



CENTLEC (SOC) Ltd INTEGRATED ENERGY PLAN 2022/2023



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DRAFT

ABBREVIATIONS

IEP	Integrated Energy planning
PV	Photovoltaic Plant
NERSA	National Energy Regulator South Africa
ToU	Time of Use
Kv	Kilo Vaults
SFS	Southern Free State
Kwh	Killowatt hours
GDP	Gross Domestic Product

LEGISLATIVE

- Energy Policy of the Republic of South Africa of 1998
- National Energy Act, 2008 (Act No. 34 of 2008)

1. INTRODUCTION

Integrated energy planning (IEP) is required to ensure that current and future energy service needs can be met in the most cost effective, efficient, and socially beneficial manner while also considering environmental impacts.

CENTLEC policy and strategic plans should be informed by this proposal on connecting Small, Medium and Large Power Systems on to the grid. CENTLEC has seen an increase in its capacity from 2003 to 2009 thus showing constant growth in electricity usage. This trend, however, has decreased from 2009 to date. Mangaung receives its electricity from Harvard via a 132kV connection. Upgrades have been performed at Mangaung, Botshabelo and Thaba Nchu to accommodate the ever-increasing capacity. Upgrades which have increased the network capacity have been through the construction of large-scale capital-intensive supply facilities and the neglect of alternatives that might have been more cost effective in the long term, had greater employment benefits and more favorable environmental impacts. These alternate power systems can come in the form of solar energy or natural gas.

The IEP aims to guide future energy infrastructure investments,

The White Paper¹ states that.

“The Department of Minerals and Energy will ensure that an integrated resource planning approach is adopted for large investment decisions by energy suppliers and service providers, in terms of which comprehensive evaluations of the economic, social and environmental implications of all feasible supply and demand side investments will have to be undertaken”.

CENTLEC's IEP will identify and recommend policy development to shape the energy landscape of Mangaung and the Southern Free State municipalities that have a service level agreement with CENTLEC. CENTLEC has been able to generate revenue through the supply of electricity; it has an immense amount of economic importance as service delivery mandates need to be attained through it and to ensure that the lights are kept on for all community members. Electricity distribution is one of the biggest sources of revenue for the city and thus needs to be sustained over the long run. The energy sector is a large sector which CENTLEC plays a part in which has an immense amount of economic importance. The CENTLEC periodically requires considerable investments in

new supply capacity, maintaining supply security and replacement of supply capacity. Together with these three (3) requirements; economic, environmental, and social impacts of all alternatives should be considered when venturing into the world of alternative sources of energy.

Energy is essential to all human activities and, is indeed, critical to the country's social and economic development. It is essential for CENTLEC as a utility to have affordable energy services for its consumers; this allows for an opportunity cost for consumers to be able to utilize the resource. It has however been seen in previous analysis and trends that when the energy service is too expensive or if there is a lack or shortage of energy then this will directly have a serious effect on the Mangaung economy and gross domestic growth. Consumers will face the prospect of deeming energy from the utility as a luxury and source other more cost reflective sources of energy. The consequence of this will result in more competition for the utility which will ultimately lower the utilities revenue levels.

Energy is a critical component in the drive and growth of the economy, and it impacts all sectors as well as individual livelihoods, thus lack of energy is a contributing factor to perpetual poverty for individuals, communities, nations, and regions.

^[2] According to the White Paper, integrated energy planning is a process that entails the following technical functions:

- Interpreting the requirements of national economic, social, and environmental policies for the energy sector.
- Analysing energy needs in terms of how their fulfillment will contribute towards attaining national economic and social goals.
- Analysing the potential of energy supply systems and demand side management to meet current and potential future energy needs. This would include analyses of individual supply sub-sectors and the linkages between sub-sectors.
- Analysing energy sector linkages to the macro-economy.
- Analysing the potential effects on the energy sector of global and technological developments.
- Evaluating the effects of legislative, institutional and industry structure arrangements on energy supply and demand; and
- Specifying, sourcing, and presenting data on energy supply and demand, energy sector institutions, and linkages with economic and social factors to provide a

statistical description of the energy sector's historic evolution and current impact on economic and social development.

Nationally, a lack of coordinated and integrated national planning for the energy sector has led to underinvestment in much needed energy infrastructure. There is currently inadequate supply of electricity due to a lack of timely investments in new capacity.

Electricity generation is constrained due to insufficient capacity and inadequate availability of existing infrastructure. CENTLEC should therefore not find itself in this position.

CENTLEC is committed to the introduction, promotion, and welcoming various sources of renewable energy to ensure the support of the green economy. Promoting renewable energy will contribute towards the diversification of electricity supply and security. In doing so, CENTLEC envisage to create an enabling environment to facilitate the introduction of independent power producers that will generate electricity from renewable energy sources.

