ENERGY INTENSIVE USER GROUP

SOUTH AFRICAN ELECTRICITY PRICE FORECAST

FY 2017

The Eton Group (Pty) Ltd

PowerEconomics

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Introduction

CONTEXT FOR THE SOUTH AFRICAN ELECTRICITY PRICE PATH STUDY

Background: The South African Supply Industry

South Africa is dominated by Eskom, a vertically integrated regulated utility, which owns 90% of the installed generating capacity. The South African electricity market is regulated by the National Energy Regulator of South Africa (NERSA) which approves the selling price of electricity to all customers. There is no competitive electricity market in South Africa.

Eskom is entering a period of excess capacity, which under low growth scenarios may last beyond 2026. Accordingly, in the medium term, little or no capital investment in new supply side capacity is required under these circumstances.

Approximately 6 000 MW of renewable capacity (mainly wind and solar PV) has been contracted for by the Department of Energy (DoE) with Eskom acting as the single buyer. To date 3600 MW has been commissioned.

Why was this study conducted?

Eskom is required to submit, at regular intervals, a Multi-Year Price Determination (MYPD) application to NERSA covering a maximum period of five years. Other than this, no forward price curve for electricity is produced by the Dept. of Energy, NERSA or Eskom. As a result, the Energy Intensive User Group (EIUG) has requested that an independent electricity price forecast be developed for their members.

How was this study completed?

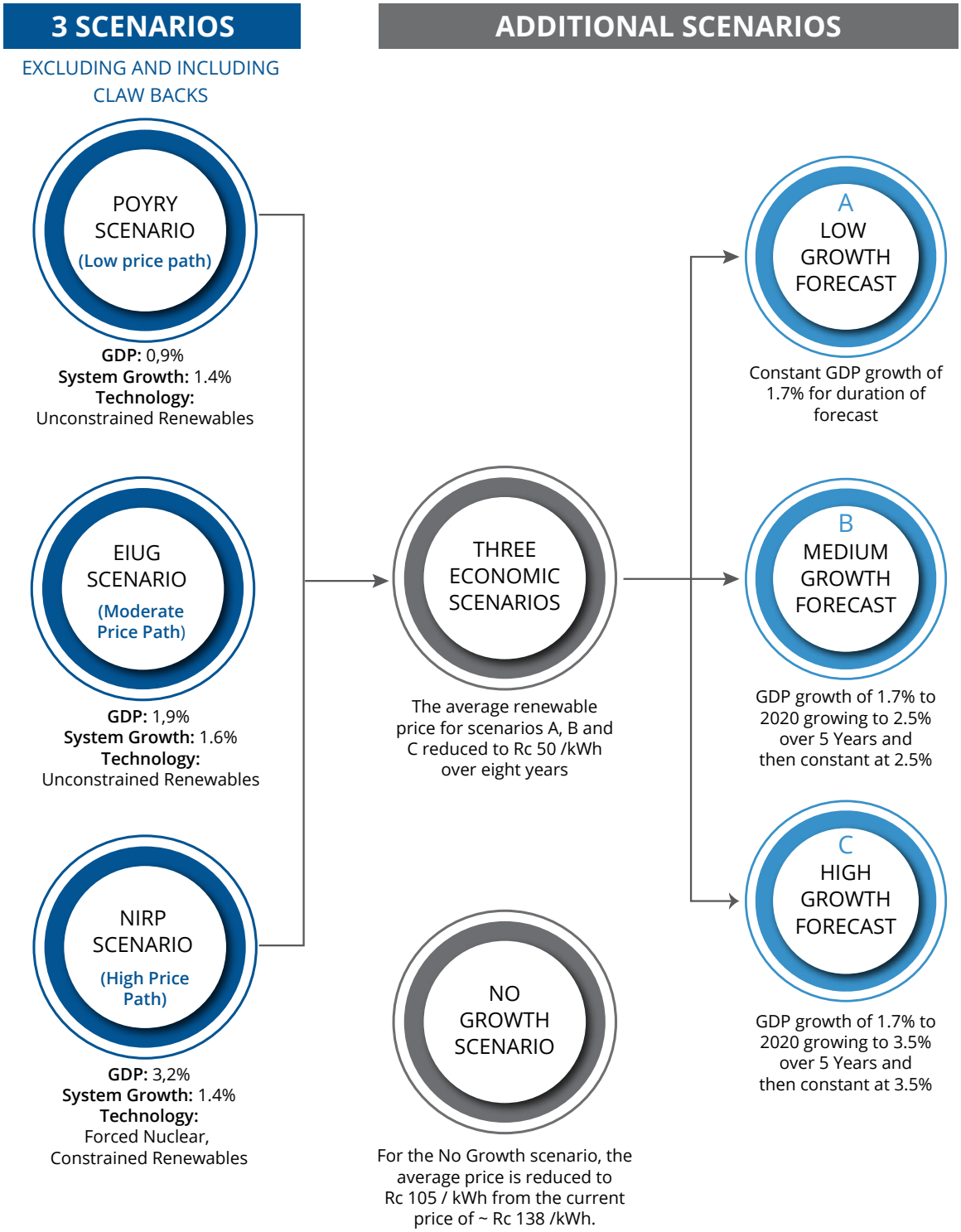
The EIUG requested that three specific scenarios be used to model the price forecast: Two scenarios are based on work done for the EIUG by Poyry (lowest GDP growth) and the CSIR (The EIUG Scenario). The third scenario simulates the last update (not approved by cabinet) of the NIRP (highest GDP growth, includes nuclear). These are three discrete scenarios with defined GDP and system demand growth, unique for each scenario.

