System Status Briefing

Jan Oberholzer
Chief Operating Officer
04 September 2019
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2 Review of Winter 2019

3 Prognosis for the next seven months (Summer Plan)

4 9-point Generation Recovery Plan

5 Conclusion
Overview

- Eskom has kept the lights on throughout winter, with 164 days of no loadshedding
- Progress with New Build - all six Medupi units connected to the grid; Medupi Unit 3 in commercial operation on 5 July 2019, and the last unit Medupi Unit 1 synchronized to grid on 27 August 2019
- Sustained performance from Koeberg and Peaking power plants
- Sustained good performance from transmission and distribution networks, despite an increase in illegal connections, vandalism and equipment theft
- Coal stockpiles remain at healthy levels with only one power station currently below the NERSA’s Grid Code requirements
- In Summer, the power system remains tight and vulnerable due to increased maintenance, the high temperature impact on some power stations and the high air-con load throughout the day
- An average of 5 500 MW planned maintenance will be performed and the aim is to keep unplanned plant breakdowns below 9 500 MW to safeguard against loadshedding
- An increased usage of diesel and pumped storage hydro plants (emergency reserves) to supplement capacity over this period
- A concerted effort from customers to use electricity efficiently remains necessary
# Overview of Transmission, Distribution and New Build performance

<table>
<thead>
<tr>
<th>Division</th>
<th>Performance Status</th>
</tr>
</thead>
</table>
| **Transmission** | • Transmission performance experiences challenges:  
  ‒ 18 interruptions YTD vs YE target of 34  
  ‒ 2.65 SM<1 losses YTD vs YE target of 3.53  
  ‒ 1 major incident (Apollo-Njala operating error)  
  ‒ 3 incidents involving severe plant failures (with a combined SM impact of 1.36) impacted restoration response times  |
| **Distribution** | • Localised network outages are impacted by an increase in illegal connections, vandalism and equipment theft  
  • Frequency of interruptions – 14.6 (YTD) vs YE target of 19.6  
  • 62 241 customer electrification (YTD) vs YE target of 177 000  
  • Outage durations – 37.7 vs YE target of 38  |
| **New Build** | • Medupi Unit 3 in commercial operation on 5 July 2019  
  • Units synchronised to the National Grid:  
    ‒ Medupi Unit 1 (27 August 2019) and Kusile Unit 3 (14 April 2019)  
  • 41 km of transmission lines constructed, against a target of 29km for the period April – August 2019 (year end target 155km) |
Generation performance for YTD August FY2020

- **Availability vs. 71.5% target for Q2 FY20:** 70.39%
- **UAGS trips vs. 159 for FY19 August YTD:** 249
- **Partial load Losses vs. 3500 MW for YTD FY20:** 3575 MW
- **Planned maintenance vs. 7.5% target Q2 FY20:** 8.58%
- **Unplanned load losses vs. 19.5% target for Q2 FY20:** 19.54%
- **Open Cycle gas turbines cost vs budget of R5.4bn:** R1.4bn*

*Includes preliminary costs for August

FY2020 YTD figures as at 31 Aug 19
Performance has been improving since the beginning of FY20, with a decline in August, as per seasonal trends. This is still below the aspiration.

### Generation monthly and YTD performance

<table>
<thead>
<tr>
<th>Percentage (%)</th>
<th>FY19 YE</th>
<th>Apr’19</th>
<th>May’19</th>
<th>Jun’19</th>
<th>Jul’19</th>
<th>Aug’19</th>
<th>FY20 YTD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>70.0</td>
<td>67.7</td>
<td>71.5</td>
<td>71.4</td>
<td>71.6</td>
<td>69.8</td>
<td>70.4</td>
</tr>
<tr>
<td><strong>OCLF</strong></td>
<td>18.3</td>
<td>18.5</td>
<td>17.6</td>
<td>21.4</td>
<td>21.3</td>
<td>19.2</td>
<td>19.5</td>
</tr>
<tr>
<td><strong>UCLF</strong></td>
<td>70.0</td>
<td>57.7</td>
<td>9.4</td>
<td>5.7</td>
<td>5.5</td>
<td>8.6</td>
<td></td>
</tr>
<tr>
<td><strong>EAF</strong></td>
<td>10.1</td>
<td>12.5</td>
<td>9.4</td>
<td>5.7</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Contributing factors

- Undesired coal quality
- Financial and capacity constraints leading to minimal refurbishments and maintenance on ageing fleet (Midlife Refurbishments)
- Outage execution slips
- Ops and maintenance skills – availability and training

