RCAs submitted for FY2014/15, FY 2015/16 and FY 2016/17

Bloemfontein
NERSA Public Hearings
4 May 2018

The Regulatory Clearing Account (RCA) is the regulatory mechanism for risk management

RCA is a balancing mechanism between what was awarded by NERSA on the basis of a forecast (MYPD), and what actually materialised (Eskom's audited financial statements) - a backward looking reconciliation

NERSA Framework

1. Differences materialise if Eskom either does not achieve or exceeds the awarded revenue (due to pricing or demand factors), or incurs costs greater or lower than those which were taken into account when NERSA calculated the MYPD allowable revenue
2. RCA balance could either be in favour of Eskom or consumer
3. RCA is subject to approval by the Regulator
4. Liquidation of the RCA as approved by the regulator may result in an increase or decrease in future electricity prices
5. The MYPD Methodology as published by NERSA in December 2012 is applicable to the MYPD3 control period

Eskom application

1. Eskom has submitted 3 RCAs for years 2 to 4 to be adjudicated
2. Applications were made based on the 2013/14 RCA determination and principles applied by Nersa
3. RCA application **not** a revenue application based on future estimates
4. The RCA is not a response to the price increase 5.23% for FY2018/19
5. Eskom is not expecting a once off price adjustment for the 3 RCAs

The RCA is a globally accepted regulatory principle and is part of RCA best practices; MYPD2 RCA decision made in 2014 and MYPD3 RCA Year 1 (2013/14) made in 2016

Fraud, corruption and irregularities

We wish to re-iterate the message by Interim Group Chief Executive during his introduction of the Eskom presentation in Cape Town:

- In January 2018, Government appointed a new Board of Directors
- 4 senior management have left Eskom due to serious misconduct allegations
- 4 executives remain on suspension, pending disciplinary hearings
- Continue to combat corruption and pursue justice within legal framework
- Undertaking mandatory lifestyle audits of all employees' two levels below CEO
- No Eskom officials are allowed to do business with Eskom
- Investigating 239 matters reported through whistleblowing facility – more than 70 cases have been addressed
- Various investigations are underway, including
    - Department of Public Enterprises Portfolio Committee inquiry
    - Judicial inquiry under leadership of Deputy Chief Justice, Justice Zondo
    - Special Investigation Unit recently announced by President
- Eskom welcomes these inquiries and investigations and will participate to contribute towards the objectives being met

- Eskom has started process to seek repayment from Mc Kinsey and Trillian by instituting a High Court review application Court to have contract set aside

Principles from RCA 2013/14 decision made on 1 March 2016

1. Allowed revenue is computed on at Eskom Company level and based on billed revenue

2. Gas turbines variances limited to amounts allowed by NERSA and additional volumes recouped at average variable costs for coal

3. International purchases treated as cross border IPPs

4. Over expenditure of operating costs are absorbed by Eskom and is not allowed to be recovered
   - For the three years under consideration, all categories of operating expenditure in accordance with NERSA decision experienced over expenditure

5. “Variances can be linked to two key sources:
   - Increases in costs due to a changing environment and assumptions after the MYPD 3 decision;
   - Assumptions made for purposes of the MYPD3 revenue decision which did not materialise.”

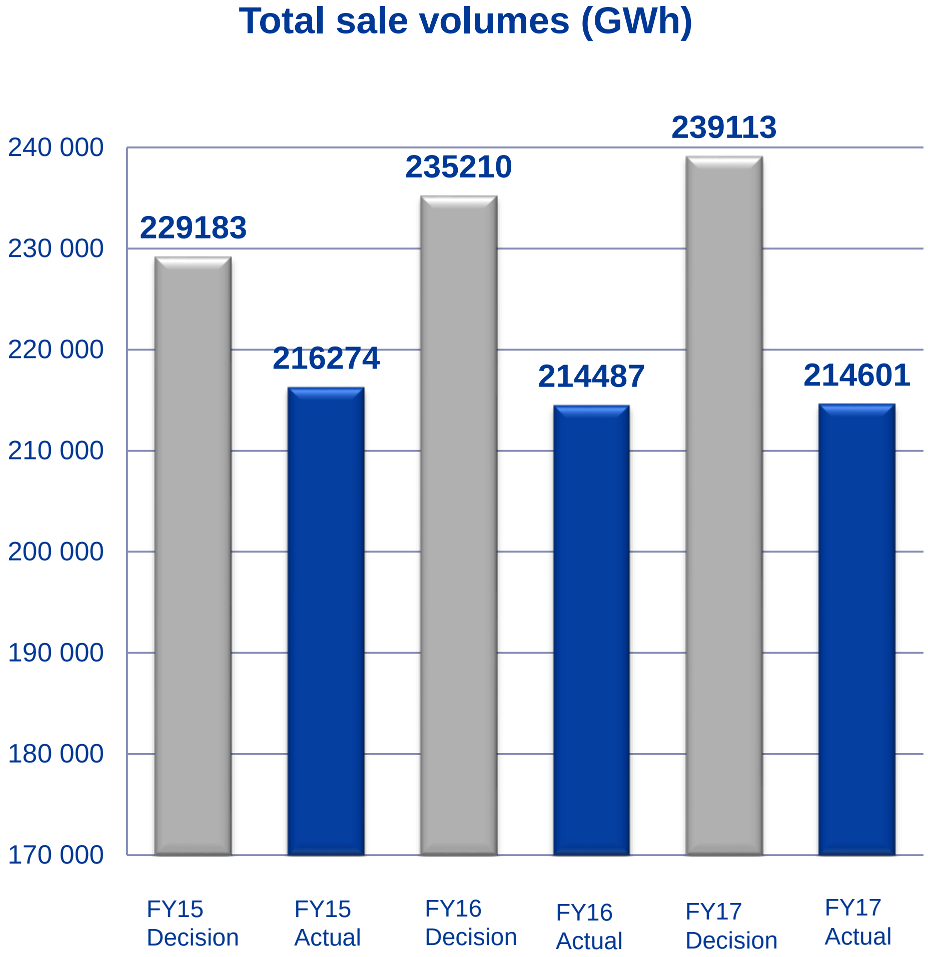
Summary of the RCAs for Year 2-4 of MYPD3

The Constitutional Court ruling of August 2017 has cleared the way for Nersa to process the 3 outstanding RCAs which total over R66 billion

RCA for 2016/17 (RM)	RCA 2014/15	RCA 2015/16	RCA 2016/17	Total RCAs Years 2-4	% contribution
Revenue	8 787	15 578	20 016	44 382	**67%**
Independent Power Producers	4 346	620	2 452	7 418	**11%**
International Purchases	3 299	3 567	2 283	9 149	**14%**
Coal	574	3 258	-359	3 473	**5%**
Open Cycle Gas Turbines (OCGTs)	1 944	689	-1 259	1 374	**2%**
Other Primary Energy	1 355	728	722	2 805	**4%**
Environmental Levy	-683	-1 180	-1 404	-3 267	**-5%**
Subtotal	**19 622**	**23 261**	**22 451**	**65 334**	
Other	-437	372	1 418	1 353	**2%**
RCA balance	**19 185**	**23 633**	**23 869**	**66 687**	**100%**

Revenue alone contributes to 67% of the RCAs over the 3 years

Revenue Variance attributable to lower sales volumes



MYPD Methodology[1]

- Allows for **revenue adjustments** attributable to **volume and mix changes**

Reasons for RCA amount

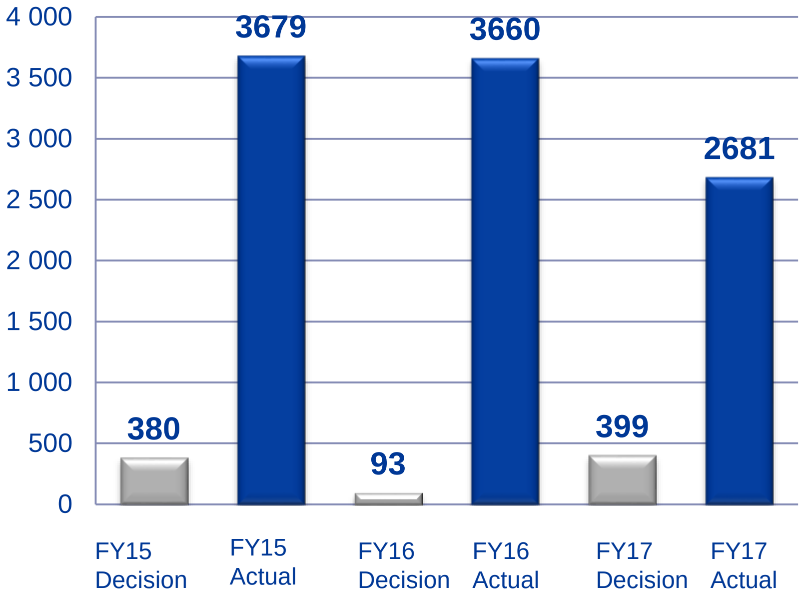
- Lower sales volume from standard tariff customers –

  Drop in volumes due to various factors including
  - Downturn in economy
  - Lower investor confidence
  - Decrease in reliance on Eskom
  - Commodity price changes
  - Elements of price elasticity
- Higher sales from export sales contributed positively to the total revenue
- Load shedding impacts in FY2015 is adjusted in the revenue variance

[1] Source: Clause 14.1.5 NERSA MYPD Methodology – Final- for publication 5 December 2012

International purchases represents cross border IPPs and is passed through to consumer

International purchase costs (R'm)



MYPD Methodology

- International purchases represents cross border IPPs
- International purchases are match with international revenue
- Variance is recovered as is treated as IPPs
- Revenue variance takes extra inflows into RCA

MYPD3 RCA decision for 2013/14

- Accounted for revenue on a total basis which included export revenues
- Thus the equivalent approach was applied to purchase costs and the full international purchases was allowed for RCA 2013/14

The revenue determination for 2018/19 further reinforced this principle to incorporate the full international purchases in the primary energy costs

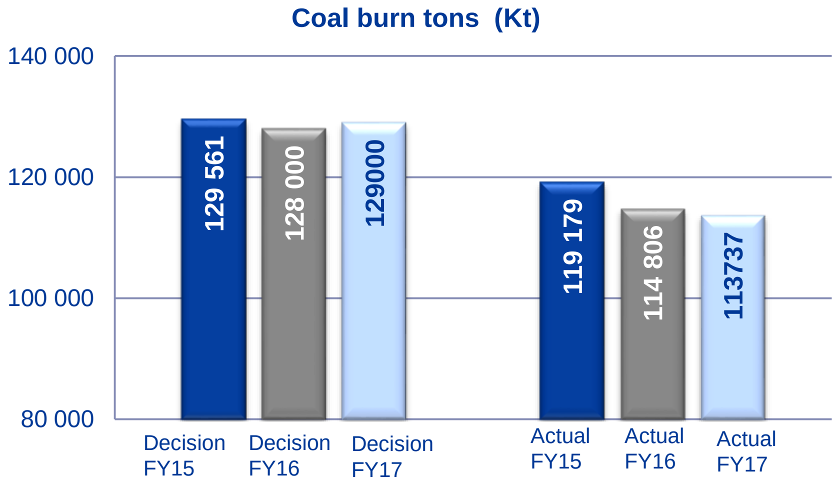
IPPs of R7.417 billion will be a pass-through cost for years 2-4 of the RCA for MYPD 3

- Variance of R7.674 billion for STPPP, R1.843 billion for Municipalities, R223 million for WEPs and R63 million for MTPPP (benefit to Eskom) in accordance with Energy Regulator decision and the Medium Term Risk Mitigation Plan of the IRP 2010
- Renewable IPP projects variance of **R423 million** (benefit to consumer)
- DOE Peaker projects were **variance of R1.205 billion** (benefit to consumer)
- Transmission ancilliary/network costs were **variance of R758 million** (benefit to consumer)
- Total IPPs reflects a net variance of R7.417 billion between years 2-4 (benefit to Eskom)

MYPD 3 Variance Decision - IPPs (Actuals)	**RCA 2014/15**	**RCA 2015/16**	**RCA 2016/17**	**Total RCAs Years 2-4**
MYPD 3 Variance	4 346	620	2 451	7 417
Renewables	2 442	-2 061	-804	-423
DOE Peakers		-605	-600	-1 205
MTPPP	-30	56	37	63
STPPP	2 132	2 682	2 860	7 674
Municipalities		858	985	1 843
WEPS	75	78	70	223
Tx Ancilliary costs/ Network costs	-273	-388	-97	-758
Cumulative variance	**4 346**	**4 966**	**7 417**	

Coal burn variance reflects a price element which is partially offset by the volume variance

Coal Burn tons and energy produced



Coal burn variance included in RCA

Coal burn variance	unit	RCA 14/15	RCA 15/16	RCA 16/17
Coal burn price variance	R'm	3 814	8 211	5 530
Coal burn volume variance	R'm	-3 240	-4 953	-5 889
Coal burn costs incl in RCA	R'm	**574**	**3 258**	**-359**

MYPD Methodology[1]

- **Performance Based Regulation (PBR) formula**
  - Compares **burn costs** between decision and actuals
  - Variance is **shared between customers** and Eskom
  - Sharing **percentage** is determined by NERSA
- The **PBR pass-through** cost consists of a **price and volume variance**

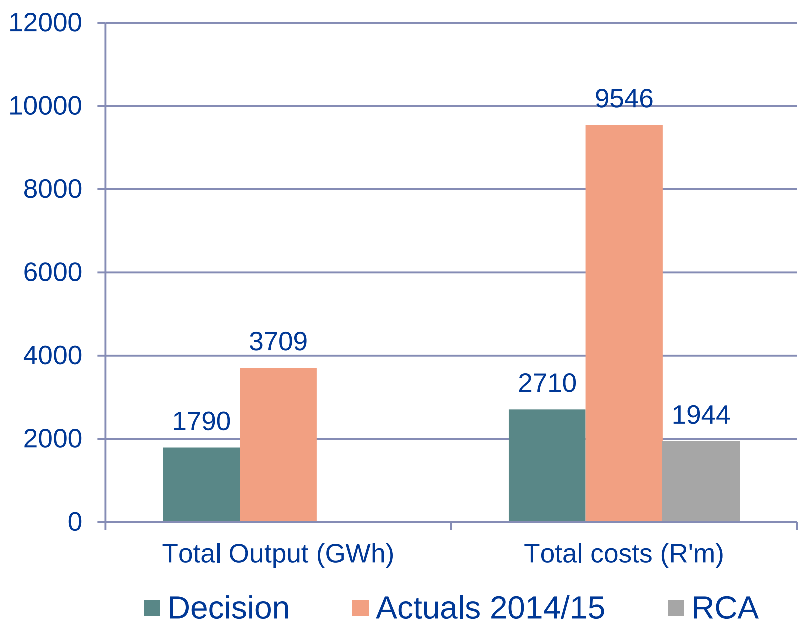
Reasons for RCA amount

- **Nersa allowed benchmark coal R/Ton was lower than Eskom's actual cost at that time**
- **Lower production** from cheaper **Cost Plus and Fixed Price mines.**
- **Procurement of additional short/medium term coal resulting in transport of coal** via road and rail instead of coal over a conveyor belt from long term contracts.
- **Favourable volume variances** passed onto consumer