On presentation of the first 3 scenarios' results to the EIUG Council (13 April 2018), the Council requested additional modelling. All scenarios and their results are described in the relevant sections of this report, with detailed results added as an Appendix where required.

THE PRICE FORECAST PERIOD

This Electricity Price Forecast of the average selling price of electricity in South Africa is for the period FY 2017 to FY 2035. From the predicted average selling price, an electricity price index is calculated with FY 2016 as the base year.

SCENARIOS OVERVIEW DIAGRAM



3 Scenarios

METHODOLOGY AND ASSUMPTIONS

All NERSA approved price increases awarded to Eskom are included in this forecast as are the anticipated Regulatory Clearing Account (RCA) claw backs.

The units for the average selling price of electricity in South Africa are in REAL South African Rands per Mega-Watt hour (ZAR R / MWh), converted to United States Dollars per Mega-Watt hour (US$ / MWh) at a Rand Dollar exchange rate of thirteen (13) Rand to the Dollar.

The standard methodology used for the calculation of the forward price curve following on after the approved one-year increase of 5.23% for Eskom FYE 2019 is, for any one year, to calculate all operating costs (including the cost of IPP energy) and depreciation and to this add a real return of 5.94% (12.3% nominal) on the depreciated (replacement cost) assets base. The 12.3% nominal ROA and the 9.7% (nominal) WACC are the values NERSA calculated for Eskom's 2018/19 one-year MYPD application.

Key Drivers

The key drivers of the electricity price are system growth, capital cost of plant, variable cost of fuel, maintenance, personnel costs and the economic parameters defining Eskom's weighted average cost of capital (WACC) and required return on assets (ROA).

For this Forecast, three scenarios were developed:

Scenarios	Price Path	System Growth	Technology
● Poyry Scenario	Low	1.4% p.a.	Renewable expansion, unconstrained
● EIUG Scenario	Moderate	1.6% p.a. (EIUG forecast)	Renewable expansion, unconstrained
● NIRP Scenario	High	1.8% p.a. (NIRP forecast)	Forced nuclear, constrained renewables

References to Support Documents

In compiling this price forecast, the following references and the data sourced from these references are given below:

a. Eskom Annual Report March 2017 – Eskom current fixed and variable operating costs, staff complement and depreciation.
b. Energy Information Agency (EIA) United States Department of Energy Reports for fixed and variable operating costs and cost of new plant.
c. Overnight costs for new plant were extracted from the EIA (US) data base.

3 SCENARIOS METHODOLOGY AND ASSUMPTIONS CONTINUED

The assumptions regarding funding

The assumptions regarding funding for nuclear and the allocation of future expansion between the private sector and Eskom are described in Table 1 below.

Table 1: Independent Power Producer Participation

Technology	IPP Participation	Comment
Nuclear	0%	The Department of Energy (DOE) has now determined that Eskom will be the owner and operator of the nuclear stations.
Coal	0%	Assumption is that IPPs will be allocated a 0% share as IPPs will be reluctant to accept the risks associated with large capital intensive projects.
CCGT	100%	Assumption is that IPPs will be allocated a 100% share to limit Eskom & government debt exposure.
OCGT	100%	Assumption is that IPPs will be allocated a 100% share to limit Eskom & government debt exposure.
Renewables	100%	All renewables put out to tender via DOE Ministerial determination.

Note:

1. The South African electricity price index for each scenario is based on the forward price curve of the average selling price of electricity for that scenario.
2. All prices in this Forecast include the Environmental Levy.

Price Forecast Framework and Drivers

The capacity investment framework for new plant for each of the three individual price path scenarios is illustrated in the table below.

Table 2: Price Forecast Scenarios

Item	Low Growth	Moderate Growth	High Growth
GDP Growth	0.9% p.a.	1.9% p.a.	3.2% p.a.
Average System Demand Growth	1.4% p.a.	1.6% p.a.	1.8% p.a.
Base Load Technology	Renewables Supported by CCGTs	Renewables Supported by CCGTs	Nuclear (Schedule as per Draft NIRP) 2819 MWs by 2028 4736 MWs by 2038
Mid-Merit	CCGT 1537 MWs by 2028 9715 MWs by 2038	CCGT 1949 MWs by 2028 10357 MWs by 2038	CCGT 0 MWs by 2028 3865 MWs by 2038
Peaking	OCGT 3122 MWs by 2028 4182 MWs by 2038	OCGT 3347 MWs by 2028 4532 MWs by 2038	OCGT 8822 MWs by 2028 17854 MWs by 2038
Renewables	Unconstrained 14% by 2028 63% by 2038	Unconstrained 19% by 2028 64% by 2038	Constrained 23% by 2028 36% by 2038
Exchange Rate	R 13 / $	R 13 / $	R 13 / $

The capital cost for new generation capacity is assumed to be in US Dollars and to convert this to South African Rands an exchange rate of R13/$ is used.

