Load shedding
Understanding the facts
Introduction

- Eskom and its employees have faced extraordinary challenges and risks in ensuring a reliable supply of electricity.

- We need to focus on the maintenance of our generating plant and limit use of Open Cycle Gas Turbines to what is sustainable to the organisation.

- We will implement load reduction as and when it is required to ensure that we have an adequate balance of supply and demand to protect the power system.

- It is important that we protect the national power system from the risk of a national blackout.
Managing demand

• It remains crucial for all South Africans to ‘Beat the Peak’ from 5pm to 9pm in winter. During these hours, the demand for electricity is exceptionally high due to excessive use of space heating, cooking appliances and geysers.

• During summer months, demand is high throughout the day up until 10pm, predominantly due to increased use of air-conditioning, geysers and pool pumps.

• In addition, planned maintenance increases significantly in summer which means we have less capacity to supply demand.

• This makes it important for consumers to reduce consumption during summer too…and remember the call to “Live Lightly”.

• In the event of unplanned activities within the value chain, load shedding could occur…
  
  • throughout the day up until 10 pm in summer
  
  • Particularly during the 5 – 9pm peak in winter
Eskom profile

- Eskom has over 46 000 **employees** powering our great nation
- Eskom serves millions of South Africans and help Eskom to **generate, transmit and distribute electricity** to:
  - Over 5 000 000 direct customers every single day
  - 226 local municipalities
  - 44 district municipalities
  - 8 Metros
We have 23 stations with 123 units.
Eskom’s fleet of power stations generate just over 42 000MW

37 297MW

- Coal
- Nuclear

Base load power stations (run 24/7)

4 409MW

- Pumped storage
- Hydro
- Gas turbine

Peaking power stations (as and when we need them – mostly during the morning and evening peak demand periods)
Overview of the residential market potential

The residential sector is a significant electricity user in South Africa, specifically with respect to its contribution to peak demand.

The appliances with the highest usage are the geyser and kitchen appliances.

### Off-peak consumption (% annual consumption)

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<th>Residential</th>
<th>All other sectors</th>
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### Demand in peak hours (% peak demand)

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Within the sector, the prevalence of technologies and end uses vary across market segments

Market segment 1
(~13% of households)

LSM 1 – 3
(number of appliances)

- 2.3 m lighting
- 0.7 m geysers
- 1.3 m pool pumps
- 2.7 m televisions
- 0.04 m kitchen appliances
- 3.2 m laundry

Market segment 2
(~64% of households)

LSM 4 - 7
(number of appliances)

- 35.6 m lighting
- 9.1 m geysers
- 0.04 m pool pumps
- 2.7 m televisions
- 25.4 m kitchen appliances
- 4.5 m laundry

Market segment 3
(~24% of households)

LSM 8 – 10
(number of appliances)

- 37.5 m lighting
- 3.5 m geysers
- 0.6 m pool pumps
- 3.5 m televisions
- 13.4 m kitchen appliances
- 4.5 m laundry

Source: Amps data, 2013 (extracted 23/09/2014, 10:00 am)

Note 1. Kitchen appliances includes all cooking (ovens, stoves, hotplates, microwaves), cool storage (fridge and freezers) and dishwashers;
Note 2. Laundry includes all washing machines and tumble dryers
Balancing supply and demand

- **National Control** aims to keep the electricity system (power stations and networks) in perfect balance.
Balancing supply and demand

- An increase in **DEMAND** adds pressure to the system. National Control calls upon the power stations to **SUPPLY** more electricity.
Balancing supply and demand

- They first **ADD POWER** from **BASE LOAD** stations, and then call upon the **PEAKING** stations to ensure that supply and demand balances out. **RENEWABLE ENERGY** projects now also add 1 100MW.
Balancing supply and demand

- Generating too much power is wasteful as we cannot store the electricity.
- Too little power results in a shortage of supply and subsequently the need to reduce load i.e. switching off customers.
- National Control manages the daily level of operating reserves
- Eskom’s ideal daily operating reserve is between 1 900MW and 2 200MW of additional capacity, over demand, during the highest peak of the day

- Demand is affected by rise or drops in temperature or an increase in output such as large industries increasing production
- The system becomes tight when we don’t have this additional capacity available
What is a tight system?

Changes in Demand

- Low reserves
- Planned maintenance

High

- Excessive usage of generation peaking plant and emergency options
- Leveraging 49M, ILS, DMP, Power buybacks, Power Alert

Unplanned maintenance

Generation plant as well as the reliability of imports

Tight system
What are the risks when we have a tight system?

The Generation plant is **vulnerable** to the following …

1. **Cold weather** conditions

2. **Plant trips**

3. **Failure** of imports from e.g. Hydro Cahora Bassa (1 500MW)

4. **Disruption of fuel supply** to power stations
How to respond to a tight system

Keeping the power system balanced at 49.18 – 50.15Hz, as per international standards, is critical to keep the grid stable and when the national electricity grid is under pressure with normal measures implemented, Eskom must reduce demand, as agreed with the National Energy Regulator (NERSA), and implement a process of Load Reduction which has two components:

• **Load Curtailment.** Our agreement with some of our large industrial customers means we can instruct them to reduce electricity consumption when it is urgent to balance the system. They are able to reduce their load by up to 20%, significantly easing capacity on the grid; but it takes a minimum of 2 hours to implement. This amounts to about 400MW currently.