[1] Source: Clause 14.1.5 NERSA MYPD Methodology – Final- for publication 5 December 2012

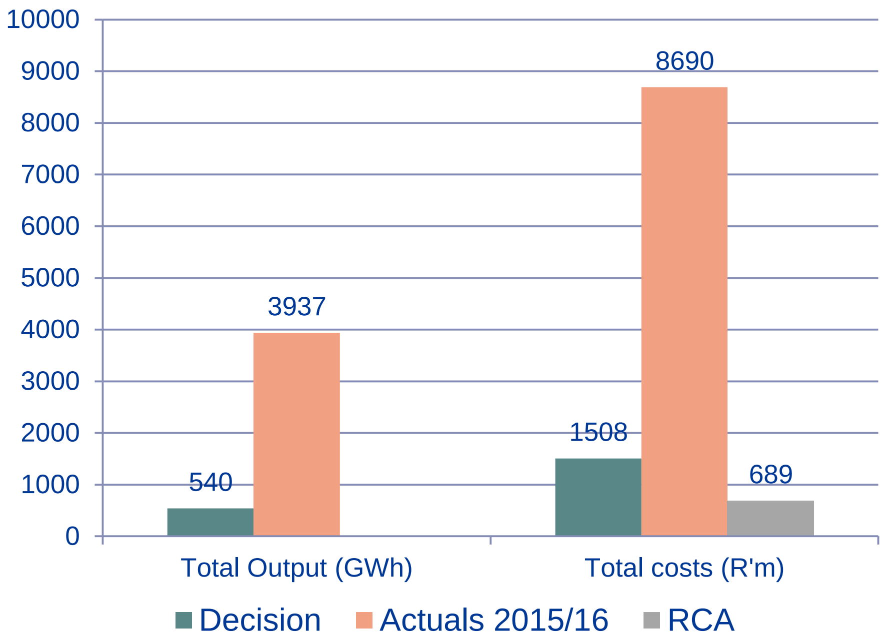
OCGT usage and costs exceeded the MYPD3 allowances in FY14/15 & FY15/16. However the RCA claim was limited based on the decision taken for 2013/14 RCA. Eskom absorbed R11.4bn to its bottom line

OCGTs analysis for 2014/15



- Actual cost over expenditure was R6836 million but the RCA claim was limited to R1944million. Thus **Eskom absorbed** the difference of **R4892 million** to its bottom-line
- Allowed OCGTs volumes was 1056 GWh plus a special allowance for the 3 months for Jan15 to Mar15 which added another 734GWh. Special allowance was to limit the impact of load shedding

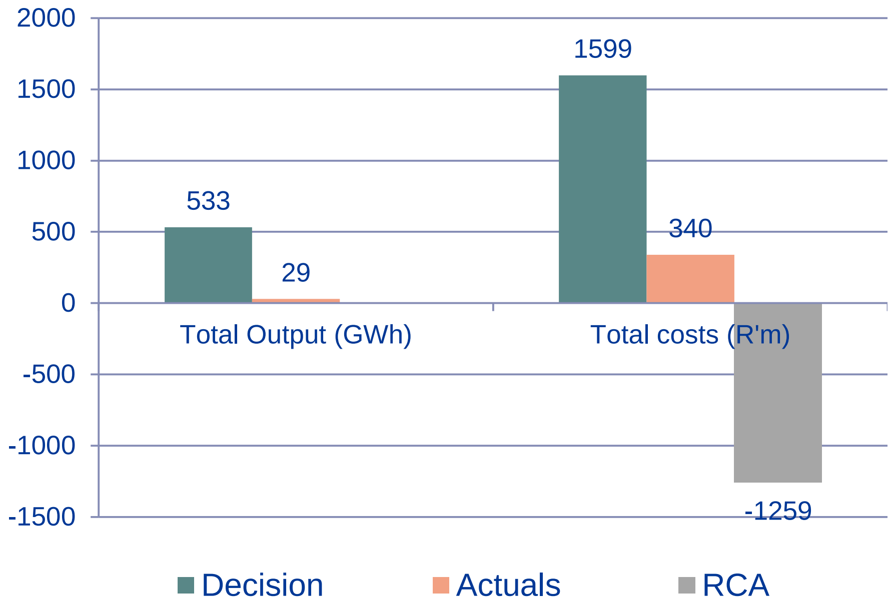
OCGTs analysis for 2015/16



- Actual cost over expenditure was R7182 million but the RCA claim was limited to R689million. Thus **Eskom absorbed** the difference of **R6493 million** to its bottom-line

OCGT usage and costs were lower in 2016/17 resulting in a claw back of R1259 million

OCGTs analysis for 2016/17



MYPD3 RCA 2013/14 decision and principle applied

- OCGT cost variances limited to amounts allowed by NERSA and additional volumes recouped at average variable costs for coal
- The above principle has been applied to the 3 RCA submissions

Reasons for RCA amount

- Due to the improvement in fleet performance and the commissioning of new capacity, lower OCGT volumes of 29GWh were required in 2016/17 compared to the allowance of 533GWh
- The under expenditure of R1259 million is then for the benefit of the consumer

Other primary energy for RCAs

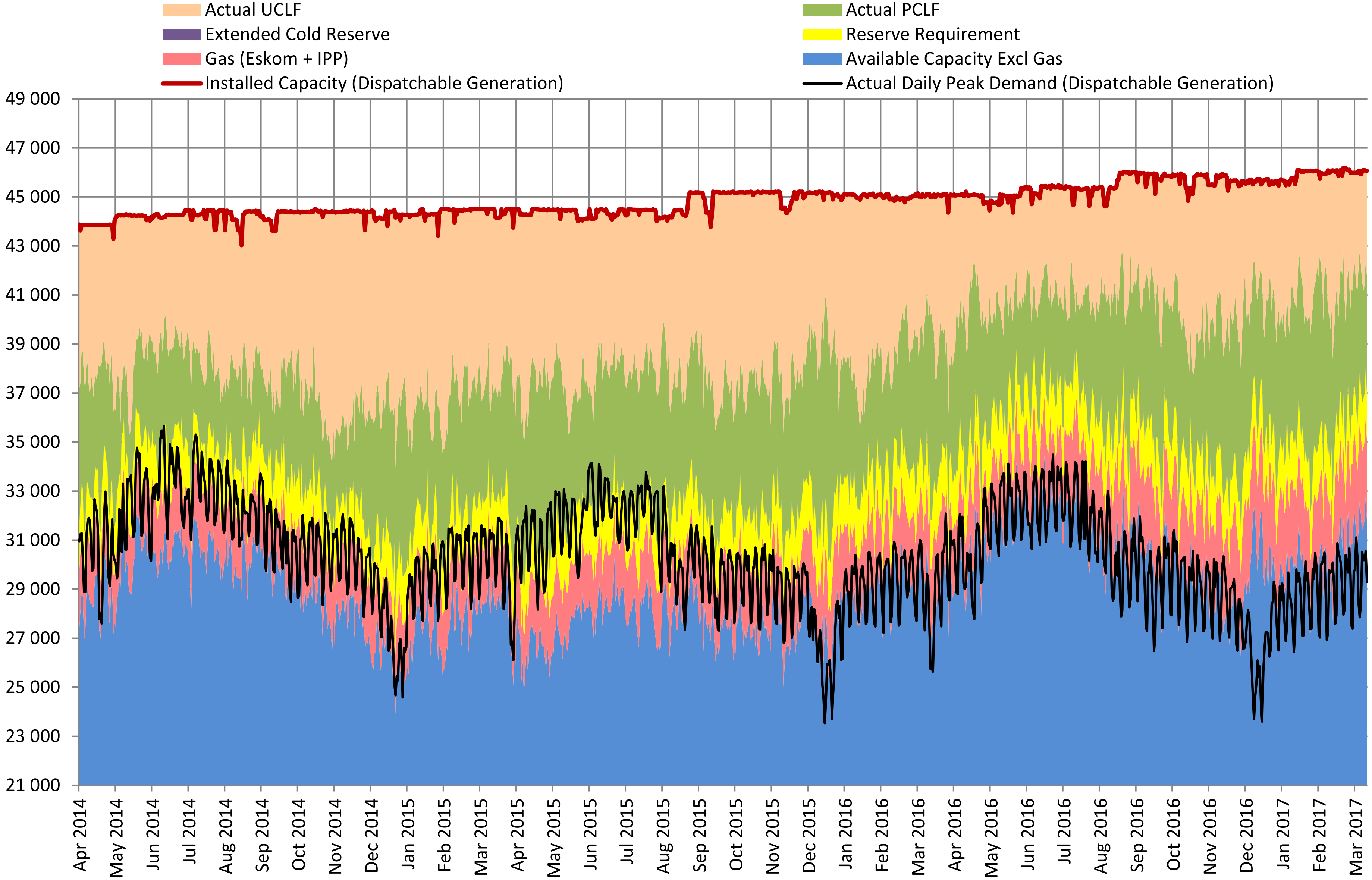
Breakdown of other primary energy components

Other Primary Energy (R'm)	2014/15	2015/16	2016/17	Total
Water	-502	-428	-437	-1367
Start-up gas & oil	1 064	657	532	2 253
Coal handling	580	542	501	1 623
Water treatment	119	84	125	328
Nuclear	180	59	281	520
Fuel procurement	-86	-131	-141	-358
Sorbent usage		-55	-139	-194
Total Other Primary Energy	**1 355**	**728**	**722**	**2 805**

Drivers to other primary energy in the RCAs

- **Water** – lower costs incurred due to actual costing rates being lower
- **Start up gas -** higher number of start ups are driven by the number of outages and trips
- **Coal handling -** additional costs incurred due to more coal having been reclaimed from the strategic to the seasonal stockpiles at the stations than anticipated
- **Water treatment**– more usage of chemicals due to poor water quality
- **Nuclear fuel -** due higher rates than assumed in decision
- **Fuel Procurement** – lower due to delay in projects
- **Sorbent usage –** due to delay in FGD implementation

Actual Available Capacity versus Residual Demand

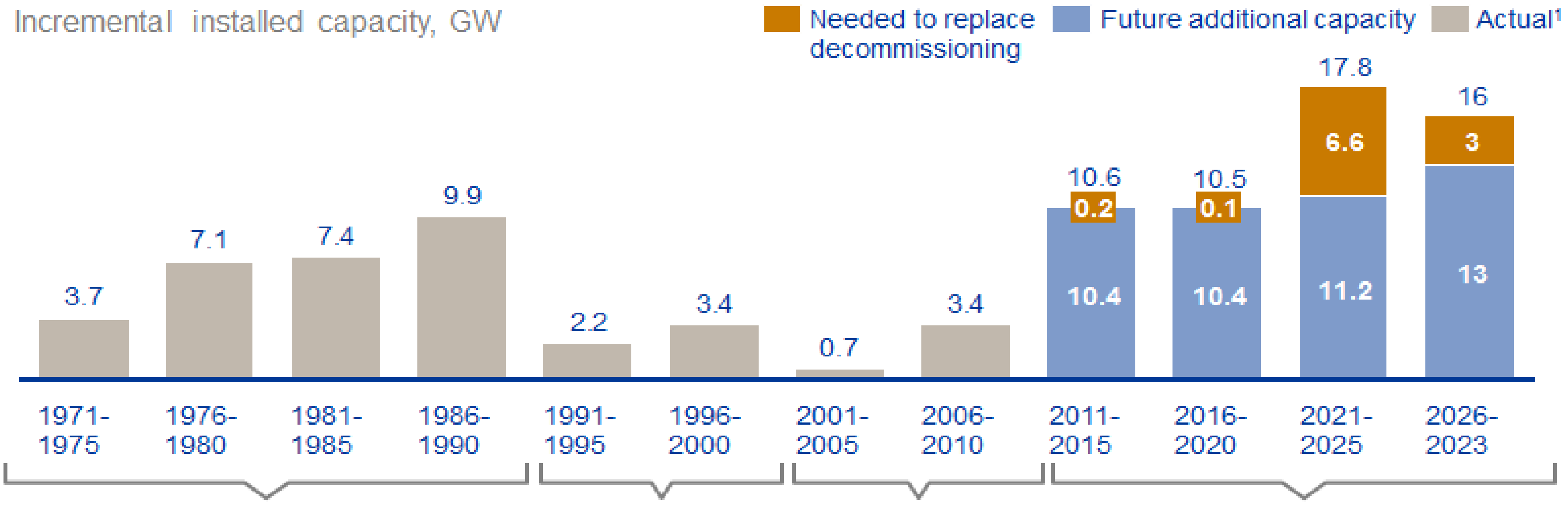


Overview – Causes of insufficient generating capacity (MW) on national grid that contributed to increased OCGT usage

- First contributor to capacity shortage is the ***delay of new capacity***.
  - ***Investment decision*** to build Medupi (and other stations) was needed by, not later than, 1999 to meet increasing demand by 2007.
  - Investment decision (business case) only made in December 2006 => needed capacity not available in time.
  - This was exacerbated by ***delays in commissioning*** of both Medupi and Kusile.
- Second contributor was ***deteriorating plant performance*** of existing plant.
  - Particularly since 2010 World Cup, necessary ***philosophy maintenance was delayed*** in interests of "***keeping the lights on***".
- Above led to very high load factors and ***limited time available*** for maintenance outages.
  - ***High utilisation*** of deteriorated plant created the cycle of deteriorating availability.
  - Despite some improvements due to efficiency and effectiveness of operations and maintenance, cycle could only be broken with ***adequate funds and space*** in which to perform required maintenance.
- Underlying cause of deterioration in fleet's performance is ***lack of sufficient capacity***, aggravated by the onset of ***age and usage related equipment failures***
  - By 2014, about 80% of existing fleet's capacity was already in period where they required ***major equipment replacements*** in order to restore plants' economic life.
  - ***Deferring this work*** was a major cause of escalation in plant breakdowns.