All assumptions regarding financial parameters and technical costs are contained in Appendix 2.

3 SCENARIOS
(EXCLUDING CLAW BACKS)

RESULTS

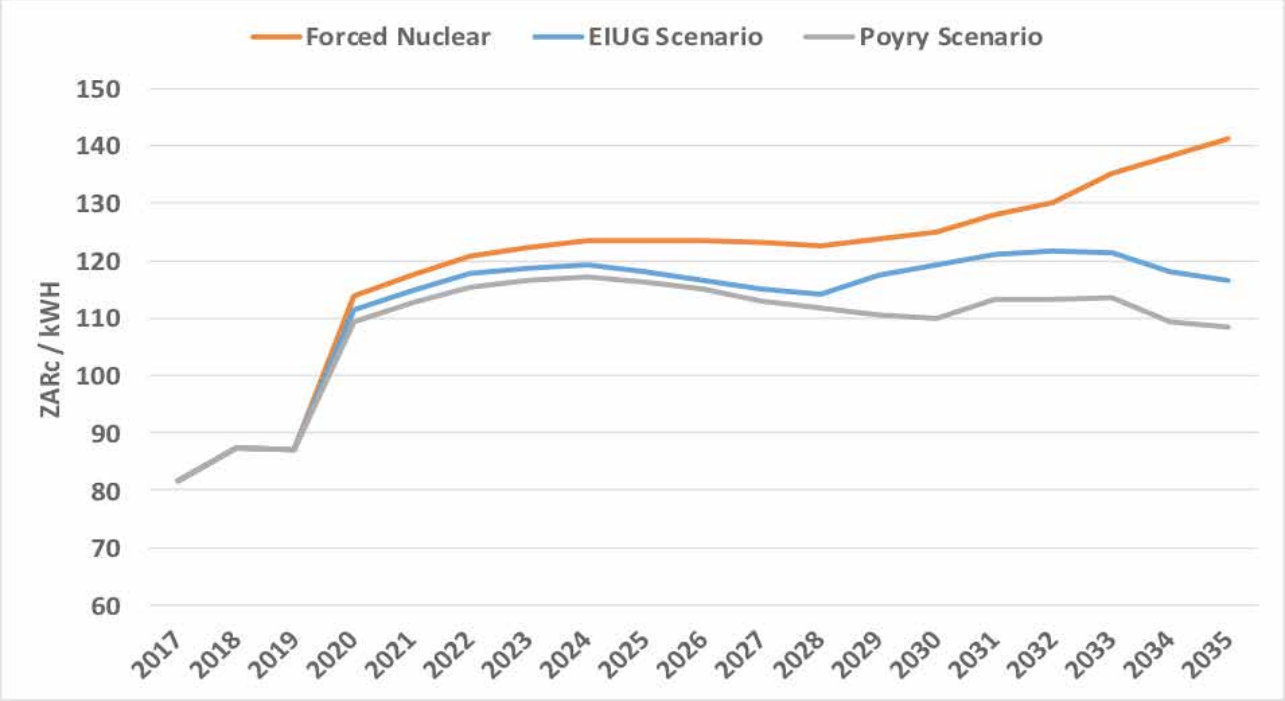


Figure 1 - 3 Scenarios South African Price Forecast (excluding Claw Backs)

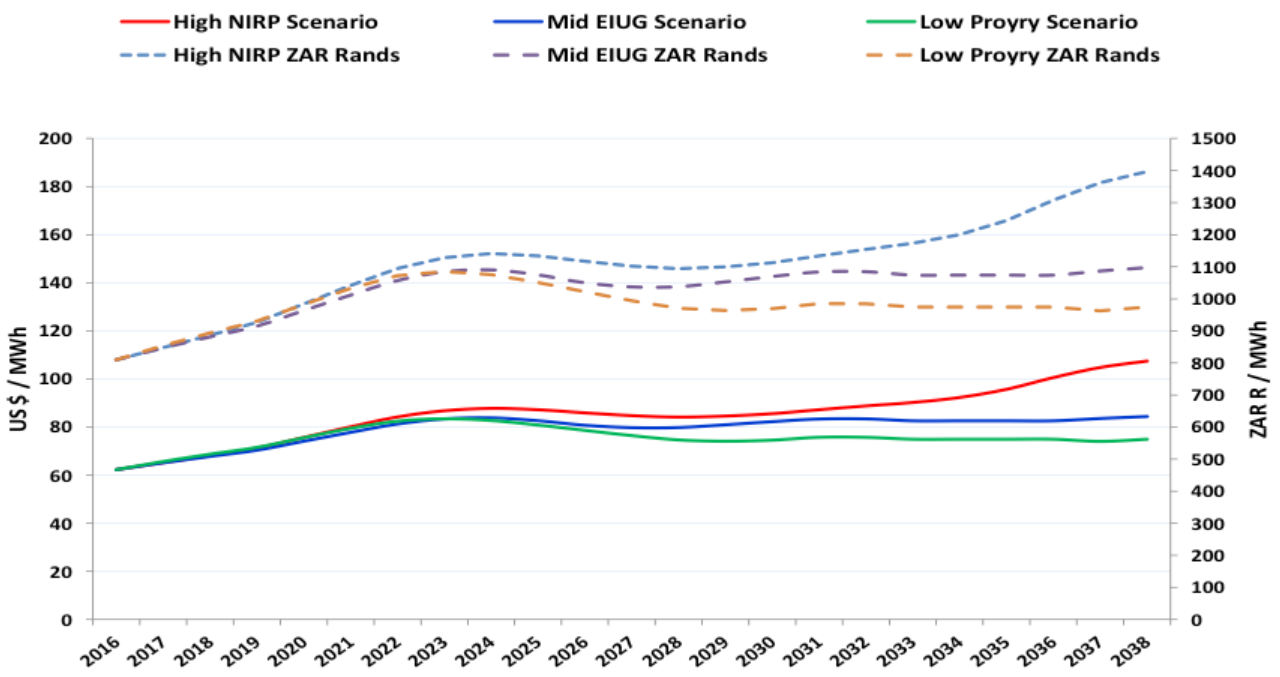
The result of applying the parameters in the standard methodology (excluding Claw Backs) on the first 3 Scenarios, is shown in Figure 1.

