than anticipated** and the unit eventually **returned to service on 7 August 2022.** The learnings from these defects has been taken into account in the planning of Outage 126.
- ❑ **On 19 August 2022,** while performing a routine operating periodic test on the Rod Control (RGL) System **one of the control rods was found to be misaligned.** As per the relevant Koeberg Incident Procedure the **Unit 2 was safely shut down** to address the misalignment and **returned to service on 25 August 2022.**
- ❑ **On 3 September 2022,** the **unit tripped while performing the same periodic test on the Rod Control (RGL) System.** (The reactor tripped due to proximity of the control rod to the ex-core detectors.)
- ❑ The Koeberg team, together with the original equipment manufacturer (Framatome) **performed numerous tests on the system and analyzed the results in detail to understand the cause.** Only once all the testing was complete, and the results acceptable was the **unit returned to service on 25 September 2022.** Due to the need to routinely perform the periodic test on the control rods, the risk of further production impact had to be considered. **To mitigate the ongoing risk, the control rods are being moved frequently.**

CRDM - Lift sequence

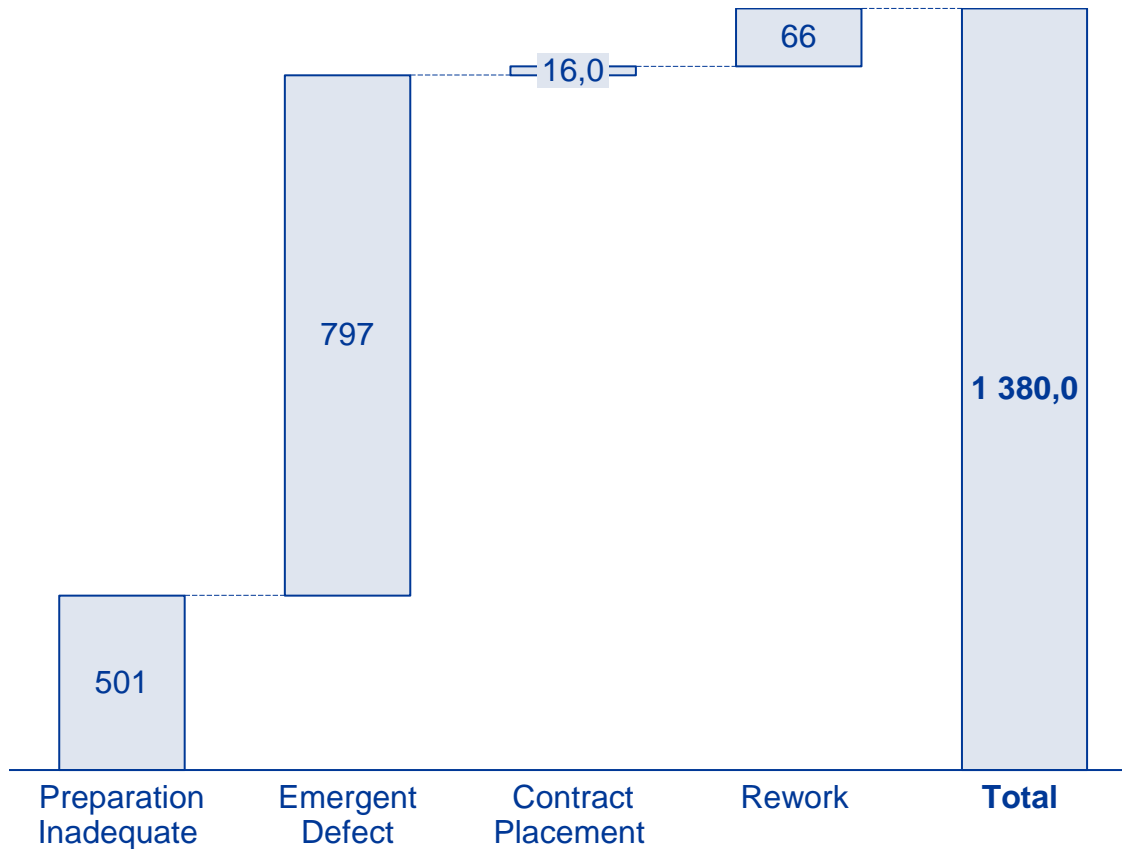


Outage 225 high level delays - overall

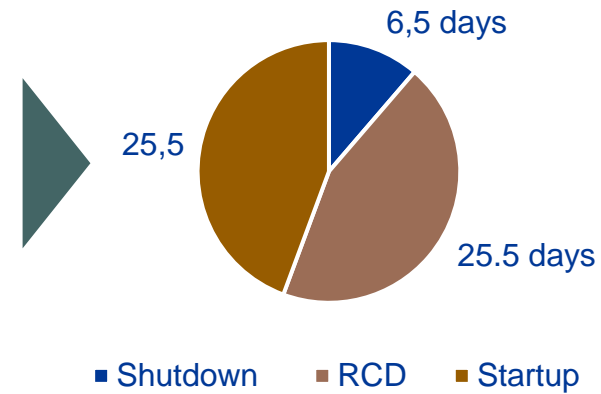
Total Outage delay of 1380 hours (equivalent to 57.5 days)