• **Load Shedding.** If the demand on the system is still greater than available supply, we have to implement load shedding to prevent an imbalance in the grid. Load shedding will also be implemented if there is insufficient time to request load curtailment; and in winter load shedding may need to be implemented before curtailment as curtailment takes too long to produce the necessary MWs.
The **load shedding protocol that Eskom follows** can be explained by looking at the situation on 6 March 2014 when we implemented load shedding for 14 hours – the first time since 2008:

- Significantly heavy rainfall resulted in wet coal and created a supply problem which became evident at 4:25 am.
- The decision was made to reduce load immediately as there was already a severe imbalance impacting our ability to maintain the 50Hz frequency.
- Next, a warning was issued to stakeholders and all media, and within a matter of minutes we implemented load shedding.
- Our six regional control centres were instructed to reduce demand and they informed municipalities that we had entered a load shedding scenario.
- At this point the municipalities were required to open their breakers to help reduce the load, while our control centres opened the breakers that supply Eskom’s direct customers.

Taking these measures – although drastic – was necessary, as doing so helped to avoid the far more negative impact of a nationwide blackout.
Find load shedding information

**WHAT DOES IT MEAN FOR ME, & WHERE DO I FIND MY SCHEDULE**

**IF ESKOM SUPPLIES YOUR ELECTRICITY**

- [www.loadscheduling.eskom.co.za](http://www.loadscheduling.eskom.co.za) OR 08600 37566 (08600 eskom)

**IF A MUNICIPALITY SUPPLIES YOUR ELECTRICITY**

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<td>086 010 3089</td>
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<td>080 131 3111</td>
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<td>Nelson Mandela Bay (Port Elizabeth and surrounds)</td>
<td><a href="http://www.nelsonmandelabay.gov.za">www.nelsonmandelabay.gov.za</a></td>
<td>041 506 5555 / 041 506 3111</td>
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<td>Polokwane (Limpopo)</td>
<td><a href="http://www.polokwane.gov.za">www.polokwane.gov.za</a></td>
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<td>eMalahleni (Witbank and surrounds)</td>
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**SCHEDULE EXAMPLE**

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Always check your load shedding schedule to make sure that you are prepared for the power cut.

**WHAT IF MY POWER IS OUT NOT ACCORDING TO SCHEDULE?**

Power outages do happen for reasons other than load shedding, for example:

- Local maintenance
- Cable theft
- Local fault

Make note of your municipal contact centre details to report any problems and to find out more.
Load shedding vs power outages

• Localised outages should not be confused with load shedding.
• Local outages can occur for the following reasons:
  • when there is a technical fault in the transmission or distribution network,
  • when electricity equipment has been tampered with such as theft of cables, or
  • when there is an overload of the local system because of irregular high usage due to electricity theft as well as normal faults

• If Eskom is not load shedding and your power is off, call your municipality or Eskom if you are a direct customer and ask what the problem is
Load shedding tips

THE LOAD SHEDDING PROCESS

01 LOAD SHEDDING
As a last resort and preventative measure, consumers are out on a rotational basis for 2 to 4 hours to protect the electricity grid from collapse. Depending on the stage, the National System Operator enforces the Regional Distribution Centres, Local Municipalities and Key Industrial Customers to implement load shedding according to their schedules.

02 VOLUNTARY OR CONTRACTED EMERGENCY DEMAND REDUCTION

03 LOAD SHEDDING

04 BLACKOUT
If preventative measures, including load shedding, are not observed, the process will not work. This is why it is so important to follow the guidelines. The National System Operator will not be able to provide electricity to your household.

05 RECOVERY
Depending on the nature of the emergency, the following are some useful tips:

STAGE 1: Scheduled load shedding
- 50% of consumers
- 2000kW to be shed

STAGE 2: Scheduled load shedding
- 100% of consumers
- 4000kW to be shed

STAGE 3: Load shedding
- 100% of consumers
- 4000kW to be shed

STAGE 4: Load shedding
- 100% of consumers
- 4000kW to be shed

Keep your cell phone fully charged when the power is on. If your cellphone battery is low, remember that you can use your car charger in your car.

Load shedding checklist
Prepare yourself by doing the following

- Keep frozen bottled water in your freezer to help keep food cold during a power outage.
- Keep a battery-powered torch or candles in a place where it will be easy to find in the dark - make sure you have an extra set of fresh batteries.
- Keep a small torch on your bedside table at all times - make sure you have an extra set of fresh batteries.
- Most medication that needs refrigeration can be kept in a closed fridge for several hours without spoiling - it is essential that you check with your doctor or pharmacist to be sure about your type of medication.
- Keep refrigerator and freezer doors closed at all times - a power outage of four hours should not cause food spoilage and a freezer should keep food frozen and safe for at least a day.
- Load shedding may result in alarm systems not operating properly, therefore check with your insurer if you are covered should you have a break in while the alarm is not powered.
- Install solar powered security and garden lights.
- Make use of surge protection: Electric surges are one of the biggest causes of damage to equipment during a power outage. Installing a surge protection device can help minimise damage. Have a surge protection device fitted to your electrical distribution board.