These prices are clearly unsustainable for industry and it appears that what Eskom requires to be a sustainable company, not relying on government guarantees, is unaffordable to South Africa.

To addres this, it is anticipated that NERSA will limit Eskom's return on assets to a maximum of 10% (nominal) including claw backs. If this is accepted, Eskom will remain cash positive but not generate sufficient profits to build a strong and independent balance sheet.

In Appendix 1, the process followed to develop a price path based on the above is explained.

3 SCENARIOS
(INCLUDING CLAW BACKS)



This price forecast (Figure 2) is based on the objective to keep Eskom cash positive with marginal profits over the forecast period for all three scenarios. Tabular results are shown in Appendix 3.

The RCA claw backs of, R19 185m for FY 14/15, R23 633m for FY 15/16, R23 868m for FY16/17 and an anticipated claw back of R20 243m for FY 17/18 are included at 66% of the stated values. It is understood that the first three applications have been lodged with NERSA. In this forecast the assumption made is that the allowed amount will be recovered over a ten-year period starting on 1 April 2019.

Additional Scenarios

METHODOLOGY AND ASSUMPTIONS

On the presentation of the first scenario results to the EIUG Council (13 April 2018), the Council requested that additional modelling be done:

- A scenario for no growth & no expansion after Kusile;
- Build scenarios around staged growth, 1st half low growth and 2nd half high growth;
- All scenarios modelled on an Eskom Cash Positive Basis;
- Reduce renewables price to Rc 50/kWh;
- Eton Discussion GDP growth scenarios – three growth scenarios agreed on; and
- Review System / GDP growth relationship – A regression function between GDP and system demand was developed using data from Eskom annual reports 2005 to 2017.

The assumptions made for this phase of the modelling were:

- Low financing costs are assumed to align with a high growth scenario (a low-price path).
- High financing costs are assumed to align with a low growth scenario (a high-price path).
- The financing cost assumptions are illustrated in the table below.

Table 3: Financing Costs

	Eskom	Eskom	IPP	IPP
	ROA	WACC	IRR	WACC
High Price Path	8.50%	9.70%	16.50%	11.00%
*Mid Price Path	7.00%	8.82%	15.00%	10.00%
Low Price Path	5.75%	7.94%	13.50%	9.00%

***Also used for the no growth scenario**

- The ROA applied was sufficient to keep Eskom cash positive for the forecast period for each scenario.
- In all scenarios modelled there are RCA claw backs or caps on the increase calculated.

This resulted in the following additional Scenarios

(agreed to at an Eton/Power Economic meeting on 17 April, 2018):

Additional Scenarios	GDP Growth	Notes
● Three Economic Scenarios (a, b, c):	See Appendix 5 for the GDP/System growth assumptions	The average renewable price for scenarios A, B and C reduced to Rc 50 /kWh over eight years
a. Low Growth Forecast	Constant GDP growth of 1.7% for duration of forecast	
b. Medium Growth Forecast	GDP growth of 1.7% to 2020 growing to 2.5% over 5 Years and then constant at 2.5%	
c. High Growth Forecast	GDP growth of 1.7% to 2020 growing to 3.5% over 5 Years and then constant at 3.5%	
● No Growth Scenario as requested by the EIUG Council		For the No Growth scenario, the average price is reduced to Rc 105 / kWh from the current price of ~ Rc 138 /kWh.

