MYPD 6 Application

NERSA Public Hearings

Nelspruit

27 November 2024

Basis of Eskom revenue application

Background

- The Multi-Year Price Determination (MYPD) 5 revenue determination period comes to an end on 31 March 2025
- **Revenue applications are guided by the Electricity Pricing policy (EPP), Electricity Regulation Act (ERA) and NERSA's MYPD methodology (2016)**
  - Must enable an efficient licensee to recover the full cost of its licensed activities, including a risk adjusted return
  - Ensure Eskom's sustainability as a business and limit risk of excess or inadequate returns, while providing incentives for new investment
  - Eskom is required to make a compliant application in terms of the MYPD methodology
- Eskom wishes to be in a position to continue to provide an electricity service to customers
- Based on forecasts which serve as assumptions that correspond to a revenue requirement
  - **Eskom has motivated the application using the latest projections**
- Revenue determination is made by NERSA based on assumptions
  - Variances between determinations and actuals are addressed after the FY through the Regulatory Clearing Account (RCA)
  - In practice, the RCA process has risks with recovery of efficient variances 3 to 6 years after expenditure incurred
- **Have considered impact on consumer by phasing of return on assets for migration towards cost reflectivity at revenue level**
- Have made ringfenced revenue applications for Generation, NTCSA (Transmission) and Distribution
  - Expect NERSA to make ringfenced revenue determinations to facilitate unbundling
- The Electricity Regulation Amendment Act (ERAA) has been signed into law by the President on 16 August 2024, and is awaiting announcement of the effective date
  - Await NERSA transitional arrangements to plot way forward
- The Retail Tariff Plan to restructure the tariff is currently being consulted on

Mechanisms in place for Eskom financial sustainability to enable electricity service

Cost reflectivity at revenue and tariff levels	▪ This MYPD 6 revenue application allows for further migration towards cost reflectivity at a revenue level ▪ The Retail Tariff Plan application initiates the journey towards cost reflectivity at a tariff level
Balance sheet support has been provided by Government	▪ Has been illustrated that balance sheet support was necessary due to inadequate tariffs ▪ A requirement for this debt support was migration of revenue to cost reflective level ▪ The debt support will come to naught if tariffs do not become cost reflective ▪ Government services such as health, schools and security could be negatively impacted if Eskom sustainability is not addressed
Efficient Eskom cost base	▪ Eskom continues to strive to improve efficiencies ▪ Less than 50% of total Eskom costs where Eskom management has a role ▪ Of this 50% - many costs are contractual in nature ▪ Significant dependence on other regulated domains including water, diesel, fuel oil costs ▪ Have motivated efficient and prudent costs to meet requirements for electricity delivery
Collecting revenue that has been billed	▪ This remains a challenge that requires further attention ▪ The National Treasury debt relief programme is not resulting in any improvement in payment levels ▪ Leaving this situation without further intervention will result in Municipal debt level being at 35% of FY 2028 allowable revenue

For financial viability to materialise, all of these elements must deliver their components, and they must occur within a short timeframe

Eskom's application is only for efficient costs

The guiding legislation (ERA) allows only for the recovery of efficient costs

NERSA has various requirements to ensure that only efficient costs are applied for

- NERSA requires the MYPD methodology to be followed and provides detailed guidance on how an application is to be made
- NERSA requires the prudency assessment criteria to be applied, as applications are made
- Eskom provides detailed information that supports its application

NERSA makes assessments for efficient costs

- These are based on the MYPD methodology and prudency criteria
- It is expected that NERSA will also make decisions within these regulatory frameworks and provide the relevant benchmarks, comparisons and motivations
- NERSA also provides reasons for its decision

Corruption and fraud continues to be addressed

- Eskom is making every effort to ensure that processes are in place to address possible fraud and corruption
- NERSA has provided guidance on addressing any recoveries

NERSA's MYPD methodology requires Eskom to provide costs in terms of this allowable revenue (AR) formula

$$AR = (RAB \times WACC) + E + PE + D + R\&D + IDM + L\&T$$

Return on Assets	Operating expenditure (incl R &D)	Primary Energy (incl imports and DMP)	IPPs	Depreciation	Integrated Demand Management	Tax & Levies	Revenue

Return on assets = % cost of capital allowed X depreciated replacement asset value

This internationally recognised methodology, if implemented (even in a phased manner) would allow for recovery of efficient costs and a fair return

NERSA methodologies allows Eskom to recover only efficient costs through tariffs to be charged to customers

Regulatory framework for tariff determination

Revenue Level

1 MYPD (decision Dec-24) + RCA

Determination of the required level of annual revenue, typically known as the revenue requirement

- Cost + return Gx, Tx, Dx and retail
- Volume
- Average price and price increase

Tariff Structure

2 Cost to serve/supply

Apportionment of revenue among customers with distinctions made between customer-, demand- and energy-related costs classes

- Cost to serve
- Cost functionalisation Gx, Tx, Dx and retail
- Cost causation and cost drivers
- Cost reflective unbundled unit costs

Tariff Level

3 ERTSA (decision Mar-25

Individual prices, formally known as tariffs or rates, are designed in order to collect the assigned level of revenue from each class

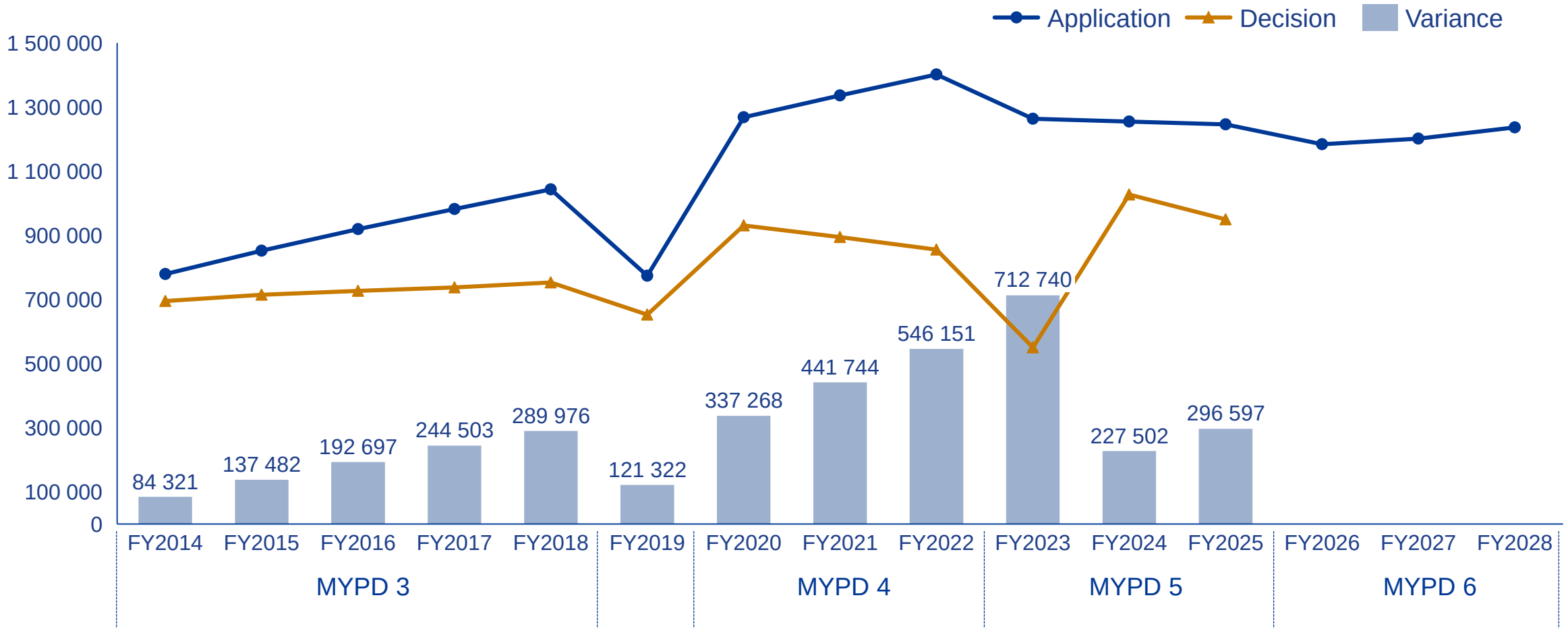
- Tariff design
- EPP, Codes, Strategic provides direction
- Design - unbundled or bundled, affordability
- Once approved by NERSA implementation

Retail Tariff Plan – restructure of tariffs to best reflect the costs for each function (**decision expected Jan-25**)

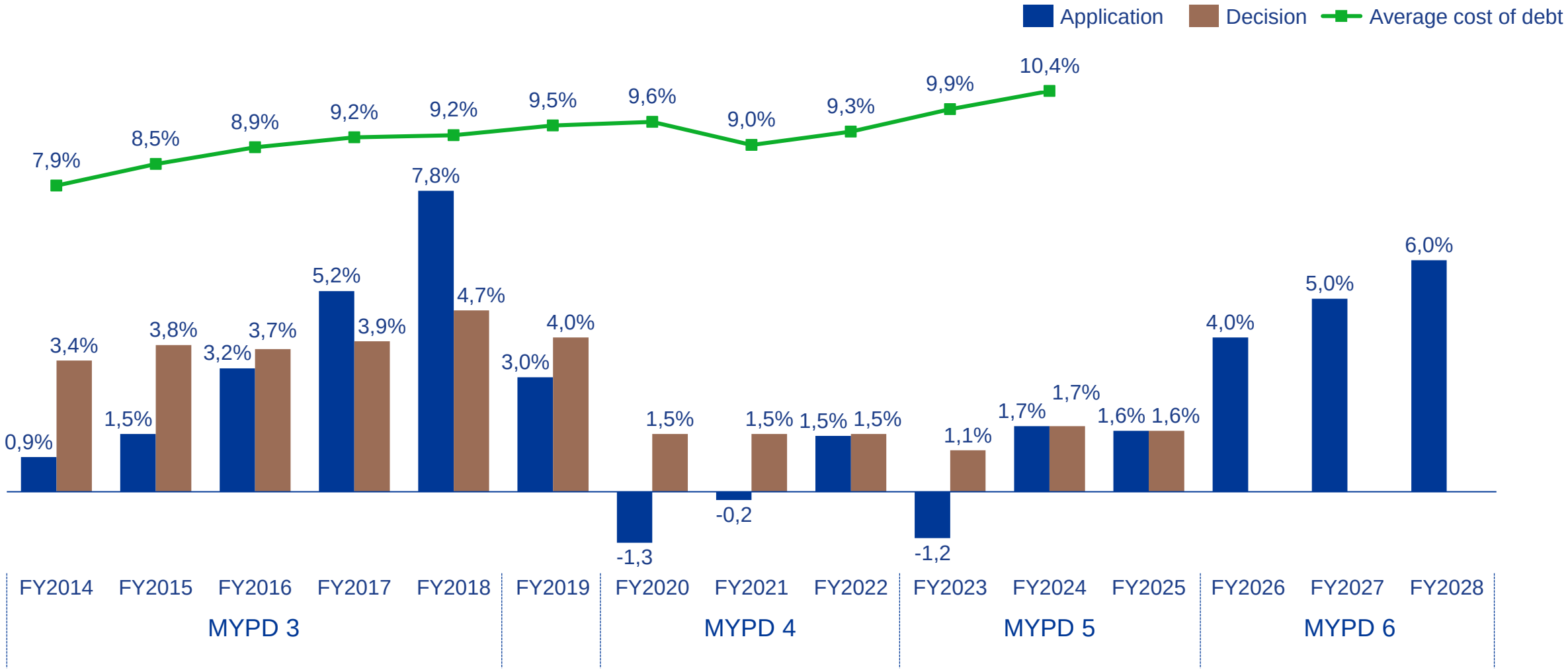
Eskom allowable revenue required to supply electricity for the period FY2026 to FY2028

Allowable Revenue (R'millions)	AR	Formula	Decision FY2025	Application FY2026	Application FY2027	Application FY2028	Post Application FY2029	Post Application FY2030
Regulated Asset Base (RAB)	RAB		988 345	1 066 724	1 192 878	1 219 244	1 243 078	1 278 277
WACC %	ROA	X	1.58%	4.00%	5.00%	6.00%	7.47%	9.69%
Returns			15 616	42 669	59 644	73 155	92 908	123 916
Primary energy	PE	+	92 816	128 000	133 061	128 869	129 492	134 119
International purchases	PE	+	9 334	10 262	9 737	13 656	11 853	12 387
IPPs	PE	+	76 970	66 633	77 640	109 820	135 510	140 943
Environmental levy	L&T	+	6 503	6 539	6 279	5 337	4 781	4 767
Carbon tax	L&T	+	-	5 534	21 291	19 895	19 274	20 948
Arrear debt	E	+	-	8 914	9 917	10 752	12 037	13 310
Operating costs	E	+	61 442	93 315	93 834	97 864	100 152	105 100
Depreciation	D	+	73 376	66 931	69 952	77 431	79 685	85 961
MYPD6 Allowable Revenue			**336 057**	**428 798**	**481 355**	**536 778**	**585 691**	**641 450**
Add: Approved RCA/court order for liquidation	RCA		16 109	16 765	14 000	-	-	-
TOTAL MYPD6 Allowable Revenue	**R'm**		**352 166**	**445 563**	**495 355**	**536 778**	**585 691**	**641 450**

The difference between Eskom's application and NERSA's decision for RAB

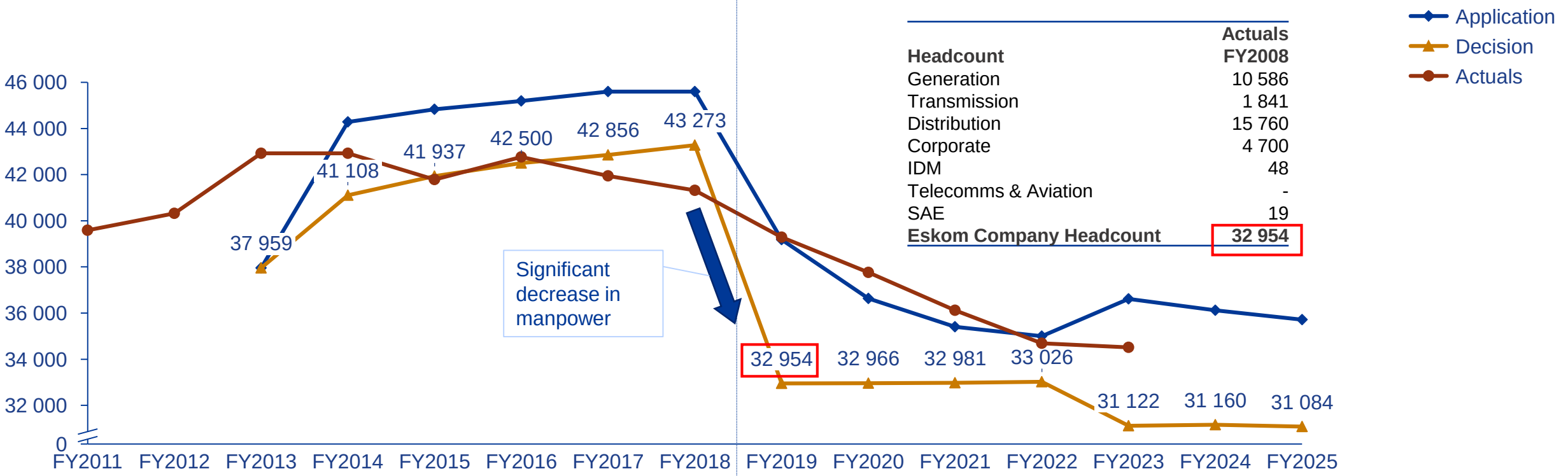


Return on Assets Applied vs Decision (%)



Eskom's average cost of debt far exceeds the return on assets that have been allowed

Employee numbers have reduced since over last few years , there is a gap in FY 2023

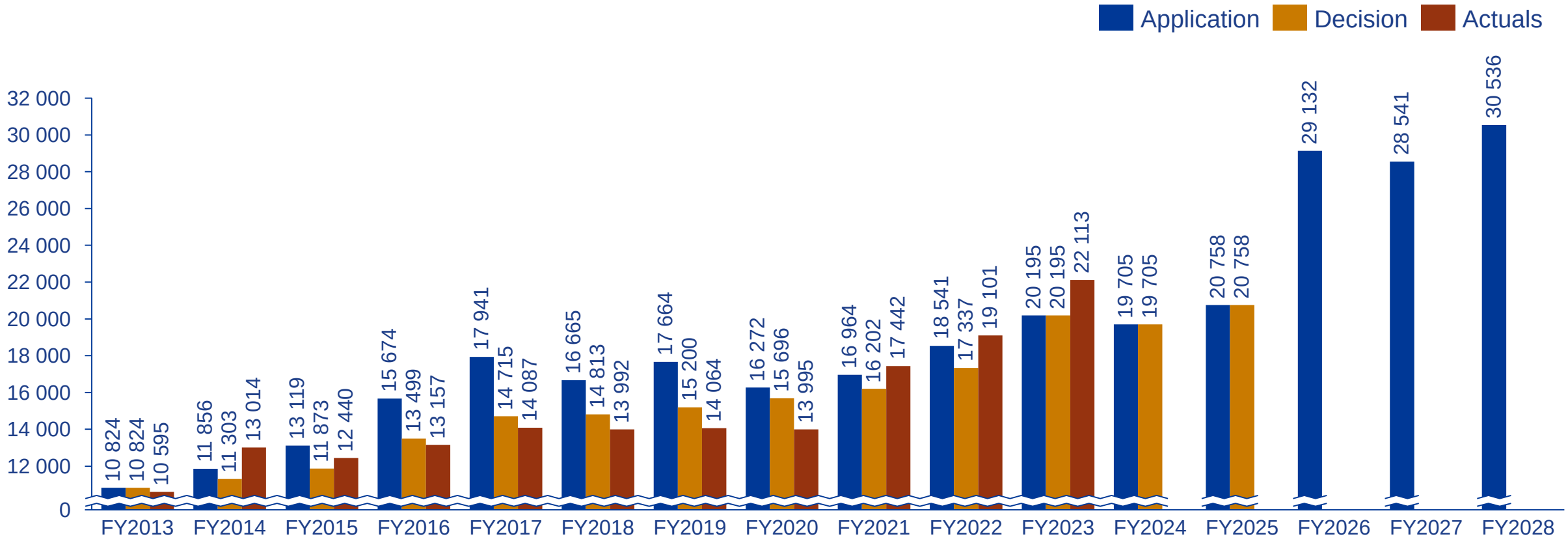


Headcount	Actuals FY2008
Generation	10 586
Transmission	1 841
Distribution	15 760
Corporate	4 700
IDM	48
Telecomms & Aviation	-
SAE	19
Eskom Company Headcount	**32 954**