FY2020 YTD figures as at 31 Aug 19
Key insights

- Partial Load Losses (PLLs) contributed the most to UCLF for FY2020 August YTD.
- LT5 adds 1.35% UCLF to the base over an extended period.
- Major Events add 1.30% to the base over an extended period.
- UCLF improved in August at 19.2% as compared to June and July where it was 21.4% and 21.3% respectively.
- Major events of 1.30% comprise 5 events at 4 stations (Kriel 2 & 3, Matla 5, Hendrina 6 and Kusile 1) each with a load loss > 300 GWh.
- Other full load losses of 2.05% comprise 230 separate full load loss events (load losses < 300 GWh).

Note: 300 GWh is equivalent to a 600 MW unit being out for approximately 3 weeks.
Key Insights

- **Kendal, Arnot, Tutuka, Medupi and Kriel** contribute about 62% of the total Partial Load Losses YTD.

- **Draught Plant, Gas cleaning, Milling Plant, Feed water and Ash Plant** were the main contributors (79% contribution) for August YTD.
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Eskom implemented no loadshedding in Winter

No loadshedding was implemented, against the risk of 26 days of potential Stage 1 loadshedding as forecasted in the Winter plan:

1. Energy Availability Factor 70.39 (August 2019 YTD) vs 67.7 (April 2019)
2. Successful implementation of 9 point Generation Recovery Plan
3. Generation unit breakdowns were maintained below 9 500 MW for most of the time
4. Demand was lower for most of Winter due to warmer weather and the economic climate
5. Other emergency resources such as demand response products and interruptible contracts (ILS) also contributed significantly towards demand peak shaving
6. Three non-commercial units from Medupi and Kusile, delivered an average production of 1 300 MW during commissioning phase
7. The Cahora Bassa (Apollo HVDC line 2) was successfully recovered, connecting the full compliment of 1 200 MW of imported renewable energy to the grid
8. Kriel Unit 2 (475 MW) & Matla Unit 5 (575 MW) returned to service adding 1 050 MW to the grid

Less diesel was utilized than planned YTD actual R1.4bn versus budget of R5.4bn
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Overall objective for Summer (next 7 months)

- Avoid loadshedding
- Execute an average of 5 500 MW of planned maintenance
- Keep unplanned plant breakdowns below 9 500 MW to safeguard against loadshedding
- Drive sustainable transmission and distribution network performance
- Encourage public participation and energy saving initiatives
What drives the summer plan?

- Customer usage generally changes from a typically high demand peak usage in the evenings during winter, to a reduced but sustained flat demand all day in summer.

- Eskom uses this opportunity to take more generating units out of service for maintenance (Average of 5 500 MW).

- Warmer than normal temperatures expected, impacting the demand profile and plant performance (Average max. demand 30 000 MW).

- Three unplanned breakdowns (UCLF) scenarios considered: 8 500 MW, 9 500 MW and 10 500 MW.

- The Summer Plan balances the need for increased maintenance against the risk of unreliable plant performance.

- The usage of pumped storage and OCGT diesel generation to supplement capacity is necessary but consistent usage could result in a rapid depletion of emergency resources which could lead to loadshedding.

- No coal related risks are expected throughout the summer months.
## Summer Scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>UCLF Range</th>
<th>System Outlook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>&lt; 9 500 MW</td>
<td>• Minimum amount of diesel will be required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Loadshedding not expected</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>9 500 MW &lt; 10 500 MW</td>
<td>• Significant amount of diesel will be required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Loadshedding not expected but risk increases</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>&gt; 10 500 MW</td>
<td>• High level of diesel utilisation will be required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Loadshedding cannot be ruled out if sustained for long duration</td>
</tr>
</tbody>
</table>

An average of 5 500 MW (up to 8 624 MW) of planned maintenance in Summer
Risks that could result in loadshedding

- New trips and plant breakdowns (e.g., Boiler tube leaks, etc.)
- High vacuum levels due to high temperatures (Matimba PS)
- Delay in returning plant to service after a planned outage (outage slip)
- Any macro factors such as protests, adverse weather or strike action could further impact plant performance
- Utilisation of emergency resources for consecutive days, could impact dam levels and diesel fuel stock
- Increased theft and vandalism could impact network performance
- Severe weather conditions impacting imports
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5. Conclusion
The plan covers load losses, coal stock, people issues and preparation for adverse circumstances.