Additional Scenarios

RESULTS

The price curves illustrating the additional work are shown below in Figure 3:

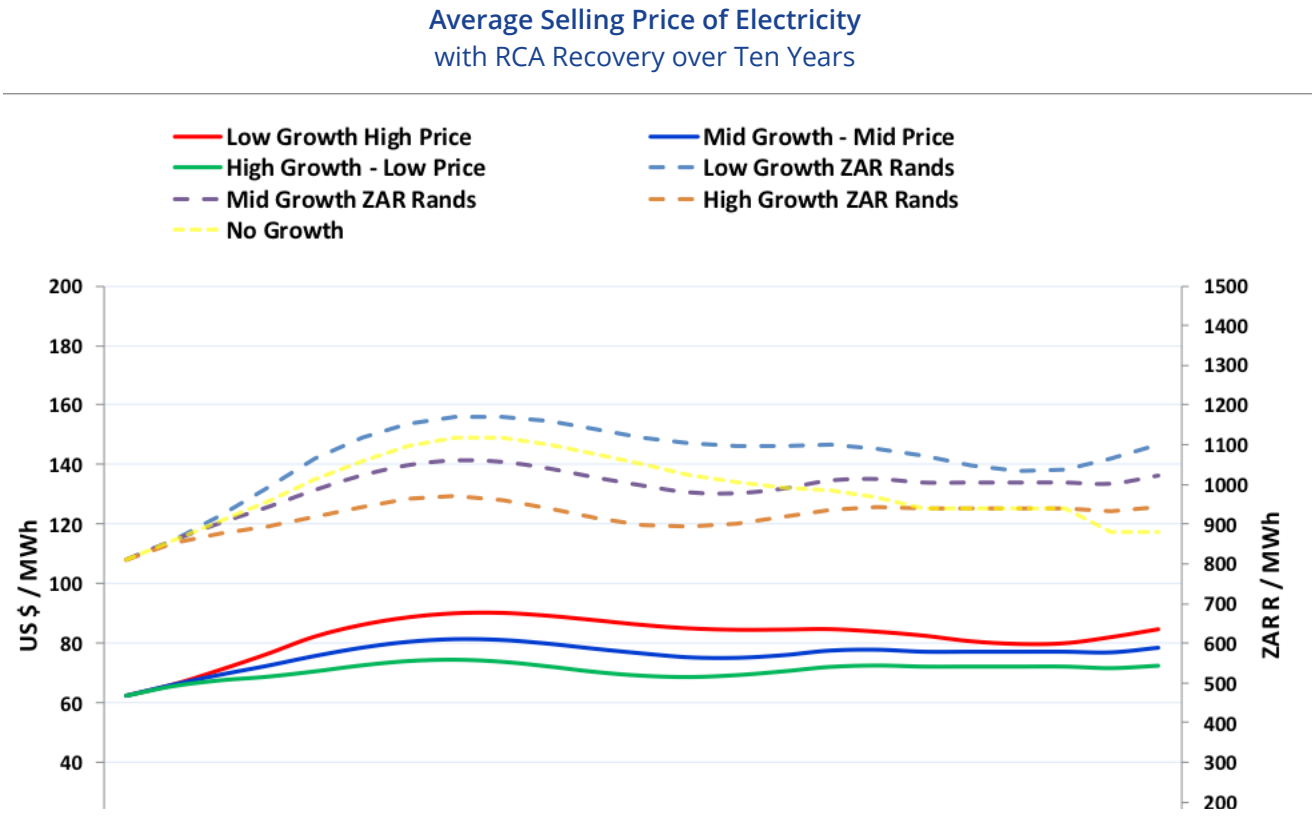


Figure 3: Forward Prices Curves for Additional Scenarios

NOTE: The price curve for the "No Growth Scenario" is only reliable up to 2027. This is because it is also a no investment scenario and as plant is decommissioned the system goes into a deficit condition. This shortfall is taken up by a dummy source at no cost.

The Tabular results are shown in Appendix 4.

APPENDIX 1 – DEVELOPMENT OF ESKOM CASH POSITIVE PRICE PATH

The forward price curves illustrated in Figure 1, if realised would be the death knell of primary industry and mining in South Africa. Continuing the status quo will require the customer base to fund, via unacceptably high tariffs, the inefficiencies and shortcomings of the current industry structure with potentially disastrous consequences.

There are a number of individual actions which may be put in place to address the Eskom crisis such as:

- A capital injection by the shareholder (government). Around R250bn will be required. This will help address the significant debt and interest payments Eskom faces.
- Reducing Eskom's head count to benchmark with best of class comparable utilities. This will help Eskom generate additional EBITDA.
- Decommission all older plant to forestall any required investment to meet air pollution requirements. This will not directly help Eskom but will help meet our international objectives
- All new build after Medupi / Kusile to be contracted to IPPs.
- Split Eskom into Generation Transmission and Distribution and privatise generation.

However, not one of these options provides the complete solution and it is likely that even if generation was privatised and a competitive market established in South Africa a capital injection will still be required to put the nascent industry on a sound footing. What is evident is that the current Electricity Industry business model is not meeting the needs of South Africa.