- Over the MYPD 2 NERSA allowed for employee numbers to increase in line with new build programme
- Over the MYPD 3 this reasoning was maintained for GTD
- However, in this period Eskom restructured to centralised business functions which resulted in an increase in corporate manpower which NERSA did not allow in MYPD 3

- In the FY2019 decision, NERSA reverted to FY2008 as a basis for assessment on manpower, note this is pre-new build programme
- The significant drop in manpower was unrealistic for Eskom to meet especially considering that these are contracted positions approved in MYPD 3
- Eskom successfully reviewed this in the High Court
- However, subsequently NERSA have maintained a similar outlook on employee numbers and have kept it consistently low

Maintenance is required to sustain operations
NERSA has allowed this in their MYPD5 decision

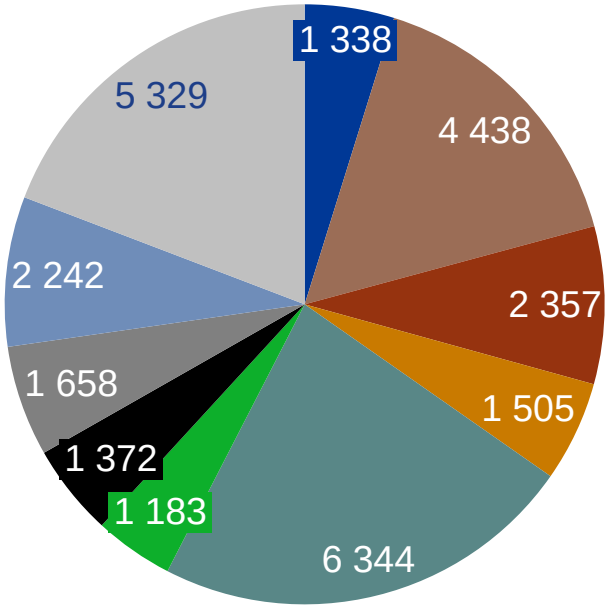


- Further maintenance required in accordance Generation operational recovery plan – 8 priority stations
- Requirement for continued operations –move from shift from “shut down” of older power stations
- More Kusile units operational
- Koeberg long-term outage

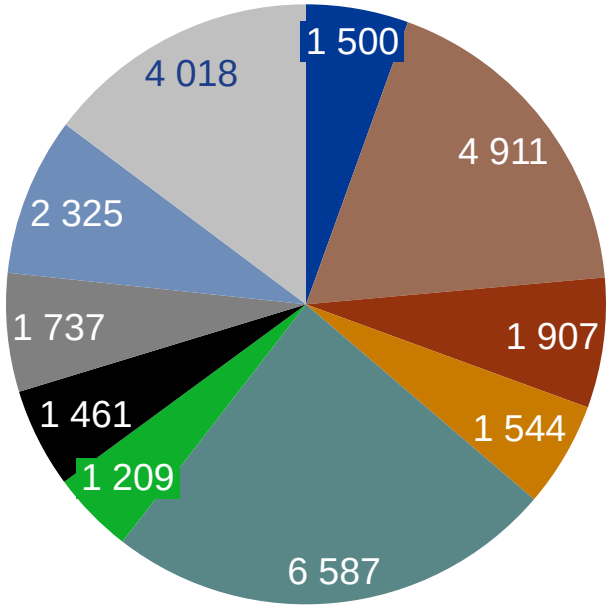
Other operating cost split into cost items (Rm)

Cost splits are only items that are greater than R1 billion

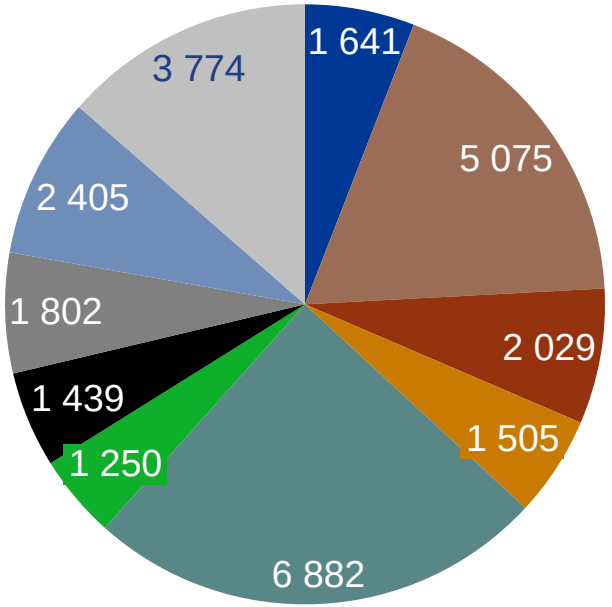
FY2026



FY2027



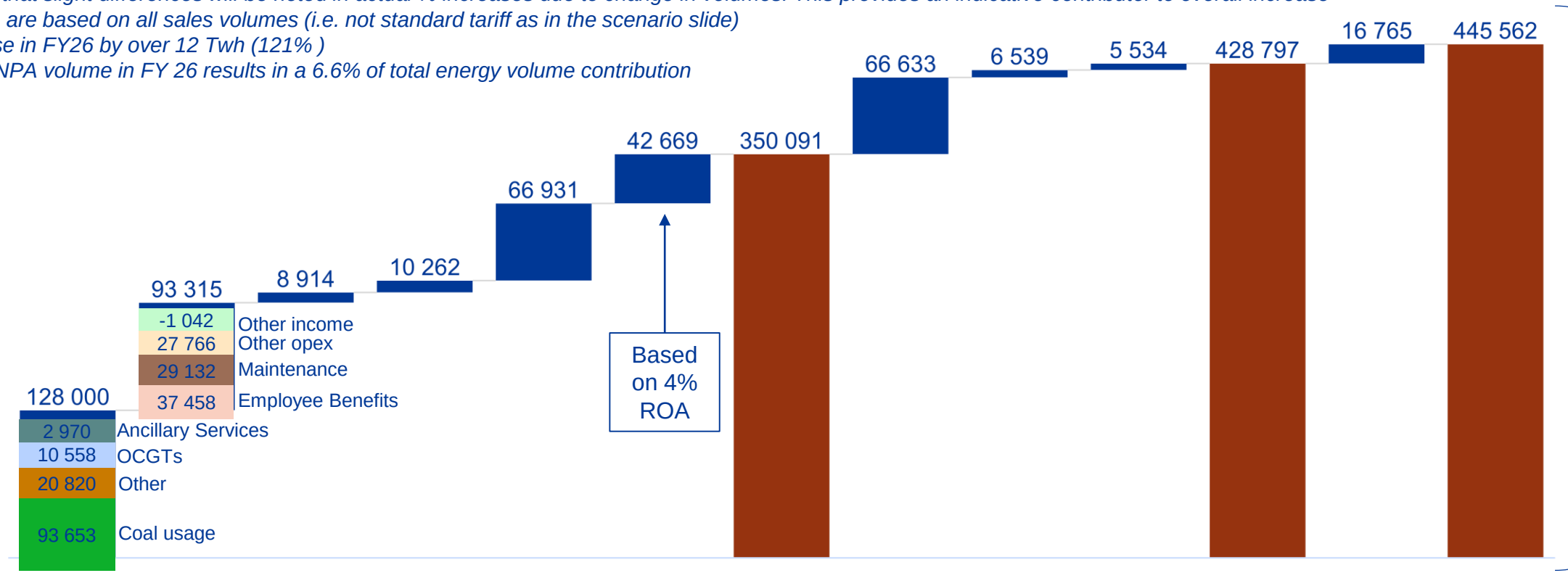
FY2028



- Internal Electricity costs
- Service costs - plant, equip, property
- Contractor Costs
- Materials Expenses
- Net insurance expense
- Cleaning materials and services
- Security services
- Software annual licensing fee
- Travel and subsistence
- Other

FY2026 revenue build-up and contributions to total price increase

- *The FY26 % increase is in comparison to the FY 25 NERSA decision*
- *Please note that slight differences will be noted in actual % increases due to change in volumes. This provides an indicative contributor to overall increase*
- *Calculations are based on all sales volumes (i.e. not standard tariff as in the scenario slide)*
- *NPA increase in FY26 by over 12 Twh (121%)*
- *Increase in NPA volume in FY 26 results in a 6.6% of total energy volume contribution*



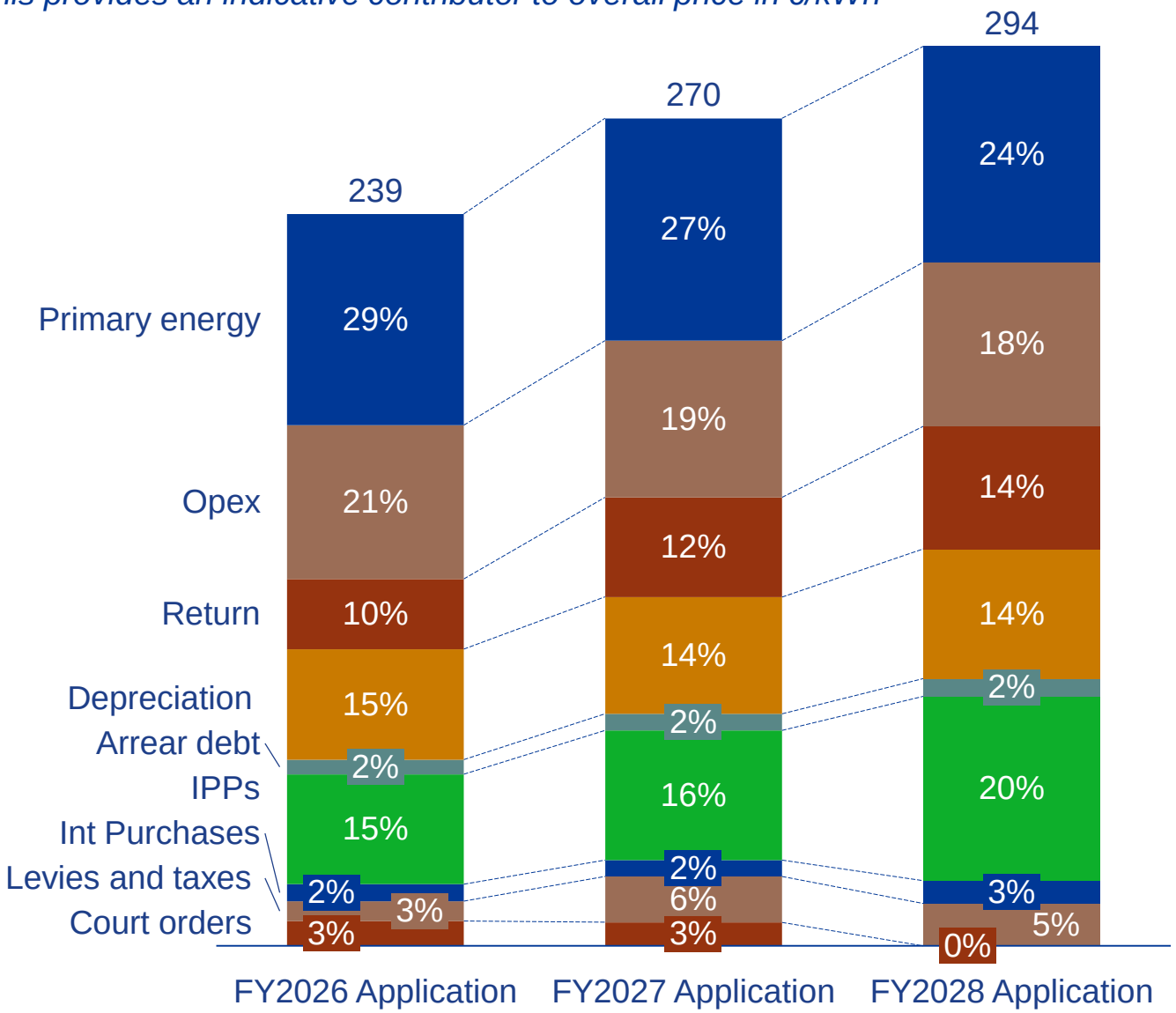
NPAs													
5.7%	11.2%	10.3%	2.6%	0.4%	-1.2%	7.9%	36.9%	-2.3%	0.1%	1.6%	36.3%	-0.2%	36.2%

Year-on-year % contributions to price increases based on standard tariff revenues and volume

Note: 1) Primary Energy (PE) includes Ancillary Services; 2) Int Purc - International Purchases; 3) Dep – Depreciation 4) ROA – Return on Assets; 5) IPPs – Independent Power Producers; 6) Env Levy – Environmental Levy; 7) RCAs – Regulatory Clearing Account

Cost contributors to c/kWh and percentage of average tariff

NB: This provides an indicative contributor to overall price in c/kWh



- Eskom management has a role to play in ~50% of the total costs
  - Within the 50% - are many multi-year contracts (prudently undertaken eg coal, employment, maintenance) legislative impacts (regulated diesel, water, fuel oil costs)
- Externally decided costs are:
  - Depreciation - based on NERSA formula
  - ROA - based on NERSA formula and does not reach Eskom WACC
  - IPPs - Govt programme
  - Environmental levy
  - Carbon tax
  - NERSA Court decisions
  - Arrear debt - mainly Munics

Measures for low-income households to have access to affordable electricity

The Government electrification programme

Facilitation of access (cost of connecting a house) to a 20A (low consumption) electricity supply.

- This complements an already subsidised tariff.

Free basic electricity (FBE)

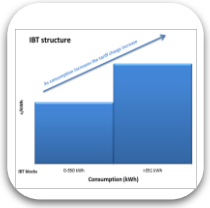
Social grants provided directly to customers through Free Basic Electricity of 50 kWh per household per month by national government to the indigent through the Equitable Share Fund

- Eskom provides FBE to customers in their area of supply as an agent for the municipalities

Subsidised Eskom tariff

For the MYPD3 period and subsequently the increase on the Homelight 20A customers (lifeline tariff) was lower than the average increase. Lower than 18% by 8% at 10%. Includes affordability subsidy (price level) and ERS subsidy (networks)

- Subsidised by direct Eskom large urban customers through the **affordability subsidy**
- The continual implementation from this lower base allows for extension of an effective subsidy
- Average Homelight 20A subsidy in FY25 was 144c/kWh of total 334c/kWh - a 43% subsidy. (Source FY2025 CTS study)



NERSA Inclining Block Rate (IBT)

The IBT was implemented by NERSA to cushion low-income households that use very little electricity.

- Eskom believes that the IBT as it is currently structured does not sufficiently target low-income households and places an unsustainable subsidy responsibility on urban customers
- IBT lowers the price and the key issue is the stepped increase above 350kWh that also makes it difficult to understand

Protecting the poor residential customer – Implementation requirements

Ensuring that Government policies are implemented

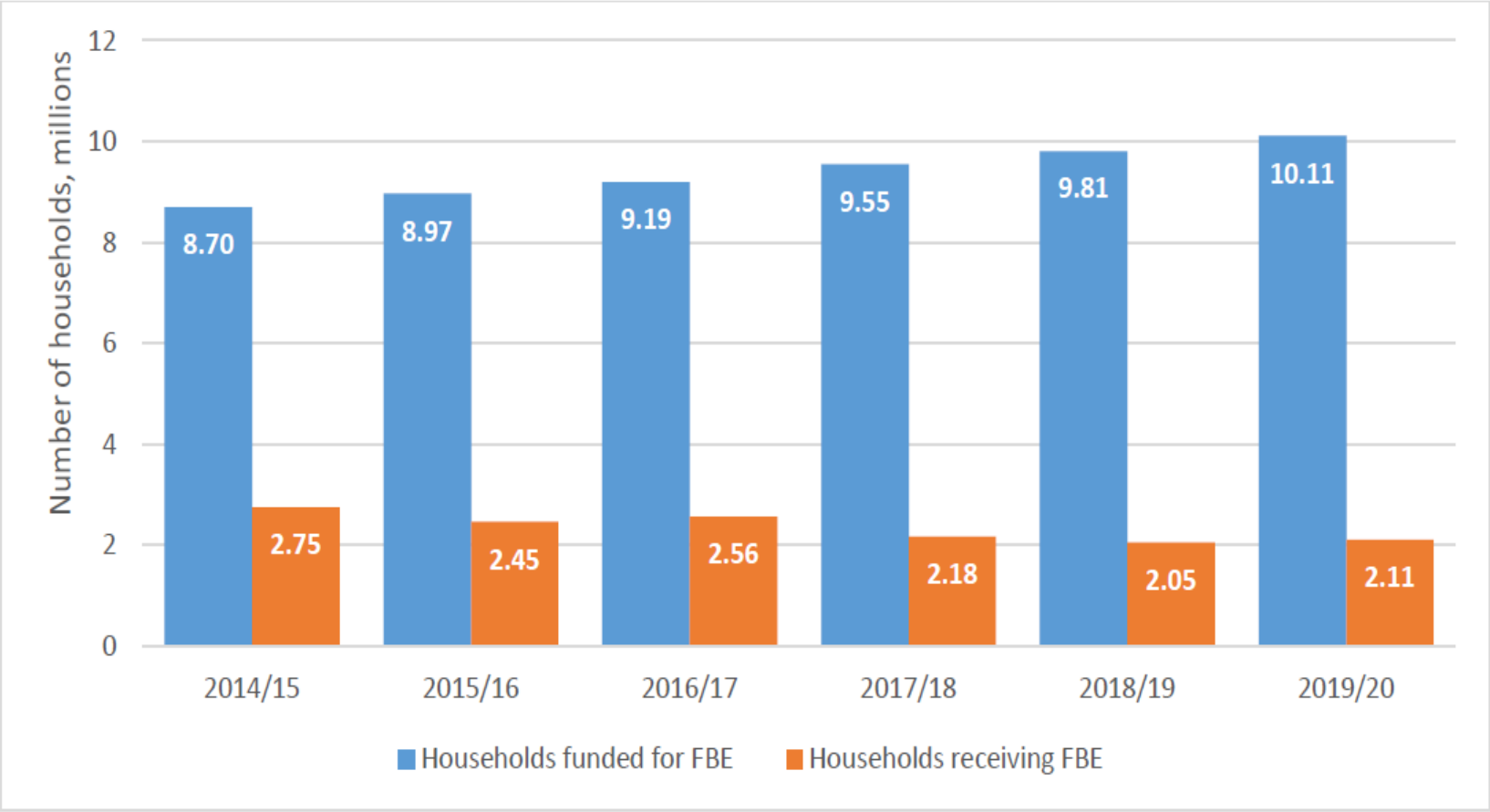
- The electrification programme is still underway
  - Government has a detailed programme in place to ensure that further areas are electrified
- It has been reported that the FBE of 50kWh is not being implemented to all relevant recipients
  - The Reserve Bank study indicates that only about 2 million recipients of a potential 10 million receive their FBE (2021)
  - Only Municipalities determine eligible recipients (indigent registers) – even if Eskom customers
  - Additional efforts are required to ensure that further recipients are identified
  - This is potentially a priority for NECOM to consider
  - The Government Departments will also have a role to play

Possible further policy changes that could be considered

- Eskom's Retail Tariff Plan (RTP) has made proposals to changes to the Inclining block tariff
  - To improve the benefit to poor residential customers, Eskom proposes **removing the IBT structure** and replacing it with a single energy rate charge for Homelight 20A customers.
  - This implies that converting the residential lifeline tariff, Homelight 20A into a single c/kWh energy rate.
  - This will protect the poor where an increased rate will not be paid by poor residential customers (for the second block)
  - This will further support poor residential customers
- The Government has indicated that protecting the poor is priority – other initiatives could be considered

Majority of FBE customers who should qualify are not being served by municipalities

Figure 15: Underspending in free basic electricity



Source: Ledger (2021).