Eskom's chronological capacity situation

The timeline below contextualizes Eskom's capacity situation from 1971



- Huge **Eskom-driven investment**, with clear objective to provide abundant cheap power

- **Excess capacity** - more than 10 GW mothballed

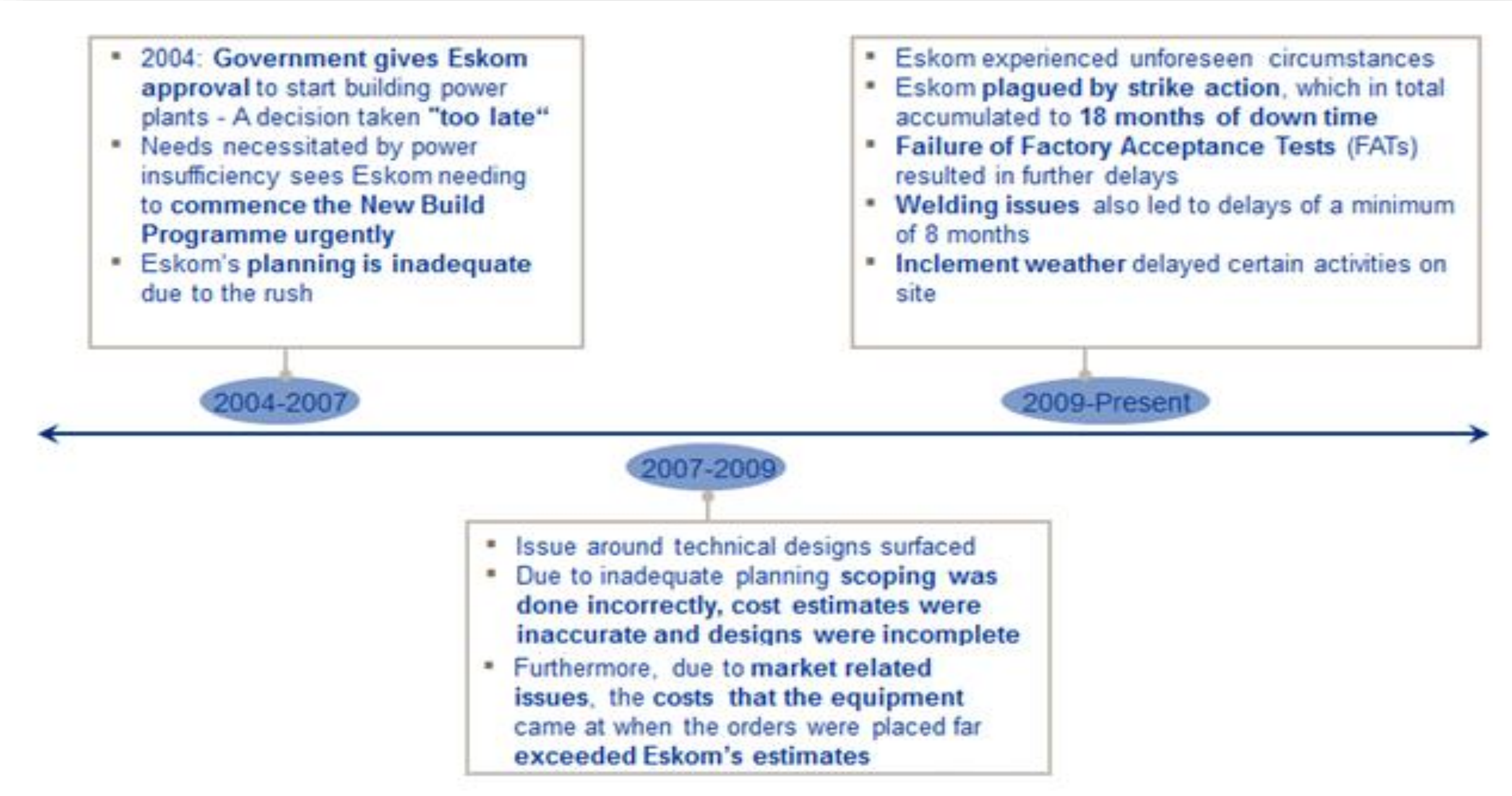
- **Under-investment**, despite warnings of looming crisis
- IPPs did not deliver
- Significant capacity returned to service through de-mothballing

- Future capacity needs require a **massive build programme**
  - Huge funding and skills requirements
  - Complex context involving **multiple objectives, technologies and stakeholders**

1 Historical figures do not include capacity to replace decommissioning

Occurrence of events since 2004

Various issues at differing times resulted in delays of the programme and cost movements. The time buckets below highlights occurrence of key events since inception.



2004-2007

- 2004: **Government gives Eskom approval** to start building power plants - A decision taken **"too late"**
- Needs necessitated by power insufficiency sees Eskom needing to **commence the New Build Programme urgently**
- Eskom's **planning is inadequate** due to the rush

2007-2009

- Issue around technical designs surfaced
- Due to inadequate planning **scoping was done incorrectly, cost estimates were inaccurate and designs were incomplete**
- Furthermore, due to **market related issues**, the **costs that the equipment** came at when the orders were placed far **exceeded Eskom's estimates**

2009-Present

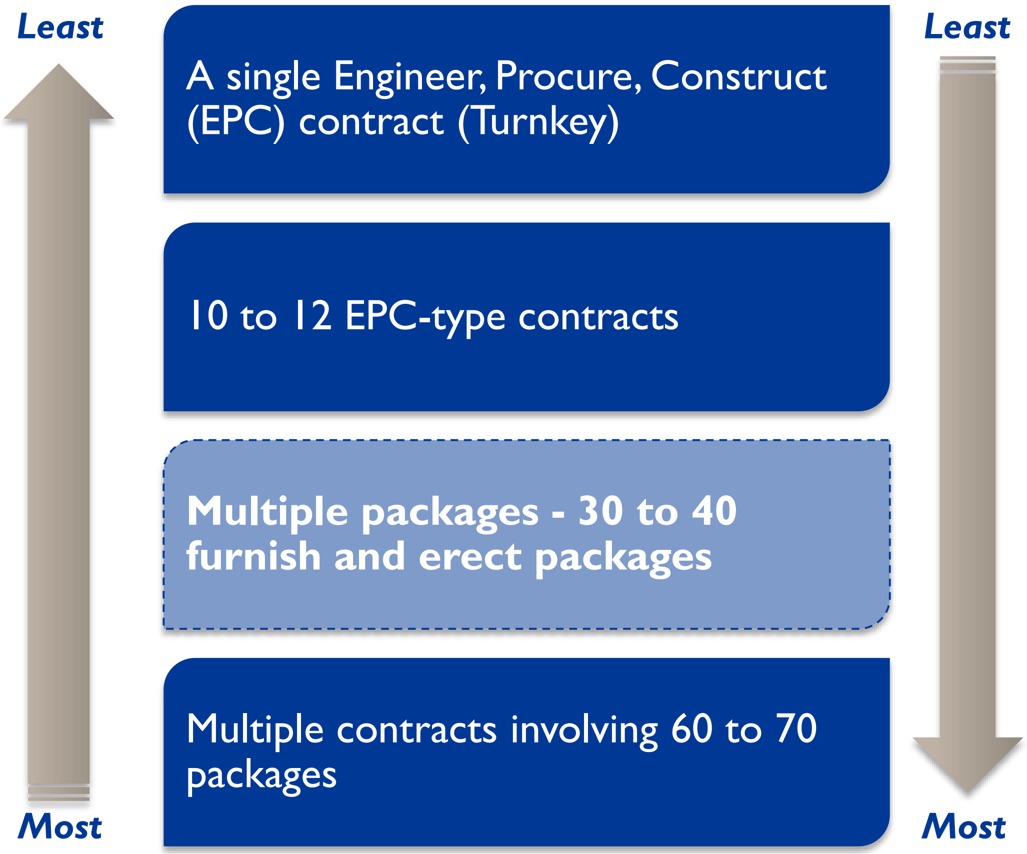
- Eskom experienced unforeseen circumstances
- Eskom **plagued by strike action**, which in total accumulated to **18 months of down time**
- **Failure of Factory Acceptance Tests** (FATs) resulted in further delays
- **Welding issues** also led to delays of a minimum of 8 months
- **Inclement weather** delayed certain activities on site

Four contracting strategies were considered for the execution of Medupi and Kusile, ultimately pursuing a multiple packages strategy

Eskom resources

- Eskom's depleted resource base having experience implementing generation projects of this type and magnitude
- Lack of resource depth in the South African construction and equipment supply markets that service power plant projects
- Heavy workload worldwide in the Power Industry
- Complexity of global economy and financial markets

Contracting Strategies



Least

Most

A single Engineer, Procure, Construct (EPC) contract (Turnkey)

10 to 12 EPC-type contracts

Multiple packages - 30 to 40 furnish and erect packages

Multiple contracts involving 60 to 70 packages

Least

Most

Meet project objectives

- Minimize life-cycle cost
- Maximize reliability
- Generate competition within construction, equipment and material markets
- Compress schedule for earlier 1st unit CO date
- Fully use available Eskom engineering personnel and other resources
- Meet/exceed BEE goals
- Maximize benefits to the SA economy
- Develop contracting model for future projects
- Shifting/managing risk

- Most **of the objectives were best met with multiple packages**, but it also determined that the **personnel resource constraints would limit the number of packages**
- **Nominally, the 30 to 40 package scenario was chosen**

Schedule delays result in a double edged sword scenario as far as the cost implications are concerned

There is a compounding effect in terms of cost movements when all the factors are looked at in total:

Insufficient set-up and development work

Force majeure events (weather & strikes)

Increase in prices of commodities, e.g. steel, copper and aluminum

Exchange rate change from 7ZAR = 1USD in 2007 to 13ZAR = 1USD in 2018

Increased costs due to market uncertainty

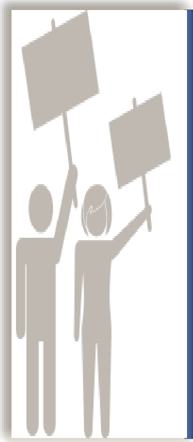
Infrastructure and logistics challenges

Contract variations after designs and legislative licenses were finalised

Poor contractor performance and productivity

The projects created risk-adjusted schedules to provide a more realistic view on schedule and funding

We continue to monitor and manage our Priority 1 risks…



Stability at Construction Sites

- **Partnership Agreement** driven together with the external and internal stability plan
- **Strict monitoring of compliances** by contractors and employees to agreed processes
- Visibility of **Employee Relations (ER) personnel** on the ground
- **External Stakeholder** engagement
- **Skills development and transfer programmes**

Inadequate Capacity, Productivity and / or Competency amongst Contractors

- **Productivity improvement initiatives,** including **focused contractors management**
- **Increased on site contract management resources** to improve associated processes such as claims management and contract oversight
- Increased **Technical Oversight Monitoring & Assurance** being instituted throughout projects

P80 Schedule

- **Risk-adjusted schedules** developed to **cater** for the **major risks** that the projects are currently facing.
- It is based on the current **contractor performance and risk provision for risks outside the control of the project** (for example, weather), based on historical events.
- A P80 schedule is provided when **cost certainty is critical,** the portfolio is **not capital constrained,** and the portfolio typically comes in **under budget.**
- P80 refers to a **80% chance** of these **risks materialising.**
- P50 refers to a 50% chance of these risks materialising.

Key lessons learned from the current New Build Programme

Sufficient **Front-end engineering and development** (FEED)

Funding and stakeholder plans

Governance and internal processes

Less reliance on the contractors

Additional **owner's oversight**

Additional **owner's supervisory** requirements

Adopt international benchmarked **project management methodologies, processes & systems**

Suitably capacitated **contract management** capability

Established **monitoring, oversight and assurance** function

Adequate **project pipeline** to prevent the loss of skills and capabilities

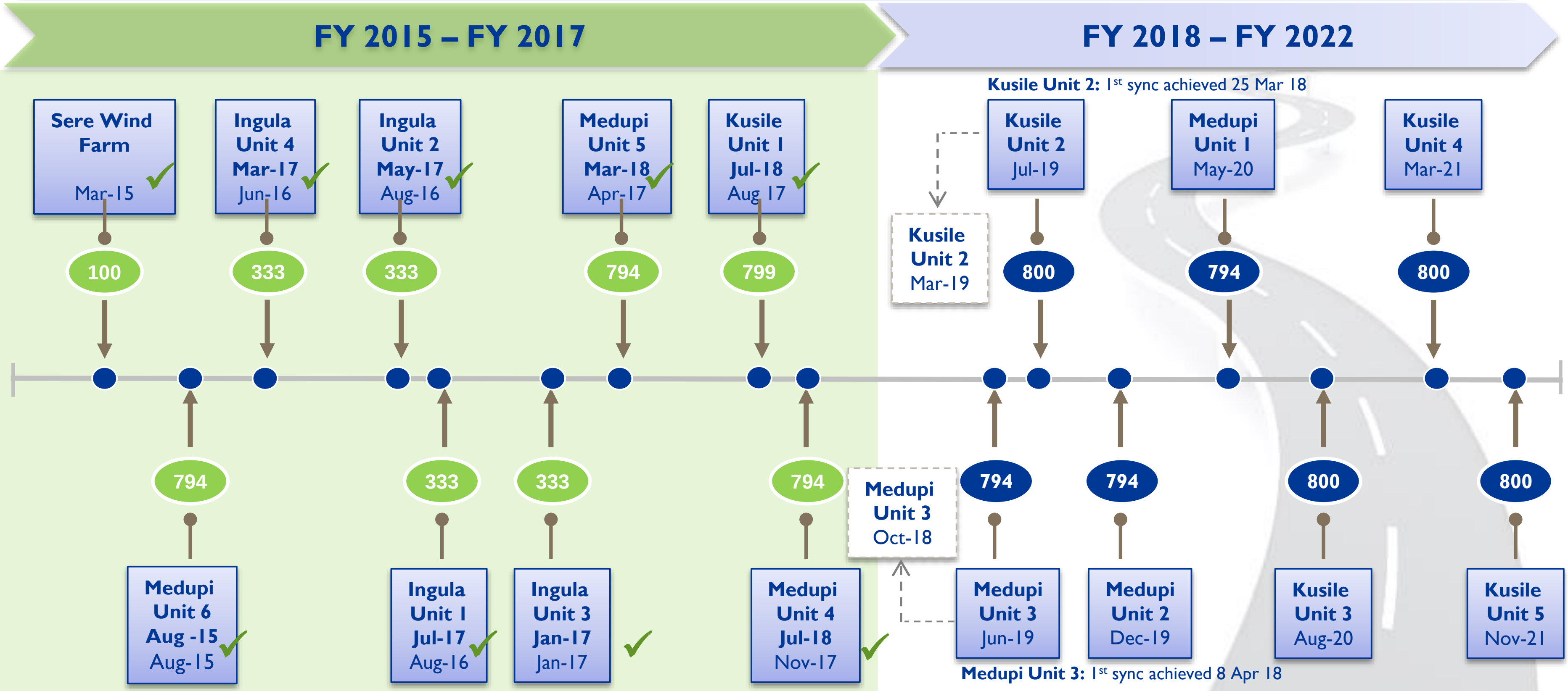
Engage **international asset creation community**