2. SCOPE

The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The National Energy Act requires the IEP to have a planning horizon of no less than 20 years. The development of the IEP is therefore a continuous process as it needs to be reviewed periodically to consider changes in the macroeconomic environment, developments in new technologies and changes in local priorities and imperatives, amongst other factors. Since change is on-going, the plan must remain relevant.

3. OBJECTIVES

From the myriad of factors which had to be considered and addressed during the Integrated Energy Planning process, eight key objectives were identified:

- **Objective 1:** Ensure security of supply;
- **Objective 2:** Minimize the cost of energy supply.
- **Objective 3:** Promote the creation of jobs and localisation.
- **Objective 4:** Minimize negative environmental impacts from the energy sector.
- **Objective 5:** Diversify supply sources and primary sources of energy.
- **Objective 6:** To highlight the renewable energy sources and its capacity
- **Objective 7:** To achieve energy efficiency; and
- **Objective 8:** Increase access to modern energy.

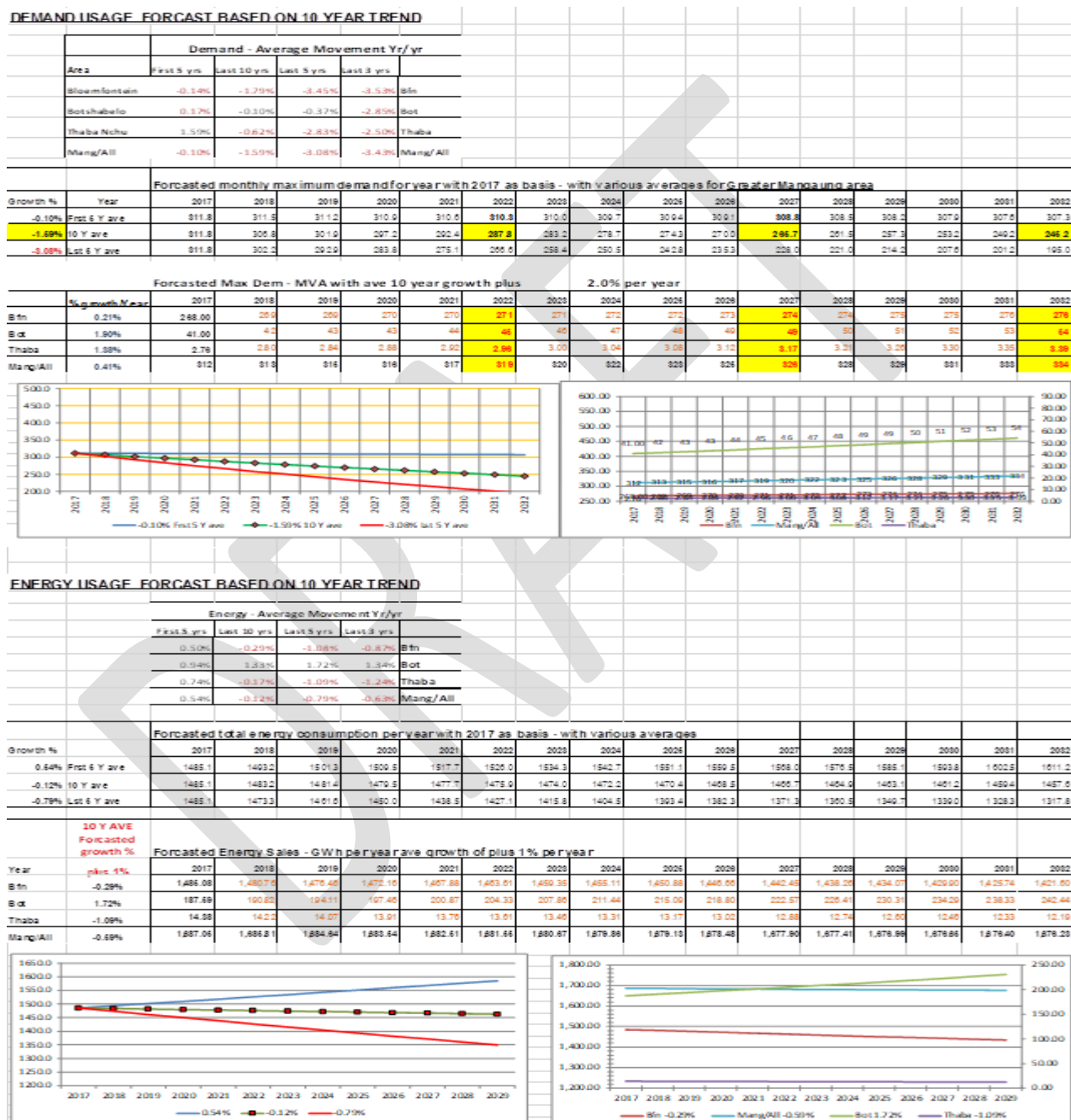
It must be noted that the government's 20-year master energy plan, the Integrated Resources Plan, was finalized in March 2011. South African photovoltaic engineering and construction companies have started construction of utility-scale photovoltaic (PV) plants in South Africa. Reference should be made to NERSA's conditions and guidelines to "Standard Conditions for Embedded Generation within municipal boundaries." The provisions of the Electricity Regulation Act (Act No. 4 of 2006) ('the Act') authorizes the Energy Regulator to prepare and pass rules designed to implement the national government's electricity policy framework, the Integrated Resource Plan, and the Act. The provisions of the Act further states that non-discriminatory access to the networks must be provided on conditions relating to:

- the circumstances under which access must be allowed.
- the circumstances under which access may be refused.
- the strengthening or upgrading of the transmission or distribution power system to provide for access, including contributions towards such upgrading by the potential users of such systems, if applicable.
- the rights and obligations of other existing or new users regarding the use of such power systems.
- Compliance with any rule, code or practice made by the Regulator; or
- the fees that may be charged by a licensee for the use of such power system

4. ENERGY SECTOR

Energy demand depends on various factors such as: climate, size of dwellings, number of people per dwelling, floor area of service sector buildings per unit of service sector output; share of energy-intensive products in manufacturing output.

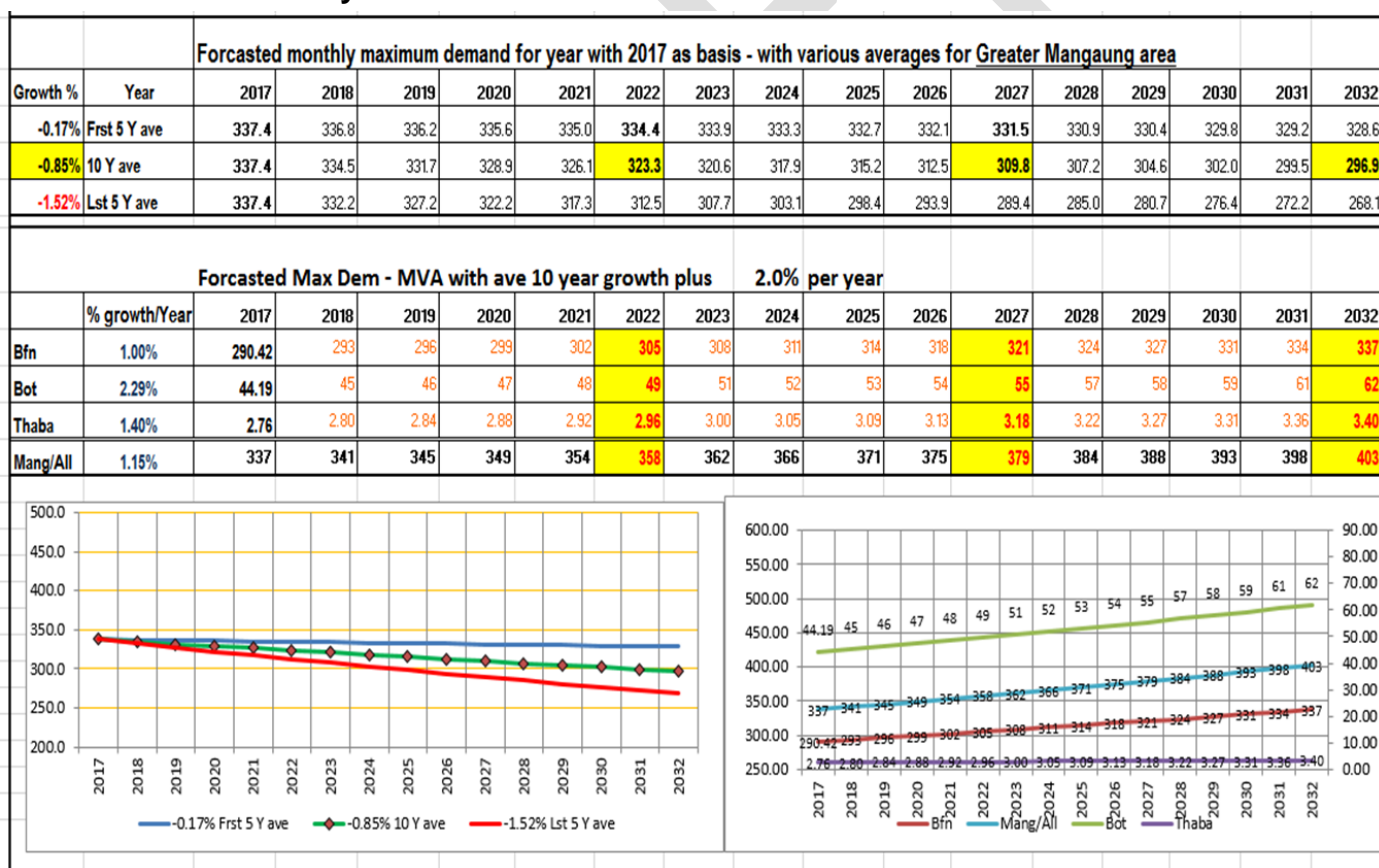
4.1. Demand Projections



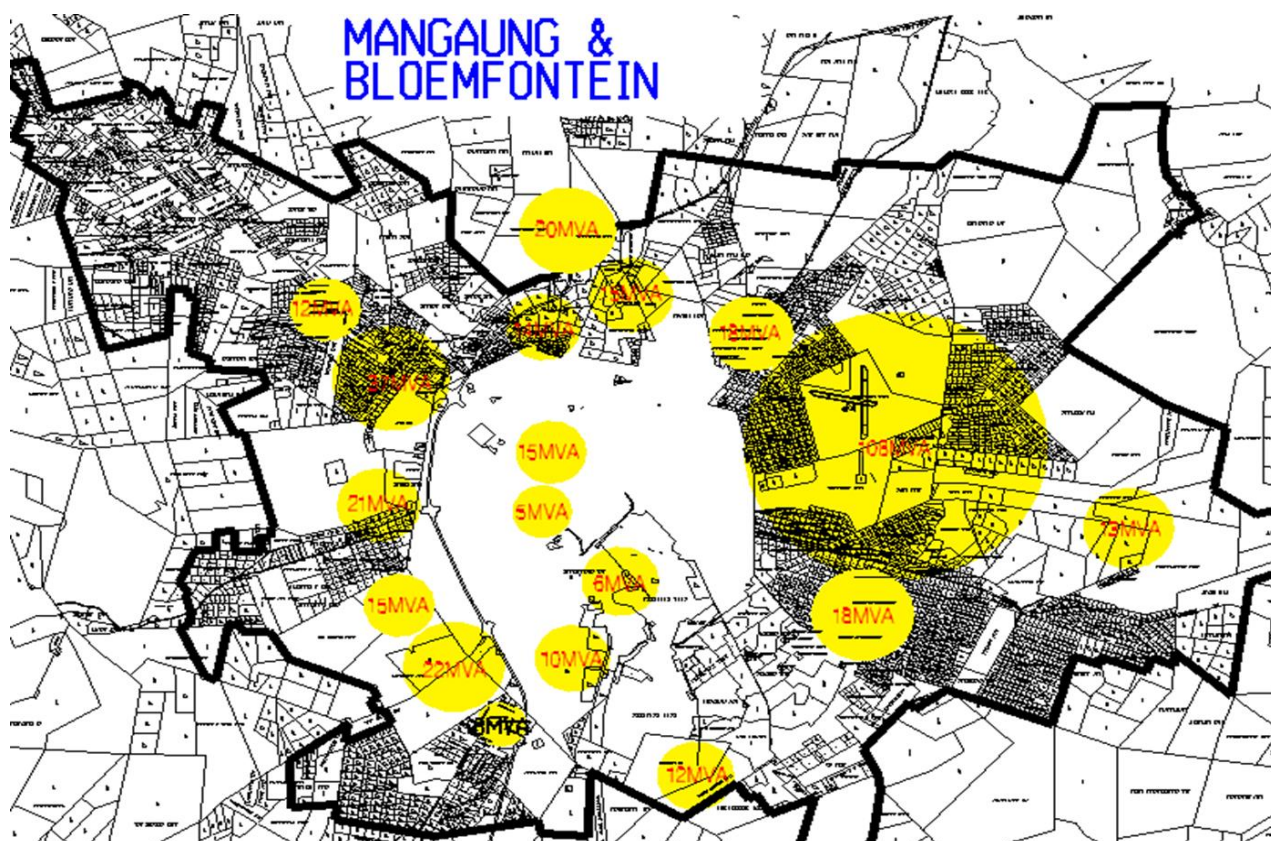
4.3 Demand average movement

Demand - Average Movement Yr/yr				
First 5 yrs	Last 10 yrs	Last 5 yrs	Last 3 yrs	
-0,18%	-1,02%	-1,86%	-0,88%	Bfn
0,08%	0,59%	1,10%	-0,40%	Bot
0,36%	-1,21%	-2,79%	-2,42%	Thaba
-1,35%	-1,95%	-2,56%	-4,99%	Mang/All

4.4 Forecasted monthly maximum demand



4.5 Proposed PV sites



CENTLEC has a customer base which is 90% domestic and 10% commercial. Customers on the prepayment system constitute 40% of CENTLEC's total revenue. The remaining 60% of revenue is being generated by Bulk Time of Use customers. The kWh consumption has not always been spread out in this particular manner as the trend has shown that there is a decline in the ToU consumer's consumption although their number has increased year on year to the number of 1463 to date. This number is for Mangaung only excluding the SFS. In this exercise, Bulk Time of Use customers will be analyzed. The structure of the economy and changes thereof have an impact on the energy-intensity of the economy and therefore on final energy demand.