Total Delays

Time lost in hours

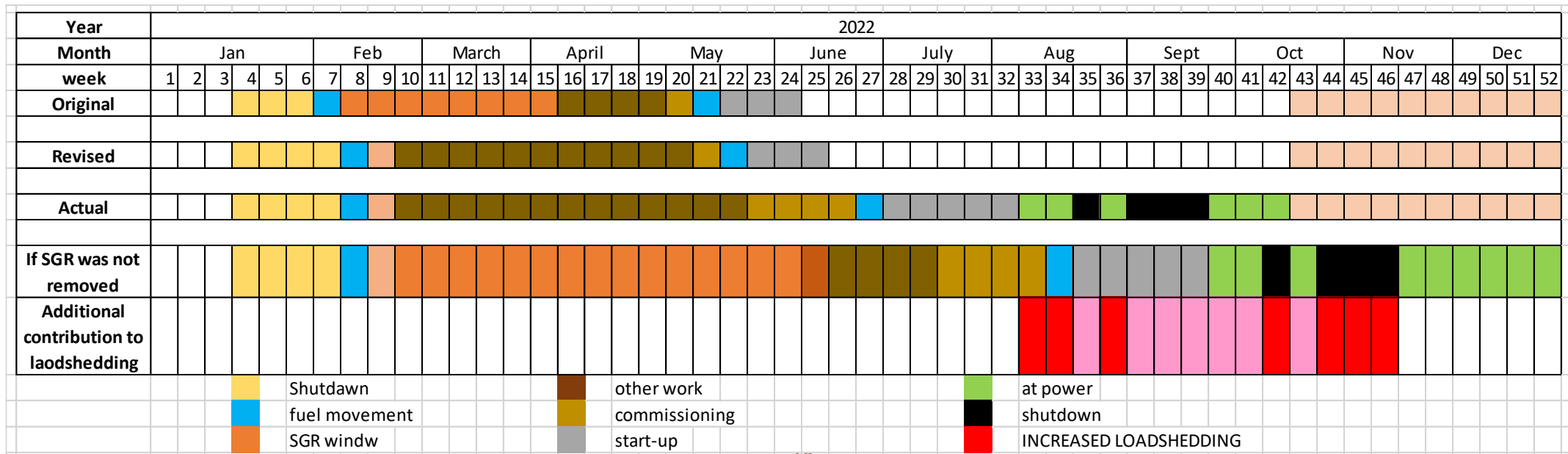


Equivalent to 57.5 days delay



Outage 225 – what if SGR had not been delayed

- ❑ The following timeline reflects the actual return to service of the Unit from outage 225 and the subsequent technical issues.
- ❑ It also reflects the timeline that would have materialized should the SGR have proceeded with the delays projected by the SGR team.
- ❑ It shows that in all probability, the unit would still not have been back in service and would have been increasing the current level of loadshedding.
- ❑ This confirms that the decision to remove the SGR from outage 225, was the correct decision.





- ❑ The **delay in the replacement** on the Steam generators **does not impact the LTO application**.
- ❑ **It does however increase the workload** that has to be performed in the remaining timeframe, which also impacts the resources of the National Nuclear Regulator.
- ❑ **Eskom has received compensation events** from the contractor associated with the deferral. These are still in various stages of assessment.
- ❑ Soon after the deferral of the SGR from outage 225, an **urgent submission had to be made to the Generation Board to request the allocation of additional monies to the project** to allow for the immediate payments **in excess of R650m**, as per a court order which awarded in the favour of the contractor on a compensations dispute originating from before outage 225.
- ❑ The **total outstanding liability** due to all the unresolved compensation events and disputes **is still being evaluated for concurrency and culpability**.
- ❑ As a result, the Generation Board **requested that an independent investigation into the Steam generator Project be performed**.
- ❑ **The Execution Release Approval (ERA) is in the process of being updated** to allocate additional monies to the project to cover the **anticipated outcome of the open compensation events and disputes**. There has been change to the original contract value and **payments have occurred as per the contract**.



- ❑ **Implementation Plan:** The **planning for Outage 126** has been focused with the **Steam Generator Replacement** as the critical path to facilitate integration, and all parties are engaged in the outage challenge sessions to optimize the duration and improve preparation.
- ❑ **Risk identification:** International teams are assisting in performing the risk assessment of the installation plans.
- ❑ **Financial exposure:** An international company experienced in contract claims management and additional legal support have been contracted to assist.
- ❑ **Facilities and station support:** The **needed facilities are complete**, and the identified actions and support needed during the project execution phase have been identified and are either being contracted or provided in-house.
- ❑ Clearly there are still going to be **emergent issues, but all efforts are being made to reduce the risks.**
- ❑ **Level of readiness is more transparent** and much higher than before.

This section on SGR Project Management aims to address the following:

- + **Project Timelines**
- + **Investigations**
- + **Current situation**



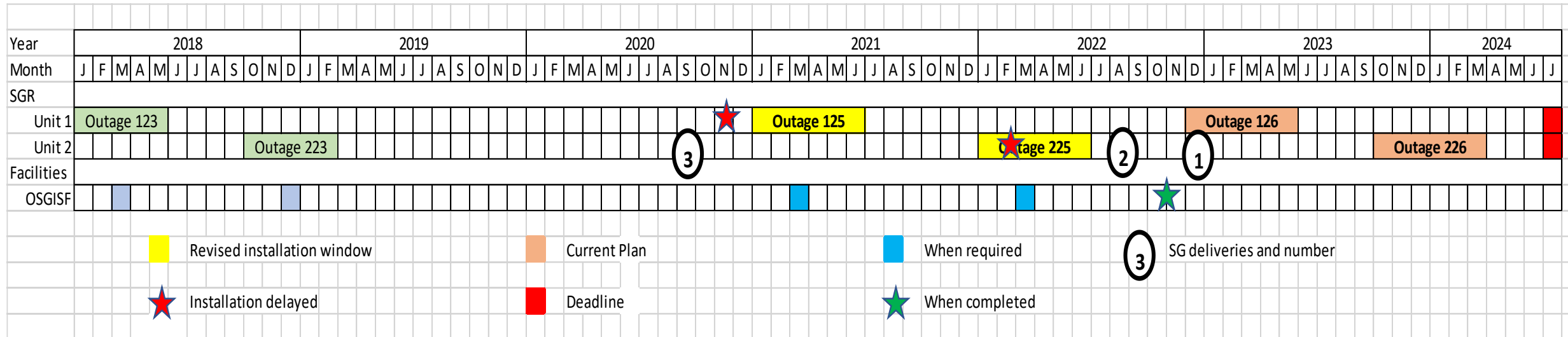


On all projects **it is the responsibility of the appointed Project Manager to manage the scope, quality, timelines and costs** of a project.