- Municipalities are responsible for recognition & administration of customers who qualify for FBE for Municipal and Eskom customers
- Municipalities have only recognized ~20% of qualifying customers. Majority customers who should qualify are not being allocated by municipalities
- Eskom provides FBE to customers identified for FBE by Municipalities
- In subsequent years situation has worsened
  - FY 2021 – 1 654 160 households
  - FY 2022 – 1 753 091 households

(Source: Non-financial census of municipalities for year ended 30 June 22, published by Stats SA, 26 March 2024)

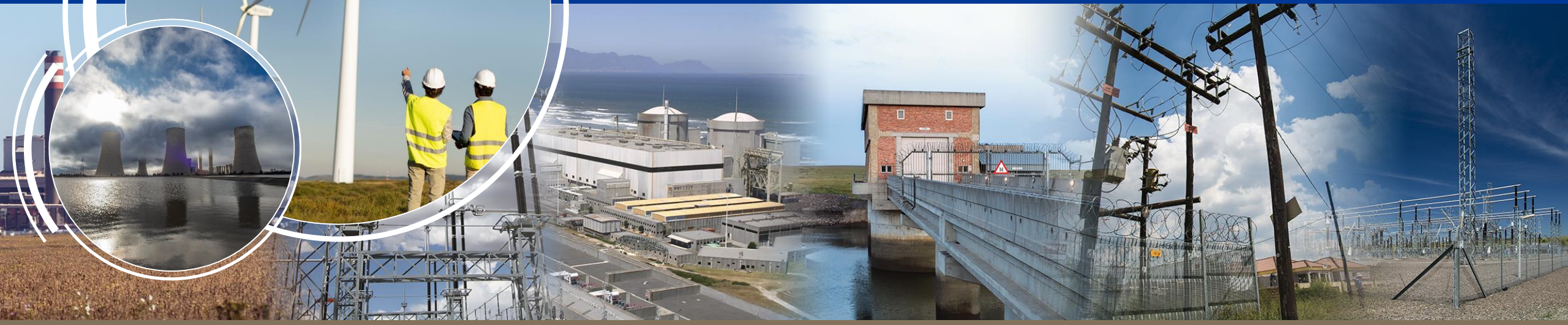
Conclusion

- Eskom's application **is in accordance with the 2006 Electricity Regulation Act (ERA), Electricity Regulation Amendment Act 38 of 2024 and the prevailing Multi Year Pricing Determination (MYPD) methodology**. It is based on efficient and prudent costs and Return On Assets (ROA) that is increased to allow for cost of capital but still minimising the impact on consumers.
- **Eskom's generators** have again been called upon **to fill the gap** caused by the **unavailability of IPPs** of various technologies
- **Eskom management has a role for about 50% of electricity production costs**, which are mainly contractual and depend on regulated decisions like water and fuel. The other 50% of costs, such as depreciation, Government programmes, and taxes, are externally determined.
- **Eskom's electricity price is lower than in most countries** due to prices not covering the efficient cost of production for providing an electricity service
- Eskom is making a **total revenue application of R446bn, R495bn and R537bn for FY2026, FY2027 and FY2028** respectively
- The key drivers for the Eskom revenue application include:
  - **Enabling the strategic role** played by Eskom
  - Ensuring the **efficient costs and a fair return to Eskom** to continue to provide an electricity service in the form of Generation, Transmission and Distribution services
  - **Migrating towards** recovering an ROA equal to the **weighted average cost of capital**
  - Striving to become self-sufficient and **not continue to be dependent on support from the fiscus**
- For Eskom to be financially viable it needs:
  - Cost reflectivity at revenue and tariff level, balance sheet support by Government, cost exemplarity and collection of billed revenue

Benchmarks – Employee Numbers

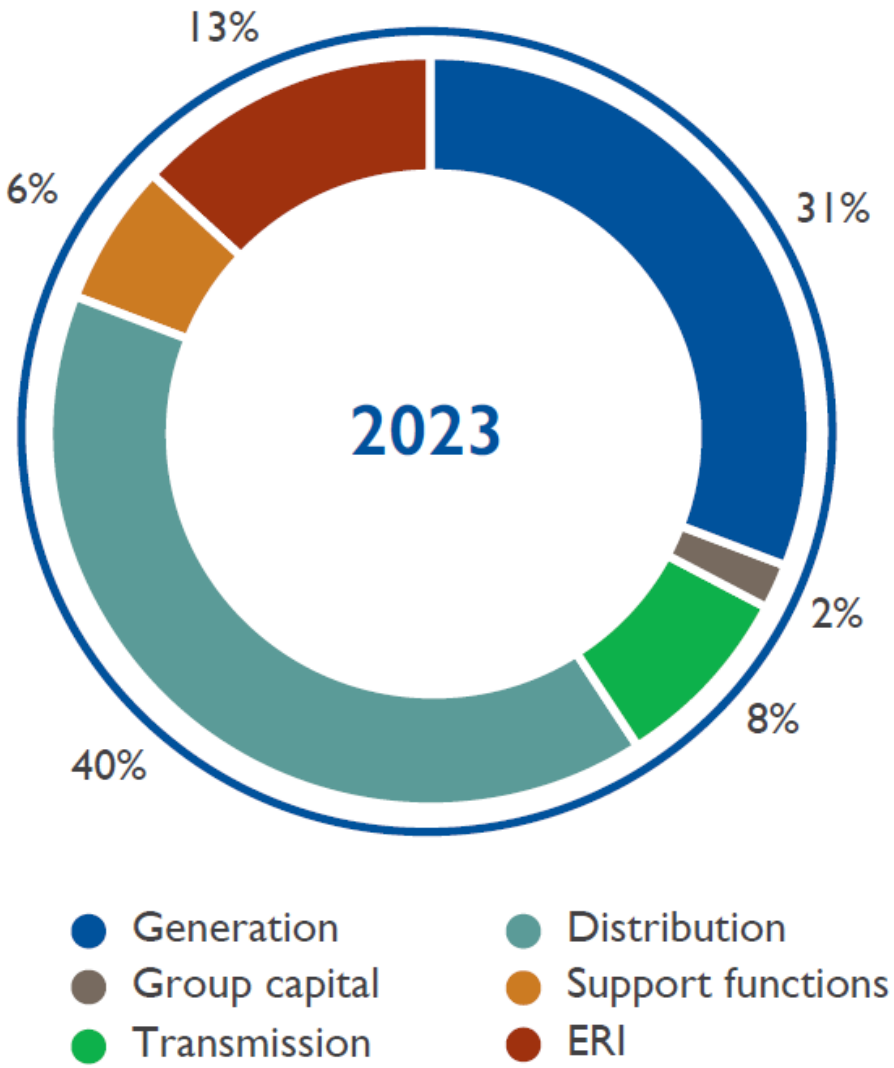
Eskom is operating at its leanest levels in decades

27 November 2024



Eskom Group Headcount

Divisional breakdown, %



KEY FACTS

- Current Headcount = **41150** employees
- Bulk of employees are involved in the transmission (8%) and distribution (40%) of electricity
- Generation employs 31% of total Eskom employees
- Eskom Rotek Industries SOC Ltd (ERI) is a unregulated subsidiary that provides technical support to the electricity business, including lifecycle and plant maintenance services (NB: ERI not included in MYPD 6 application)

Eskom Headcount over time

2001
GX: 42 011 MW Installed
Tx & Dx: 316 339 km line
Tx & Dx: 262 256 transformers
Dx: 3 274 863 customers

2008
GX: 43 037 MW Installed
Tx & Dx: 366 268 km line
Tx & Dx: 324 444 transformers
Dx: 4 152 312 customers

2023
GX: 52 390 MW Installed
Tx & Dx: 405 173 km line
Tx & Dx: 415 288 transformers
Dx: 7 074 672 customers

VSP in support of transformation

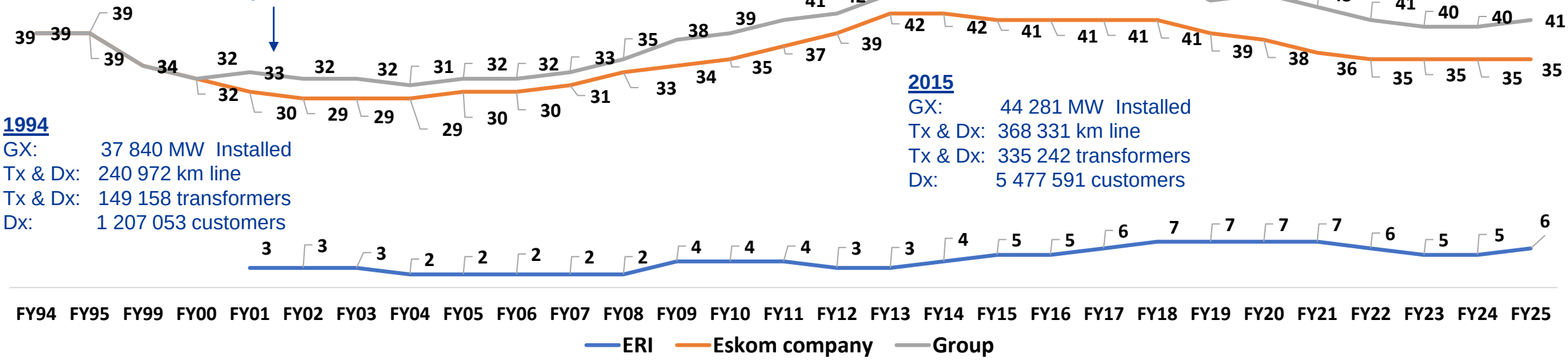
Eskom voted best utility in the world

Build programme

2014/15 Reduce learners from 14% to 6%

2018 Turnaround plan: External recruitment moratorium

Recruitment moratorium lifted



1994
GX: 37 840 MW Installed
Tx & Dx: 240 972 km line
Tx & Dx: 149 158 transformers
Dx: 1 207 053 customers

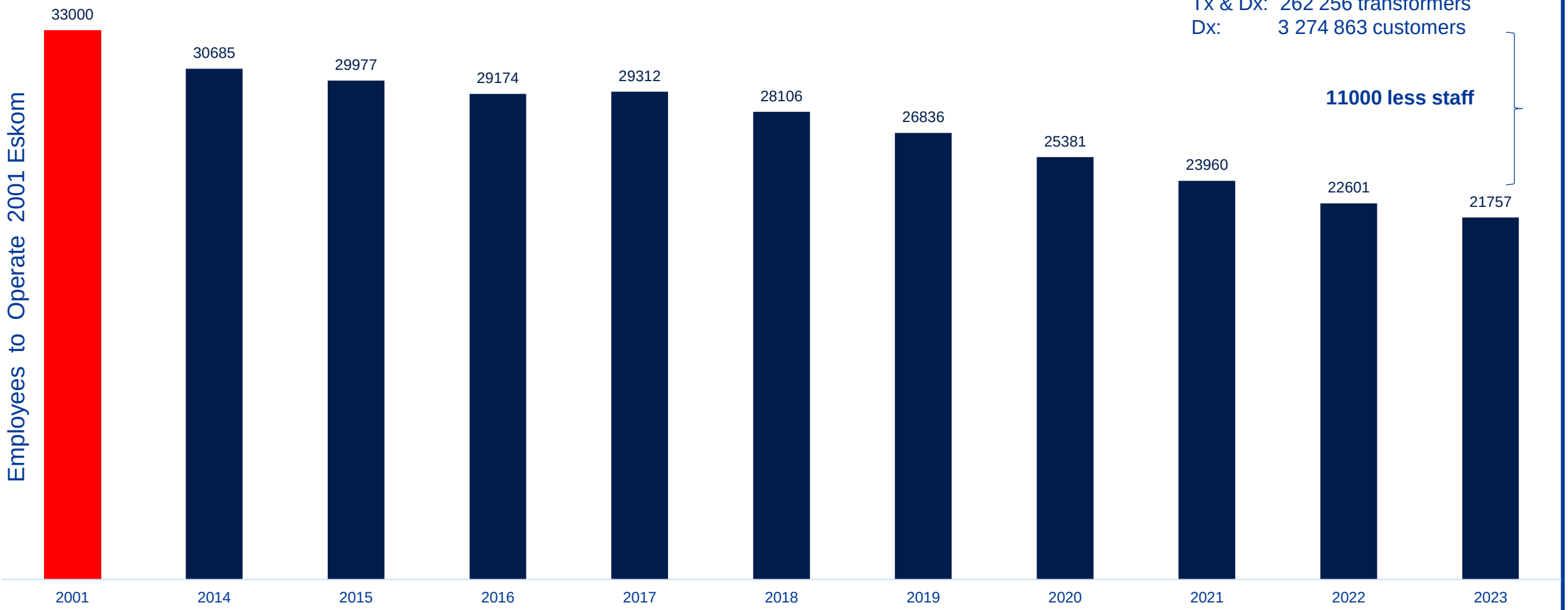
2015
GX: 44 281 MW Installed
Tx & Dx: 368 331 km line
Tx & Dx: 335 242 transformers
Dx: 5 477 591 customers

N.B. World Bank study was released in 2016

Equivalent employees to operate 2001 Eskom Gx fleet & Tx and Dx networks

Eskom voted best utility in the world

2001
GX: 42 011 MW Installed
Tx & Dx: 316 339 km line
Tx & Dx: 262 256 transformers
Dx: 3 274 863 customers

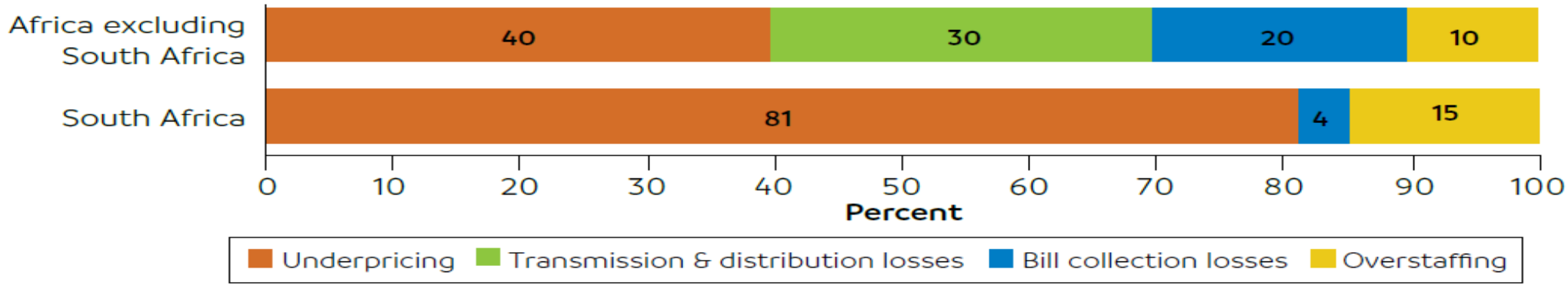


- Eskom worker of today does the work of 1.5 workers in 2001

2016 World Bank Report – Reported overstaffing due to error in analysis

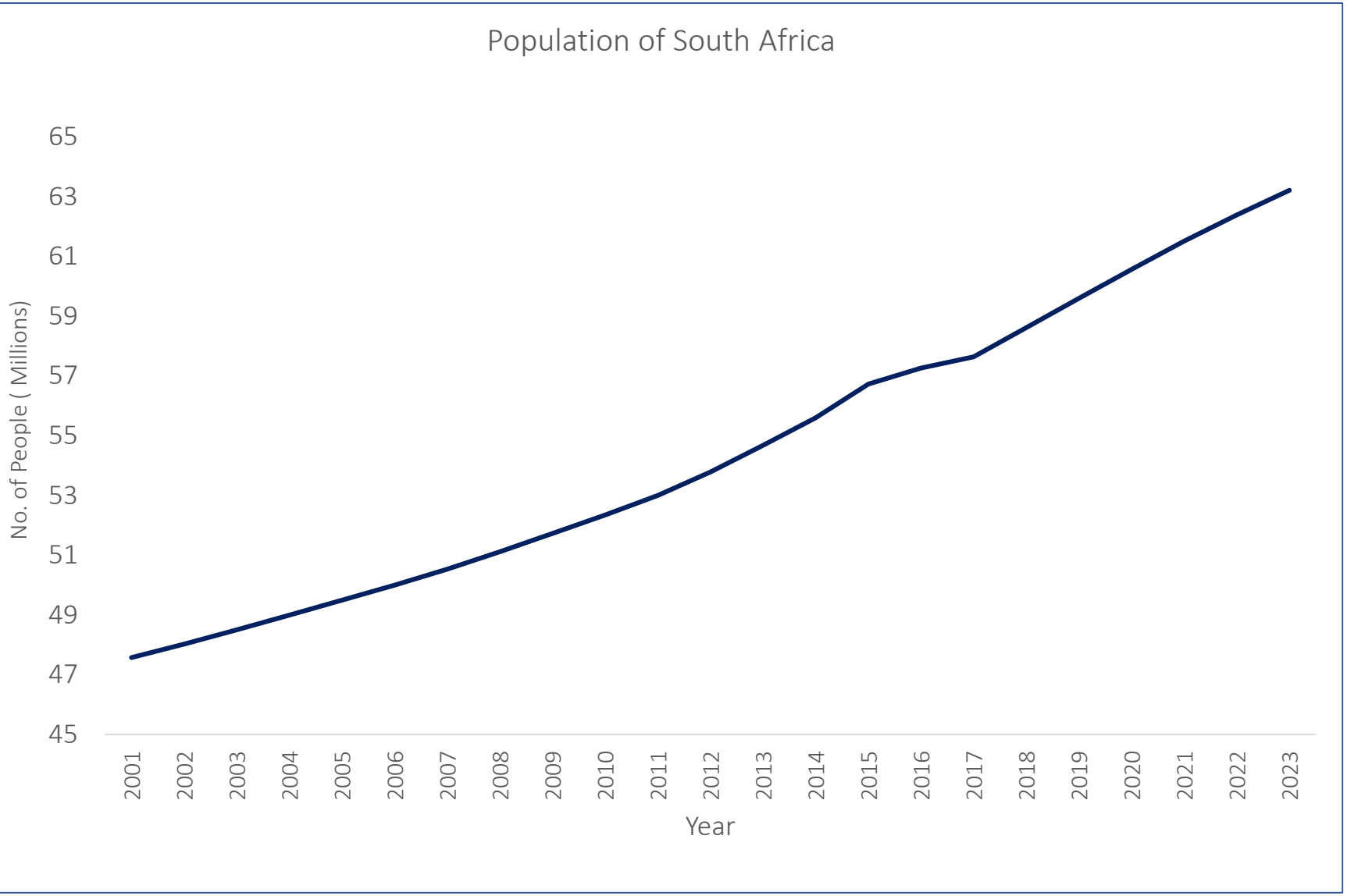
"Policy Research Working Paper 7788 : Financial Viability of Electricity Sectors in Sub-Saharan Africa: Quasi-Fiscal Deficits and Hidden Costs"