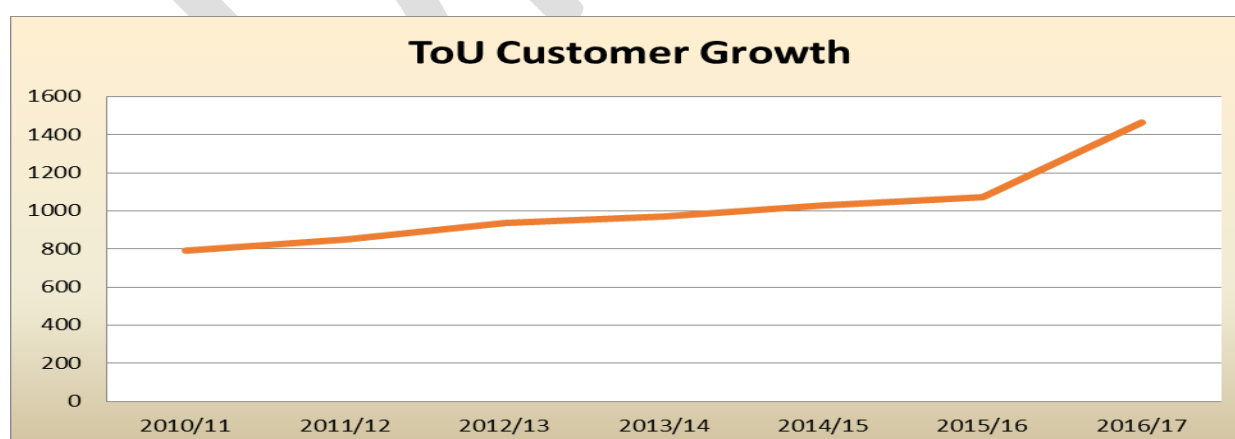
The ToU customers can be classified in terms of agricultural (animal husbandry, crop farming, forestry and fishing), commerce and public services (wholesale and retail, public services, financial and business services, hospitality, education, entertainment, information and communication), transport (private, public and freight transportation), industrial (manufacturing and production of all goods and products including fast moving consumer goods), mining and residential (i.e. formal and informal households in rural and urban areas). Their growth in kWh, revenue and demand will be analyzed.

5. POPULATION GROWTH

TOTAL NUMBER OF ToU CUSTOMERS									
		2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Category	Sub Category	Customers	Customers	Customers	Customers	Customers	Customers	Customers	Customers
Agricultural	Farm	5	5	6	6	6	8	9	9
Agricultural	Livestock Farming	1	1	1	1	1	1	1	1
Commerce	Business Service	19	19	27	56	68	75	77	308
Commerce	Financial Service	0	0	1	1	1	1	1	9
Commerce	Retail	4	4	7	12	14	15	18	62
Commerce	Wholesale	2	2	2	2	2	2	2	18
Industrial	Business Service	279	279	291	299	308	321	327	331
Industrial	Financial Service	21	21	21	21	21	21	22	22
Industrial	Manufacturing of Goods	19	19	22	22	21	21	22	22
Industrial	Production of Goods	24	24	24	24	24	24	25	25
Industrial	Public Transport	5	5	5	5	4	4	4	4
Industrial	Retail	60	60	65	70	72	75	79	78
Industrial	Wholesale	27	27	27	27	27	25	25	25
Public Service	Child Welfare	2	2	2	2	2	2	2	3
Public Service	Church	6	6	8	10	10	10	10	12
Public Service	Correctional Service	2	2	2	2	2	2	2	2
Public Service	Departmental	68	68	70	75	76	79	83	99
Public Service	Fire Department	0	0	0	1	1	1	2	3
Public Service	Hospital	10	10	10	11	11	11	12	12
Public Service	Military	1	1	1	2	1	1	1	1
Public Service	Police Station	11	11	12	12	12	12	12	12
Public Service	Postal Service	2	2	2	2	2	2	2	3
Public Service	School	35	35	40	45	46	48	53	67
Public Service	Sport & Recreation	6	6	6	7	7	8	12	12
Public Service	Tertiary Education	12	12	13	13	13	13	13	13
Public Service	Water & Sanitation	7	7	8	11	14	16	18	20
Residential	Apartments	28	28	32	33	33	38	40	41
Residential	Stand-Alone House	4	4	6	10	9	10	11	56
Residential	Townhouse Complex	121	121	127	145	154	175	178	181
Transport	Airport	2	2	2	2	2	2	2	4
Transport	Public Transport	8	8	8	8	7	7	7	8
		791	791	848	937	971	1030	1072	1463