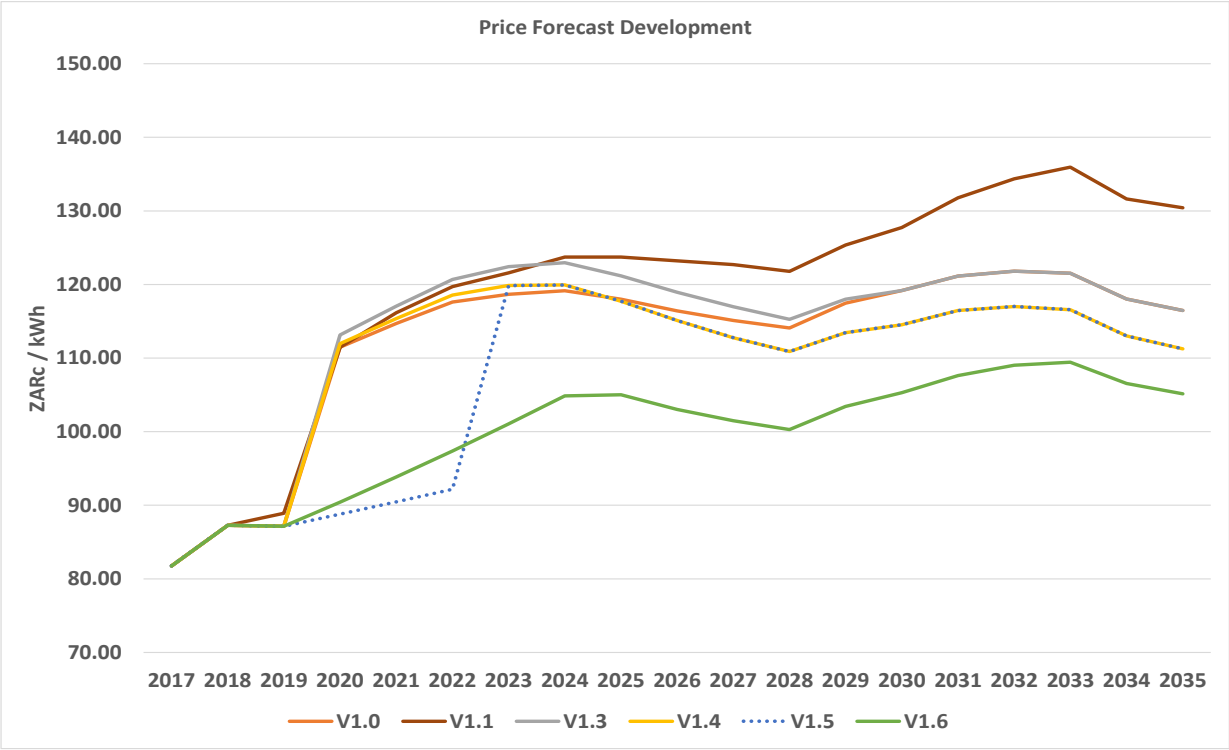
Clearly some plan needs to be developed and followed diligently to prevent the economy crash landing. Based on the above the forward price curves have been developed on the basis of keeping Eskom cash positive for the forecast period as opposed to allowing Eskom to get the profits it would require to develop a strong independent balance sheet.

The Process for the EIUG scenario is describe below. A similar process was applied to the Forced Nuclear and Poyry scenarios.

The steps to Develop the forward price curve are detailed below (Please see Figure 4):

1. Step 1
    - Curve V1.0
        - EUIG Scenario – Base Case
        - ROA (Nominal) – 12.3%
        - WACC (Nominal) – 9.7%
2. Step 2
    - Curve V1.1
        - EUIG Scenario – But with no Growth (For Interest)
        - ROA (Nominal) – 12.3%
        - WACC (Nominal) – 9.7%
3. Step 3
    - Curve V1.3
        - EUIG Scenario – Step 1 plus 66% of Claw Back over 10 years
        - ROA (Nominal) – 12.3%
        - WACC (Nominal) – 9.7%
4. Step 4
    - Curve V1.4
        - EUIG Scenario – Step 3 plus 1.0% PA productivity improvement
        - ROA (Nominal) – 12.3%
        - WACC (Nominal) – 9.7%
5. Step 5
    - Curve V1.5
        - EUIG Scenario – Step 4 Plus 3 X 8% (nominal) price cap
        - ROA (Nominal) – 12.3%
        - WACC (Nominal) – 9.7%
6. Step 6
    - Curve V1.6
        - EUIG Scenario – Step 4 Plus 5 X 10% (nominal) price cap
        - ROA (Nominal) – 8.50%
        - WACC (Nominal) – 9.7%

Figure 4



As would be expected Step 2 (Curve V1.2) which is the no growth scenario leads to ever increasing prices and would inevitably lead to rapidly declining sales (not modelled) and the inevitable death spiral.

Steps 1 and 3 (Curves V1.0 and V1.3) address Eskom's requirements but not the price impact on customers. The 1% PA productivity improvement curve V1.4 does result in lower prices but these are still unacceptably high in the short term.

Even NERSA's 3 X 8% price cap (Curve V1.5) does not address the underlying problem (over investment and high operating costs) and just delays the huge increase in price from 2019/20 to 2022/23.

A rational price path (Curve V1.6) is only achieved if the focus is shifted to keeping Eskom cash positive (ROA 8.5%) and implementing a cap of 5 X 10%. These are the assumptions applied when developing the EIUG scenario price path.

A similar approach was adopted for the Forced Nuclear and Poyry scenario price paths.