Improved **Labour Management**

We remain focused on bringing new capacity online, delivering earlier than P80 on average

Medupi, Kusile- Coal fired
Ingula - Pumped-storage scheme

▭ P80 schedule
✓ Achieved CO on or earlier than P80
⬚ Latest forecast



FY 2015 – FY 2017

Sere Wind Farm Mar-15 ✓ — 100
Ingula Unit 4 Mar-17 Jun-16 ✓ — 333
Ingula Unit 2 May-17 Aug-16 ✓ — 333
Medupi Unit 5 Mar-18 Apr-17 ✓ — 794
Kusile Unit 1 Jul-18 Aug 17 ✓ — 799

Medupi Unit 6 Aug -15 Aug-15 ✓ — 794
Ingula Unit 1 Jul-17 Aug-16 ✓ — 333
Ingula Unit 3 Jan-17 Jan-17 ✓ — 333
Medupi Unit 4 Jul-18 Nov-17 ✓ — 794

FY 2018 – FY 2022

Kusile Unit 2: 1st sync achieved 25 Mar 18

Kusile Unit 2 Mar-19 (latest forecast)
Kusile Unit 2 Jul-19 — 800
Medupi Unit 1 May-20 — 794
Kusile Unit 4 Mar-21 — 800

Medupi Unit 3 Oct-18 (latest forecast)
Medupi Unit 3 Jun-19 — 794
Medupi Unit 2 Dec-19 — 794
Kusile Unit 3 Aug-20 — 800
Kusile Unit 5 Nov-21 — 800

Medupi Unit 3: 1st sync achieved 8 Apr 18

4 613 MW commissioned since 2015 &
10 750 MW commissioned since 2005 ….

…6 382 MW to be commissioned over the next 5 years
Kusile unit 6 (800MW) is scheduled for FY 2023

P80 dates
CO = Commercial Operation

- The latest forecast provided for K2 & M3 that is more reflective of the current construction performance
- Subject to change, given the risks experienced on the projects at any point in time

Conclusion on new build programmes

- Eskom **precluded from the New Build Programme in 1998.**
- Eskom required to **commence New Build Programme and start initial planning work in 2004.**

- **Good progress** achieved on the New Build Programme **from 2005 to date.**
- **Focus remains on bringing new capacity online,** delivering earlier than P80 on average and within P50 costs.

- The **costs of the New Build Programme** is **within the range of international benchmarks** and initiatives are in place to manage our costs.

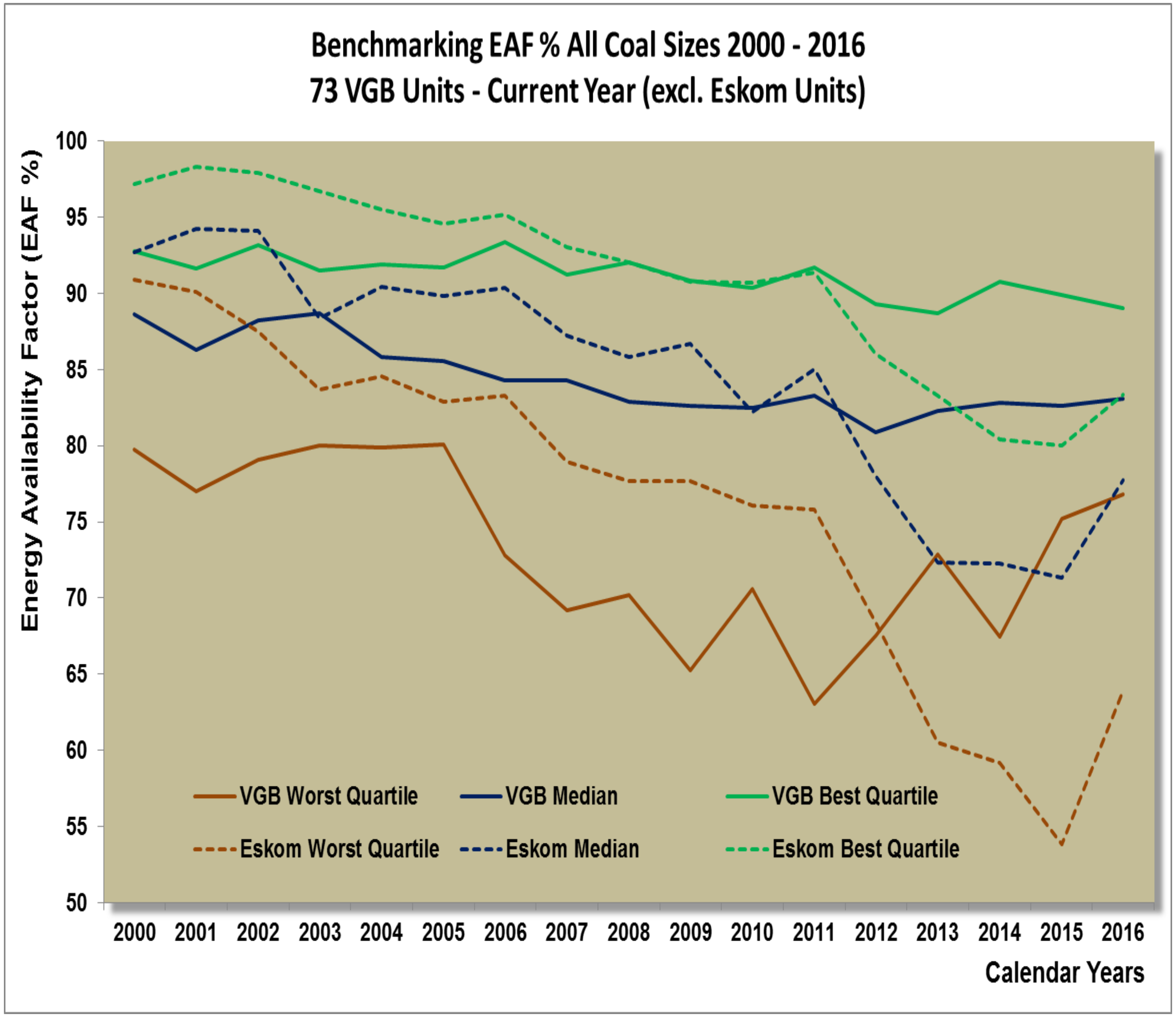
- It is **not feasible and cost beneficial to suspend all or parts of the build programme.** Too much has been invested in fabrication and major construction work. As such, the programme cannot be stopped now

- Schedule delays result in a double edged sword scenario. There is a compounding effect in terms of cost movements when all the factors are looked at in total, i.e. force majeure events; exchange rate changes; infrastructure challenges; increase in commodity prices; cost increases due to market uncertainty; poor contractor performance & productivity; contract variations; insufficient development / set-up.

- We continue to **monitor** our **Priority 1 risks**, relating to stability at construction sites and inadequate capacity, productivity and / or competency amongst contractors, thereby mitigating further schedule delays and / or cost overruns.
- Number of **key lessons learned** from the execution of the current build programme.

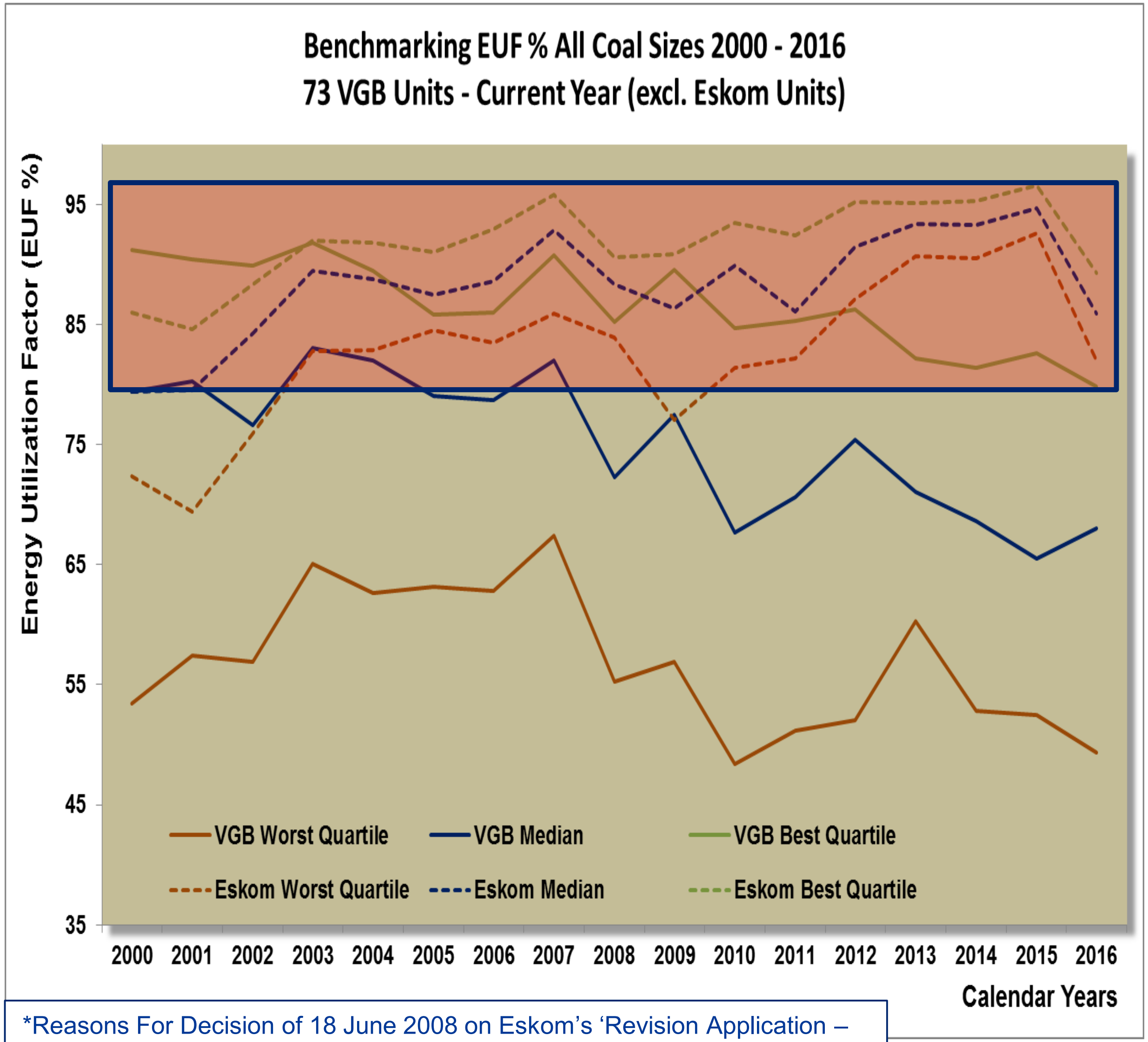
- **Rapid development with shortcuts** taken in design and engineering, cause uncertainty, design changes, **integration issues and accompanying delay and cost escalation**
- **Cost and schedule confidence** can be achieved with **sufficient development time**

Decline in availability (EAF) from 2013 contributed to constrained system and increased OCGT usage



- Decline in availability (EAF) from 2013 contributed to constrained system which required increased OCGT usage for system security and to minimise load shedding
- Availability (EAF) better than or in line with peers until rise in UCLF from 2013
- Decline in EAF primarily due to increase in UCLF
- Nevertheless, in line with peers until 2013. Mostly due to lower PCLF – required to KLO
- Improvement in 2016 due to decrease in UCLF

Generation plant ran harder than all other utilities



*Reasons For Decision of 18 June 2008 on Eskom's 'Revision Application – Price Increase Application for the 2008/09 financial year',

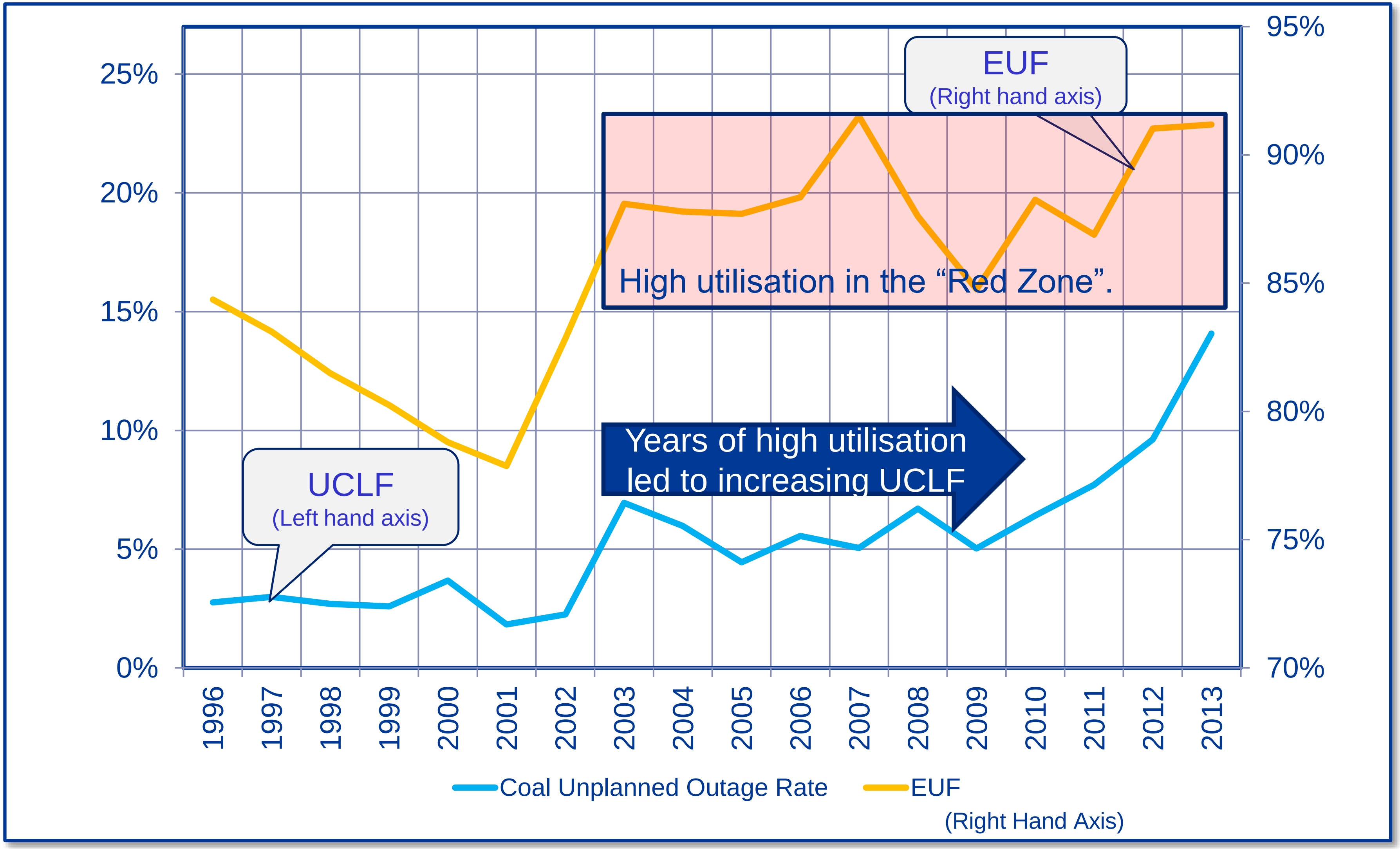
- Generation stations have been running harder than other utilities and in "red zone" for last 15 years.
- High utilisation means plant systems required to operate at limits, leading to strain, increasing wear-and-tear and decreasing plant reliability.
- *NERSA stated that "*Eskom is running power stations at higher load factors than previously expected and therefore incurs wear and tear which will require maintenance and repairs. Increased plant breakdowns result in increased use of start-up fuel to bring plant back into production.*"