Table 1: Total number of ToU customers in Mangaung

5.1 Total growth of TOU customers



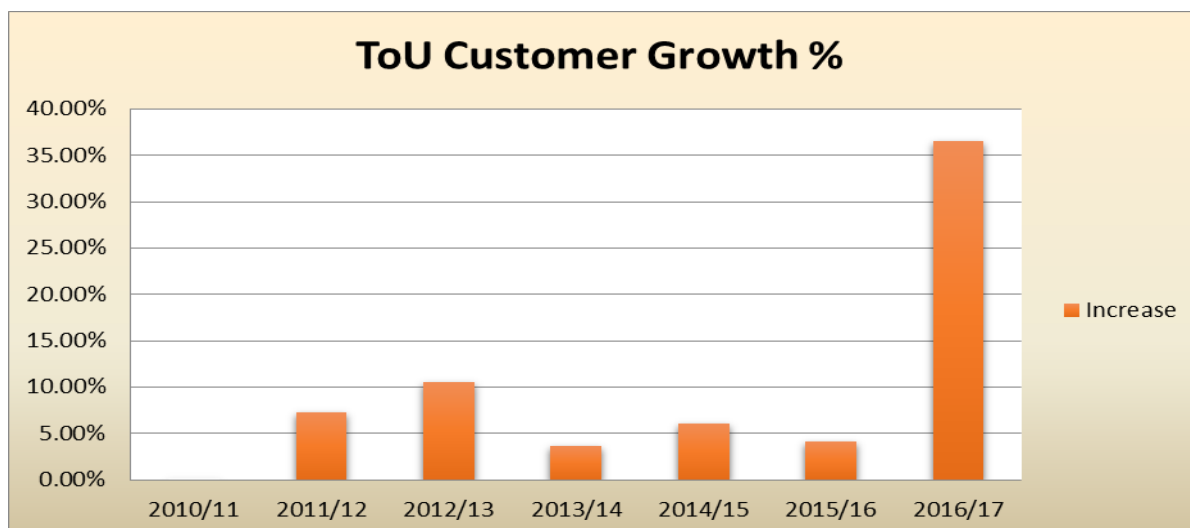
Graph 1: The total growth of ToU customers

5.2 Increase of TOU customers

% INCREASE OF ToU CUSTOMERS							
		2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Category	Sub Category	Increase	Increase	Increase	Increase	Increase	Increase
Agricultural	Farm	20.00%	0.00%	0.00%	33.33%	12.50%	0.00%
Agricultural	Livestock Farming	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Commerce	Business Service	42.11%	107.41%	21.43%	10.29%	2.67%	300.00%
Commerce	Financial Service	100.00%	0.00%	0.00%	0.00%	0.00%	800.00%
Commerce	Retail	75.00%	71.43%	16.67%	7.14%	20.00%	244.44%
Commerce	Wholesale	0.00%	0.00%	0.00%	0.00%	0.00%	800.00%
Industrial	Business Service	4.30%	2.75%	3.01%	4.22%	1.87%	1.22%
Industrial	Financial Service	0.00%	0.00%	0.00%	0.00%	4.76%	0.00%
Industrial	Manufacturing of Goods	15.79%	0.00%	-4.55%	0.00%	4.76%	0.00%
Industrial	Production of Goods	0.00%	0.00%	0.00%	0.00%	4.17%	0.00%
Industrial	Public Transport	0.00%	0.00%	-20.00%	0.00%	0.00%	0.00%
Industrial	Retail	8.33%	7.69%	2.86%	4.17%	5.33%	-1.27%
Industrial	Wholesale	0.00%	0.00%	0.00%	-7.41%	0.00%	0.00%
Public Service	Child Welfare	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%
Public Service	Church	33.33%	25.00%	0.00%	0.00%	0.00%	20.00%
Public Service	Correctional Service	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Public Service	Departmental	2.94%	7.14%	1.33%	3.95%	5.06%	19.28%
Public Service	Fire Department	0.00%	100.00%	0.00%	0.00%	100.00%	50.00%
Public Service	Hospital	0.00%	10.00%	0.00%	0.00%	9.09%	0.00%
Public Service	Military	0.00%	100.00%	-50.00%	0.00%	0.00%	0.00%
Public Service	Police Station	9.09%	0.00%	0.00%	0.00%	0.00%	0.00%
Public Service	Postal Service	0.00%	0.00%	0.00%	0.00%	0.00%	50.00%
Public Service	School	14.29%	12.50%	2.22%	4.35%	10.42%	26.42%
Public Service	Sport & Recreation	0.00%	16.67%	0.00%	14.29%	50.00%	0.00%
Public Service	Tertiary Education	8.33%	0.00%	0.00%	0.00%	0.00%	0.00%
Public Service	Water & Sanitation	14.29%	37.50%	27.27%	14.29%	12.50%	11.11%
Residential	Apartments	14.29%	3.13%	0.00%	15.15%	5.26%	2.50%
Residential	Stand-Alone House	50.00%	66.67%	-10.00%	11.11%	10.00%	409.09%
Residential	Townhouse Complex	4.96%	14.17%	6.21%	13.64%	1.71%	1.69%
Transport	Airport	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Transport	Public Transport	0.00%	0.00%	-12.50%	0.00%	0.00%	14.29%
		7.21%	10.50%	3.63%	6.08%	4.08%	36.47%