World Bank Breakdown of Hidden Costs



- World Bank correctly identified that the biggest concern for Eskom was ***underpricing***
- The World Bank made **substantive errors** in their staffing analysis for all African utilities incl. Eskom's headcount, this error-ridden analysis has been repeated continuously by the South African media despite being disproven as far back as 2018
- Created massive media coverage and pressure on Eskom headcount
  - Which, in turn, created an enduring perception of Eskom overstaffing
- **Many utilities worldwide**, both in developing and developed countries would **not meet the benchmarks** the World Bank deemed suitable for Sub-Saharan African utilities.
- Resulted in immense pressure to reduce headcount, irrespective of operational conditions or requirements over the last few years
- The World Bank report findings laid the foundation for a devastating deskilling of the organisation across Eskom - particularly in Generation & Distribution

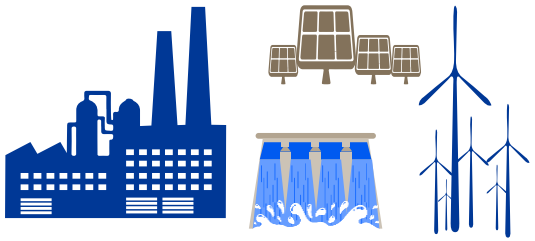
South Africa sees significant growth in population



- South Africa's population has grown by ~33% since 2001
- Growth in population drives the need for infrastructure and services
- Service delivery and infrastructure in South Africa has battled to keep pace with requirements
- Eskom infrastructure and operating requirements are also affected, particularly for electricity distribution

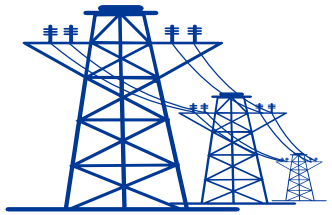
Impact of changes in Eskom

Generation



Eskom Generation
- Generates electricity
- Manage and operates power stations

Transmission



NTCSA
- Transports electricity at high voltage across the country
- Control, operate & maintain transmission grid
- Balance supply and demand
- Market Operator

Distribution

Eskom Distribution
- Deliver electricity to end-customer
- Control operate & maintain Distribution grid
- Retail and customer services

- Major Changes
  1. Increase in RE generation
  2. Increase in number of customers

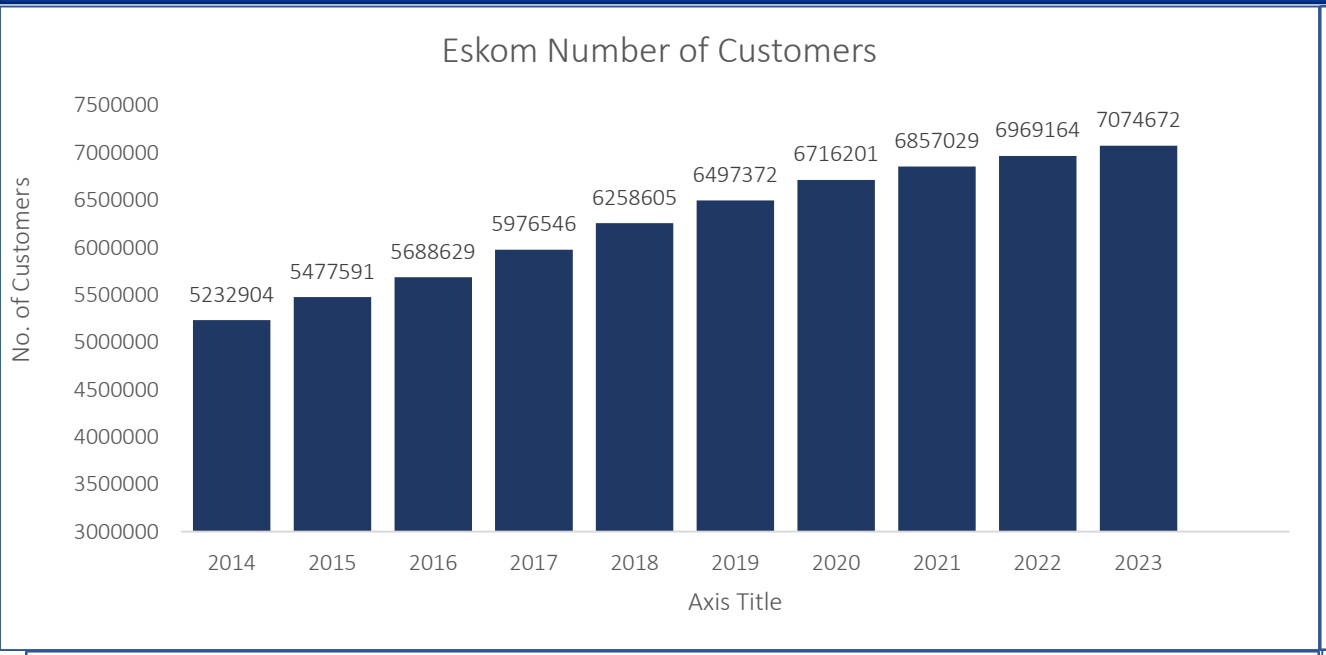
- Power station staffing is determined by plant design layout and technology
- Power station needs to be operated safely & maintained to operate **when** required
- Lower Utilization of Plant does not reduce staff requirements
  - Operational needs remain the same
  - Energy costs reduce
- Intermittent nature of solar & wind means dispatchable power plants e.g. coal still required
- Renewable generation requires **more power lines** to connect smaller power plants for NTCSA and Distribution
- Transmission & Distribution operations are independent of energy or Eskom sales i.e. sales does not affect staff requirements

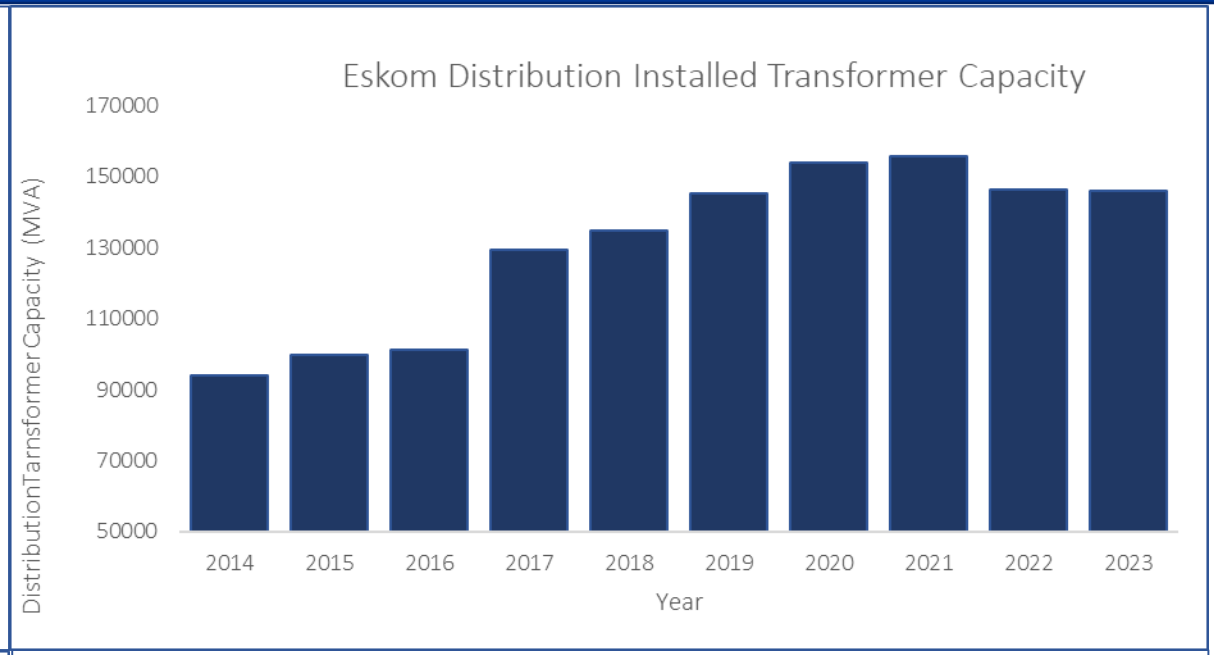
Lower energy output due to RE growth does not reduce staffing requirements to manage the grid.

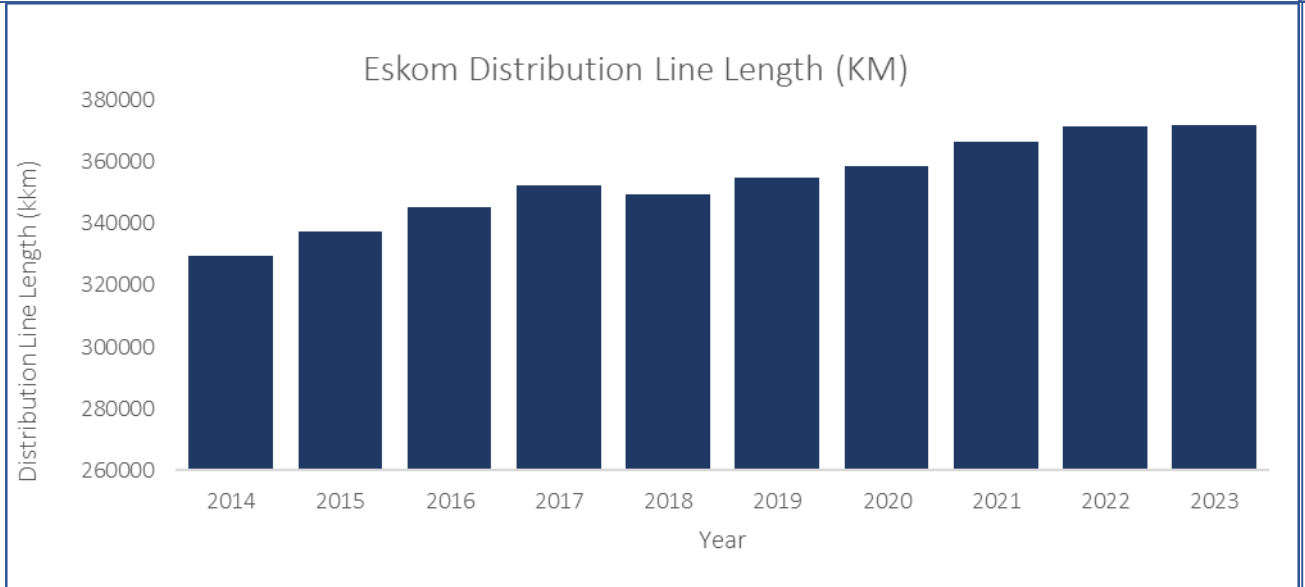
For transmission and distribution, more RE places upward pressure on staff requirements

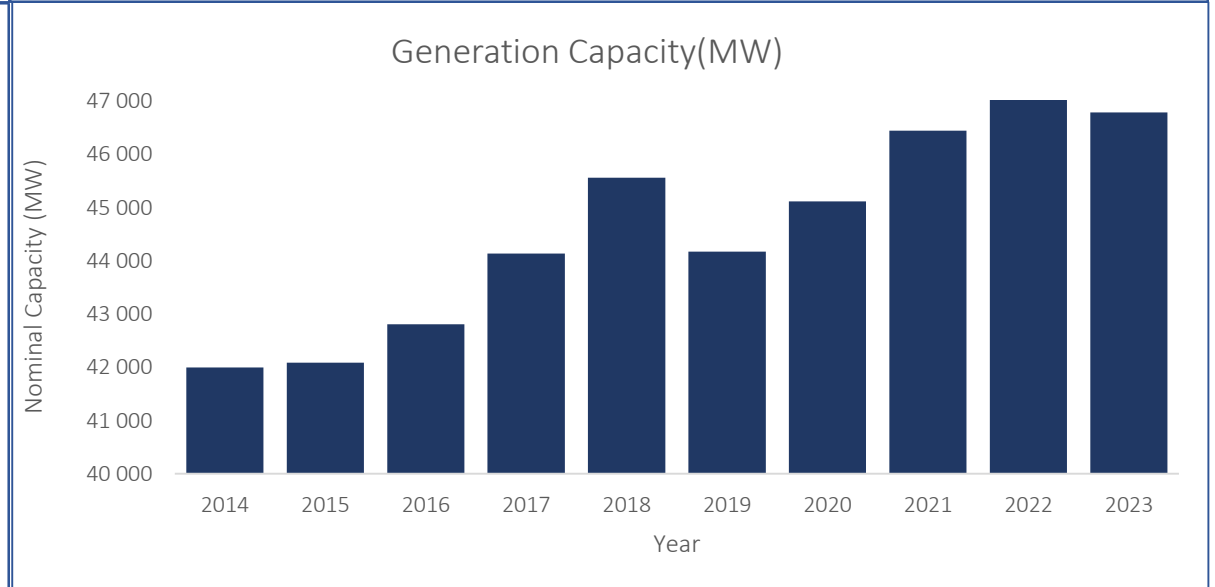
More customers require more Distribution staff to maintain level of service