Load factors / high utilisation

From 2003 Eskom’s coal fleet has been operating at very high output levels to meet rising demand

- Energy Utilisation Factor (EUF) has been in the “red zone” above design parameters for more than a decade
- Overloading and strain on components decreases plant reliability and increases unplanned breakdowns (UCLF)
- UCLF went from 2.5% in 2002 to 5% to 7% till 2010 and nearly 15% in 2013
- Direct correlation between high EUF and increased plant breakdowns
- Result is a cumulative and compounding vicious circle threatening loss of control of plant performance

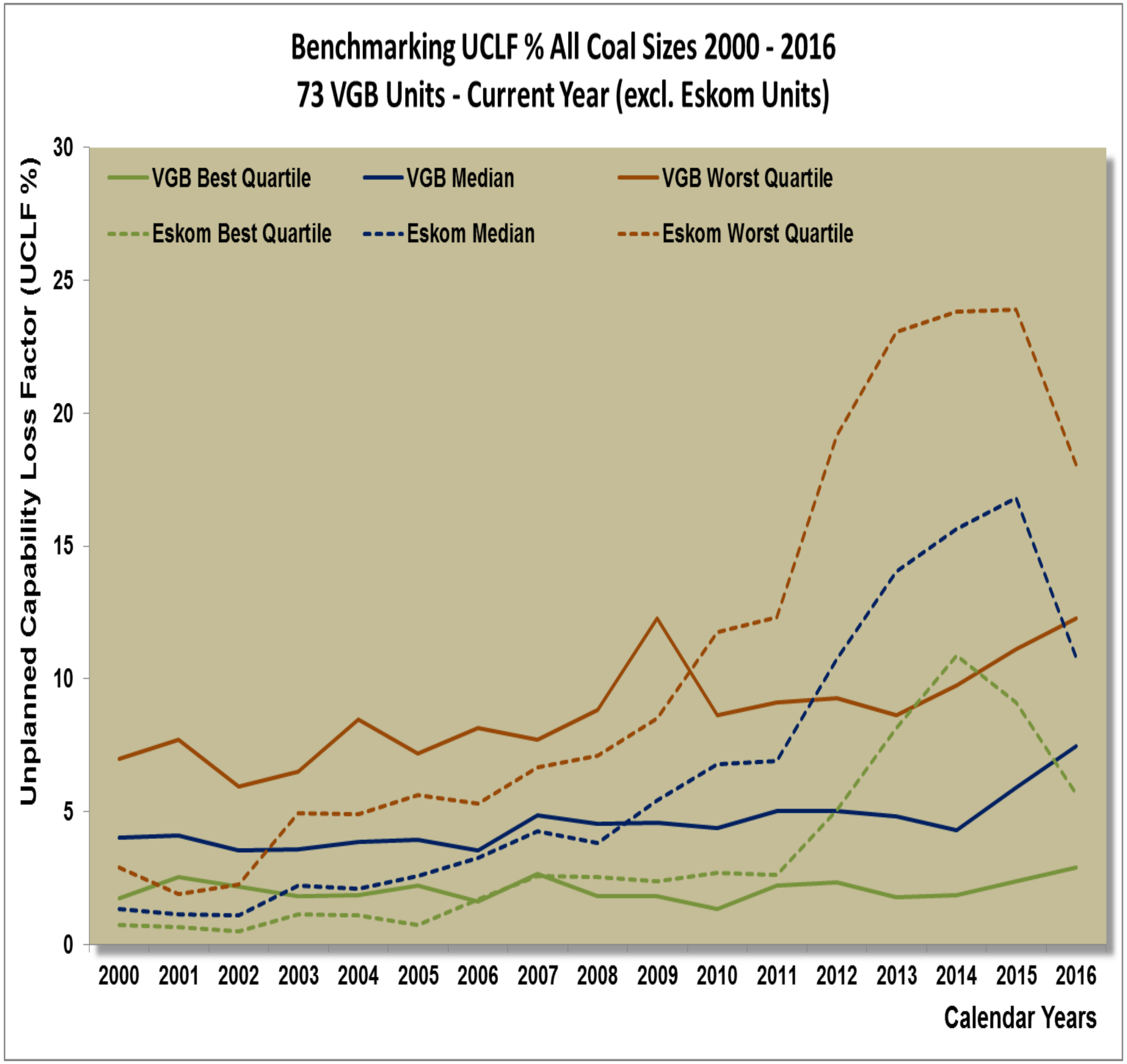
Higher utilisation leads to additional stress on components and thus to increasing breakdowns but only after a delay.



Requirement to "keep the lights on" added maintenance needs while decreasing space available for planned outages

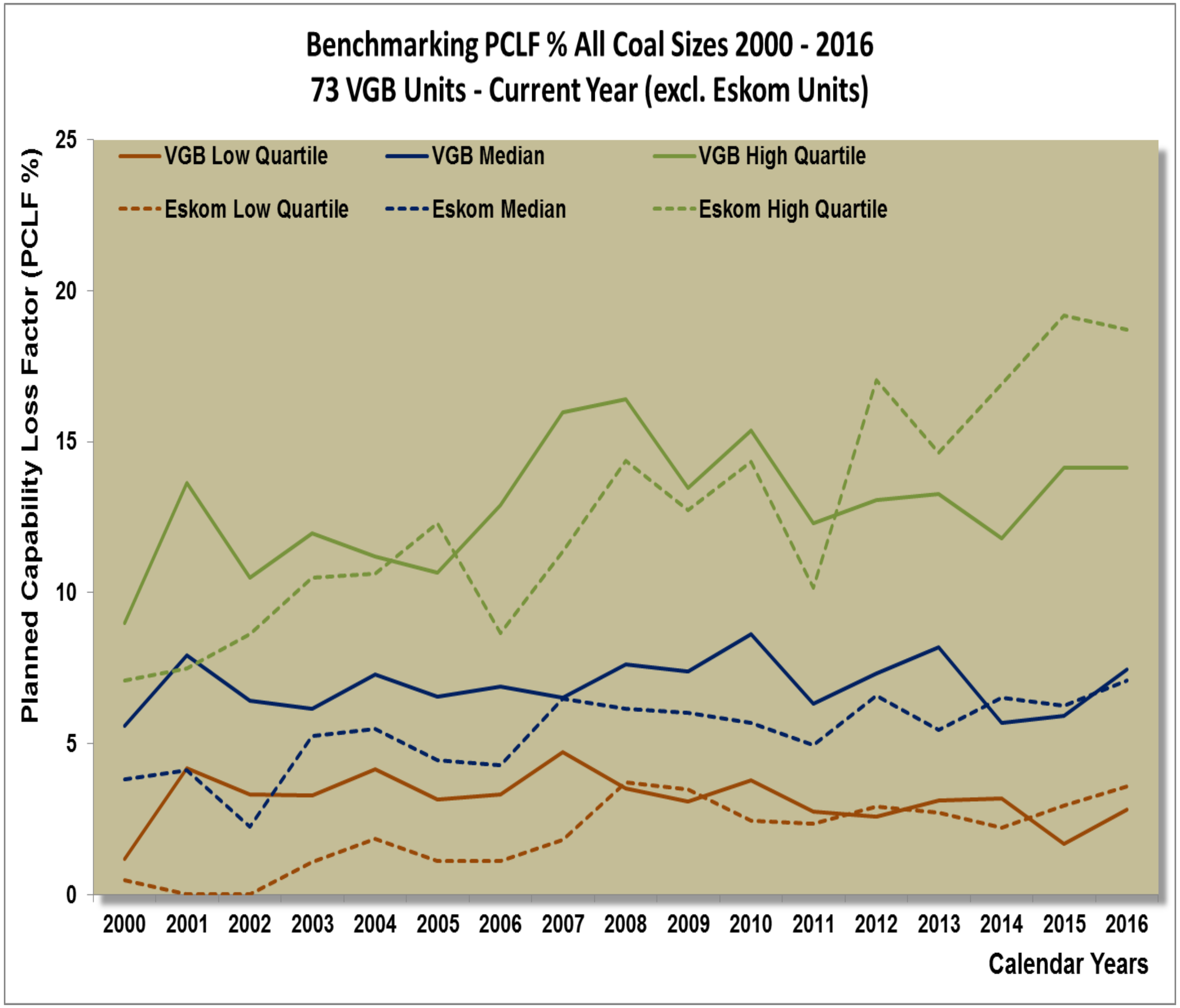
- Keep Light On (KLO) was a *de facto* mandate from the shareholder and up to April 2014, was included in Eskom's Shareholder Compact
- Requirement has been made even more firm and inflexible during international events such as 2010 Soccer World Cup
- From 2008 Eskom delayed planned maintenance and design-based maintenance to meet demand. Result was a substantial maintenance backlog.
- KLO severely constrained Eskom's ability to do the required minimum design-based maintenance.

Unplanned breakdowns increased as direct result of high utilisation



- Maintenance space further constrained by deteriorating UCLF from 2012
- Already constrained from 2004 and particularly from 2006, exacerbated from 2012 when plant reliability decreased further
- Combined effect insufficient capacity and increased UCLF was maintenance space reduced to a very low level, notwithstanding additional capacity added in the form of de-mothballed coal stations and OCGTs, making it very difficult to execute required amount of maintenance

Capacity constraints meant less opportunity for planned maintenance – especially reliability / proactive maintenance



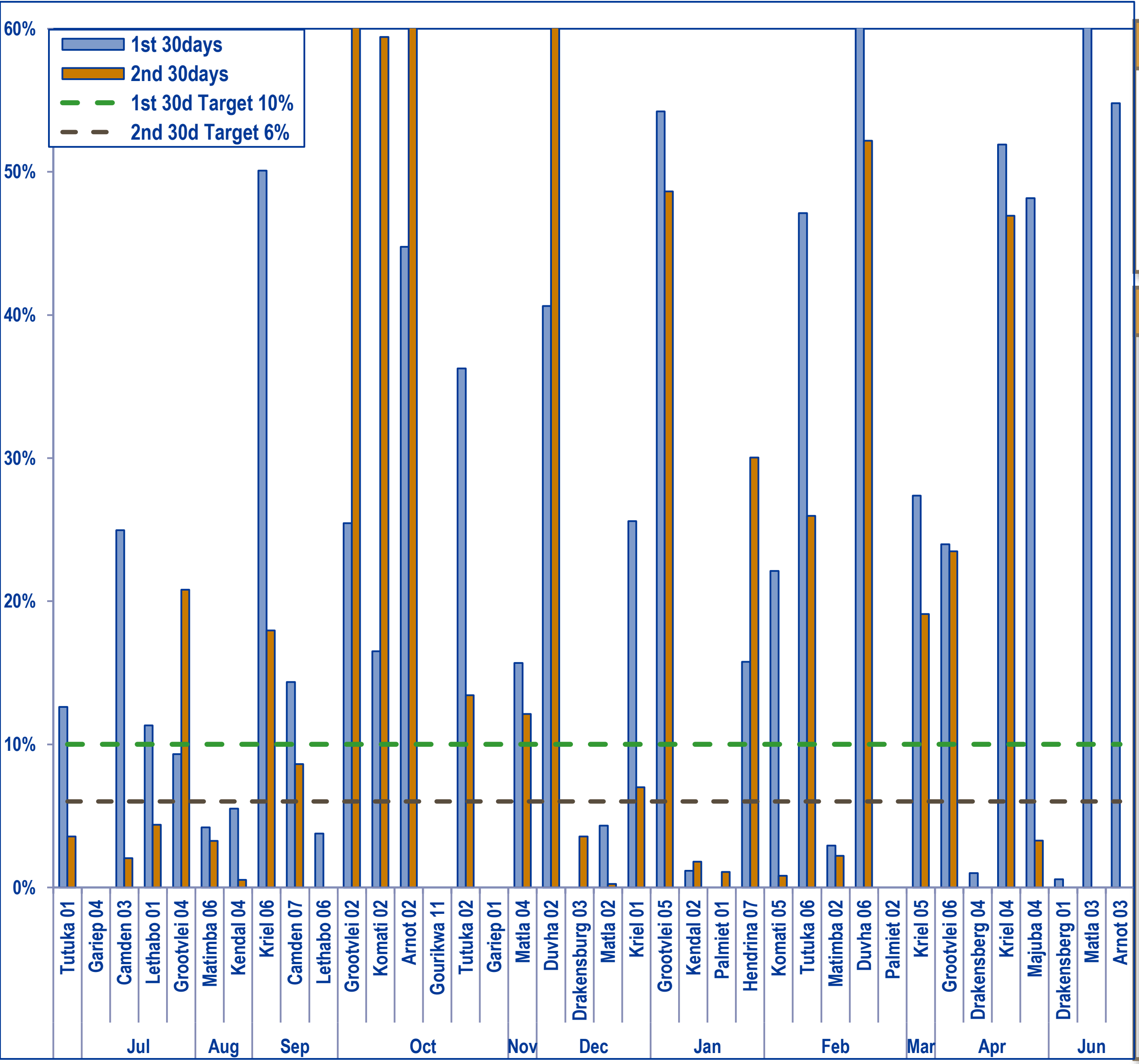
- Maintenance space constrained and less planned maintenance was executed than peers
- Sustainability Strategy 80:10:10) from 2013/2014 increased maintenance at priority stations.
- PCLF Top Quartile very high but median and Low Quartile in line with peers
- PCLF increase contributed to 2016 drop in UCLF and improvement in EAF.