Table 2: % increase in ToU customers

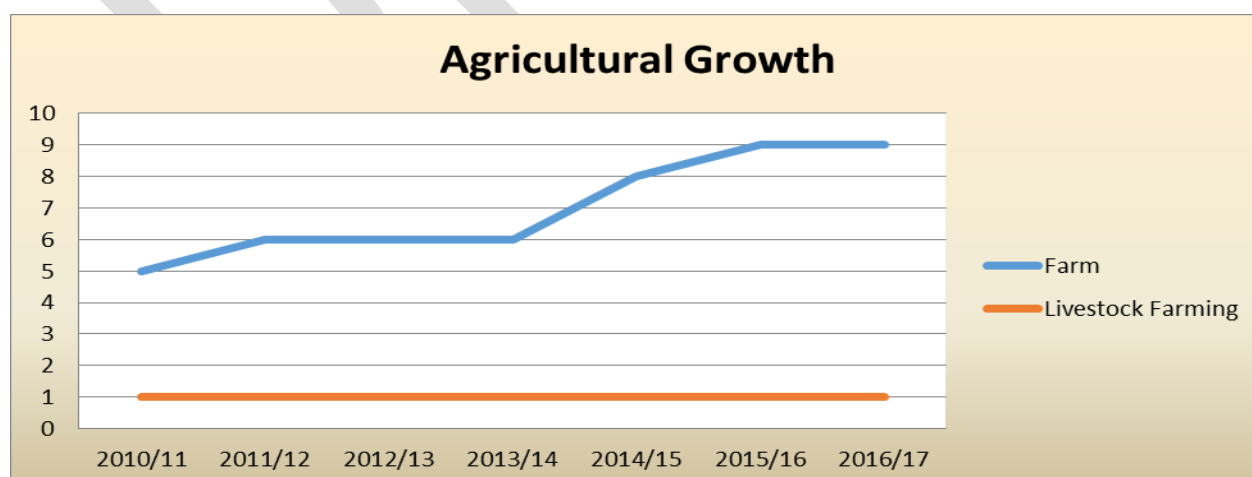
5.3 Percentage growth TOU customers



Graph 2: The % growth of ToU customers

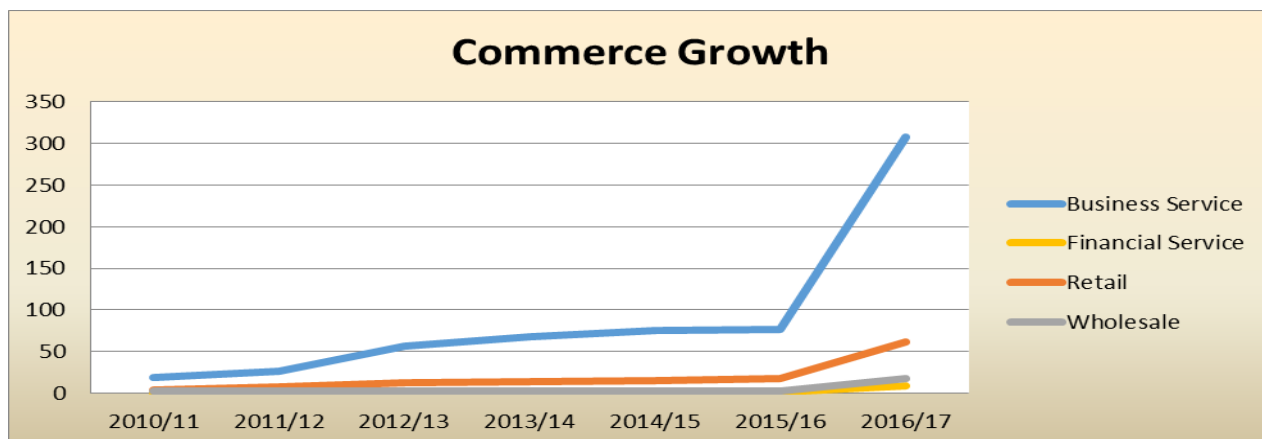
The high increase in the number of ToU customers in the 2016/2017 financial year is due to the installation of ToU meters for consumers that consume more than 1000kWh per month. These consumers already had connections at their dwellings and were a part of the distribution network. They had an installation base of rotational and/or prepayment meters. An average growth rate of 6.3% can be seen in the ToU customer's year on year. This is good as it shows that more large power consumers are connecting to the distribution network. Thus, an increase in revenue and kWh consumption should be inevitable.