Increasing Assets and Customers over last decade

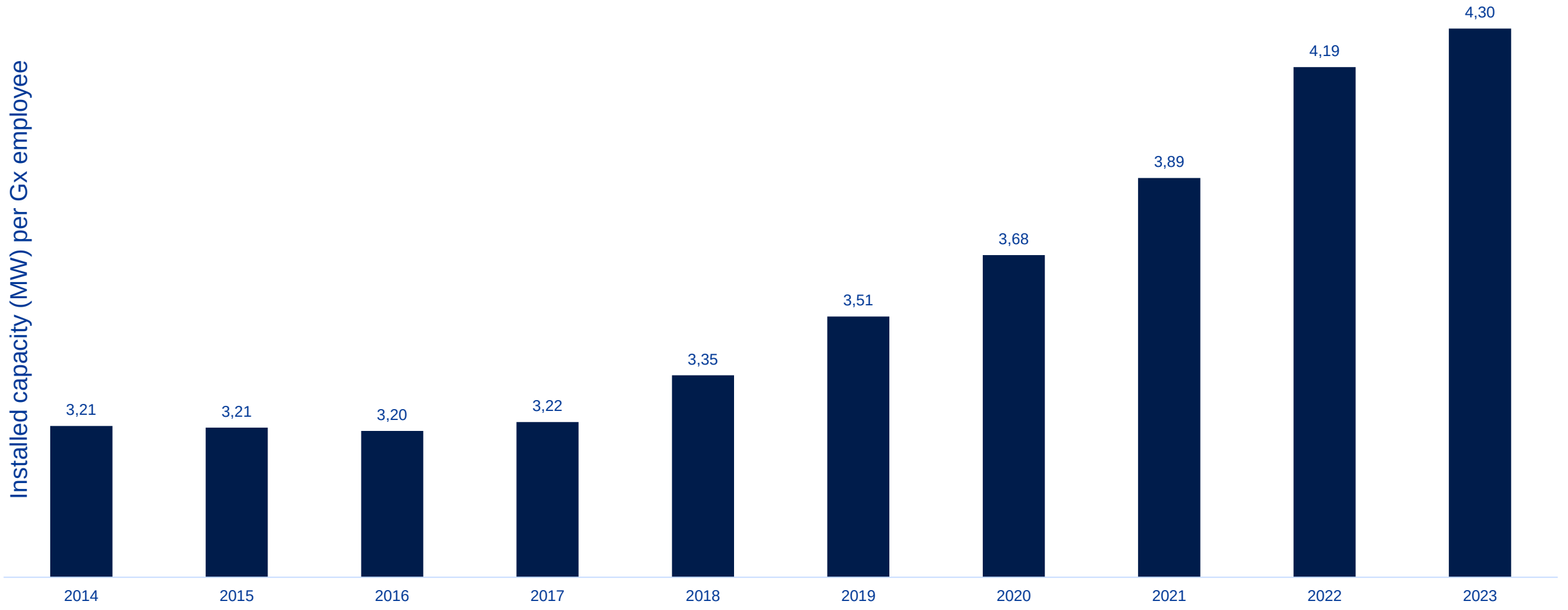




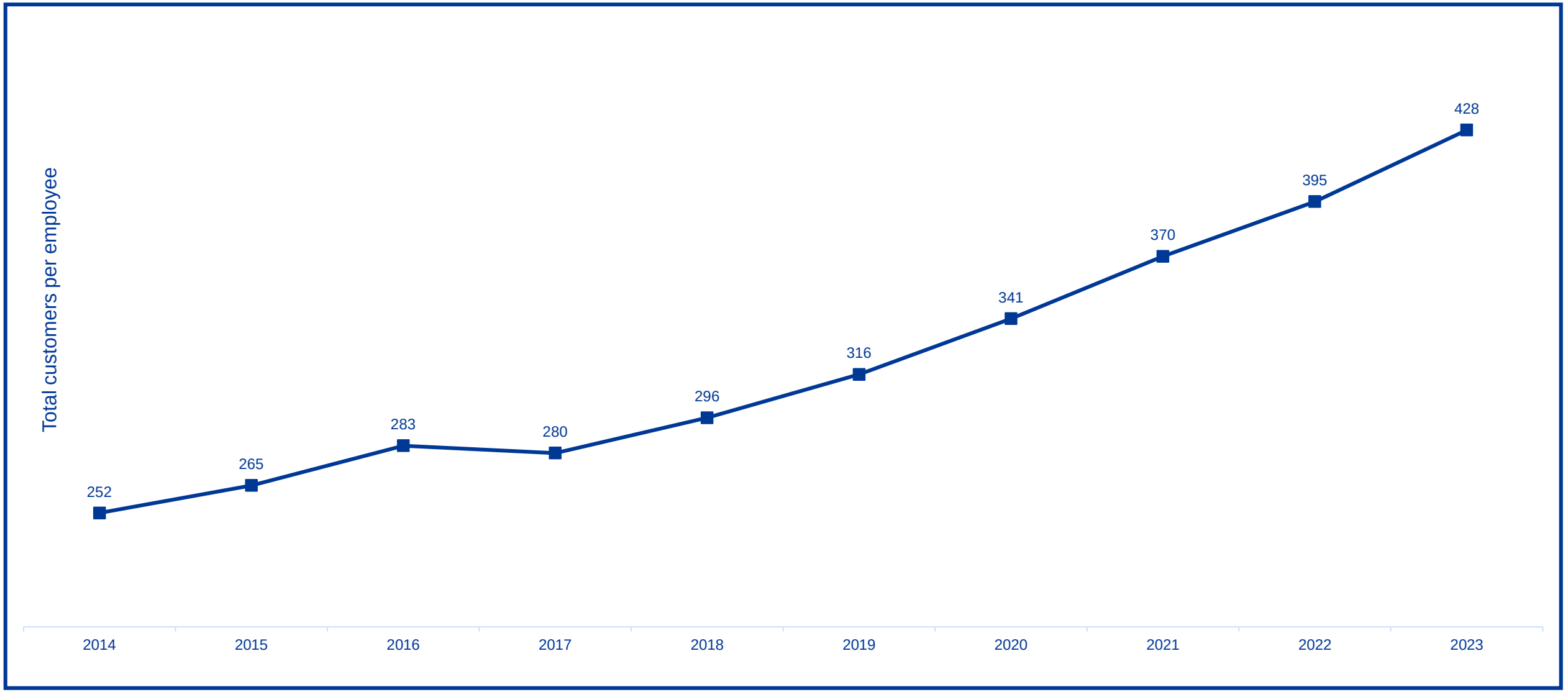




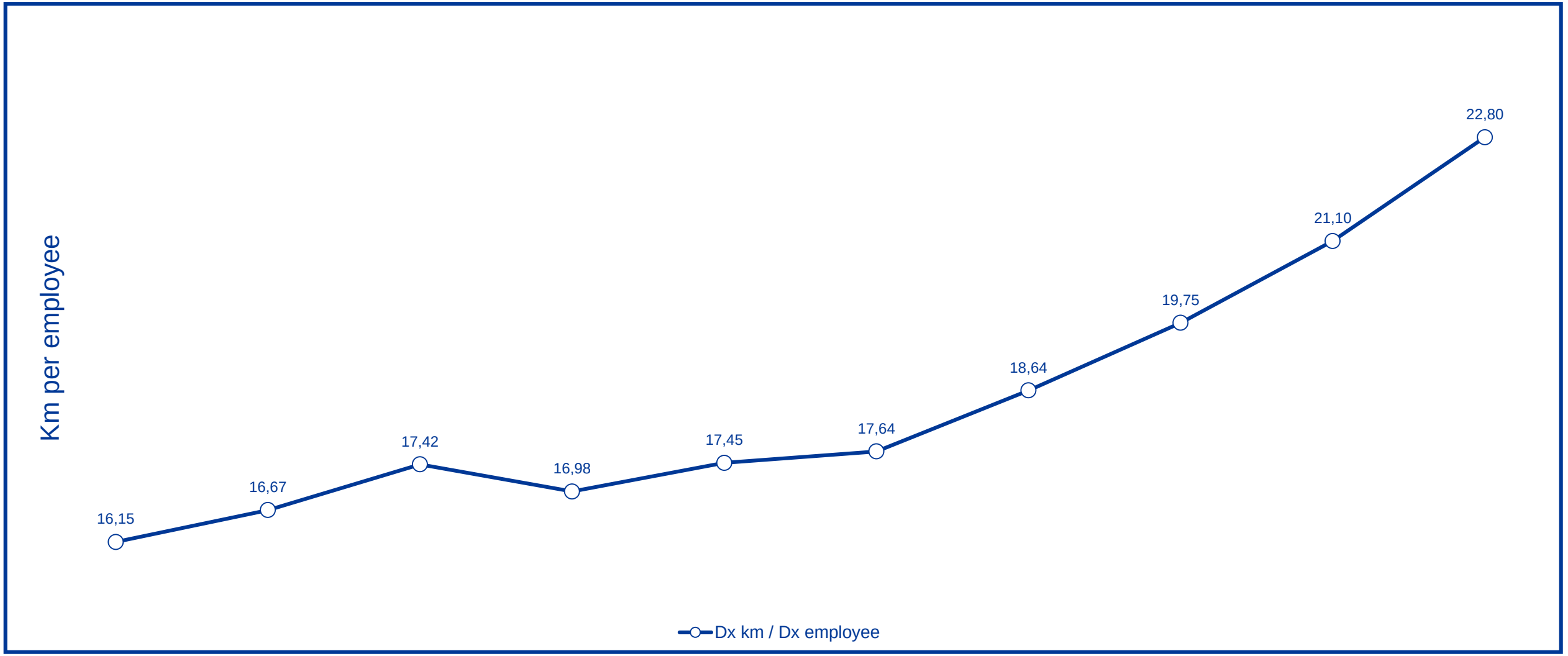
Installed generation capacity per Generation employee (MW / employee) has increased in last decade



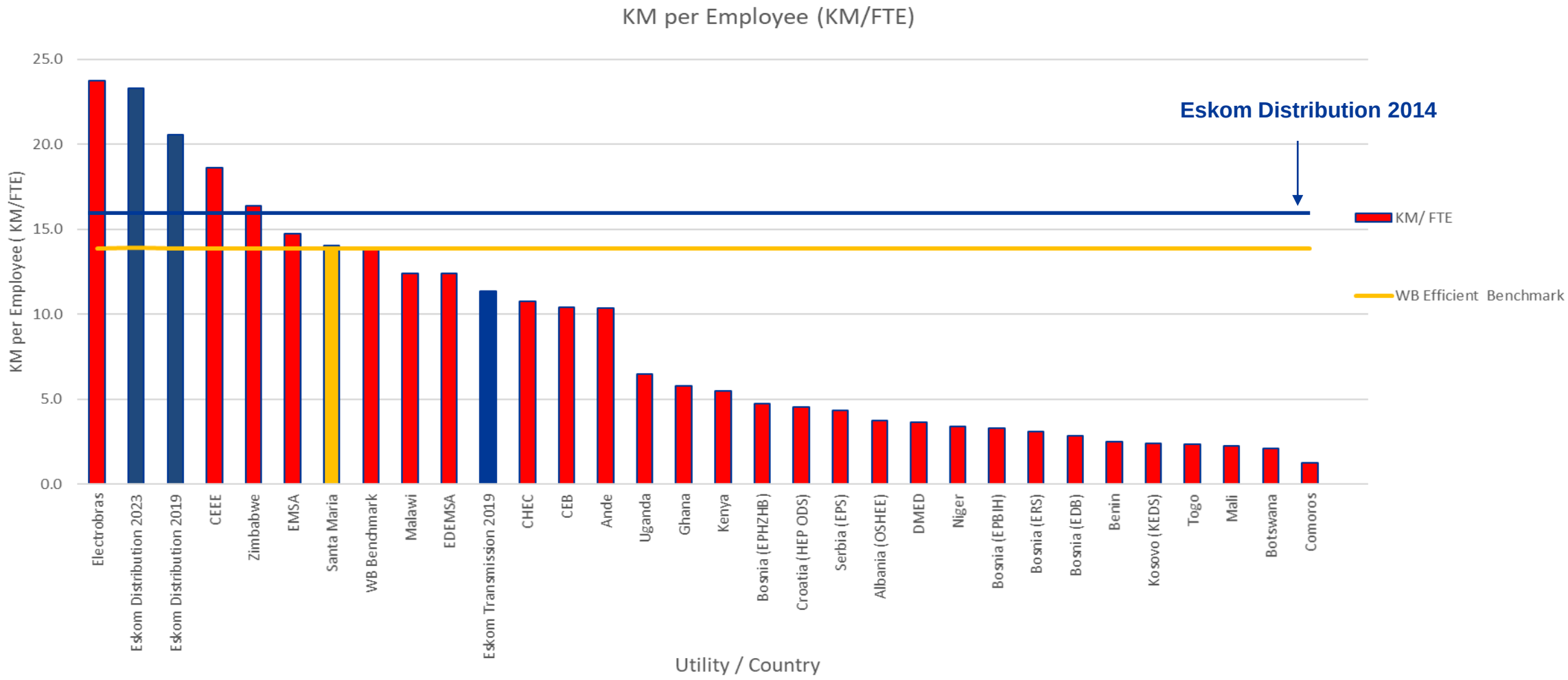
Customers per distribution employee has increased over decade



Distribution-km line per employee has increased in last decade



Eskom Distribution compares favourably to International Benchmarks



- Eskom Distribution amongst the leanest staffed Distribution utilities in the developing world.
- Transmission included for reference only

Conclusion - Eskom is operating at its leanest levels in decades

- Eskom operates in a context where South Africa's population has increased significantly over the last two decade
- As a result, Eskom's customer numbers have increased by 1.955 million (39% up) over the last decade while employee numbers have decreased at the same time
- The assets required to supply these customers have increased across all of Eskom's divisions
- Employee numbers have decreased at the same time, Eskom is operating at its leanest levels in decades
- This has led to a significant workload increase on employees with skill shortages in certain areas
- Eskom has decreased staff as operational requirements have increased due to 1) growth in customer numbers and 2) increasing renewables penetration
- The net effect of this has been that Eskom has seen a significant loss of skills, which has negatively affected operational performance across Eskom's divisions. The situation requires reskilling within Eskom
- Sales volumes has not been used as a measure to determine employee numbers
- Shortfall in employee benefit revenue decisions exert further pressure on Eskom to provide efficient services

2014-2023

- Generation division
  - Generation Capacity + 4766MW (11% up)
  - Employee numbers -1,708 (12% down)
- NTCSA
  - Transformer Capacity +19,410 MVA (14% up)
  - Number of Transformers +39 (9% up)
  - Line length +3,896 km (13% up)
  - Employee numbers +15 (0.5% up)
- Distribution division
  - Transformer Capacity +56,172 MVA (62% up)
  - Number of Customers +1.81 million (35% up)
  - Number of Transformers +94,028 (29% up)
  - Line length +50,633 km (16% up)
  - Employee numbers -3,581 (18% down)

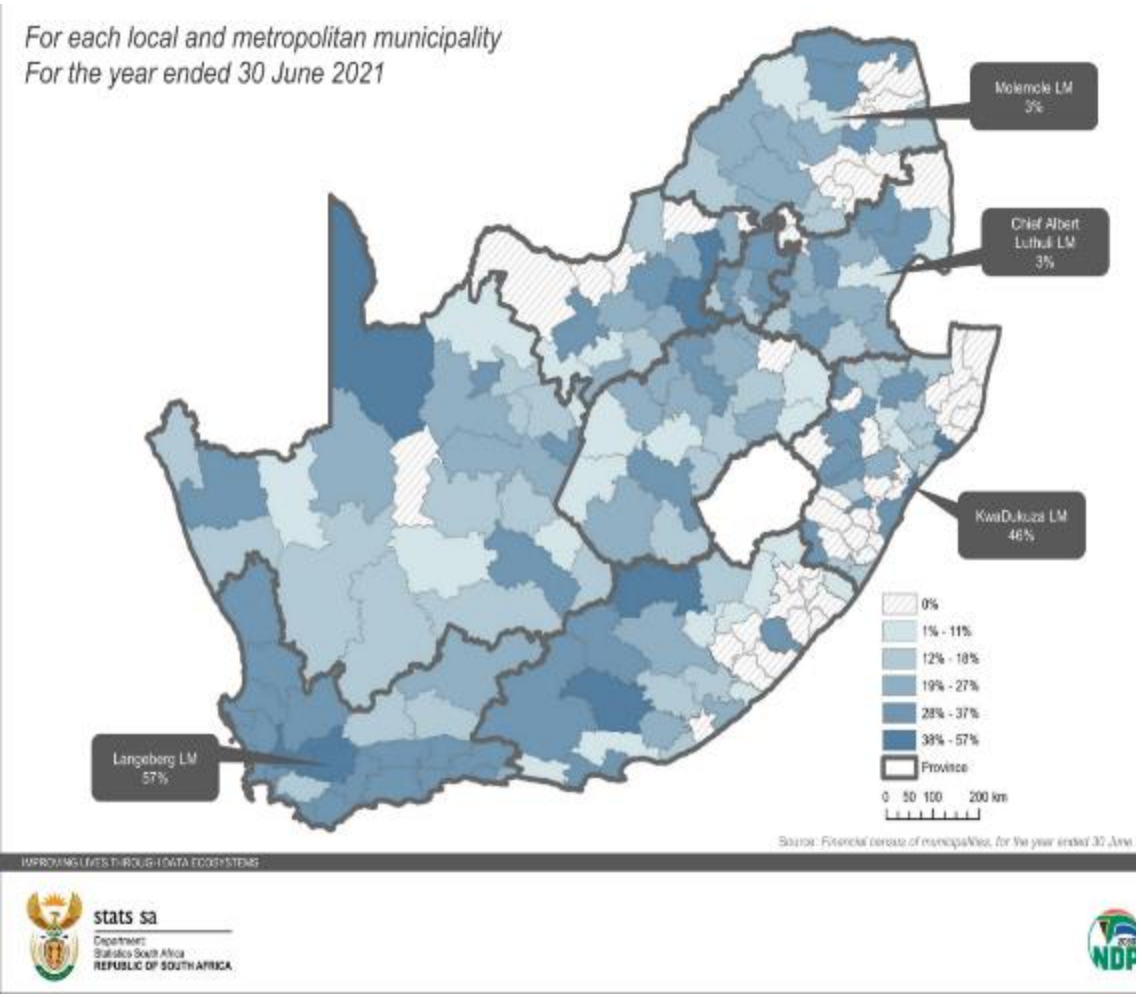
International Electricity Price Comparisons

27 November 2024

Basic facts about electricity pricing in South Africa

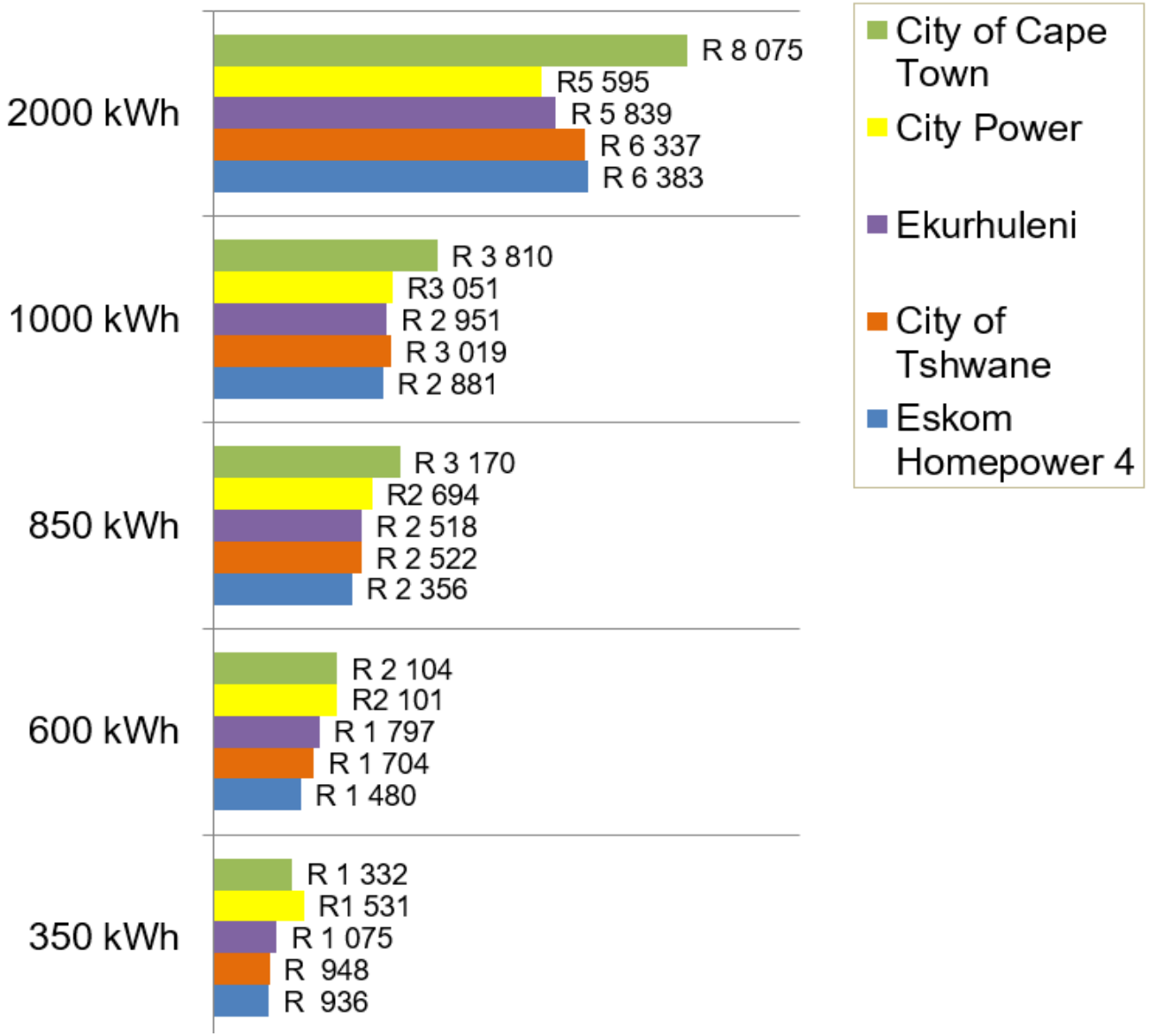
1. 60% of electricity customers are supplied by Munics, 40% by Eskom. Eskom's bulk price to municipalities in FY2023/24 was ~163c/kWh
2. Eskom tariffs are regulated according to international best practice rate of return regulation. This includes a detailed Cost of Supply (COS) and public participation.
3. All Municipality tariffs have not been based on COS studies. Concerns have been raised by the High Court. The legal process is still underway.
4. As per the Local government fiscal framework, municipalities see electricity revenue as a key source of revenue for the Municipality.
5. Municipalities are empowered to levy surcharges through the electricity tariff, which Eskom does not.
6. This results in two different classes of electricity customers in South Africa.
    1. Eskom direct customers – regulated according to international practices with public scrutiny
    2. Municipal electricity customers which have traditionally been awarded benchmark increases not based on cost of supply studies
7. This two-tier system of electricity pricing in South Africa, impacts affordability of electricity to the majority of customers.