Maintenance

Eskom’s maintenance backlog, especially of proactive maintenance outages, built up from 2008

- Maintenance was deferred and reduced because of zero load shedding priority.
- Higher load factors and deferred maintenance increased plant breakdowns.
- High and increasing reactive maintenance increased the backlog of proactive maintenance because of rolled outages.
- Backlog rose from 2 in 2008 to 40 in 2011. From 2012 as many outages were superseded as were backlogged.
- Prioritisation of stations has increased maintenance needs of non-prioritised stations.
- Eskom’s Sustainability Strategy from 2013/14 included to reduce and eliminate the backlog but depended on capacity for maintenance being available.
- Constrained system had not allowed space to reduce the backlog
- Thus, ***OCGT usage required*** to make space for essential maintenance to ***arrest performance decline*** and ***minimise load shedding***.

FY2016 – Philosophy Outages (excl IN) & ST >21 days. Post Outage UCLF 1st 30 days and 2nd 30 days 29.46%



Excludes OCLF SOURCE: GPSS

UCLF- 60 days

Quarter	FY15	FY16
Q1	13.33%	29.46%
Q2	11.26%	------
Q3	21.85%	------
Q4	23.39%	------

Key Insights 1st 30 days

November:
- **Matla 04**: Boiler Tube Leaks

December:
- **Duvha 02**: Blr trip, Trb trip & blr optimisation tests
- **Matla 02**: Blr trip - low drum lvl
- **Kriel 01**: R/H Saf vv stuck open, feed pumps tripped

January:
- **Grootvlei 05**: Blr drum press high, clinker removal
- **Hendrina 07**: Turb Governor faulty & poor vacuum

February:
- **Komati 05**: turbine control oil pressure low
- **Tutuka 06**: Poor condenser vacuum
- **Duvha 06**: ID fans @max, Both hph banks o/c

March:
- **Kriel 05**: Unit Trips, Dry Dust Problems, re-htr spray wtr vv repairs

April:
- **Grootvlei 06**: Poor Mill / vacuum performance
- **Kriel 04**: Steam Feed Pump Turbine cw valve repairs / chemical conditions
- **Majuba 04**: Condenser T1 bellow leaking (Vacuum high), Boiler tube leak repairs

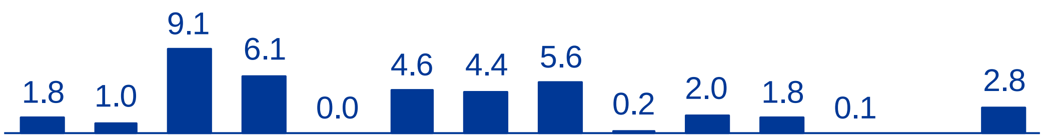
June:
- **Matla 03**: Re-heat vent line repairs, boiler tube leak repairs (8days)
- **Arnot 03**: Governor Valves:1 & 4 Failure, boiler tube leak repairs(7.5days)

Post maintenance UCLF on areas within scope is well within international standards and target

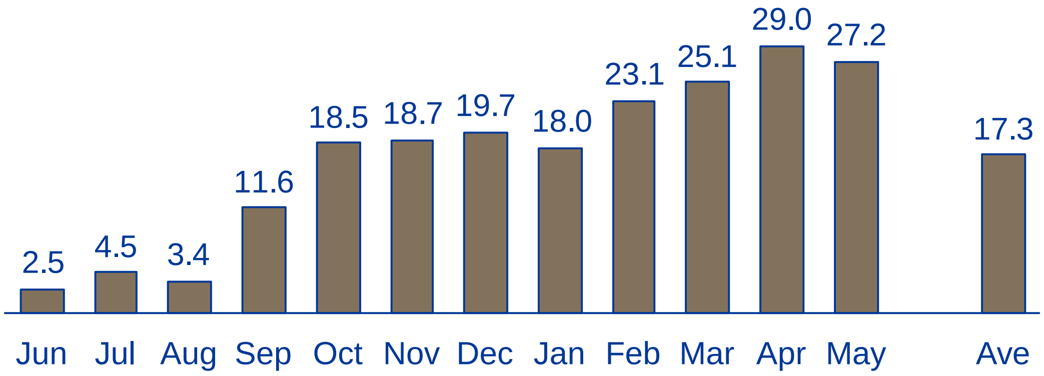
Challenges with post outage UCLF are driven by the ageing fleet

- Only **2.8% of post outage UCLF** was as a result of ***direct execution quality,*** owing to outage work well **within the 10% target**
- Drivers of post outage UCLF include
  - **Postponed mid life refurbishment** of units
  - Insufficient **funding**
  - **Capacity constraints** forcing outages to be postponed
- **Postponement of outage scope** accounts for the majority of post outage UCLF

Post outage UCLF as a result of *direct execution quality*
UCLF % *(June 2014 – May 2015)*

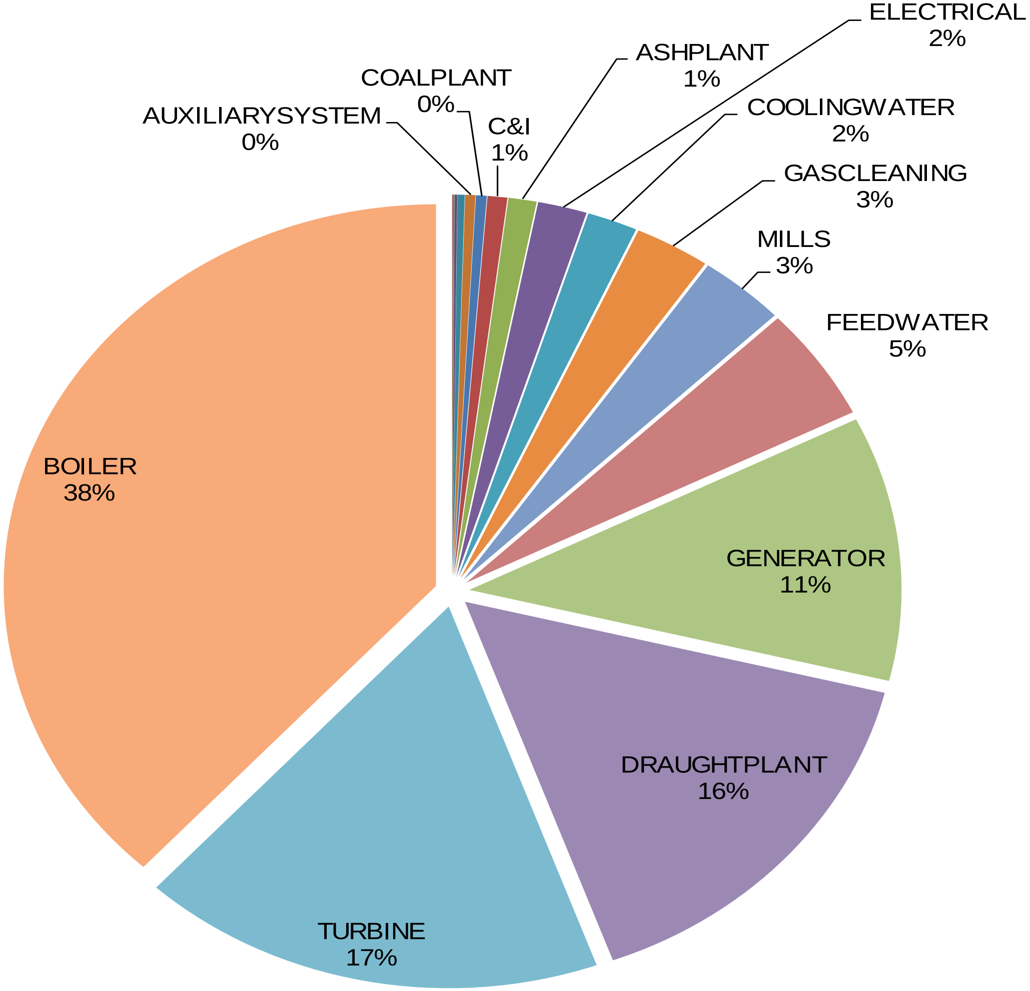


Post outage UCLF as a result of *other plant failures*
UCLF % *(June 2014 – May 2015)*



Unplanned Energy Loss per categories for FY2017

Boiler, Turbine & Draught Plant were the biggest contributors to unplanned energy loss



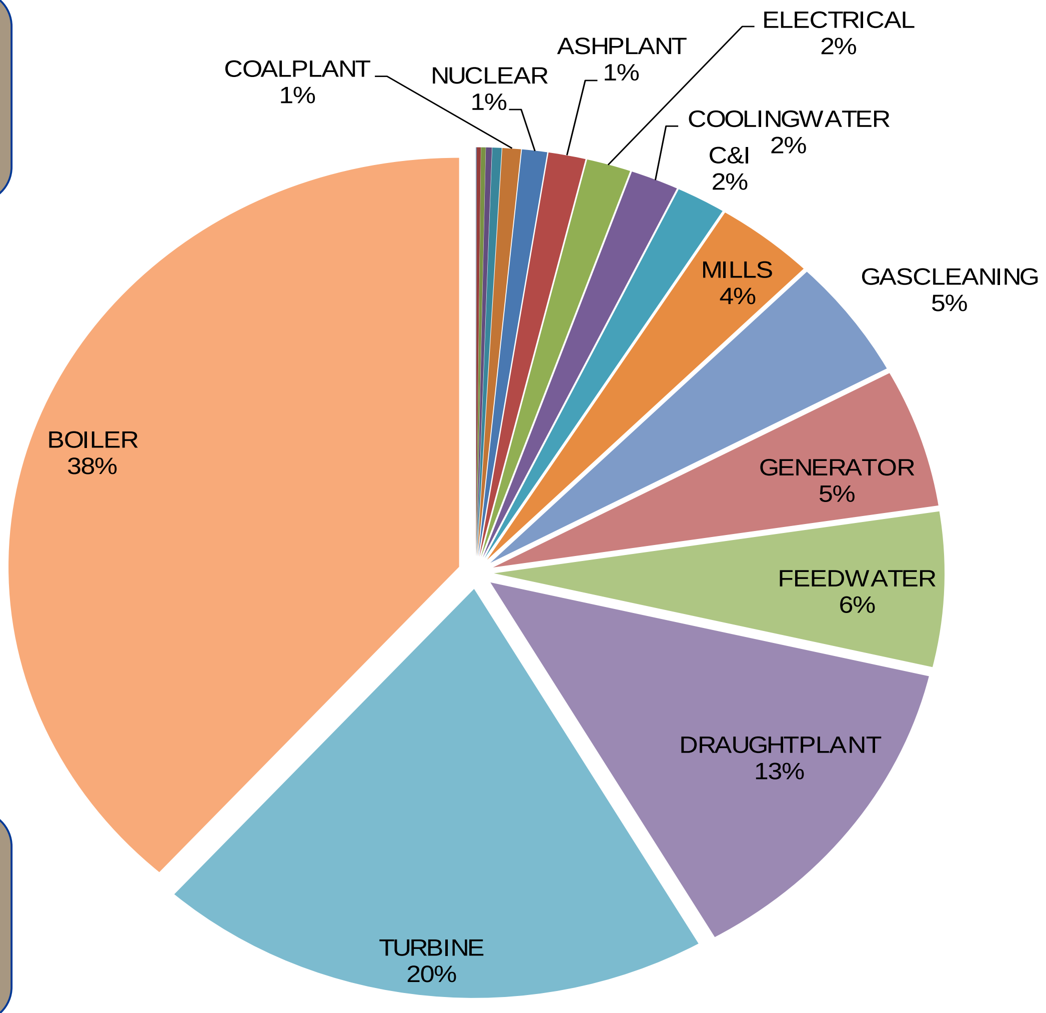
UCLF 9.90%

Boiler tube leaks, in particular a symptomatic of high utilisation.

Unplanned Energy Loss per categories for FY2016

UCLF 14.91%

Boiler, Turbine & Draught Plant were the biggest contributors to unplanned energy loss

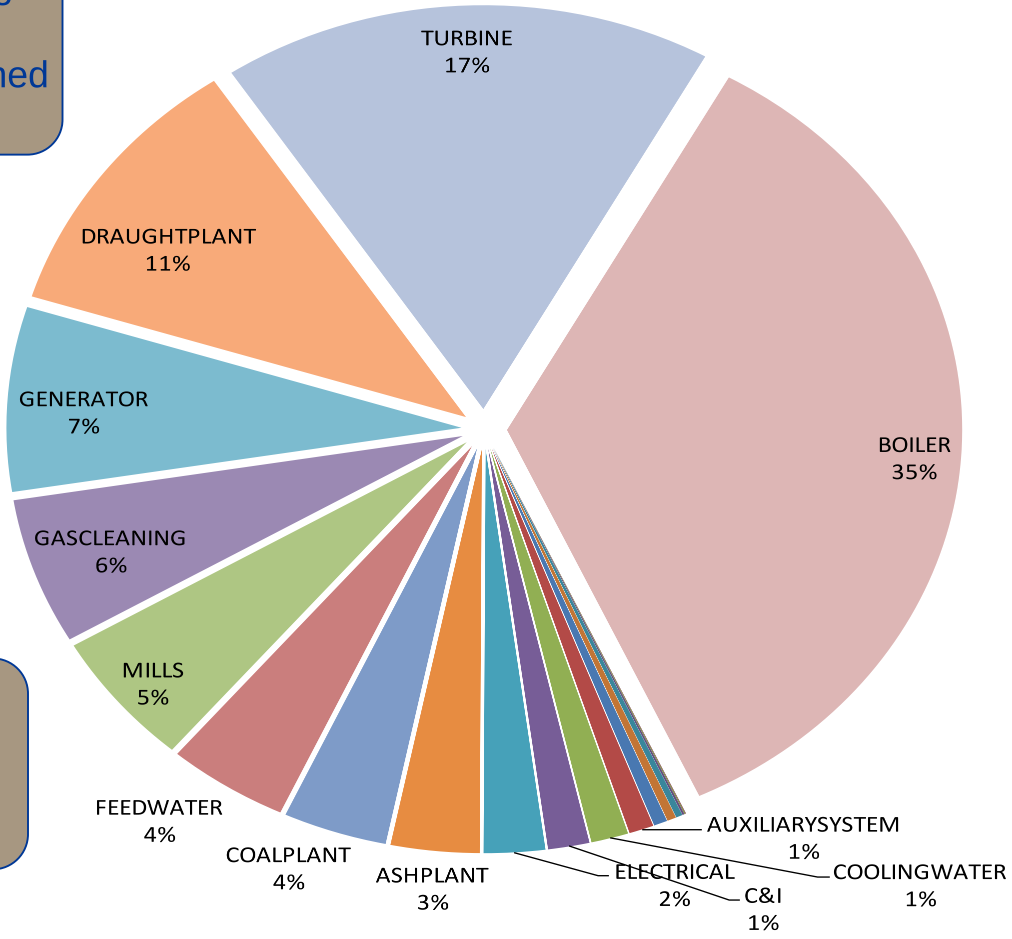


Boiler tube leaks, in particular a symptomatic of high utilisation.