1. Fixing new plant
2. Fixing full load losses and trips
3. Fixing units on long-term forced outages
4. Partial losses and Boiler tube leaks
5. Fixing outage duration and slips
6. Fixing human capital
7. Prepare for increased OCGT usage
8. Reduce emissions
9. Fixing coal stock piles

Recommendations from Ministerial Task Team enhances plan.
Since inception, we have made implementation progress (1/6)

<table>
<thead>
<tr>
<th>Stream</th>
<th>Status in November 2018</th>
<th>Progress to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fix new plant</td>
<td>• Established SWAT team to guide recovery</td>
<td>• <strong>Boiler modifications tested</strong> at Medupi Unit 6 – decision on final solution in process</td>
</tr>
<tr>
<td></td>
<td>• Identified design errors at Kusile and Medupi</td>
<td>• <strong>Ingula units upgraded</strong> from 245MW to 300MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multiple enhancements made to <strong>Medupi milling plant</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased <strong>operational stability at Medupi</strong> a key contributor to avoid winter load-shedding</td>
</tr>
<tr>
<td>Fix unit trips</td>
<td>• Initial focus was to:</td>
<td>• Trips <strong>remain a concern</strong>, though higher trip levels expected due to “teething troubles” of new units</td>
</tr>
<tr>
<td></td>
<td>– enhance timeous trip analyses and correctives actions</td>
<td>• Re-established the trip <strong>root-cause analysis</strong> process</td>
</tr>
<tr>
<td></td>
<td>– improve maintenance effectiveness and spares management at Medupi</td>
<td>• Enhanced operational focus at 4 stations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Good progress in reducing trips at <strong>Medupi and Tutuka</strong>.</td>
</tr>
<tr>
<td>Stream 3</td>
<td>Fix units on long-term forced outages</td>
<td></td>
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<tr>
<td>-----------------</td>
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<td></td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td><strong>Status/Progress</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Lethabo Unit 5 (600MW) | • High Pressure steam pipe failure on 10 October 2018  
• Procurement process unlocked with National Treasury, contractors appointed and work commenced  
• Planned outage scope executed during repair time  
| Targeted Return Date end Dec 2019  
| Duvha Unit 4 (600MW) | • On 23 August ‘17, turbine tripped on generator stator earth fault – returned on 6 Nov 2018 but was shut down again to address a Generator H₂ leak  
| Returned  
| Grootvlei Unit 2 (200 MW) | • Auxiliary steam range pipe burst on 26 January ‘18  
• Also experienced Generator issues  
• Initial delay due to funding constraints  
| Returned  
| Kriel Unit 2 (600MW) | • Stator earth fault on 03 May ‘18  
| Returned  
| Matla Unit 5 (575MW) | • Cold reheat non return valve leak experience on 05 February 2019  
| Returned  
| Duvha Unit 1 (600MW) | • Generator Stator fault on 17 Jul 2019  
• Stator rewind required  
• Return date Dec 2019  
| Under assessment. Return date to be confirmed  
| Duvha Unit 3 (600MW) | • Progress pending legal action  
| To be confirmed  

Since inception, we have made implementation progress (2/6)
Since inception, we have made implementation progress (3/6)

<table>
<thead>
<tr>
<th>Stream</th>
<th>Status in November 2018</th>
<th>Progress to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>63 outages scheduled to address load losses till Dec 2019</td>
<td>Year-to-date PLLs of 3 575 MW against a target of 3 500 MW</td>
</tr>
<tr>
<td></td>
<td>Boiler tube failure strategy in place</td>
<td>Detailed review of boiler tube leaks conducted and implementation plans per station in process.</td>
</tr>
<tr>
<td>5</td>
<td>Allocated specialist resources at each station to focus on planning, readiness and execution</td>
<td>Timeous and quality execution of outages still a challenge</td>
</tr>
<tr>
<td></td>
<td>Developed plan to focus on Rotek performance – enabling contracts, skills, spares and quality management</td>
<td>Outage staff relinked to power stations for direct control over execution</td>
</tr>
<tr>
<td></td>
<td>71 outages (FY20), 12 completed, 9 in execution and 8 deferred.</td>
<td>All funding for the FY20,21,22 released</td>
</tr>
</tbody>
</table>

1. There will be continued focus to drive the outage plan, however funding is a constraint 2 Failures including preventables.
Since inception, we have made implementation progress (4/6)