Compiled by: Eskom Corporate Affairs
February 2015
For more info go to: www.eskom.co.za

Back up your data: Make it a priority to save your data offline in case of a hard drive crash or unforeseen electrical fault. Online "cloud-based" backups are very convenient and are mostly automated, which means that you have one less thing to worry about.
How to respond to a tight system

- Research has shown that the **Power Alert** notifications are well recognised by South Africans.
- The response to the different Power Alert messages results in a visible behaviour change and reduction in electricity usage, as shown in the table below:

### Average MW impact per message:
National Power Alert (April 14 – Oct 14)

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<th>SUPPLY STATUS</th>
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What to do when you see the Green power alert …

The electricity supply is stable, but limited.

Please switch OFF lights in all unoccupied rooms
What to do when you see the Orange power alert…

There is moderate strain on the electricity supply.

Switch OFF lights in all unoccupied rooms, most importantly, the geyser and the pool pump plus the dishwasher and the tumble dryer.
What to do when you see the Red power alert …

There is INCREASING strain on the electricity supply.

Switch OFF lights in all unoccupied rooms, most importantly, the geyser and the pool pump plus the air conditioner, dishwasher, tumble dryer and stove.
What to do when you see the Black power alert...

There is SIGNIFICANT strain on the electricity supply, and load reduction is imminent.

Switch OFF all appliances that are not absolutely essential, except for minimum lighting required in the room you are using and the television that displays the status of the Power Alert.
What you can do to limit the need for load shedding

- Delay switching on lights and appliances until after the peak periods whenever possible
- Switch off your pool pump and geyser, and never run both at the same time or other large electrical equipment simultaneously
- Most important: remember the golden rule, switch off what you don’t need.
- Adjust air-conditioners to 23° Celsius in summer and 20° Celsius in winter
- Retrofit your homes and businesses with energy efficient lighting

Saving electricity not only reduces pressure on the grid, but also reduces your electricity bill and South Africa’s carbon emissions.
Check your appliance usage

**Typical Electricity Usage per Appliance for an Hour**

Using your appliances effectively can lower the risk of load shedding.

- **0 - 0.5 kWh**
  - Lighting
  - TV
  - Computer
  - Small electronic appliances

- **0.5 kWh - 1.0 kWh**
  - Microwave oven
  - Toaster
  - Vacuum cleaner
  - Washing machine

- **1.0 kWh - 1.5 kWh**
  - Kettle
  - Slow cooker
  - Iron
  - Game console

- **1.5 kWh - 2.0 kWh**
  - Air conditioner
  - Water heater

- **2.0 kWh - 2.5 kWh**
  - Swimming pool pump
  - Radiator

- **2.5 kWh - 3.0 kWh**
  - Air conditioner

- **3.0 kWh - 3.5 kWh**
  - Water heater

- **3.5 kWh - 4.0 kWh**
  - Gas stove

Switching off your geyser, air-con/heater, pool pump and other unnecessary appliances, especially during peak times, can reduce demand. This can lower the risk of load shedding.
• Eskom is committed to completing the new build programme

• However, until we add additional capacity, our system will be constrained.

• Should this be compounded with the event of unplanned activities within the value chain, load shedding is unavoidable.

• **Summer** will be a season of high **maintenance** for Eskom’s power stations, as demand is lower, allowing a window of opportunity for maintenance.

• Eskom has put a **five-year strategy** in place for Generation sustainability which includes a **firm commitment** not to postpone critical maintenance.

• Maintenance throughout summer will **improve plant reliability**, yet place additional pressure on the power system.

• In the **short to medium term**, this will introduce risks to balancing supply and demand.
Switch off unnecessary appliances from 5pm to 9pm – **beat the peak**!
Reduce electricity usage throughout summer – **live lightly**!
On-going communication with stakeholders and customers

Look out for the following which will provide you with more information:

- Articles in national publications
- Radio and television advertisements
- 49M – Know your number campaign
- Print advertisements
- Make the Call info - http://www.eskom.co.za/Pages/MaketheCall.aspx
- News and updates on social media platforms:
  - http://loadshedding.eskom.co.za/
  - Facebook address: Eskom holdings soc ltd.
  - Twitter handle: ESKOM_SA
  - Eskom App “MyEskom” – free download from apple, mobile and android
My Eskom App Features

- Forecast of the national power system
- Contact Eskom through the “Talk to Eskom” function
- Energy-saving tips
- Weather information
- Power outage information
- Access to load shedding schedules
- Profile setup based on household appliances
- Users can sign up for Eskom notifications (up-to-date information)