APPENDIX 2 – FINANCIAL PARAMETERS

Item	Units	Low Price Scenario	Mid Price Scenario	High Price Scenario
Financial (Nominal Values)				
Eskom WACC	%	9.7%	9.7%	9.7%
Eskom ROA	%	8.5%	8.5%	8.5%
IPP IRR	%	13.5%	15.0%	16.5%
IPP WACC	%	9.0%	10.0%	11.0%
Overnight Capital Cost				
Open Cycle Gas Turbines	$/kW	608	676	744
Closed Cycle Gas Turbines	$/kW	880	978	1076
Pumped Storage	$/kW	4501	5626	6751
Coal PF - FGD	$/kW	2560	3200	3840
Nuclear	$/kW	4756	5945	7134
Import Hydro	$/kW	2498	3123	3748

1. The Eskom ROA of 8.5% keeps Eskom cash positive for the duration of the forecast period for all three scenarios.
2. The different values for the IPP IRR & WACC for the low price and high price scenario were used to define the upper and lower price path boundaries for the given assumption that Eskom should only be given price increase to only keep it cash positive. This assumption implies Eskom should be restructured.
3. Overnight capital costs as per Energy Information Agency (EIA) managed by the United States of America Energy Department are used in this forecast.

Fuel Costs, and Variable and Fixed Maintenance Costs for Different Generation Technologies

These values have been updated using Eskom's March 2017 annual report by:

1. Assessing Eskom's current fixed and variable costs (a predominantly coal fleet) using figures from the Eskom March 2017 annual report.
2. Calculating the relative costs by technology (in US $) from data extracted from the United States Dept. of Energy EIA website using coal as the base.
3. Calculating the costs of technologies other than coal by applying the relative costs from two to the costs calculated in one.

These costs are shown below:

Technology	Fuel Costs US $ / GJ	Variable Costs US $ / MWh	Fixed Costs US $ / MW pa
Open Cycle Gas Turbines	10.00	5.76	6945
Closed Cycle Gas Turbines	10.00	1.88	11234
Pumped Storage	4.33	0.00	18383
Coal PF - FGD	2.29	2.69	51982
Nuclear	0.40	1.24	102411

The fuel for the OCGTs and CCGTs is assumed to be LNG and a price of US $ 10 / GJ has been used in this study. The justification for this is that the EIA projected reference price for Natural Gas does not exceed US $ 4.5 / GJ for the forecast period. Allowing US $ 2 /GJ for liquification and re gassing the assumption of US $ 10 / GJ is considered conservative.

APPENDIX 3 – SOUTH AFRICAN ELECTRICITY PRICE FORECAST

The results shown include the assumed RCA recovery

Applicable Protocols																								
Exchange Rate Protocol	R/$	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
South African CPI	%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
SA Average Electricity Price REAL																								
		Reference	CY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY
ZAR Currency		Date	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
High NIRP	R/MWh	01-Jul-17	810.0	846.9	884.6	924.9	983.4	1041.5	1094.6	1128.1	1140.8	1133.6	1116.7	1101.9	1093.9	1099.5	1112.3	1133.7	1154.2	1172.9	1199.9	1244.0	1307.3	1361.9	1396.8
High Growth	Index		1.00	1.05	1.09	1.14	1.21	1.29	1.35	1.39	1.41	1.40	1.38	1.36	1.35	1.36	1.37	1.40	1.43	1.45	1.48	1.54	1.61	1.68	1.72
Mid EIUG	R/MWh	01-Jul-17	810.0	846.9	881.3	915.0	963.4	1011.4	1056.5	1083.9	1089.9	1074.2	1049.7	1036.9	1037.6	1052.4	1069.2	1083.5	1084.3	1073.7	1073.7	1073.7	1073.7	1086.3	1097.1
Mid Growth	Index		1.00	1.05	1.09	1.13	1.19	1.25	1.30	1.34	1.35	1.33	1.30	1.28	1.28	1.30	1.32	1.34	1.34	1.33	1.33	1.33	1.33	1.34	1.35
Low Poyry	R/MWh	01-Jul-17	810.0	846.9	885.3	924.5	981.1	1032.8	1072.0	1084.7	1075.4	1050.8	1022.0	993.9	970.6	963.3	969.4	984.7	984.5	974.3	974.3	974.3	974.3	962.5	974.2
Low Growth	Index		1.00	1.05	1.09	1.14	1.21	1.28	1.32	1.34	1.33	1.30	1.26	1.23	1.20	1.19	1.20	1.22	1.22	1.20	1.20	1.20	1.20	1.19	1.20
USA Currency			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
High NIRP	US $/MWh	01-Jul-17	62.30	65.15	68.04	71.15	75.65	80.12	84.20	86.78	87.76	87.20	85.90	84.76	84.15	84.58	85.56	87.21	88.79	90.22	92.30	95.69	100.56	104.76	107.44
High Growth	Index		1.00	1.05	1.09	1.14	1.21	1.29	1.35	1.39	1.41	1.40	1.38	1.36	1.35	1.36	1.37	1.40	1.43	1.45	1.48	1.54	1.61	1.68	1.72
Mid EIUG	US $/MWh	01-Jul-17	62.30	65.15	67.79	70.38	74.11	77.80	81.27	83.38	83.84	82.63	80.75	79.76	79.81	80.96	82.24	83.35	83.41	82.59	82.59	82.59	82.59	83.56	84.39
Mid Growth	Index		1.00	1.05	1.09	1.13	1.19	1.25	1.30	1.34	1.35	1.33	1.30	1.28	1.28	1.30	1.32	1.34	1.34	1.33	1.33	1.33	1.33	1.34	1.35
Low Poyry	US $/MWh	01-Jul-17	62.30	65.15	68.10	71.11	75.47	79.44	82.46	83.44	82.72	80.83	78.61	76.45	74.66	74.10	74.57	75.75	75.73	74.95	74.95	74.95	74.95	74.04	74.94
Low Growth	Index		1.00	1.05	1.09	1.14	1.21	1.28	1.32	1.34	1.33	1.30	1.26	1.23	1.20	1.19	1.20	1.22	1.22	1.20	1.20	1.20	1.20	1.19	1.20