- ❖ On the SGR project – the **management of quality identified the manufacturing and design deficiencies** that resulted in the **ability to claim delay damages from the contractor**. However, the same cannot be said for the management and controls associated with the scope, the timelines and the costs.
- ❖ Eskom imposed the maximum delay damages on this contract, **limiting Eskom’s ability to impose further penalties on Framatome for any additional delays, thus** removing all incentive for the contractor to perform.
- ❖ Although it is within the authority of a Project Manager to review, **the SGR team refused to explore any alternative payment schedules that could have reduced the tension with the contractor**. Many people told them they needed to find a way to work with the contractor (as is intended in the spirit of the NE contract) to find a solution. **This was always turned around and used to accuse management of wanting them to “give Framatome money”**.
- ❖ The project management has **always displayed an external locus of control**. When challenged on the project status, delivery, timelines and responsibility, they **avoided responsibility by blaming management and others** (like Koeberg essentially the maintenance department) for not supporting the SGR project team. Often resulting in the raising of a grievance and making allegations about others.

The timelines on the project and the construction of the facilities speak for themselves.

SGR - project timeline related to the facilities



- The initial plan was to install steam generators in outage 125 (starting Jan 2021), yet the facilities were only now being completed.
- The project has always argued that their status would not impact the execution of the project, while Framatome is using the lack of completion in their claims against Eskom. Especially as many of these facilities were an accommodation to Framatome after tender.
- The timeline clearly raises question over the applied level of project planning and the effectiveness of the applied controls.



There have been many incidents associated with the project that have warranted and resulted in various forms of investigation, including:

- **Violation of License Conditions** during the construction of the old SG storage facility..
- **Clarity and communication** of actual project status.
- **Need to defer** the project schedule
- **Need for Eskom to pay a significant amount of money at last minute**, due to a compensation event ruling, without any warning.

The **latest investigation** requested by the Generation Board **is apparently complete**, and ready for presentation to the Generation Board.

The **SGR leadership were placed on paid suspension by the Chief Nuclear Officer (CNO)** while the Board requested investigation was being completed.

At present, **no disciplinary action has been instituted**. Once the report has been received and reviewed, based on a holistic review of the overall effectiveness of the project management and controls that has been applied, disciplinary action, in accordance with the Eskom processes, may be initiated if there is evidence of negligence.



Currently **there has been a significant change in the overall project status** and the integration with the rest of the organization:

- ❑ Detailed focus and raising the urgency on the facilities have resulted in them all **being available earlier than needed**. (there is one exception where the increased urgency has not materialized, which is being dealt with.)
- ❑ The **integration with the station regarding outage planning and maintenance support** is at a new level.
- ❑ **There is improved project status communication** on the actual project status.
- ❑ The **relationship with the contractor**, although still strained, is **now on a different footing**.
- ❑ The **project has established the required controls** associated with project documentation and controls.

This section on Outage 126 aims to address the following:

- + Outage Plan
- + Outage readiness
- + Risk mitigation



Outage 126 - Plan

- ❑ The Outage has been scheduled to **start in December 2022**
- ❑ The outage was **previously scheduled to start earlier** (October) but was moved to December for various reasons:
 - **Fuel efficiency.** – The October shutdown did not allow for the optimum use of the nuclear fuel. Once the studies to enable the unit to enter stretch-out were approved, the operating cycle was change to increase the fuel usage.
 - **Availability of the replacement steam generators.** – The movement of the outage provided a larger buffer to allow Framatome enough time to ensure the readiness of the replacement steam generators.
 - **Time between outages.** – The delay to the start of Outage 126 provided additional time to increase the level of readiness, after the completion of outage 225.
- ❑ **An outage duration of 185 days has been used** in the overall generation capacity planning

Outage 126 - Readiness

- ❑ Outage planning **has been refocused**
 - **Now seen as SGR outage** (limited window for maintenance)
 - **Optimised shutdown window** (to get to SGR window asap)
 - **Framatome schedule being scrutinised** in detail for realism
 - **Continue to optimise schedule and resourcing** for the other (non SGR) work.
 - **Have contracted experienced resources** to assist in areas of Outage management and SGR project/contract management and project control.
- ❑ These will continue right up to the start of the outage.



Current / emergent Risks / Focus:

- ❑ Detailed risk **review of the Steam Generator schedule by an independent consulting company** – In progress
- ❑ A US utility that has recently replaced steam generators will also be assisting in a review of the schedule – **already engaging virtually, on site in November**
- ❑ **Placing additional support contracts**, to maximise where possible the onsite availability of specialised support services during critical periods.
- ❑ Addressing the causes for the delays experienced during the recent outage.

This section on Long Term Operation aims to address the following:

- + What is Long Term Operation
- + Current Status
- + LTO conclusions





- ❑ The original plant design aging assessments **took into account an assumed 40 years of operation.**
- ❑ **During 2019** the National Nuclear Regulator **changed the Koeberg Licence to be valid for the operation of the Koeberg Nuclear Power Station until 21 July 2024 unless,** amended for subsequent licensing stages including long term operation; or varied, suspended or revoked.
- ❑ **This date is 40 years after the date that Unit 1 entered commercial operation.** (Unit 2 entered commercial operation in November of the following year, and Eskom has requested that the licence be changed to reflect a separate date for Unit 2)
- ❑ **The onus is on Eskom to demonstrate to the Regulator that the Safety of Koeberg can be demonstrated** for the period of Long-Term Operation requested through a formal Licence application.

LTO - Koeberg Technical Life of plant overview

60 Year Life expectation (minimum)

Original assumptions (40 years)

LTO Period (20 years)

Business as Usual: Refuelling, Service/Maintenance Plan, Design Improvements.