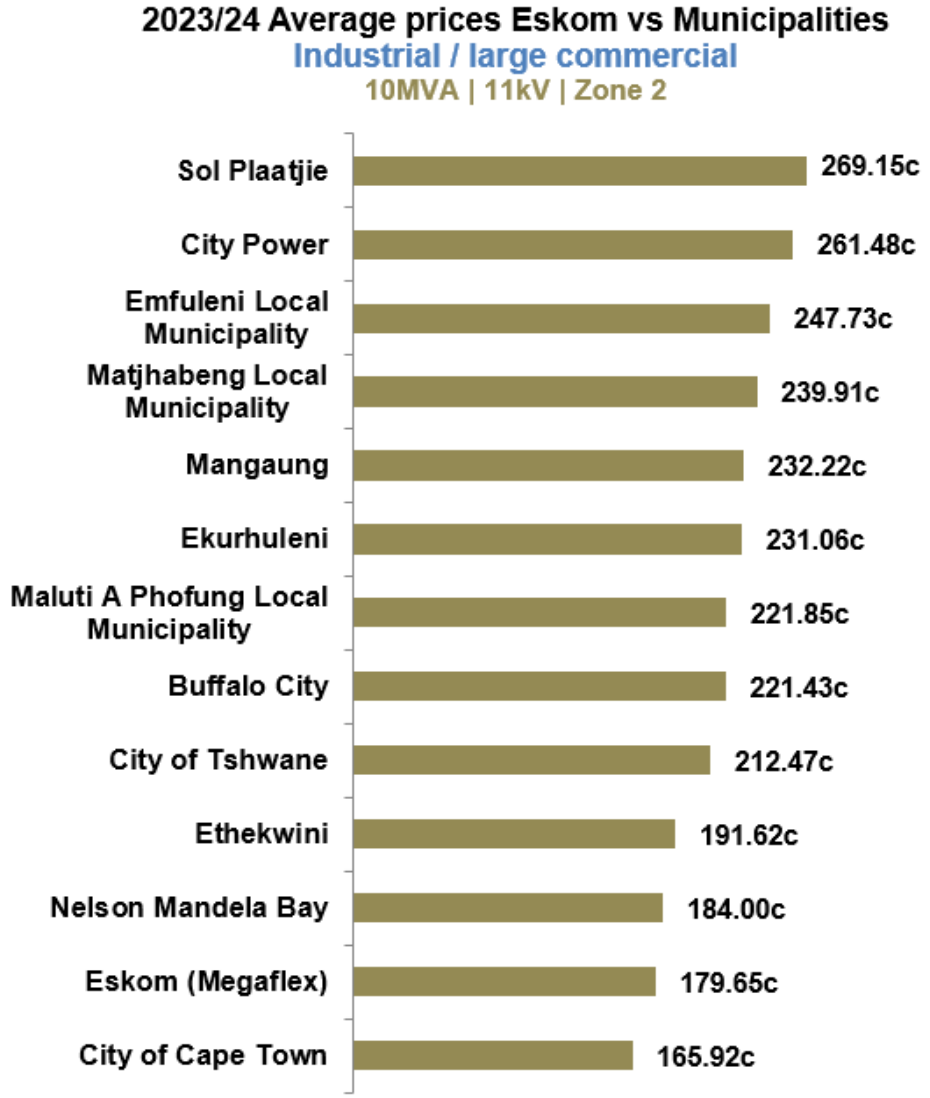
Electricity Revenue is the highest contributor for most municipalities



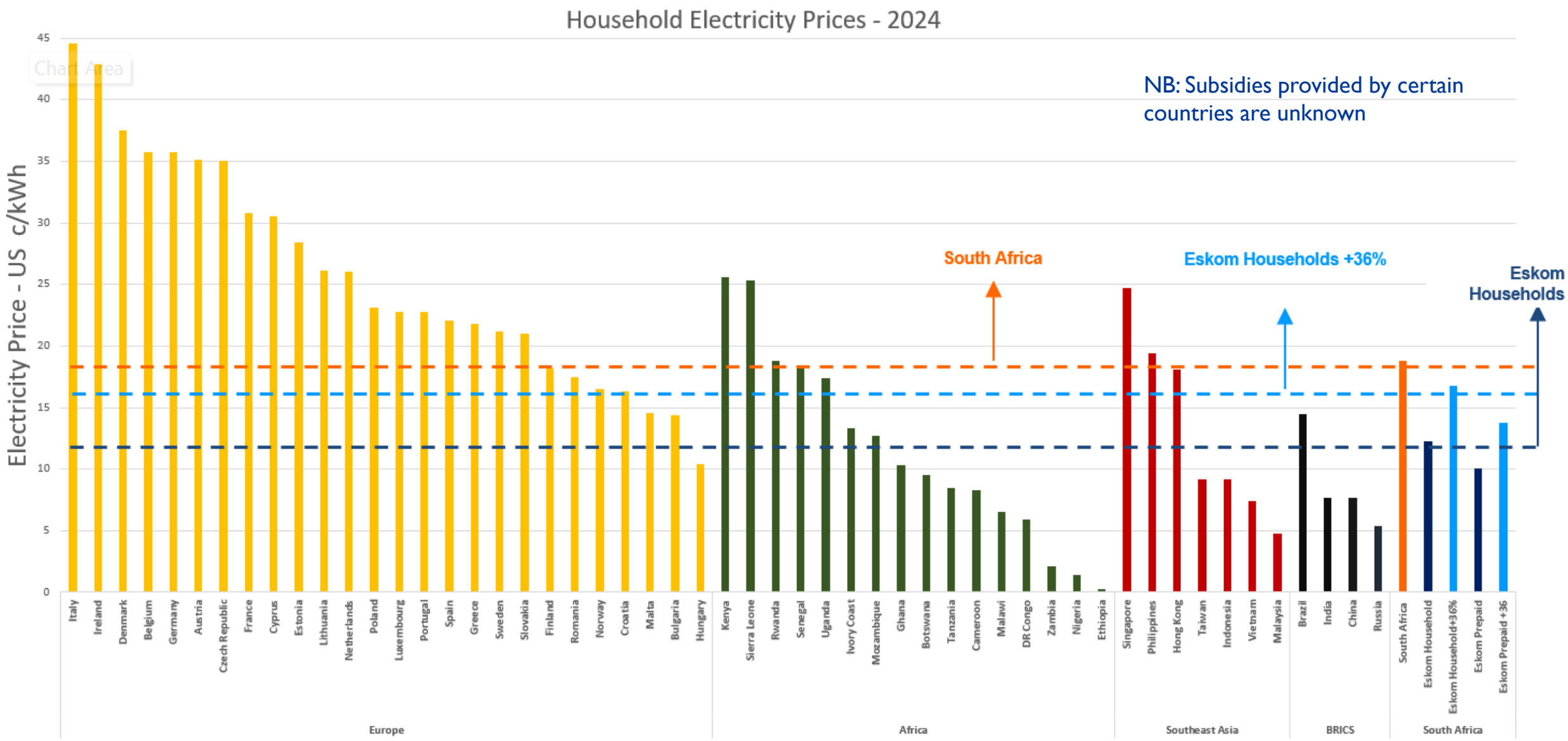
Description	Total	Metros	Secondary Cities	Other
R thousands	Budget Year 2020/21			
Revenue By Source				
Property rates	17.8%	20.6%	16.3%	12.4%
Service charges - electricity revenue	29.6%	32.7%	37.5%	18.2%
Service charges - water revenue	11.0%	11.9%	11.2%	8.6%
Service charges - sanitation revenue	4.3%	4.9%	4.5%	2.8%
Service charges - refuse revenue	3.2%	3.3%	3.6%	2.8%
Rental of facilities and equipment	0.7%	0.9%	0.3%	0.3%
Interest earned - external investments	1.0%	0.9%	0.6%	1.5%
Interest earned - outstanding debtors	2.1%	1.1%	4.1%	3.2%
Dividends received	0.0%	0.0%	0.0%	0.0%
Fines, penalties and forfeits	1.4%	1.3%	1.5%	1.5%
Licences and permits	0.2%	0.2%	0.1%	0.4%
Agency services	0.5%	0.3%	0.4%	0.9%
Transfers and subsidies	22.3%	14.1%	17.8%	43.1%
Other revenue	5.9%	7.7%	2.0%	4.0%
Total Revenue (excluding capital transfers and contributions)	100.0%	100.0%	100.0%	100.0%

Eskom prices lower than most Municipalities



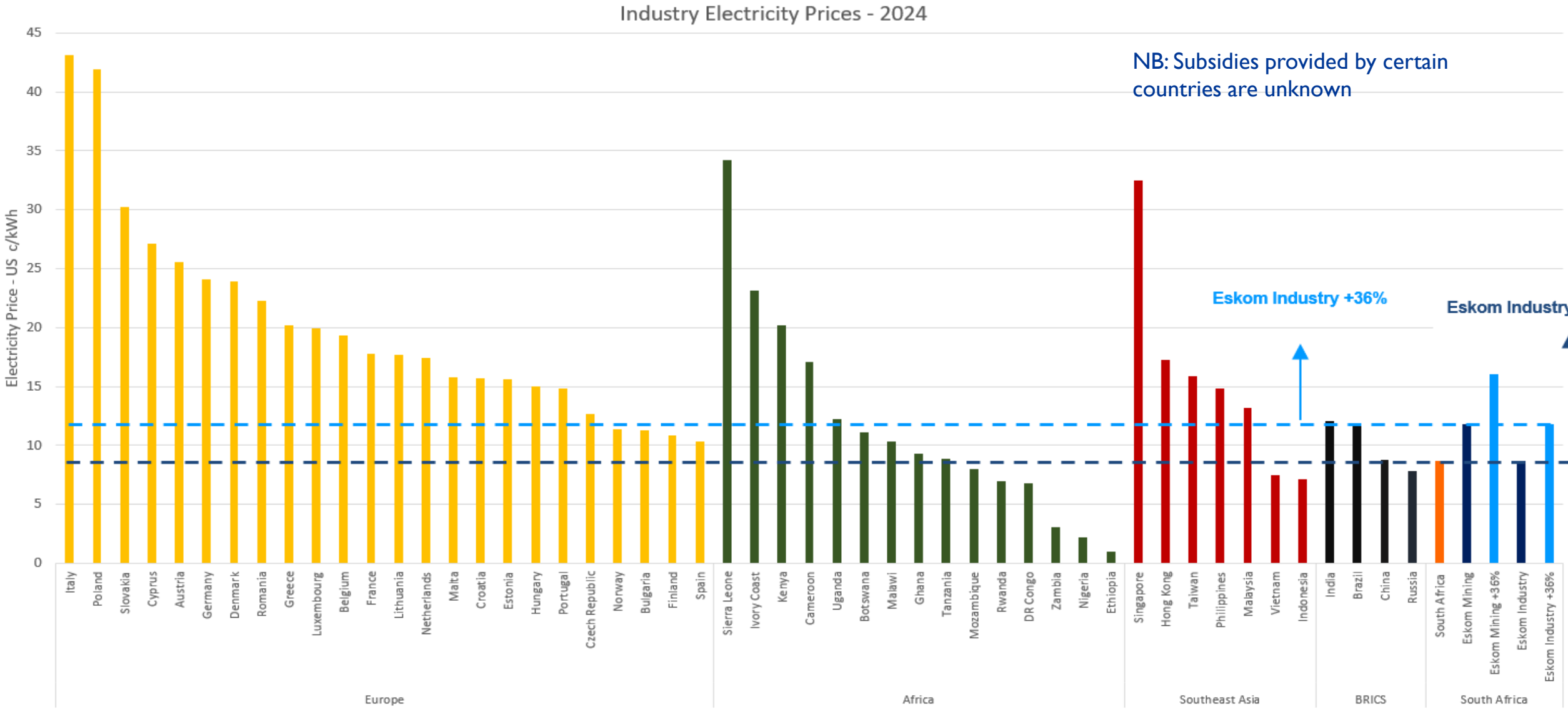


Despite escalating prices, Eskom's household prices are lower than many comparative countries



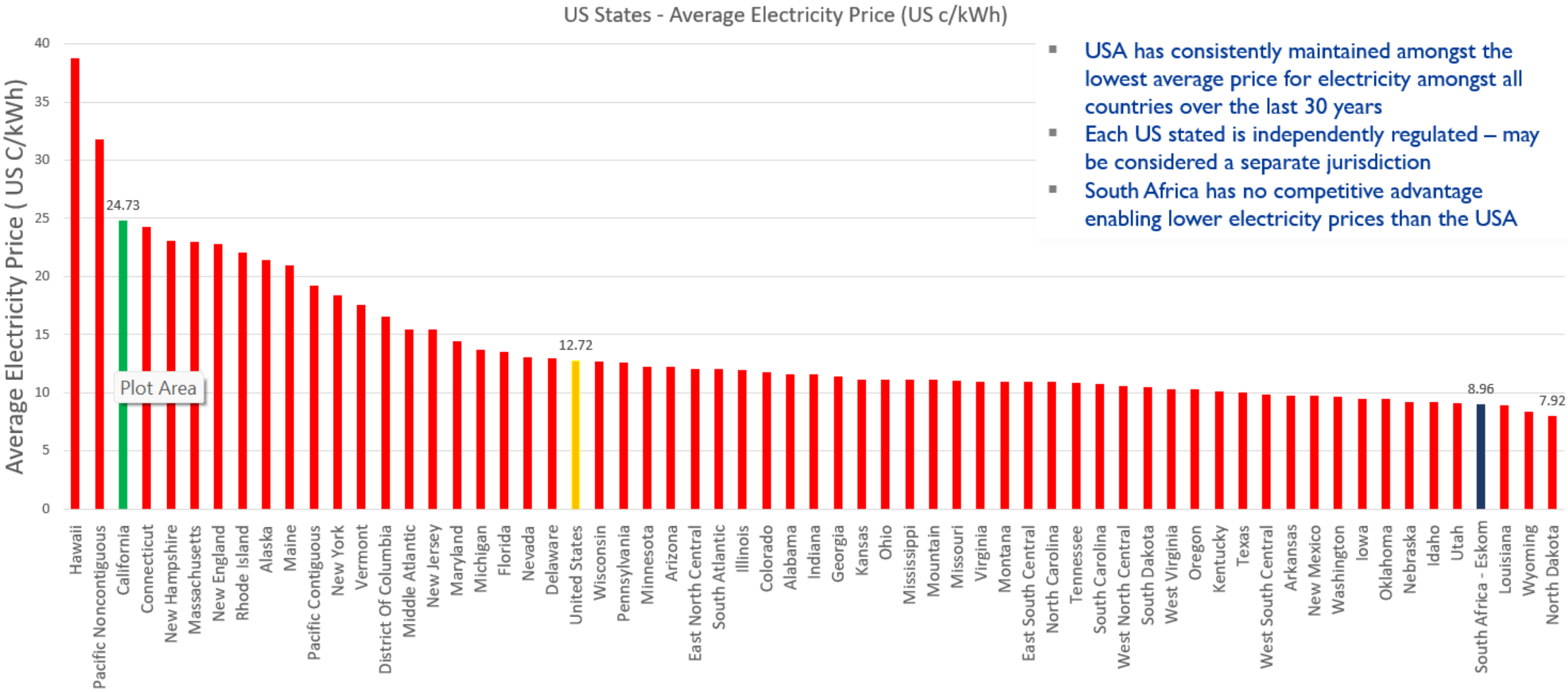
Source: GlobalPetrolPrices.com (2024)

Eskom industrial prices will compare well with many other countries – even if 36% increase is granted