Unplanned Energy Loss per categories for FY2015

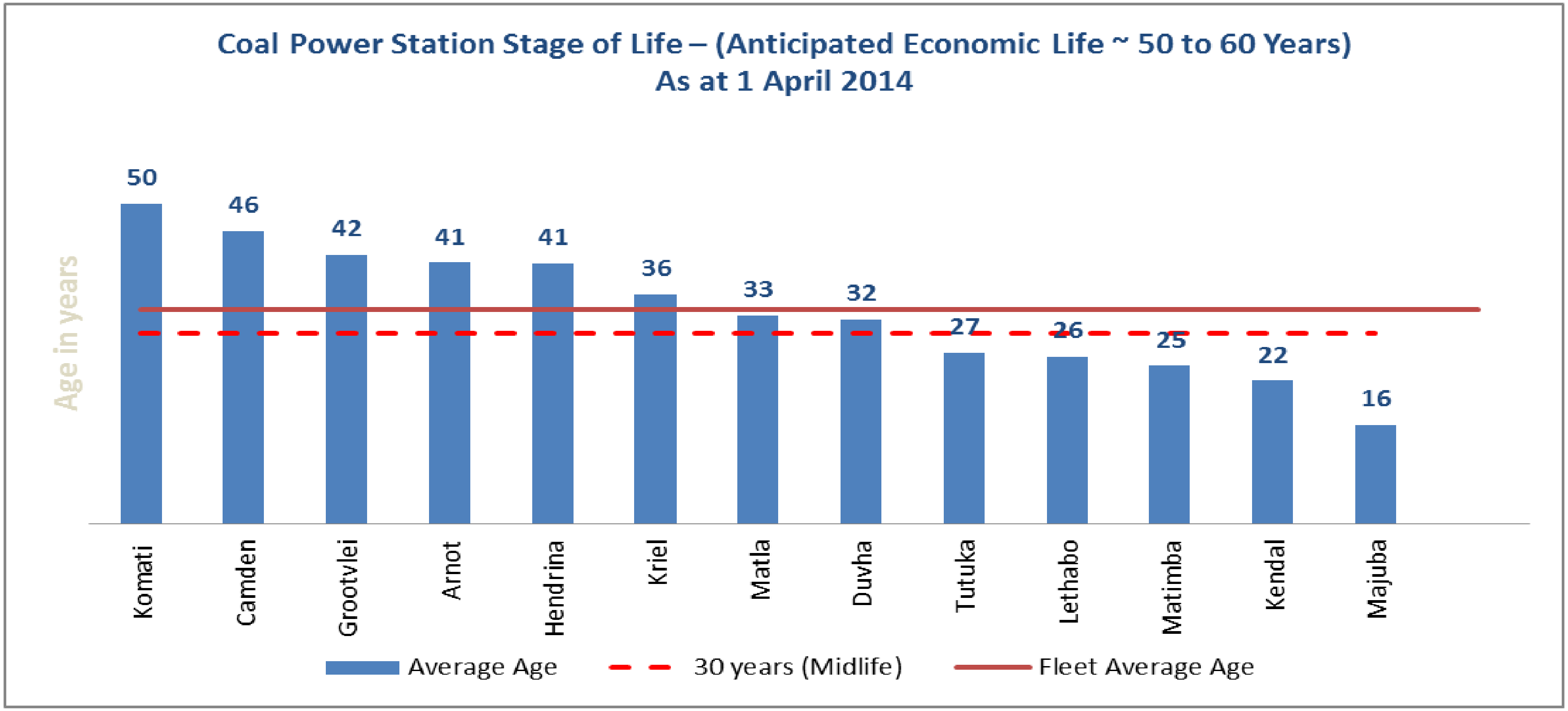
Boiler, Turbine & Draught Plant were the biggest contributors to unplanned energy loss.

UCLF 14.22%



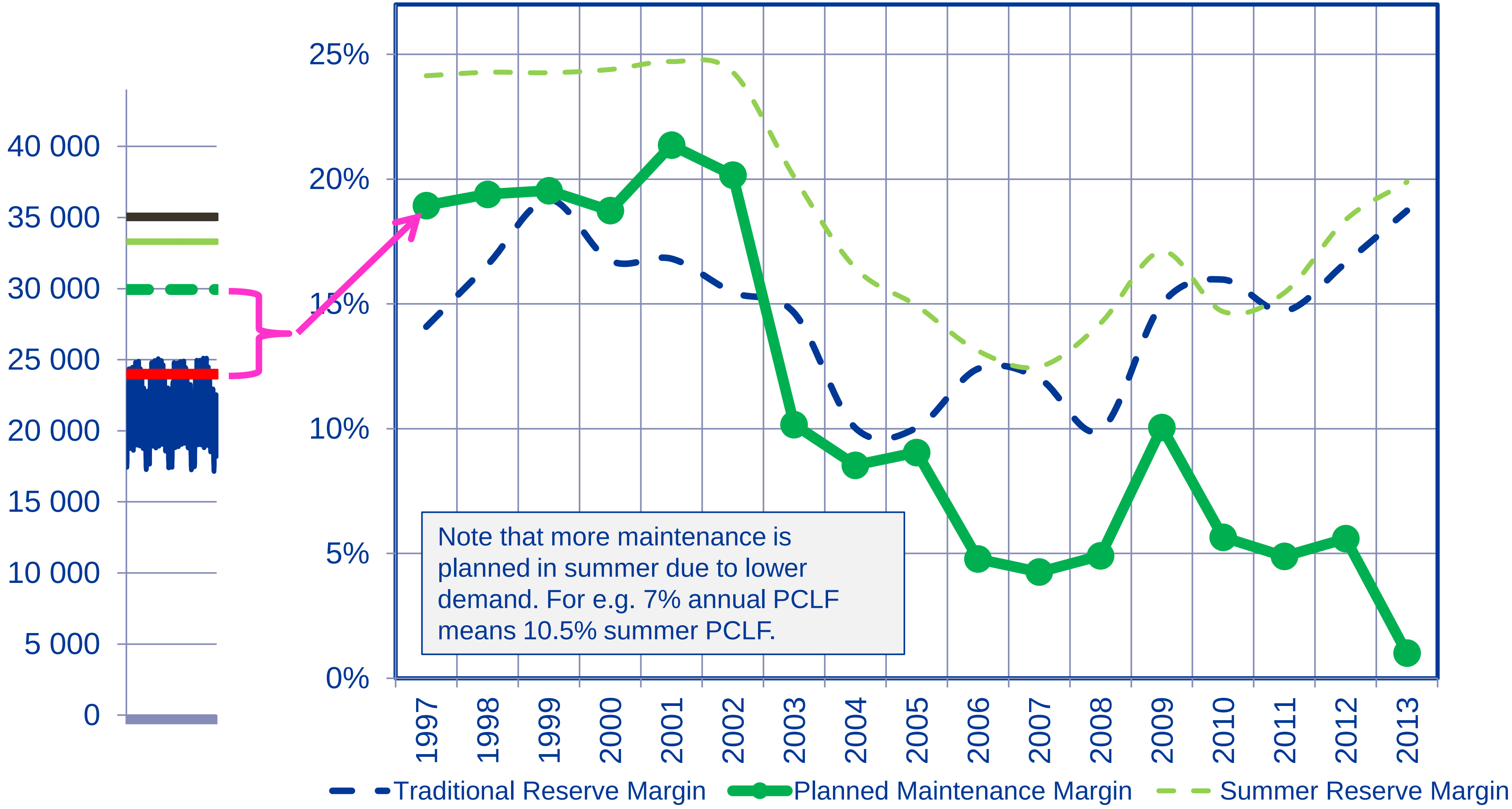
Boiler tube leaks, in particular a symptomatic of high utilisation.

Constrained system leading to reduced maintenance was exacerbated by age of the stations - most of Eskom's coal stations were past or approaching 30 year life.



- Average age of the stations was 34 years and all except Majuba had reached or past that period where they required major equipment replacements in order to restore the plants' economic life.
- Replacement/refurbishment of major components requires extensive outage time, and is expensive.
- Primarily due to financial and capacity constraints, particularly to keep the lights on between 2008 and 2014, much of this refurbishment could not be executed.
- Major components not being replaced or refurbished when due increases the risk of incurring a significant decline in technical performance.

Maintenance Margin for Generation - Shows how little space there was to perform planned maintenance



Note that more maintenance is planned in summer due to lower demand. For e.g. 7% annual PCLF means 10.5% summer PCLF.

2018/05/04

Actions by Eskom in response to challenges.

Eskom had devoted continuous and high level attention to maintenance and load losses

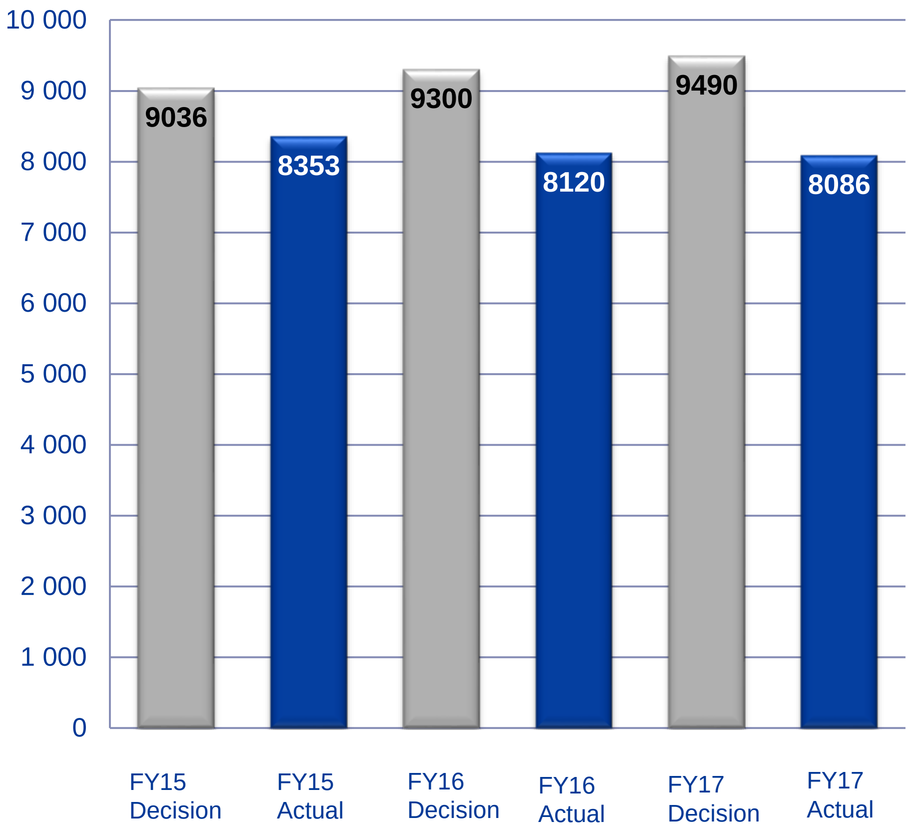
- Maintenance strategies and Life of Plant plan for each power station
- 5-year Outage plan, updated regularly
- Generation Sustainability Strategy (80:10:10)
- Accelerated maintenance implemented from 2013
- PLL focus on 5 stations contributing most to the total

Conclusion on Generation Performance

- High and increasing reactive maintenance, and the resultant decreasing amount of proactive maintenance, were the ***direct result of the constrained system***, aggravated by the reduced plant reliability and also by capital expenditure constraints.
- Eskom remains convinced that the only way to restore plant reliability was to put ***emphasis on proactive maintenance***, which includes ***refurbishment***. If this had not been done and outages had continued to be deferred in order to keep the lights on, the availability would have continued to deteriorate even further and the ***improvement from late 2015 would not have been possible***.
- It was thus ***prudent*** that the OCGTs were, as was expected when they were commissioned, utilised beyond their normal peaking function, during the 2015 and 2016 financial years, “to improve the supply / demand balance … during the period of plant shortage” as NERSA said in December 2007.
- This contributed to ***creating space for maintenance*** and ***limiting the far more expensive load shedding***, once all other demand and supply side options had been fully utilised.
- The ***improved performance*** from late 2015 was one of the contributing factors to the ***reduced OCGT usage in 2016/17***.