Future Work as part of normal plant operation

Replaced Turbine, upgraded many control systems, replaced Essential piping, Heat exchangers, Transformers, Chillers, etc

1984

2010

2024

2025

2045

NNR approval

LTO Programme

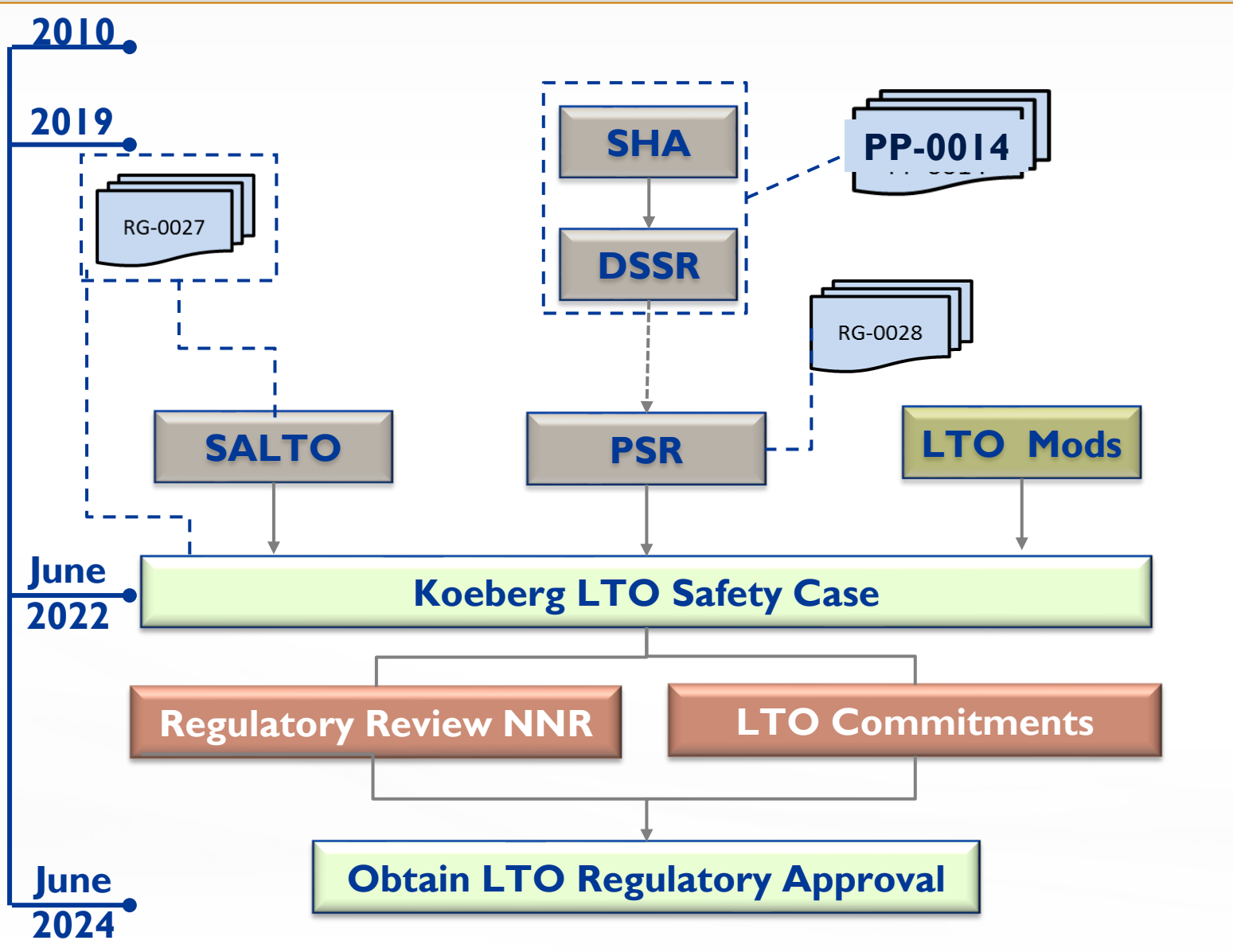
- Understand and map out the approach/requirements for Nuclear License extension,
- Review Nuclear Safety against local and international regulatory requirements and identify any gaps,
- Review the aging mechanisms applicable and ensure they are acceptable for the period of long term operation,
- Identify the projects and activities that are needed to support the licence application

Compulsory activities after 2024/license extension based on LTO studies:

- Updated service/maintenance plans
- Updated Inspection schedule,
- Additional safety monitoring requirements
- Continued plant enhancements

Complete the required Projects and Activities needed to enter LTO

LTO - high level overview



Legend

- SHA** – Seismic Hazard Analysis Studies
- DSSR** – Duynefontyn Site Safety Report
- SALTO** – Safety Aspects for Long Term Operation
- PSR** – Periodic Safety Review
- LTO Mods** – Plant Modifications needed for LTO
- RG-0027:** Ageing management and long term operations of NPPs
- RG-0028:** Periodic safety review of NPPs
- PP-0014:** Considerations for external events for nuclear installations
- RG** – NNR Regulatory Guide **PP** - Position Paper

Safety Assessments

Life Limiting Plant Features

Submission

Purpose

Periodic Safety Review (PSR)

- Provides assurance that the **plant status is acceptable against current safety requirements** (national and international)
- Provides assurance that the **plant is safe to continue operating until the next Periodic Safety review** (10 yr. intervals), subject to the addressing any deviations through completion of corrective actions,

Safety aspects of Long term operation (SALTO)

- The objective of SALTO is to **assess Koeberg's ageing management processes**. The results are used to drive improvement to demonstrate that Koeberg is suited for up to 60 years of operation,
- Part of the process **involves identifying systems, structures and components** (SSC's) that are important to plant and nuclear safety. The design life and limits of these components are evaluated through a rigorous safety analysis to determine its suitability for extended operation.
- The outcomes of the safety analysis **will result in plant upgrades, updated service/maintenance plans, and inspections.**

Duynefontyn Site Safety Report (DSSR)

- **Assesses the magnitude & occurrence probability** of external events and hazards,
- **Assesses site security, public exposure risks & physical characteristics** that could pose a significant impediment to the development and execution of emergency preparedness and response actions,

Submission

Purpose

Safety Case

- The LTO Safety Case documents information and arguments, which substantiate **the safety of the plant, activity, operation or modification**,
- Provides the **overall justification for continued safe operation and commitment to the NNR** on the extent to which the current licensing basis remains valid.

Public Information Document (PID)

- The purpose of the Public Information Document (PID) is to **provide members of the public with sufficient information on the Eskom application sent the National Nuclear Regulator (NNR)** for a variation to the Nuclear Installation License to operate Koeberg beyond 2024, for an additional 20 years.