Source: GlobalPetrolPrices.com 2024

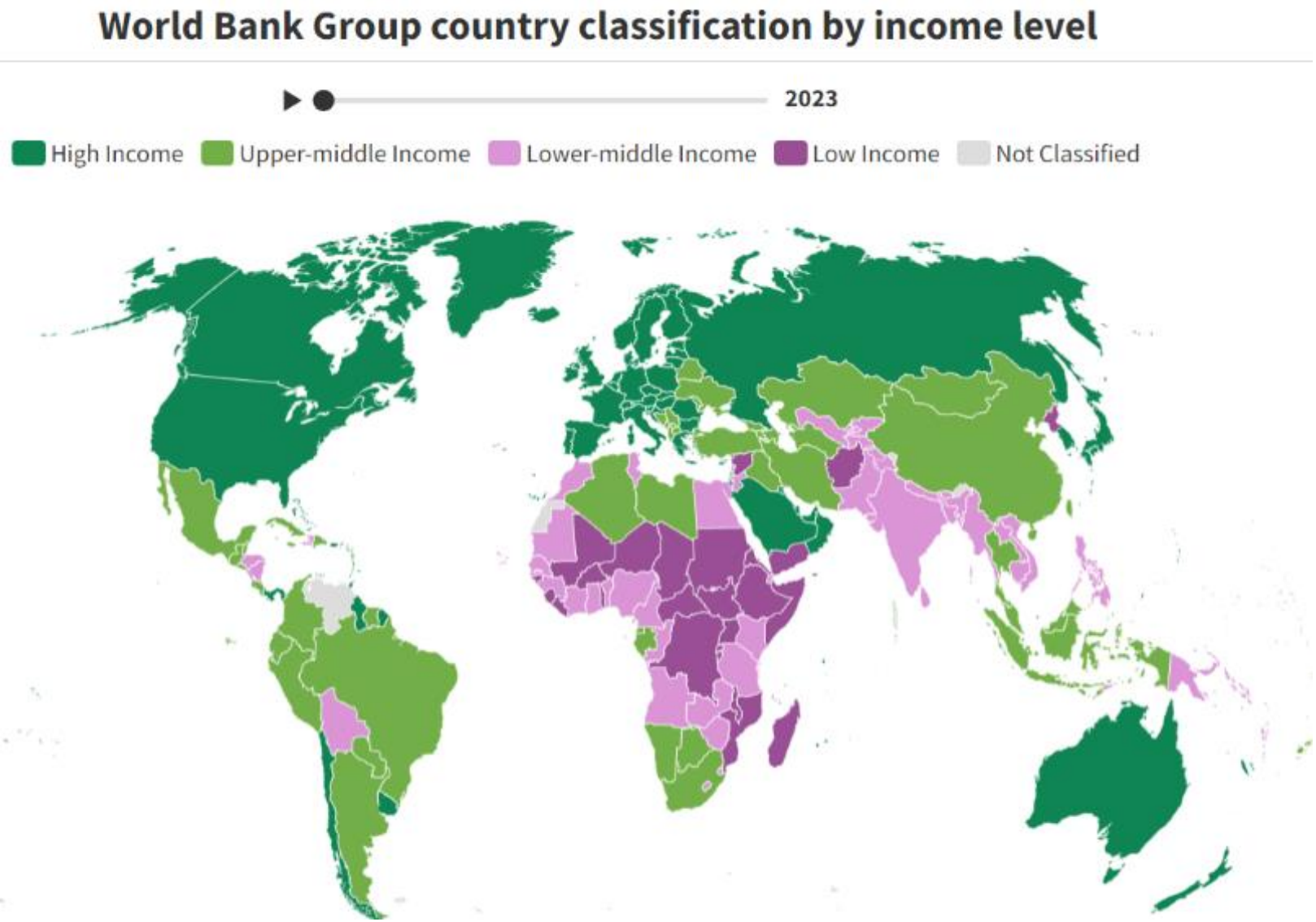
Eskom's average electricity price compares well with most US states



- USA has consistently maintained amongst the lowest average price for electricity amongst all countries over the last 30 years
- Each US stated is independently regulated – may be considered a separate jurisdiction
- South Africa has no competitive advantage enabling lower electricity prices than the USA

Source: US EIA, Eskom (2023)

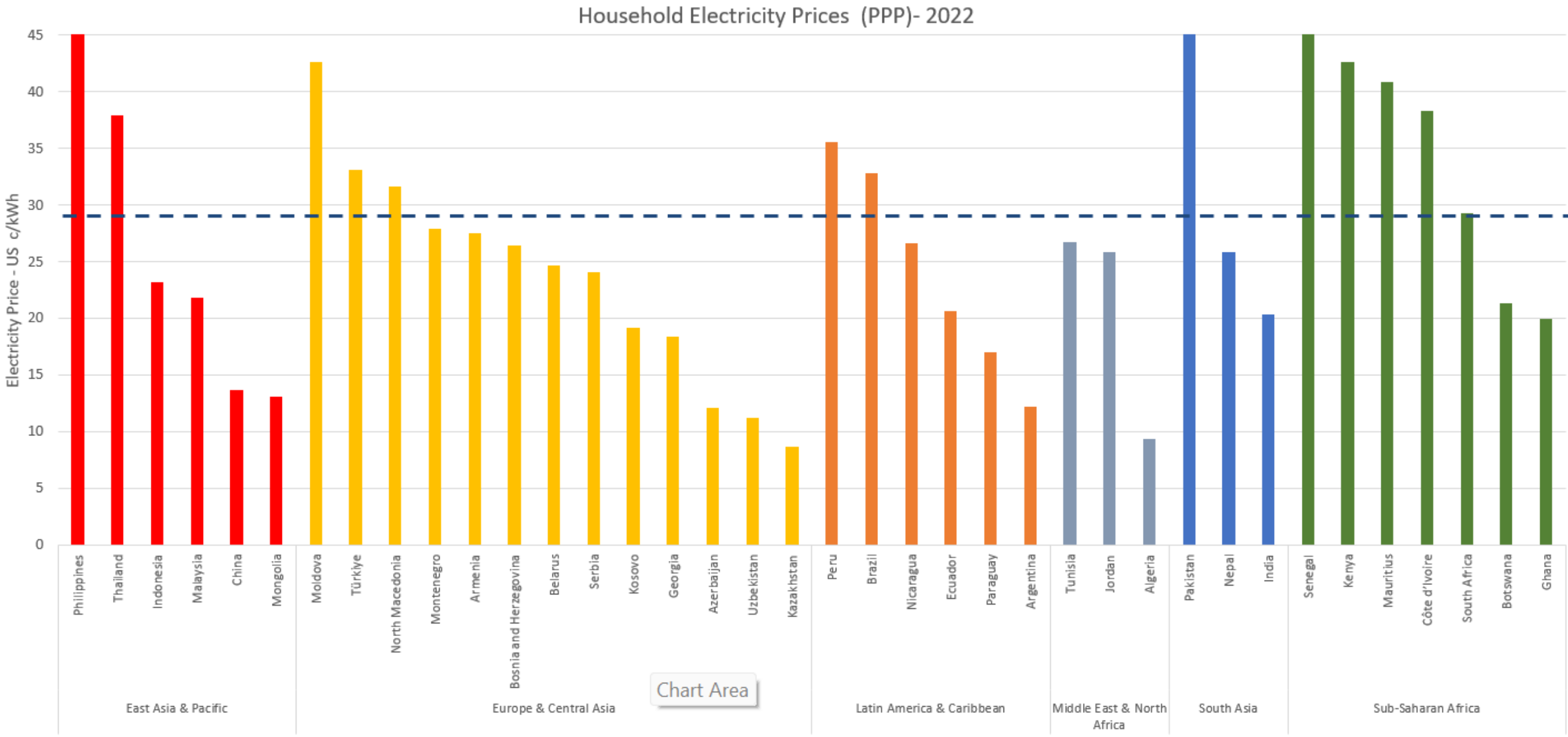
Peer Countries & relative affordability



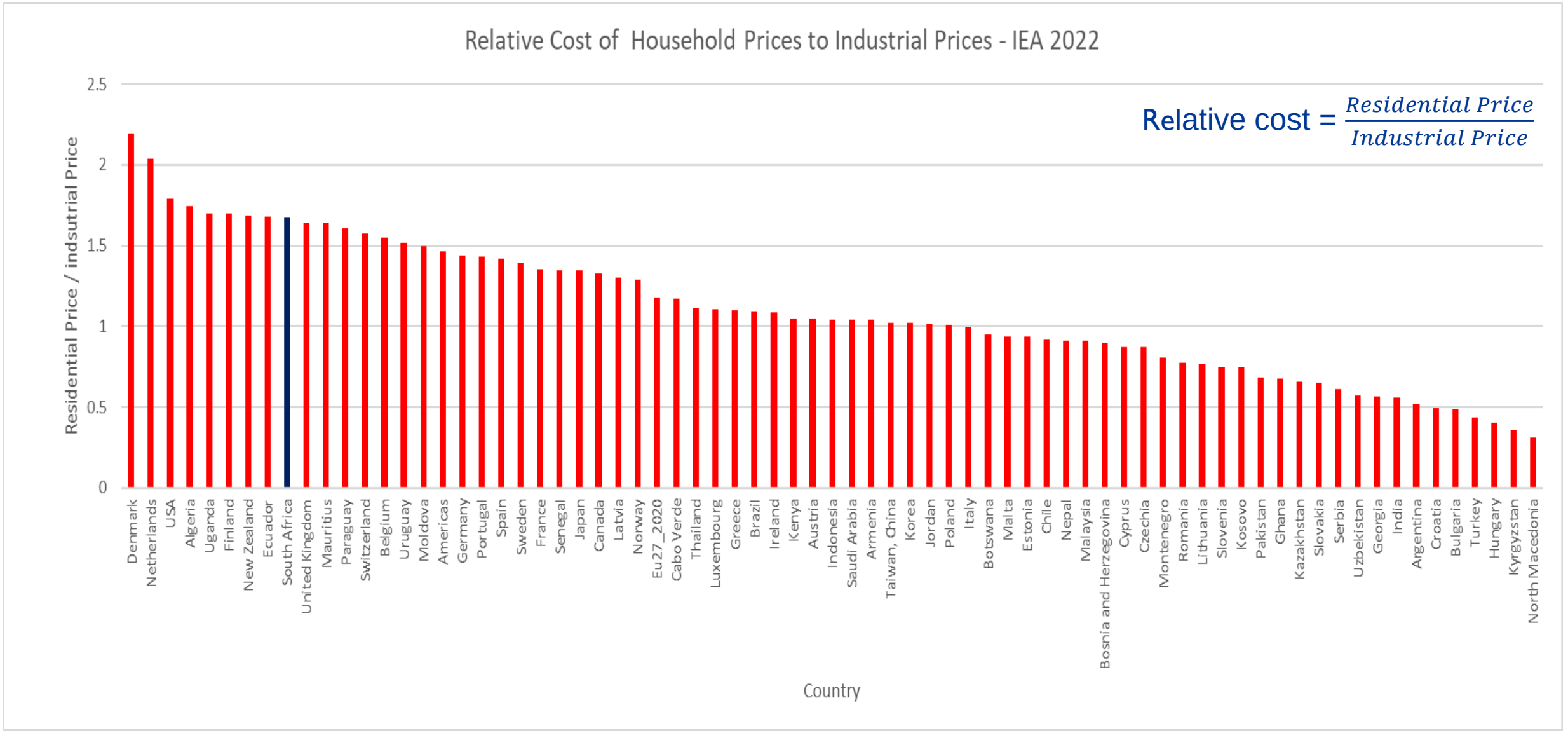
- Comparison on USD & USD Power Purchasing Parity (PPP) basis
- PPP adjusts for local purchasing power
- Peer group for South Africa - Upper & lower middle income countries
- SA GDP per Capita - $6253

Income	From	To
High	>$13845	
Upper Middle	$4466	$13845
Lower Middle	$1136	$4465
Low		< $1135

Power Purchasing Parity Comparison for Middle Income Countries - IEA



Household Electricity Price relative to Industrial Price



Understanding the consequences of price changes on consumer demand

Econometric estimation of price and income elasticities of SA electricity demand

27 November 2024

Understanding the consequences of price changes on consumer demand

Study purpose and objectives

- **Rationale**: Provide a better understanding of the likely effect that the revenue application will have on consumers of electricity and the South African economy more generally.
- **The aims** of the study are as follows:
  - To calculate the price and income elasticity of electricity demand and provide commentary;
  - To provide sectorial comparisons of the estimated elasticities of electricity demand; and
  - To provide an international comparison (at an aggregate and sectoral level) of electricity demand's price and income elasticity.

Literature review

- Review of the methodology variables and data used in similar studies in SA and internationally
- Informs comparison of study results

Data sourcing review and cleaning

- Data used informed by theoretical underpinnings of the analysis and data availability
- Data sources and preliminary analysis direct the use of econometric techniques and models specified.

Econometric Analysis

- Based on the nature of the data provided.

Robustness analysis

- To verify the credibility of the analysis, a range of plausible specifications are provided to check whether estimates hold with some consistency across models

What Is Price Elasticity of Demand?

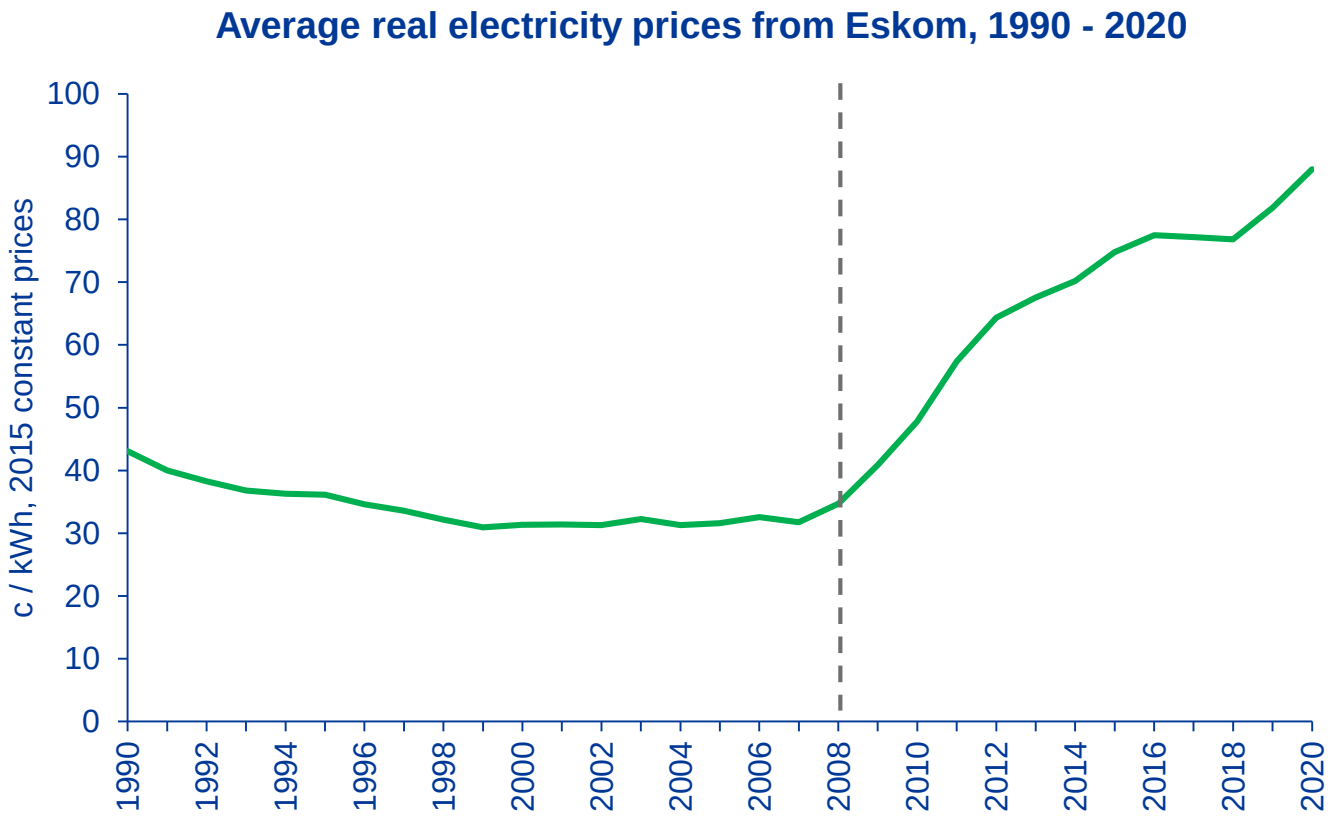
- Price elasticity of demand is a measurement of the change in the demand for a product as a result of a change in its price.
- If a price change creates a large change in demand, that is known as elastic demand. If a price change creates a small change in demand, that is an inelastic demand.
- Key takeaways
  - A good or service is considered perfectly elastic if the price elasticity is infinite, meaning demand changes substantially even with minimal price change.
  - If price elasticity is greater than 1, the good is elastic; if less than 1, it is inelastic.
  - If a good's price elasticity is 0, there is no amount of price change that produces a change in demand, and it is perfectly inelastic.
  - If a price change leads to an equal percentage change in demand, the price elasticity is exactly 1, known as unitary elasticity.
  - If there are no good substitutes and the product is necessary, demand won't change when the price goes up, making it inelastic.

Types of Price Elasticity of Demand

Calculated Price Elasticity of Demand	**Type of Elasticity**	Result of Change in Price
Infinity	Perfectly elastic	Demand declines to zero
Greater than 1	Elastic	Significant change in demand
1	Unitary elasticity	Equivalent percentage change in demand
Less than 1	Inelastic	Insignificant change in demand
0	Perfectly inelastic	No change in demand

Source: https://www.investopedia.com/terms/p/priceelasticity.asp#:~:text=Price%20elasticity%20of%20demand%20is%20%EE%80%80a%20measurement

Setting the context



- The South African **electricity sector has faced many challenges** in the last two decades i.e. load shedding
- With these challenges, **Eskom's price structure and tariff regulation have become the focus of public debate**
- **After a period of low and stable levels** in which real prices were declining (i.e. lower than inflation increases), **real electricity prices started rising sharply to raise finances for Eskom** *(among other things for its new-build programme to expand generation capacity)*

In this context, a frequent and robust estimation of the price elasticity of electricity demand is a helpful tool to understand the consequences of price changes on consumer demand

Sources: Own analysis based on Eskom direct sales- and Annual Report data

Calculating how revenue maybe impacted by a price change

An elasticity estimate assists in understanding only how consumption, and therefore revenue may, be impacted by a price change

Price elasticity (Ɛ)	Interpretation	Revenue implication
Elastic (|Ɛ|>1)	% change in Q_d greater than % change in P	**Revenue decreases with price increases** (% increase in P more than offset by % decrease in Q_d)
Elastic (0≤|Ɛ|<1)	% change in Q_d less than % change in P	**Revenue increases with price increases** (% increase in P causes a smaller % decrease in Q_d)

*As Eskom's total **revenue (R)** is its **average price per unit of electricity sales (P)** multiplied by **total consumption (Qd)** (or R= P x Qd), this means that when **demand is inelastic (elastic)**, a **price increase** will lead to **an increase (decrease) in revenue from sales**, keeping all the other parameters unchanged (ceteris paribus)*

Study design and data

- There are three main variables that the dataset will consist of**: electricity price, consumption, and economic output per economic sector** or proxy for economic conditions of the residential users
- Given the prevalence of **load shedding** in the country and its expected impact on demand across all industries, it is also **included as an additional explanatory variable**
- The modelling exercise is organised in three parts
  - **Part A :** Eskom's direct, non-residential customers *(time period & frequency: annually from 2003 – 2020)*
    i. Industrial,
    ii. Mining;
    iii. Rail
    iv. Municipalities (who on-sell to their direct customers as redistributors; i.e. bulk sales).
  - **Part B: Residential customers who buy directly from Eskom** i.e. not through a municipality *(time period & frequency: annually from 2010 – 2020)*
    - This allows us to examine the Residential sector in a more disaggregated manner (at least the Eskom-direct subset).
  - **Part C: SA aggregate** *(time period & frequency: annually from 1990 – 2020)*
    - Total country's electricity consumption from the national grid (i.e., from Eskom) and
    - Evolution over time.

