ESKOM: “SWEATING THE ASSETS”

Compiled by: Nigel Volk and Malcolm Fawkes
Introduction

• Eskom Generation consists of:
  – 1 Nuclear Power Station
  – 2 Pumped Storage Power Stations
  – 2 Hydro Stations
  – 10 Operational Large Coal Fired Power Stations
  – 3 Mothballed Coal Fired Power Stations
  (Eskom also has other smaller supply sources).

• Eskom Plant consistently operates with availabilities which compare very favourably with the best utilities in the world and as a consequence Eskom has received numerous awards for its technical achievements. The coal plant also runs with load factors which are high by most international standards.
# International Sales Comparisons

<table>
<thead>
<tr>
<th>Company</th>
<th>Country</th>
<th>Sales TWh</th>
<th>Rating by sales</th>
</tr>
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<tbody>
<tr>
<td>RAO-UES</td>
<td>Russia</td>
<td>636</td>
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<tr>
<td>EDF</td>
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<tr>
<td>E.On</td>
<td>Germany</td>
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<td>KEPCO</td>
<td>South Korea</td>
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<td>TEPICO</td>
<td>Japan</td>
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<td>RWE Energie AG</td>
<td>Germany</td>
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<td><strong>Eskom</strong></td>
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<td>Vattenfall</td>
<td>Sweden</td>
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<td>Eletrobras</td>
<td>Brazil</td>
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<td>Kansai Electric Power Co.</td>
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<td>FPL</td>
<td>USA</td>
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</table>
• Load Factor is the measure used to indicate how frequently and how hard the individual units run.
• **Nuclear** units run base load – they generally run hard.
• Because SA is a dry country the **Hydro** capacity is constrained by the inflow to the catchment area which is limited.
• **Gas turbines** and pumped storage have low duty cycles. Because of high energy cost they only run when absolutely necessary at the times when the demand reaches its peak.
• Hence the greatest variability of supply of power is from the **Coal Fired** units. It is in this area that the comparison to utilities in the USA and Europe becomes relevant.
Koeberg has consistently increased its energy output over its life and (allowing for current circumstances) its contribution to the Eskom grid has been significant.
The Hydro Stations are currently running hard!

Because water is such a scarce resource Eskom attempts to use it wisely. This year is a rare case where due to unusual rainfall Gariep actually overflowed even though the station was generating at full capacity at the time.
Eskom’s Gas Turbines don’t often run – but when they do they run hard!

The gas turbines in Eskom would normally generate less than 10 GWh per year (average over last 10 years).

An example of sweating the assets would be the fact that from November 2005 to March 2006 the same gas turbines generated 75 GWh! This was while supporting the grid in the Cape.

These assets have been called upon in an hour of need to fulfill an important role which they have done adequately under the circumstances.
Base Load Stations are those defined to run with load factors of 80%+

40% of Eskom’s coal stations run at this level which compares favourably with our USA peers for example.
Eskom Generation’s Load Factor since 1985

The Eskom stations are currently operating at load factors higher than any time in recent history.
Eskom Management brought about a dramatic improvement in availability of the individual units from 1994 onwards.
Eskom’s availability was lower than the USA average in the years before the early 1900’s but improvements from then took Eskom to a new plateau which is currently being sustained.
Most Eskom stations have 6 individual units – with the units more available the load factor on individual units at Eskom stations picked up from 1999.
Sweating the Assets

1. Load Factor demands on the Coal Fired Power Stations are greater then before and greater than many international utilities.
2. Availability of Eskom units is generally much higher than international benchmarks.
3. Load Factor per unit at the stations is rising steadily to be soon at levels last seen in 1985 as well as point 1 above.
4. Stations ageing where average age about 15 years, so wear and tear increasing.
5. It will be necessary to keep a very close eye on maintenance practices involved in the stations to ensure long term health.
Eskom burns some of the most abrasive coal in the world which causes erosion in the boilers. This can be seen in boiler tube leaks. Note link to load factor shown by red line (some exceptions).
Load Factor Affects Costs

It’s often difficult to show the relationship between Maintenance cost and load factor – this example was made possible by specific circumstances at Tutuka Power Station but highlights the relationship well.
Growth in demand projected to be between the red and purple lines which necessitates the re-introduction of the mothballed stations, followed by new capacity.
The mothballed Stations will increase capacity in Eskom by almost 10% once all units are commissioned. These stations had less years service than 20 - 30% of the current installed base. They will provide important capacity increase and some are already operating.
The Balance between Demands and Responses

“SWEAT THE ASSETS”
INCREASED LOAD DEMAND

INCREASED FOCUS ON MAINTENANCE
INCREASED LOAD FACTOR
Eskom is proud of its record in terms of emissions from its stations and although the stations are being required to run much harder than before they are strictly controlled in terms of their emissions.
Eskom is intensively training for the future. This team is the latest professional group being trained to become future station management.
Eskom has been sweating its assets for the last few years and will continue to do so for the next few.

With the experience we have gained, the journey forward will be an informed one though.

Effective maintenance is the key to ensure sustainability and Eskom is responding appropriately.

Thank You