Nuclear Security review

- Conduct an **overall security risk assessment**. Assess Koeberg security provisions (physical and cyber) to confirm compliance with national regulations, and conformance to international nuclear security standards,
- **Assess Koeberg security provisions in the context of ageing management and Long-Term Operation (LTO)**, identify any deviations from national regulations and international standards and required corrective actions to address the deviations,.

The LTO Safety Case shall, amongst others:

- ❑ Demonstrate compliance with relevant regulatory safety criteria and requirements,
- ❑ Base the application on the results of a safety analysis, with consideration of the ageing of Systems, Structures, and Components,
- ❑ Provide an overall assessment of the safety of the nuclear installation and justification for continued safe operation,
- ❑ Include the necessary safety improvements in the application, including refurbishment, provision of additional Systems Structures and Components, and additional safety analyses and engineering justifications, to ensure the licensing basis remains valid during the LTO period

Licensing Process and Safety Assessments

- **Safety Aspects for Long Term Operation (SALTO):** Ageing management assessment **completed** and submitted to the National Nuclear Regulator (NNR) - Execution of outstanding ageing analyses are in progress,
- **Periodic Safety Review (PSR):** All activities **completed**, and all submissions made to the NNR,
- **Safety Case Compilation:** Compilation is **completed** and has been submitted to the NNR,
- **LTO Public Information Document (PID):** PID **submitted** to the NNR,
- **Nuclear Security:** The security review **in progress** and due to be submitted to the Regulator in Q4.


LTO Activities and Projects

- **Independent review performed** on SALTO work by the International Atomic Energy Agency (IAEA),
- Major Projects needed to address aging issues:
 - Steam Generator Replacement: Installation scheduled in 2023 (outages x26),
 - PTR Water Tank Replacements – **completed** on both Unit 1 and 2,
 - Reactor Pressure Vessel Head Replacement – **completed** on both Unit 1 and 2,
- Duynefontyn Site Safety Report – **in progress** and on track,
- Implementation of the Ageing assessment actions and new management programme – **in progress** and on track,
- Other Plant Enhancements are **in progress** and on track for completion with constant monitoring of the critical path.

Feedback from the IAEA SALTO Review in early 2022:

- Safety Aspects of Long-Term Operation (SALTO) is a process to develop a thorough approach to ageing management as part of the preparations for Long-Term Operation (LTO).
- In early 2022 the IAEA visited Koeberg to perform a review of SALTO (called IAEA SALTO Mission):
 - The IAEA issues guidance documents on how to manage a SALTO process which was followed.
 - The IAEA offer a service to review the thoroughness of how well this process has been applied.
 - The IAEA SALTO review was concluded in March '22
- The report contained two recommendations and twelve suggestions (none were a surprise – the recommendations were associated with work already in progress),
- Recommendations and all suggestions are included in the overall scope of work to be completed.

Public Access to IAEA Report:

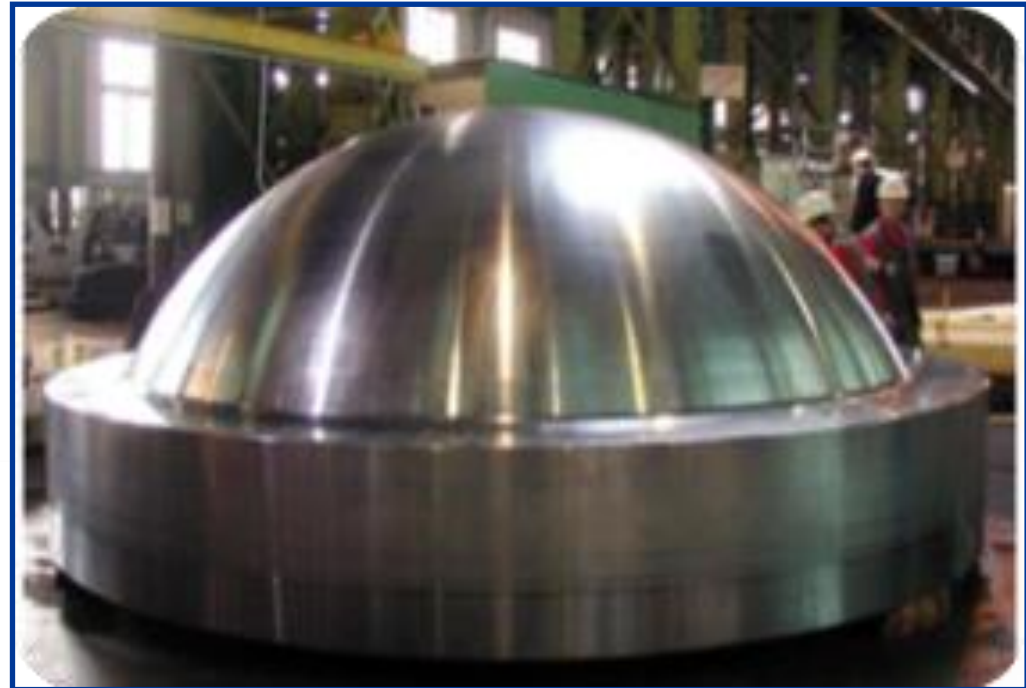


Eskom informed the DMRE (the country interface with the IAEA) that Eskom believes that the IAEA SALTO Review Report, should be published (available on the IAEA website) after their mandatory 90 days of issuing the report. Eskom is not withholding the report from the public.