<table>
<thead>
<tr>
<th>Stream</th>
<th>Status in November 2018</th>
<th>Progress to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Fix human capital</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Identified critical vacancies and skills gaps at Power station management, operations and maintenance areas</td>
<td>• Generation <strong>Group Executive</strong> appointed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Support staff relinked</strong> to Power Station Managers to support on-site operational control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All Generation <strong>critical vacancies</strong> identified, targeted to be filled by December 2019</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• External appointment of <strong>205 Eskom trained plant operators</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All 9 Point Plan identified critical skills to be filled as part of the above process.</td>
</tr>
<tr>
<td>7</td>
<td>Prepare for increased OCGT usage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Tank levels for diesel was low with constrained supply and excessive usage</td>
<td>• <strong>Lower than anticipated usage</strong></td>
</tr>
<tr>
<td></td>
<td>• Finance developed plan to secure supply of diesel</td>
<td>• July 2019 load factor of <strong>3.92%</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tank levels in recent weeks <strong>above 90%</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Final approval of <strong>five-year diesel purchasing agreements</strong> targeted to be approved by end September 2019.</td>
</tr>
</tbody>
</table>
Since inception, we have made implementation progress (5/6)

<table>
<thead>
<tr>
<th>Stream</th>
<th>Status in November 2018</th>
<th>Progress to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce Emissions</td>
<td>• Eskom not implementing emission retrofit projects within committed timelines could lead to medium term risk of 9 000 MW.</td>
<td>• Stream focus changed to “Reduce emissions”</td>
</tr>
<tr>
<td></td>
<td>• Non-compliance to Atmospheric Emission License limits could lead to a short term risk of 4 470 MW.</td>
<td>• Focus on 7 of the 87 generation units where emissions are high - a potential risk of 4 470 MW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Strong focus on expediting projects to ensure timeous legal compliance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Kendal emissions have reduced in August reducing the number of units which are operating with high emissions to 4.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Matla emissions reduced on the one high emitting unit</td>
</tr>
</tbody>
</table>
Since inception, we have made implementation progress (6/6)

Stream 9  Fix coal stockpiles

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Status in November 2018</th>
<th>Progress to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 10 stations below Grid Code requirement</td>
<td>• 1 station below Grid Code requirement but above 15 days</td>
<td></td>
</tr>
<tr>
<td>• 5 of the 10 stations below 10 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stations impacted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Arnot, Camden, Duvha, Hendrina, Kendal, Komati, Kriel, Majuba, Matla and Tutuka</td>
<td></td>
<td>• Kriel</td>
</tr>
<tr>
<td>Stock pile levels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 25.2 days</td>
<td></td>
<td>• 50.0 days as at 03 Sept 2019</td>
</tr>
<tr>
<td>• Projecting to grow to 28.2 days by 31 March 2019</td>
<td></td>
<td>• Actual stock days 35.6 days on 31 March 2019</td>
</tr>
<tr>
<td>• All stations reach expected level by Feb 2020</td>
<td></td>
<td>• All stations reach expected level by Dec 2019</td>
</tr>
<tr>
<td>Coal Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Coal Quality – Good progress with coal quality related OCLF at 0.66%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant improvements at Matla. Further improvements not necessarily financially viable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Rain: Mitigations in place include compacted dry strategic stockpiles and wet coal handling procedure – continued focus on remaining 2 power stations to ensure sufficient dry coal.</td>
<td></td>
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</tr>
</tbody>
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Conclusion

- Eskom is committed to recovering its operational performance
- The generation 9-point recovery plan is on track and has yielded some positive results
- Reducing outage slips remains a key focus area during summer maintenance season
- While planned plant maintenance remains a priority (average 5 500 MW), keeping unplanned plant breakdowns below 9 500 MW is necessary to safeguard against loadshedding
- Heightened focus on sustained transmission and distribution network performance
- No risk foreseen for coal stock days in summer
- The summer plan will be reviewed on a regular basis in response to changes on system performance
- We appeal to customers to continue to use electricity sparingly, as the risk of loadshedding remains
It can be this easy for households to **save electricity** (and costs) during **summer**

1. **Use the cold water tap** rather than using the geyser every time.
2. **When you leave the room, remember** to switch off the lights.
3. **Set your swimming pool pump** cycle to run twice a day, three hours at a time for **optimal energy use**. And avoid running a cycle between 5pm and 9pm to support the power system.
4. **Set air-conditioners’ average temperature in summer at 23°C**.
5. **Be energy efficient and change your light bulbs to energy efficient lights/LED’s**.
6. **At the end of the day, turn off** computers, copiers, printers and fax machines at the switch. **Avoid stand-by** or sleep mode.
Thank you