Environmental levy was underspent due to lower sales and therefore lower production

Environmental levy (R'm)



MYPD Methodology[1]

- Allows for taxes and levies as a pass through

Reasons for RCA amount

- Environmental levy reflects a clawback in favour of the consumer
- Attributable to lower production levels linked to the lower sales volumes in actual mode
- Environmental levy rate is pass through to consumer

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[1] Source: Clause 14.1.5 NERSA MYPD Methodology – Final- for publication 5 December 2012

Other categories contributing to the RCAs

Breakdown of Other categories

Other categories (R'm)	2014/15	2015/16	2016/17	Total
Capital Expenditure (CECA)	91	332	636	1 059
EEDSM	-149	-368	-	-517
Service Quality Incentives (SQI)	236	318	343	897
Inflation	209	-152	162	219
Other income	-528	-152	-	-662
Total other categories	**-141**	**-4**	**1141**	**996**

Drivers to other categories in the RCAs

- **Capital Expenditure (CECA)** – amounts claimed as a result of variance in return on assets due to variance in capital expenditure being incurred when compared to assumption in MYPD3 decision
- **EEDSM –** lower achievement due to delays in project executions and strategy has been revised
- **SQI –** Distribution and Transmission networks have performed well over the period
- **Inflation –** Operating costs per the MYPD3 decision adjusted for change in CPI
- **Other Income** – Amount of other income adjusted based on RCA2014 decision principles

In summary Eskom’s RCA applications are within the ambit of the MYPD 3 methodology and the precedent set in MYPD 3 year 1 RCA

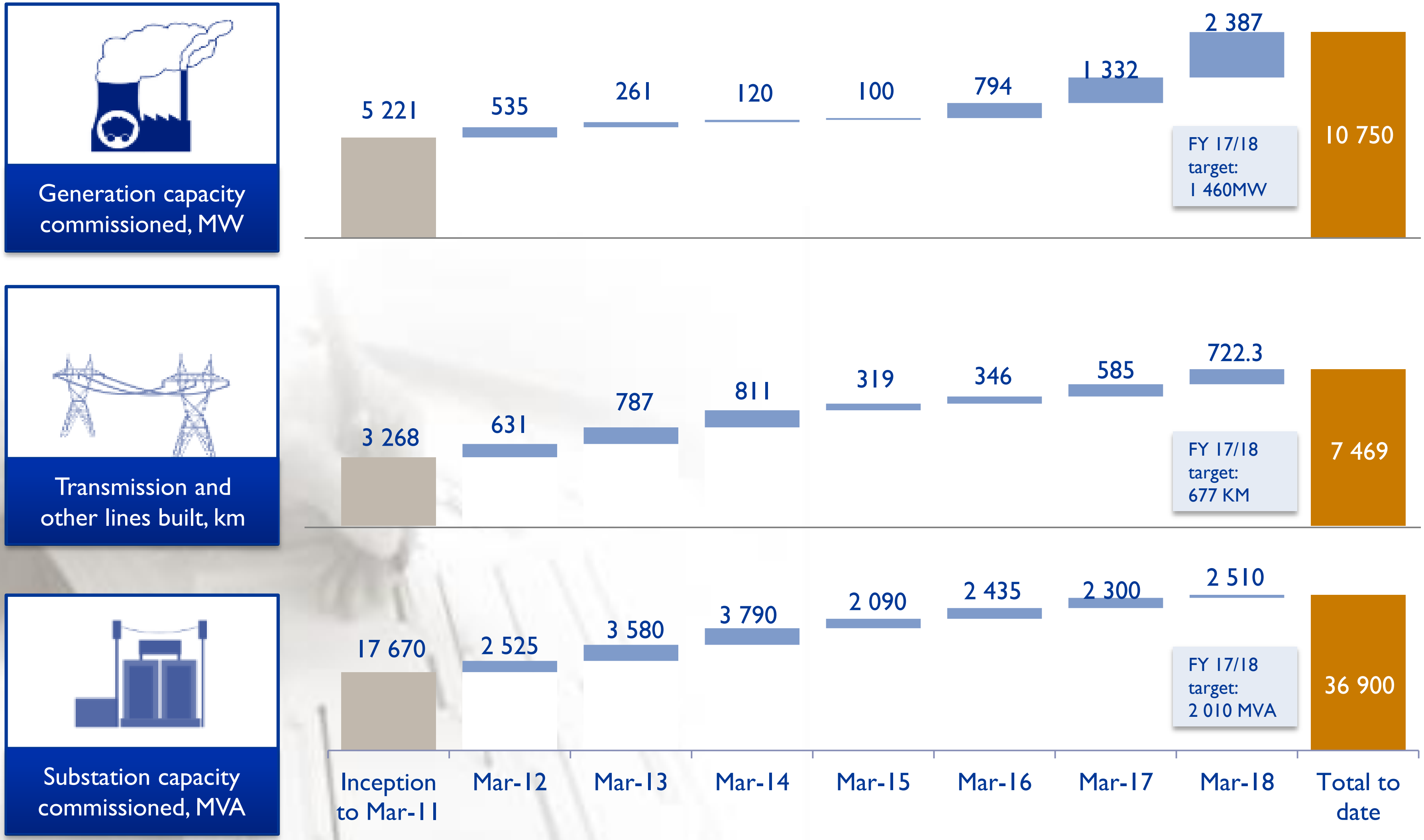
- Eskom has submitted the RCAs for years 2,3 and 4 of MYPD3 based on:
  - MYPD3 regulatory methodology
  - Decision and principles of the RCA 2013/14 decision
- The application is based on audited financials at Eskom company level
- Eskom is requesting the revenue variance which contributes 67% (R44bn)
- IPPs contribute 11% (R7.4bn) and cross border purchases 14% (R9.1bn)
- Coal costs adds 5% (R3.5bn); OCGTs 2% (R1.4bn) and other primary 4% (R2.8bn) and Other items 2% (R1.4bn)
- Environmental levy is clawed back by 5% (R3.3bn)
- Eskom has absorbed operating costs of R33.8bn as higher expenditure is not allowed to be claimed through the RCA under the current MYPD methodology
- Eskom has also absorbed the OCGTs costs of R11.4bn above MYPD3 levels which exceed the coal cost compensation
- Eskom is aware that the RCA Balance of R66bn will not be liquidated once off and is likely to be phased.

The phasing of the liquidation of the RCAs needs to take Eskom’s financial sustainability into consideration

Thank you

Backup

A large amount of construction work has been completed from the start of the build programme in 2005 to date…



- To date, the construction work that has been completed has added ~ 10 750MW of capacity, ~ 7 469km of transmission network and ~ 36 900 of substation transformer capacity (MVAs)

D

Efficiency of Eskom Generation New Build is best measured by overnight cost of construction

Comparing costs of constructing different power plants is challenging, due to difference in size, construction time, inflation, technology, location, etc.

Overnight cost is an internationally accepted method used to compare the construction cost of different power plants on a common basis.

Is defined as the **cost incurred if a power plant could be built overnight**

Includes costs associated with **civils and construction, mechanical equipment, electrical work, control and instrumentation, project management and development. Interest capitalised** to the project is excluded

Cost is expressed in terms of USD cost per kilowatt of installed capacity converted to the same base year, thereby enabling a like-for-like comparison. To ensure like-for-like comparisons, international benchmarks are adjusted to a common base.

D Eskom’s overnight cost of construction is essentially within benchmarked comparisons

USD / kW (2017 value)	Minimum	Maximum
Lazard	2 520	6 845
EPRI	2 400 (excl. FGD)	2 990 (incl. FGD)
International Energy Agency	1 618	3 064
Medupi (excl FGD)	2 769	2 900
Kusile (incl FGD)	2 906	2 974

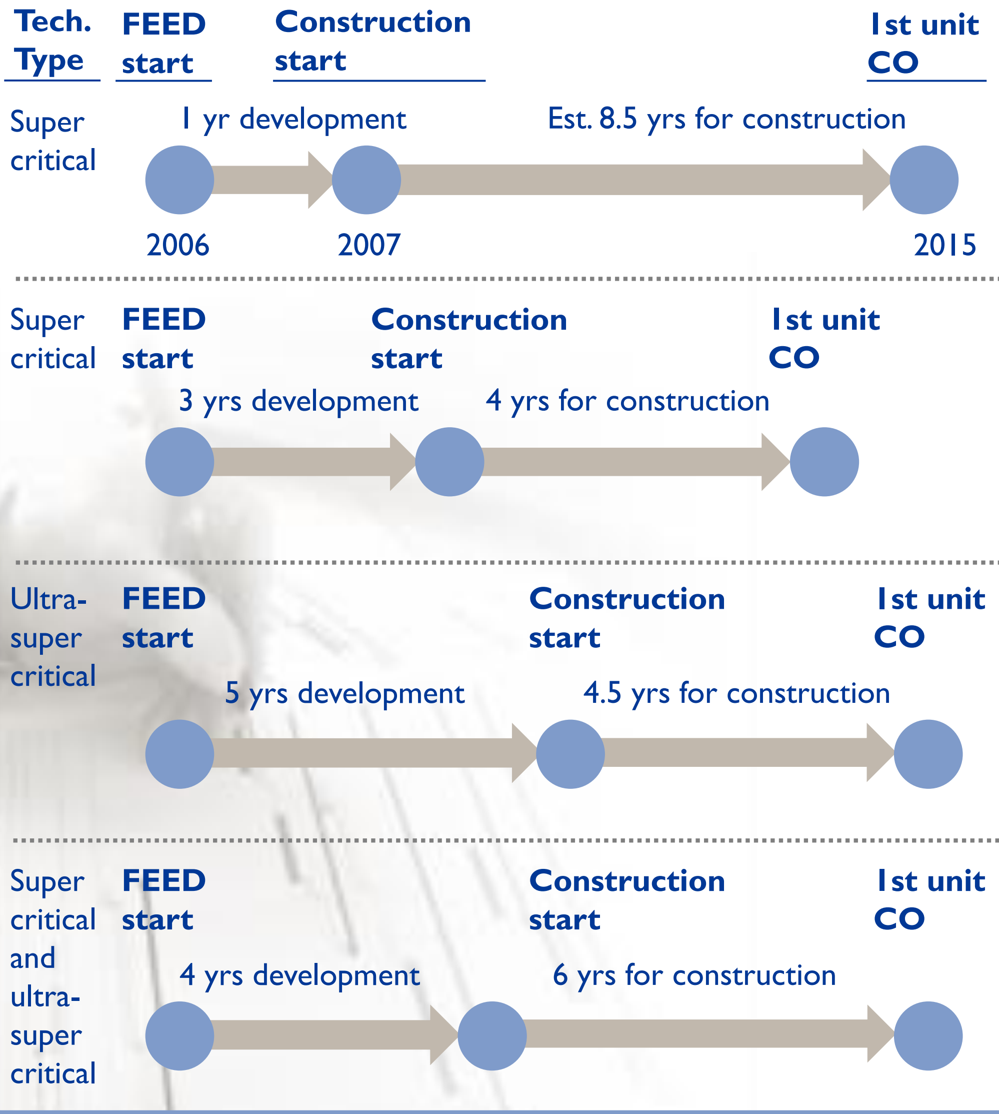
Medupi & Kusile overnight cost are within the range of international benchmarks provided by Lazard and the International Energy Agency. For EPRI (provide single figure ideal state, rather than range)

Medupi is within the FGD benchmark and Kusile is lower than the FGD benchmark.

The minimum values for Medupi and Kusile represent the P50 costs, whereas the maximum values represent the P80 costs.

D

The approach taken in comparable projects shows investment in front end engineering and design reduces execution time and increases schedule certainty



Medupi (800MWx 6) Concept to 1st Unit CO

Tech. Type | **FEED start** | **Construction start** | **1st unit CO**

Super critical

1 yr development

Est. 8.5 yrs for construction

2006

2007

2015

Project schedule and estimates change resulting in loss of confidence

Tata Mundra PS India (800MW x 5) Concept to 1st Unit CO

Super critical

FEED start

Construction start

1st unit CO

3 yrs development

4 yrs for construction

Repeatability and forward planning produced better cost and schedule certainty

Opole PS, Poland (900MW x 2) Concept to 1st Unit CO

Ultra-super critical

FEED start

Construction start

1st unit CO

5 yrs development

4.5 yrs for construction

Forward planning produced better cost and schedule certainty

GKM AG, Germany (900MW x 1) Concept to 1st Unit CO

Super critical and ultra-super critical

FEED start

Construction start

1st unit CO

4 yrs development

6 yrs for construction

Forward planning produced better cost and schedule certainty

- Rapid development with **shortcuts** taken in design and engineering inevitably **cause uncertainty, design changes, integration issues and accompanying delay and cost escalation**
- **Cost and schedule confidence can be achieved** with sufficient development time

D

A set of four criteria was used to evaluate projects constructed in the same period for comparison

Units constructed in the same period (2006-2015) as Medupi unit 1 and that meet five criteria were considered

Criteria include:

- ✓ Power Station unit technology type was either supercritical or ultra-supercritical
- ✓ The size of the units were between 800 and 900 MW
- ✓ Sufficient data was available to make a comparison
- ✓ The technology used was consistent throughout the build (all units were the same technology type)

Only 3 of the 22 power stations built in the same period allowed a fair comparison with Medupi Power Station

It will not be feasible to suspend all or part of the works at Medupi and Kusile (1/2)

- **Medupi is 89.9% complete** and **Kusile is 84.4% complete**. It will **not be feasible to suspend** all or part of the works**.**
- P50 schedule is being pursued for Medupi and Kusile. P80 will have financial implications as **Eskom will lose the R14bn savings identified from schedule acceleration**.

Is it cost beneficial to postpone the construction of Kusile units 5 and 6?

1. Significant **contractual penalties** will be incurred
2. Significant p**reservation costs incurred per annum** of plant and equipment already built and manufactured
3. To **start** the **construction again** at a later stage would need significant **start-up costs**
4. The boiler contractor, Mitsubishi Hitachi Power Africa (MHPA) – significant cost overrun on the **original contract value for Kusile.** The contractor will surely make **use** of a **clause in the contract to terminate**. The clause states that if the Employer suspends works for more than 6 months, the Contractor can deem the contract terminated. Surely, the Contractor is going to take this way out and Eskom will have to find another contractor or re-contract with MHPA at an increased cost – not cost estimated yet
5. **In place of** the capacity of **Kusile 5 and 6**, Eskom **will have to invest** in the **life extension** of the **old coal fired stations** with **much lower thermal efficiencies** (below 30%) than Kusile (45%)

The **cash** that can be **saved to postpone Kusile 5 and 6** is estimated to be a maximum of **R15bn. Clearly not advisable to postpone Kusile 5 and 6.**

It will not be feasible to suspend all or part of the works at Medupi and Kusile (2/2)

- Other than the financial implications of stopping the remaining units, the current system does require the new units due to Eskom's aging fleet.
- Until the finalisation of the Integrated Resource Plan (IRP) and allocation to Eskom, it is risky not to have Eskom's cheaper units running. Stopping these units might result in load shedding when there is an upward turn in the economy.
- The decision to cease construction of Kusile units 5 and 6 would have a tremendous social and economic impact.
- From an environmental perspective, Kusile is being constructed with Flue Gas Desulphurisation (FGD) and Medupi will be retrofitted with FGD, which makes a significant contribution towards mitigating harmful environmental emissions.