Refuelling Water Storage Tanks
have been upgraded



The Unit 2 Reactor Pressure vessel head and
control rod drive mechanism have been upgraded



Following the installation of complex new
equipment, occasionally, adjustments are required
to ensure optimal operation



□ Current / emergent Risks / Focus:

- **New dashboard tracking commitments individually.** Monitoring of the critical path for each enables risks to be easily identified to enable mitigation actions to be developed.
- There is still a **lot of work to be done.**
- Biggest challenge remains **getting LCR approved for end date of Unit 2.** (waiting NNR to review the submitted documentation regarding the ILRT and the aseismic bearings)

- Nothing has been identified that will preclude the safe operation of the plant beyond current established timeframes,
 - Long Term Operation (LTO) activities are continuing according to plan, and being closely monitored as slippage could impact the issuing of the required license
 - The Public Information Document has been developed to inform the public on the LTO requirements and Eskom approach
- Eskom has submitted the LTO safety case to the NNR. The NNR has two years to conclude the review and provide an outcome,
 - The NNR will lead the public engagement concerning the Koeberg LTO
 - Eskom understands that life extension approval is not guaranteed, but is a prerogative of the NNR

This section address the following :

- + Other challenges facing Koeberg
- + Resourcing
- + Overall Conclusion





- ❑ Upcoming long outages to facilitate the LTO work – **impact on resources**
- ❑ Loss of experiences as **staff are attracted to other opportunities.**
- ❑ Ongoing challenge due to the ease that mis-information spreads on social media.
- ❑ The current **production uncertainty associated with the recently installed control rod drive mechanisms** on Unit 2.



- ❑ Over the past few years there has been, and continues to be, **a loss of experienced staff**, Eskom has put in place strategies to address the gaps created by the loss of skilled resources. However, **there remains over 1400 well-trained, experienced, and dedicated employees** who continue to diligently perform their duties to ensure the safe operation of Koeberg.
- ❑ The **impact of the skills loss is being experienced in the efficiency** of the organisation and making us more reliant on contractors in the execution of certain activities.
- ❑ During outage 225, **delays were experienced due to the reduced bench-strength** within the maintenance organisation. On some occasions staff who were needed to perform work on the critical path were unavailable as they had to go home to rest.
- ❑ **Koeberg is actively recruiting to rebuild the organisational bench strength** – but this will take time as lost experience takes time to replace.
- ❑ Where possible, **previous staff with the appropriate experience are being hired** to help build capacity, transfer skills, and improve performance.



- ❑ The steam generator Replacement Project **will go ahead during the upcoming outages**, and the **level of preparedness has been significantly improved**.
- ❑ **There are no known risks that would preclude safe long-term operation**. The biggest licencing challenge remains the single end date in the licence which pose a risk to Unit 2 depending on when the licence is amended to allow LTO.
- ❑ The commitments associated with Long Term Operation **are progressing as planned and are being closely monitored**.
- ❑ Once the long SGR and LTO outages are complete, the **overall availability of Koeberg can again improve to on average > 85%**.
- ❑ **Koeberg is a National Asset** that needs to be operated for as long as possible.
- ❑ The rigorous regulatory environment and the regular oversight provided by international experts ensures that **Koeberg is always operated safely**.



Diesel Cost, Repurposing of Komati Power Station and Training of Critical Skills

On diesel you said the maximum cost is R2,4bn – are you budgeting for this amount since you have been reporting that you are running out of funds or for a different amount?

- ❑ The budget for diesel for the OCGTs was **R2,6bn YTD end September 2022** while the actual for the same period was **R9,3bn**. Projections range between **R12bn and R14bn for the year**. Note that **OCGT usage is dependent on system status** as influenced by factors such as variations in demand and the availability of the Generation fleet.

As Koeberg units are suspended, the diesel usage increases and syndicates prey on such situations.

- ❑ Eskom has **learnt lessons from the past** and processes are in place to ensure that only reputable dealers are given diesel supply contracts **in an open and competitive process**, rigorously reviewed by the Generation Board before approval.

Regarding repurposing of Komati Power Station and jobs being at stake – how far and what will become of those individuals?

- ❑ A number of **options for Repurposing and Repowering are being considered** at Komati.
 - ❑ These include **Solar PV with Battery Storage (BESS), Synchronous Condensers, Wind, and Gas.**
 - ❑ **They are all at various stages** of development and evaluation of responses to the Request for Interest.
 - ❑ The **most advanced is the PV with BESS** where operation is anticipated between late 2024 and early 2026.

- ❑ As 8 of the 9 units at Komati **have already been shut down**
 - ❑ staff numbers have **already reduced significantly** due to a combination of **natural employee attrition, voluntary relocation or departure of employees**, to various business units **as a result of promotions** and or **level transfers** where vacancies exist and there was an interest from individuals to relocate.

 - ❑ Komati has also compiled a draft **operational structure to cater for manpower needs after unit 9 shutdown**, based on interim activities anticipated and assistance with the various projects in the short to medium term.

 - ❑ The structure is not yet approved as the **HR principles for relocation of surplus staff still need to be finalised and consulted with organised labour.** Current estimates are that most of the remaining staff will either be required for continuing site activities or utilised in the Repurposing and Repowering or JET projects, or to fill critical vacancies. The principles of relocation for the remaining staff are still to be finalised after consultation with labour.

11 units currently on unplanned outage returning during October, November, December and January 2023

- ❑ **Due to the unreliability and unpredictability of the coal fleet**, as units are returned to service, other units fail so the number of units off-line is fluid.
- ❑ **As at 17h00 on 30 October 2022, 11 coal-fired units were offline** due to unplanned failures (3 units on outage slip are not included).
- ❑ Of these,
 - **5** are expected to return in the next 4 days
 - **3** more in a week
 - **1** by the end of November
 - **1** in December, and
 - **1** in January 2023.

The issue of skills, that Eskom is bleeding, is there a plan to stop the bleeding; are there initiatives to train for these critical skills?

- ❑ The current **Eskom turnover (average 4%) in critical skills is below industry benchmarks (5.9%)** though there is a significantly higher number of retirements in the Generation Business.
- ❑ **Eskom's current employee value proposition** including a proportionately high training spend (**average of R0.900bn**) assist in **retention of skills and development of technical skills**.
- ❑ The retention initiatives include:
 - maintaining a healthy pipeline of **technical trainees (above 1000)**,
 - annual **bursar intake (290)** and a wide network of **decentralised technical training centres** supported by a training centre of excellence (Eskom Academy of Learning) located in Midrand.
 - The **classroom technical training is also supported by on-the-job training** through mentors and coaches.
- ❑ Despite the existing training initiatives, Eskom has also **reviewed and relaunched technical leadership development, general management and supervisory development**.
- ❑ Furthermore, **retired ex power station skills are being brought back** to support management in areas where required.
- ❑ Eskom has also **recently completed a skills audit in the technical functions** and further initiatives will be designed to address the identified skills gaps.