20 South African and international studies reviewed

List of international studies reviewed

Study	Country	Data period	Method	Income elasticity	Price elasticity
Al-Arenan et al. (2020)	Saudi Arabia	1986 – 2015	STSM	0.60	-0.34
Arisoy and Ozturk (2014)	Turkey	1960 – 2008	TVPKF	0.98***	-0.01***
Chang et al. (2019)	OECD countries	1978 – 2013	SGMM – YFE	0.88 (non-reported)	-0.05 (non-reported)
Cialani and Mortazavi (2018)	EU countries	1995 – 2015	DML		-0.20**
Csereklyei (2020)	EU countries	1996 – 2016	SGMM		-0.75 (non-reported)
Dilaver and Hunt (2011)	Turkey	1960 – 2008	STSM	0.15***	-0.16***
El-Shazly (2013)	Egypt	1982-2010	DOLS	1.33***	0.05 (not significant)
Jamil and Ahmad (2011)	Pakistan	1970 – 2008	VECM	1.61***	-1.22***
Liddle and Hasanov (2021)	OECD/non-OECD countries	1978 - 2016	DCCE	0.5**	-0.25**
Lim, Lim and Yoo (2014)	Korea	1970 – 2011	Johansen	1.090**	-1.002**
Sharimakin et al. (2018)	EU countries	1995 – 2009	DMM	0.83**	-0.77**
Shirani – Fakhr et al. (2015)	Iran	2000 - 2011	STSM	0.85	-0.47 (not significant)

List of South African studies reviewed

Study	Focus	Data period	Method	Income elasticity	Price elasticity
Blignaut, Inglesi-Lotz and Weidemann (2015)	Sectoral	2002 - 2012	SUR	1.632 – 3.824***	-1.745*** - not significant
Bohlmann and Inglesi-Lotz (2021)	Residential	1950 – 2017	ARDL	0.680***	-0.0716***
Inglesi-Lotz (2011)	Aggregate	1980 – 2005	KF	0.79***	-0.075***
Inglesi-Lotz (2014)	Industrial	1970 – 2007	KF	0.690***	-0.952***
Inglesi-Lotz and Blignaut (2011)	Aggregate	1993 – 2006	SUR	0.71***	-0.87***
Kohler (2014)	Aggregate	1989 – 2009	ARDL		-0.939**
Masike and Vermeulen (2022)	Aggregate	1980 – 2018	KF	0.387	-0.288***
Ye, Koch and Zhang. (2018)	Residential	2010-2011	2PM	0.427***	-0.188***

Key findings:

- Consumers' electricity demand is generally **more responsive to changes in their income than prices**
- **Price elasticities vary over time and there seems to have been a structural break post-2008**

Gaps in the literature:

- The sparsity of economic **sector-specific studies**
- **Shortage of disaggregated, publicly available data for the Residential sector** as a whole**.**
- **There is limited evidence on how the broader pricing elements impact demand (e.g., the nature of customer billing and tariff structures).**
- **Notably,** as yet, there has not been any domestic research attempting to untangle price from pricing structure effects.

Results:
Part A – Direct, non-residential customers

	Sector			
Variable	**Industry**	**Mining**	**Municipalities**	**Rail**
Price elasticities				
Pre – 2008	-0.254***	--0.183***	-0.218***	-0.445***
Post – 2008	-0.254***	-0.174*	-0.208*	-0.432*
Income elasticities	0.828***	0.500***	0.243***	1.455***

*Notes: i) *[**]{***} indicates statistical significance at 10% [5%]{1%} level of significance*
ii) Post-2008 coefficients are the sum of price and interaction term coefficients, where the latter is significant. Stars indicating statistical significance based on interaction term coefficient estimates.

Price elasticities:

- **The four sectors' price elasticities are all negative and inelastic** ($0 < |\mathcal{E}_p| < 1$). (i.e. Relatively small change in demand due to price increase)
- Only for the Industrial sector there is no evidence of a changing price elasticity before and after 2008/09, while the rest of the sectors' price elasticities have differed.
- The loadshedding variable indicates a slight adverse effect in the consumption of the four sectors (minor in magnitude)

Income elasticities:

- **Consumption increases with economic output, but in lesser proportion** (i.e. inelastic),
- Income elasticities are generally higher than the price elasticity for a given sector (i.e., generally closer to 1; such that electricity consumption is more sensitive to income change than price changes)

Results:
Part B – Direct residential customers

Variable	Preferred specification (5) estimate	Range
Price elasticities	-0.614***	[-0.684,0 (non-sign)]
Income elasticities	1.014***	[0.932,1.935]

*Notes: i) *[**]{***} indicates statistical significance at 10% [5%]{1%} level of significance*

Price elasticities:

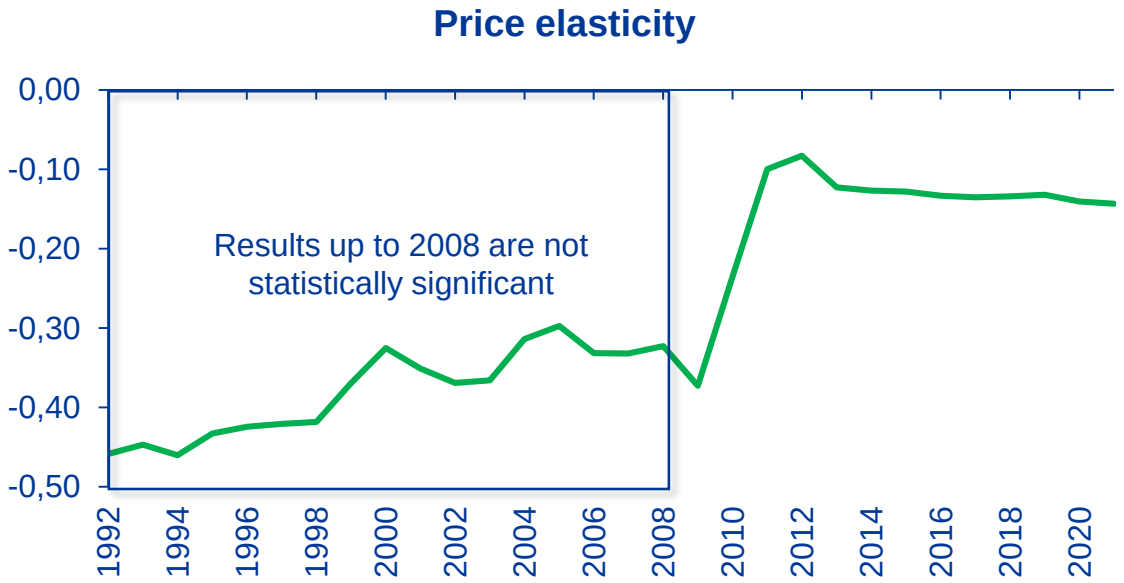
- **Eskom's direct Residential customers are price inelastic over the period from 2010 – 2020** ($0 < |\varepsilon_p| < 1$).
- Price elasticity is closer to 1 which suggests a higher price sensitivity than other sectors

Income elasticities:

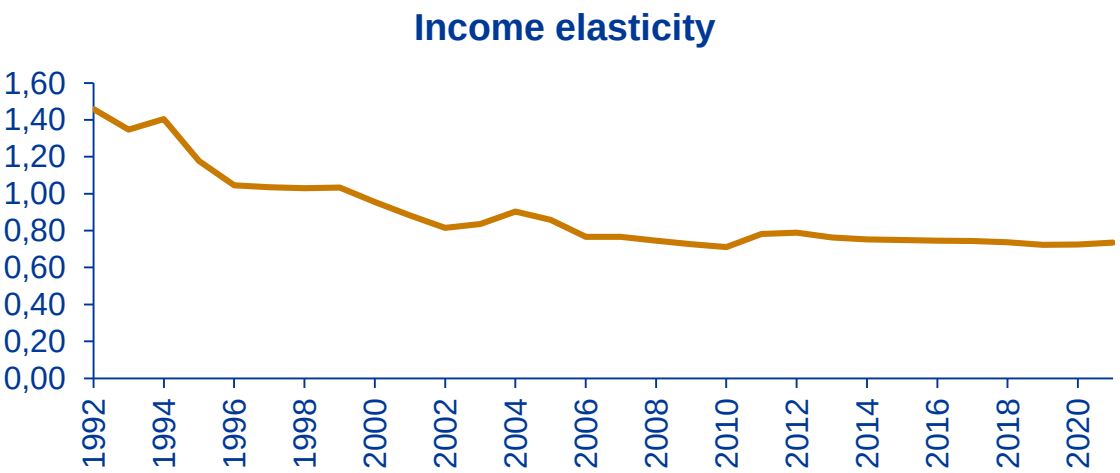
- **Positive and elastic** ($|\varepsilon_y| > 1$)
- The income elasticity is higher than 1 and thus relatively elastic with respect to the income change
- Changes in household income have a more dominant role in determining electricity demand

However, it is not possible to draw conclusions from the elasticity estimates for this subset of Residential customers to the broader Residential sector. The predominant share of Residential customer demand (72%) is supplied by municipal distributors, whose prices vary significantly and can be much higher per kWh than those faced by the equivalent Eskom customer.

Results:
Part C – SA Aggregate, over time



- Before and up to 2008, price elasticities are not significant
  - This suggests that when **electricity prices were decreasing** (in real terms) **prior to 2008**, **national electricity demand was not responsive to the minor real price changes** over time period
- Immediately after the first significant real price increases in 2008 and 2009, the price elasticity peaks at -0.37 in 2009
- After the initial shock, the model shows that the price elasticity decreased from 2009 to 2011, before stabilising
- **The average elasticity in the overall post-2008 period is thus less elastic than the years immediately after 2008**



- The income elasticity evolution presents an approximate mirror image of the price elasticity higher in the 1990s and slowly decreasing and stabilising towards the end of the period
- The declining income elasticity reflects the changes in the structure of the SA economy
- The economy is experiencing more growth in the tertiary sectors than in the primary ones

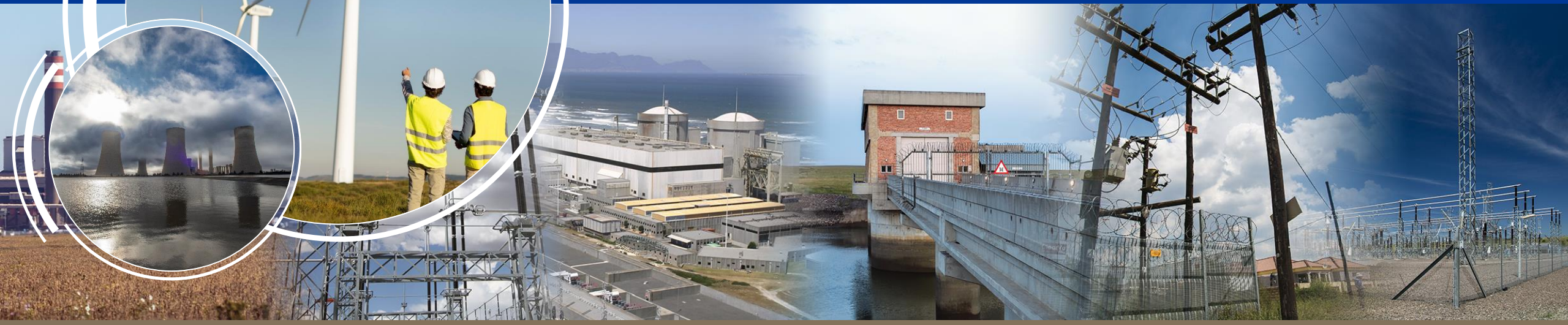
In conclusion

- The cumulative price increments have resulted in increased demand sensitivities.
- Households are markedly more price sensitive than industry. Subdued household income growth has resulted in a limited income effect on total consumption
- The current tariff structure incentivises higher income households to partially defect from the grid
- The Eskom “battery” is the role the utility plays to make up the shortfall in megawatts when PV stops contributing to the grid during peak demand (i.e. in the early mornings and evenings)
- The restructuring of the tariff is critical to ensuring that distributed self-generation and grid power can co-exist in an economically efficient manner. Capacity charges and energy charges must be separated in order to provide a proper price signal for partial grid defection
- The security of supply is a pre-requisite for sustained economic development. A balance needs to be sought between security of supply, the environment and affordability
- Penetration rates for social safety packages (e.g. Free Basic Electricity) have to be improved

The most expensive electricity is “no electricity”

Recap on Macroeconomic Impact Assessment

27 November 2024



Four policy scenarios were run to determine the impact on macro-economic factors

Eskom's MYPD5 application	❑ The pricing path forecasts to approach full cost recovery toward the end of the three-year period, and is modelled as a **20.5%, 15.07% and 10% nominal electricity price increase** in each of the three years ❑ Eskom's MYPD5 revenue application proposes a **phased-in approach** ❑ An additional assumption is that as Eskom's financial position improves and debt service costs are increasingly met over the period, the country's sovereign credit rating also improves. **A 0.5% improvement in the country's credit rating over each of FY2023 and FY2024** (1% cumulatively), is therefore modelled as an additional policy shock
Eskom's high-price scenario	❑ This scenario front-loads Eskom's revenue adjustment to a level that implies full cost recovery. This is modelled as a **30% and 11% nominal electricity price increase over the first two years of the MYPD period** ❑ The country's **credit rating is assumed to improve by 0.5% annually over FY2023 and FY2024**
Eskom's low-price scenario	❑ Represents Eskom's view on what a potential low-price scenario could be, i.e. not allowing it to recover full economic costs over the MYPD5 period. This is modelled as a **10% nominal electricity price increase in each of the three years** of the period ❑ The country's **credit rating is assumed to improve by 0.5% annually over FY2023** Eskom is not able to recover its stated full economic costs, its financial position does not improve, and so the **country's credit rating assumed to remain the same**
CPI-linked, low-price scenario	❑ Scenario four in which **electricity prices are set at CPI** – thus lower than the projected baseline path (which is based on electricity inflation parameter that is above inflation and approximates NERSA's average tariff awards over the MYPD3 and MYPD4 periods) ❑ Assume country's **credit rating further deteriorates by 0.5% annually over FY2023 and FY2024**

The results from the model indicate that the MYPD 5 application is the best performing scenario

- **The MYPD5 Application scenario performs best on the majority of the variables of interest** (five of the eight).
  - Relative to the other price path scenarios modelled, this suggests that the scenario is the optimal mix between achieving a sustainable price path toward cost reflectivity and considering the short-run impacts on consumers and the broader economy.

Legend for ordinal ranking of scenarios

1st 3rd

2nd 4th

Scenarios	Macroeconomic indicators (cumulative % deviation from Baseline from 2022 to 2026)					Financing indicators (cumulative deviation from Baseline from 2022 to 2026)		
	GDP	Employment	Inflation	Investment	Household consumption	Public sector deficit (R bn)	Current account balance (R bn)	Tax revenue (% change)
High-price	0.29%	0.03%	0.80%	4.06%	0.33%	-R110.48 bn	-R137.00 bn	4.56%
MYPD 5 Application	0.64%	0.25%	0.85%	6.95%	0.82%	-R110.25 bn	-R255.47 bn	5.10%
Low-price	-0.14%	-0.16%	0.14%	-0.54%	-0.23%	-R29.39 bn	R28.39 bn	0.91%
Inflation-linked	-0.81%	-0.43%	-0.15%	-6.84%	-1.13%	R81.71 bn	R274.84	-3.96%

Results are consistent with the widespread acceptance that prices play a key role in efficient resource allocation. These results are still applicable to the MYPD 6 period

Key messages from Economic Impact

- There is an important historical context for this assessment:

  Whilst it is official government policy that *"**electricity prices should reflect efficient market signals, accurate cost of supply and concomitant price levels**"*[1] and a statutory requirement that *"**tariffs and the regulation of revenues … must enable an efficient licensee to recover the full cost of its licensed activities, including a reasonable margin or return**"*[2], a review of the **country's actual tariff levels and related tariff decision-making** over the last half a century **suggests that this has rarely been the case**.

- In large part as **a consequence of historical under-pricing and under-investment**, Eskom's current operational and financial challenges are **placing a significant strain on the country's economy**
- CGE Modeling: Across the majority (six out of eight) of the macro-economic and fiscal indicators, the economy is decisively better off over the medium term if prices are set such that they reach cost-reflective levels over the MYPD5 period
  - In a dynamic sense, the general pattern is one of **"short term pain for long term gain"**
- These results are consistent with the widespread acceptance that prices play a key role in efficient resource allocation.
  - **Cost reflective pricing incentivises sufficient utility investment** in capacity and maintenance for the electricity sector
  - **Cost reflective prices provide accurate signals** to inform private investment and consumer response decisions
  - **Electricity subsidies crowd out other essential public spending**
- It is important to emphasise that efficient and cost-reflective tariffs are not in tension with broader policy objectives of ensuring access to electricity at affordable (i.e., subsidised) rates to low-income households

Note: 1) Section 16(1)(a) of the Electricity Regulation Act Nr. 4 of 2006; 2) Section 15 of the Electricity Regulation Act Nr. 4 of 2006

Thank you