APPENDIX 4 – SOUTH AFRICAN ELECTRICITY PRICE FORECAST (ADDITIONAL SCENARIOS)

The results shown include the assumed RCA recovery

Applicable Protocols																								
Exchange Rate Protocol	R/$	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
South African CPI	%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
SA Average Electricity Price REAL																								
		Reference	CY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY
ZAR Currency		Date	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
High Price	R/MWh	01-Jul-17	810.0	858.9	922.6	991.6	1066.6	1117.9	1151.6	1169.3	1171.1	1158.4	1139.0	1118.6	1103.6	1097.4	1098.2	1100.1	1089.1	1071.8	1047.5	1035.8	1038.8	1065.5	1099.6
High Growth	Index		1.00	1.06	1.14	1.22	1.32	1.38	1.42	1.44	1.45	1.43	1.41	1.38	1.36	1.35	1.36	1.36	1.34	1.32	1.29	1.28	1.28	1.32	1.36
Mid Price	R/MWh	01-Jul-17	810.0	858.9	902.9	942.6	985.4	1022.3	1049.0	1061.0	1057.5	1040.8	1018.1	997.6	980.3	978.1	989.7	1010.2	1014.1	1005.2	1005.2	1005.2	1005.2	1002.4	1022.7
Mid Growth	Index		1.00	1.06	1.11	1.16	1.22	1.26	1.30	1.31	1.31	1.29	1.26	1.23	1.21	1.21	1.22	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.26
No Growth	R/MWh		810.0	859.57	908.72	957.34	1011.95	1060.21	1097.68	1117.73	1118.10	1101.51	1077.07	1050.45	1024.61	1004.82	992.51	986.03	968.29	941.25	941.25	941.25	941.25	880.80	879.41
Low Price	R/MWh	01-Jul-17	810.0	852.0	877.9	894.0	917.3	943.9	963.4	969.5	960.6	939.7	915.3	898.5	892.8	901.0	917.7	937.6	943.8	939.2	939.2	939.2	939.2	932.3	942.9
Low Growth	Index		1.00	1.05	1.08	1.10	1.13	1.17	1.19	1.20	1.19	1.16	1.13	1.11	1.10	1.11	1.13	1.16	1.17	1.16	1.16	1.16	1.16	1.15	1.16
USA Currency			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
High Price	US $/MWh	01-Jul-17	62.30	66.07	70.97	76.28	82.05	85.99	88.58	89.95	90.08	89.11	87.62	86.05	84.89	84.42	84.48	84.62	83.78	82.45	80.58	79.67	79.90	81.96	84.58
High Growth	Index		1.00	1.06	1.14	1.22	1.32	1.38	1.42	1.44	1.45	1.43	1.41	1.38	1.36	1.35	1.36	1.36	1.34	1.32	1.29	1.28	1.28	1.32	1.36
Mid Price	US $/MWh	01-Jul-17	62.30	66.07	69.45	72.50	75.80	78.64	80.69	81.62	81.35	80.06	78.32	76.74	75.41	75.24	76.13	77.71	78.01	77.32	77.32	77.32	77.32	77.11	78.67
Mid Growth	Index		1.00	1.06	1.11	1.16	1.22	1.26	1.30	1.31	1.31	1.29	1.26	1.23	1.21	1.21	1.22	1.25	1.25	1.24	1.24	1.24	1.24	1.24	1.26
Low Price	US $/MWh	01-Jul-17	62.30	65.54	67.53	68.77	70.56	72.60	74.11	74.57	73.89	72.28	70.41	69.12	68.68	69.31	70.59	72.12	72.60	72.24	72.24	72.24	72.24	71.71	72.53
Low Growth	Index		1.00	1.05	1.08	1.10	1.13	1.17	1.19	1.20	1.19	1.16	1.13	1.11	1.10	1.11	1.13	1.16	1.17	1.16	1.16	1.16	1.16	1.15	1.16

APPENDIX 5 – GROWTH ASSUMPTIONS FOR ADDITIONAL SCENARIOS

GDP Growth Scenarios		Average Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
High	**%**	**3.1%**	1.7%	1.7%	1.7%	2.1%	2.4%	2.8%	3.1%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Mid	**%**	**2.3%**	1.7%	1.7%	1.7%	1.9%	2.0%	2.2%	2.3%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Low	**%**	**1.7%**	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
System Growth Scenarios																										
High		**2.4%**	0.30%	0.30%	0.30%	0.85%	1.39%	1.92%	2.43%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%	2.89%
Mid		**1.3%**	0.30%	0.30%	0.30%	0.54%	0.79%	1.03%	1.27%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%	1.51%
Low		**0.3%**	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%