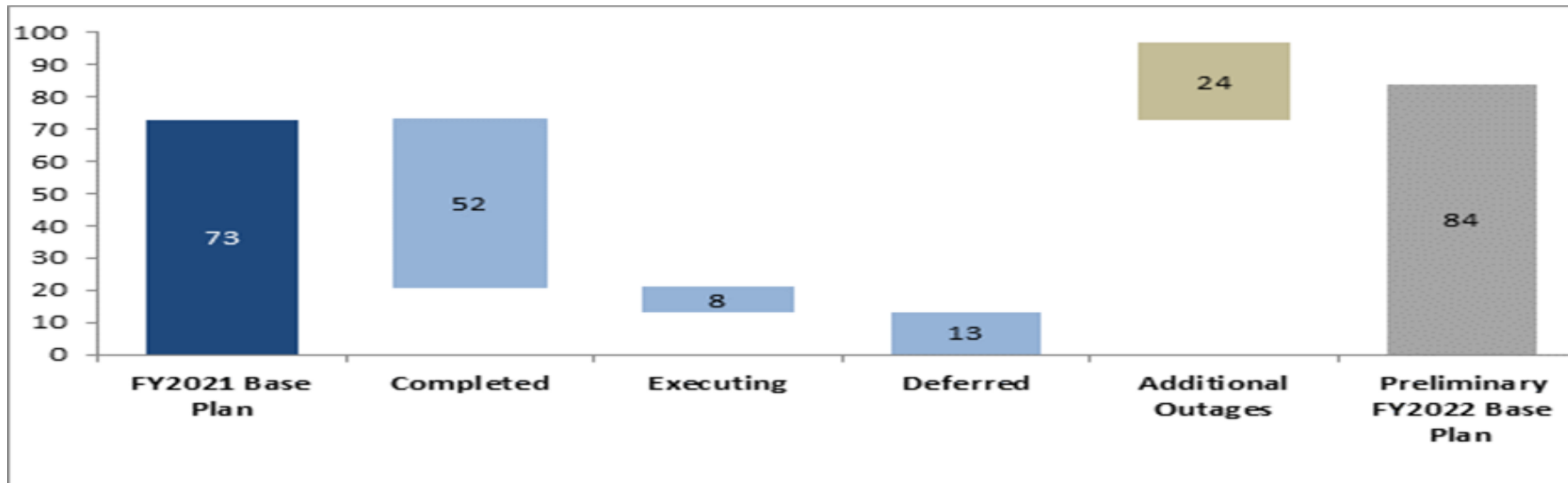
Reliability Maintenance Recovery Plan



- During the FY2021, the **Reliability Maintenance Recovery (RMR) Plan** was embarked on, with the aim of **improving the general performance of 11 targeted fossil-fired power stations**
 - The first 6 months of the programme **particularly focused on nine specific outages**, with the aim of making a step change in outage readiness.
 - Due to the critical need to enhance outage performance, the **focus was extended to all outages in March 2021**
- Challenges were experienced with the **funding of the RMR Plan during FY2022**. Reliability maintenance was sacrificed to ensure that **statutory maintenance received priority to minimise the negative impact on the EAF**.

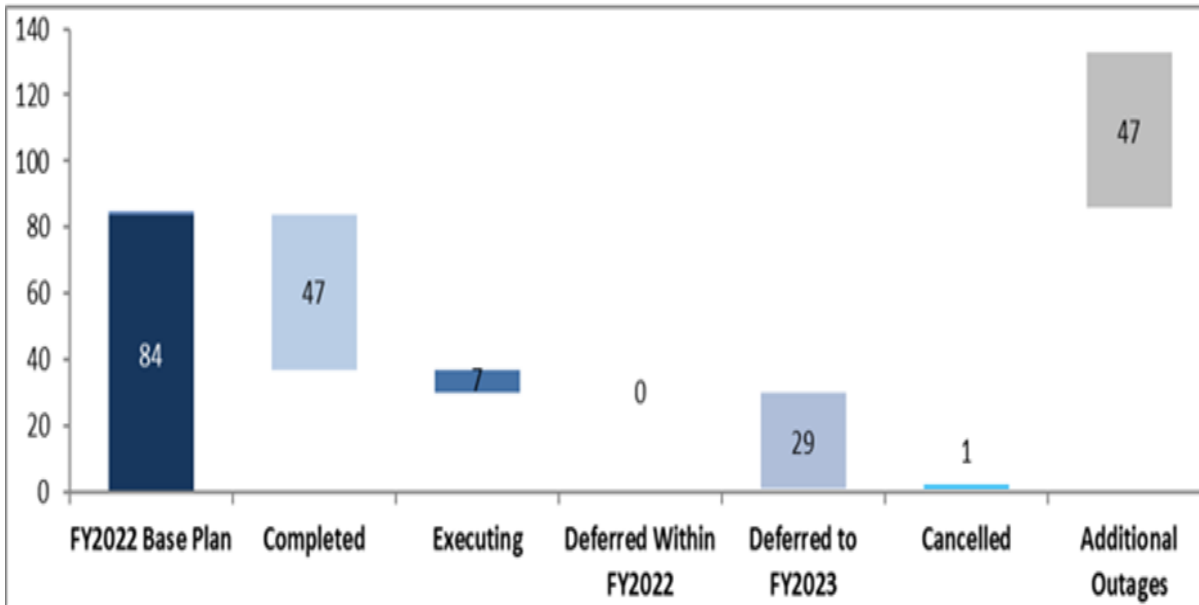
FY2021 Maintenance Status:

- **A total of 73 outages were accommodated in the FY2021 RMR Plan**. As at 31 March 2021, **52 of the 73 outages had been completed**, with only one outage having been completed with RMR involvement



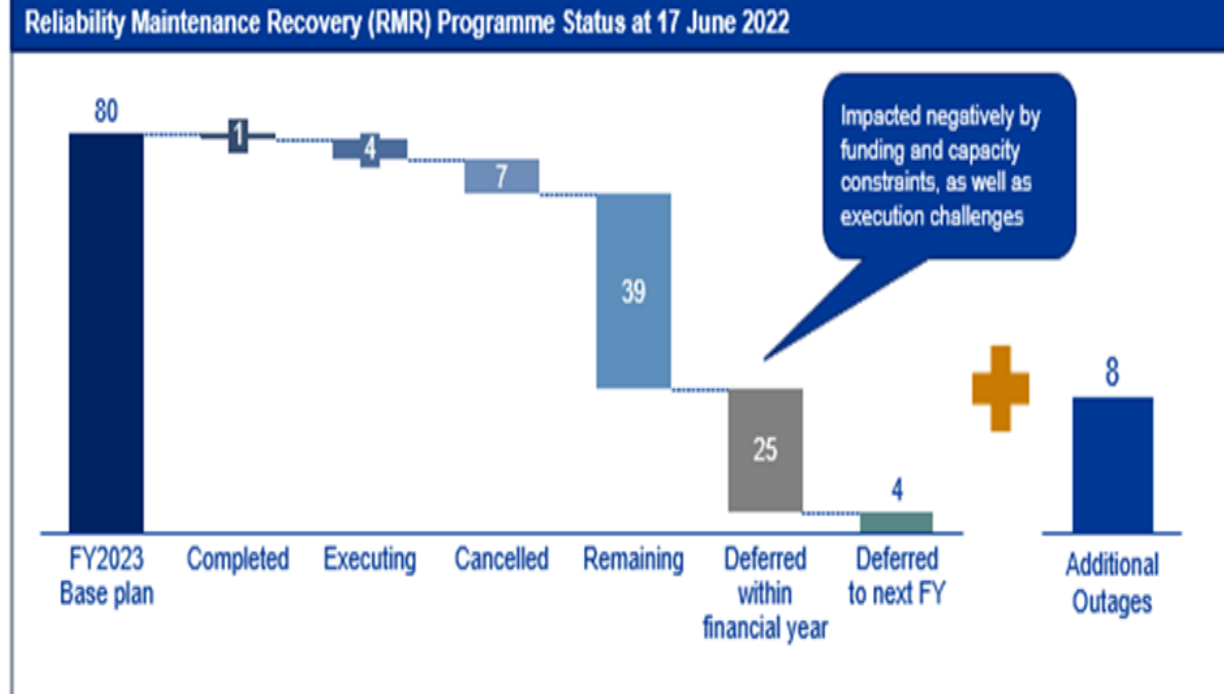
FY2022 Maintenance Status

- As of the beginning of April 2021, **84 outages** were accommodated in the FY2022 RMR Plan. As of 31 March 2022, **54 of the 84 outages** had been **completed**, while **1** had been cancelled. **29 outages** had been deferred to the FY2023 financial year.
- An additional **47 short-term outages** were executed in FY2022 (additional to the 84 planned outages).
- These Outages include **General Overhauls** (86 days); **Mini General Overhauls** (70 days); **Interim Repairs** (30 – 50 days) and **Opportunity Maintenance**.



FY2023 Maintenance Status

- The FY2023 RMR Plan **base line is 80 Outages**, of the 80 outages (as at 17 June 2022) **1** is complete, **4** are in execution, **25** have been deferred within this financial year and **39** remaining, **7** have been cancelled, and **4** outages have been deferred to the next financial year with an additional eight short-term outages having been executed.



Performance of completed outages

- ❑ The main work affecting plant reliability and predictability is **carried out during mini general overhauls (MGOs) and general overhauls (GOs)**. There are currently **16 MGOs and GOs completed** in FY2022 with RMR involvement, with results as shown in the next slide.
- ❑ The **underfunding of outages** due to severe financial constraints has **severely limited the ability of the site** to drive outage excellence. The **constraint will remain over the next five years**, arising from the National Energy Regulator of South Africa's (NERSA) determination of the Multi-Year Price Determination 5 (MYPD5), which will require support from the National Treasury (NT) to expand guarantees.
- ❑ **Outage readiness is hugely dependent on timely funds releases**. Inadequate outage preparation is manifested in outage slips and poor outage performance, as seen in the table below, thereby having a knock-on effect on EAF.

Funding impact on upcoming outages

- ❑ Currently, the **affordability limit for FY2023 to FY2027 is below the base budget** required (by R4,9 billion).
- ❑ In **managing the current budget shortfall**, a priority ranking model is being utilised to allocate capital funding for outages.
 - The priority model is used to categorise the outages **as must-do (Priority 1, or P1), should-do (P2), and discretionary (P3)** to stay as close to the affordability limit as possible.
 - Must-do outages **are those that are typically statutory** (that is, GOs and mini overhauls (MOs)), while should-do outages are those that **will substantially affect station reliability** (mostly interim repairs (IRs)), and discretionary outages **are inspection outages**.
 - In FY2023, **29 planned outages are Priority 1, 19 planned outages are Priority 2, and three planned outages are Priority 3**.
- ❑ The Corporate Plan of **R8,171 billion will not fully fund all P1, P2, and P3 outages**. Without additional funding, **deferral of outages becomes necessary** – and possibly the **shutting down of units that have reached statutory hours**. This will also have an **impact on the production plan and will lead to load shedding**.
- ❑ **Units reaching their dead-stop dates will require shutdown**. All lower-priority outages (P2 and P3) will be affected, resulting in poor reliability.

Enablers required for improved outage performance currently receiving internal focus

- Additional support is required from **Exco, the Board, and the National Treasury on ensuring timeous and adequate outage funding**.
- **Human capital** requires focus with regard to complement, competence/proficiency, contractor capacity, and capability.
- **Disciplined execution is necessary**, particularly in the planning and execution of routine maintenance and outages.
- **A motivated workforce is critical in the turnaround of Outage performance**: an automated system has been developed and implemented in Generation Division to generate and send customized birthday and anniversary messages, to uplift the demotivated workforce and improve communication. The system send a customized emails from the Group Executive: Generation to the employees, congratulating them on critical milestones.



Conclusion