5.4 Agricultural Growth



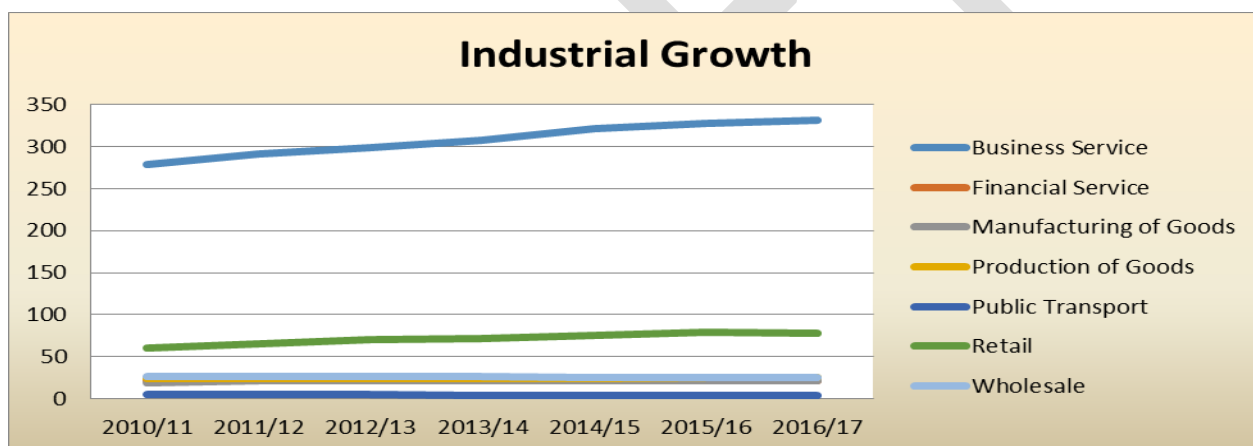
Graph 3: Agricultural sector growth

5.5 Commerce growth



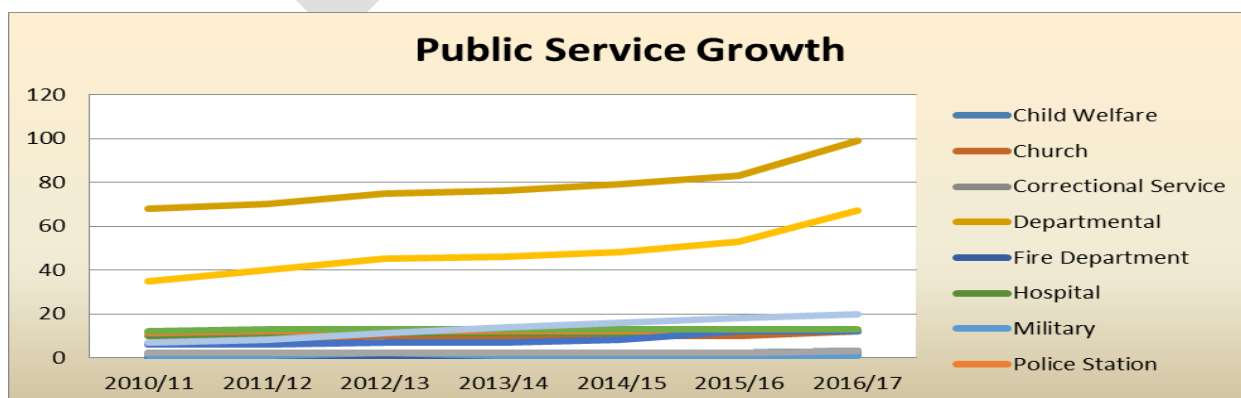
Graph 4: Commerce sector growth

5.6 Industrial growth



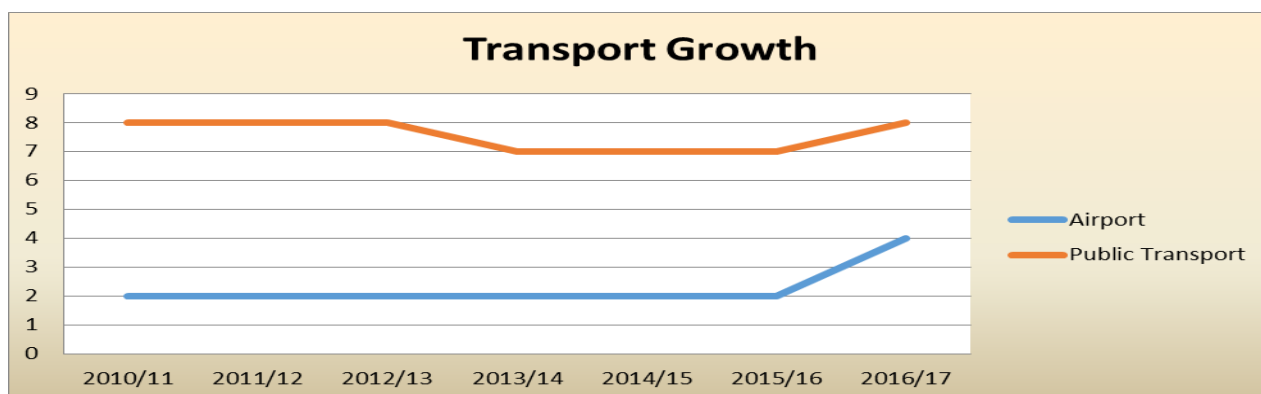
Graph 4: The Industrial sector growth of ToU customers

5.7 Public service growth



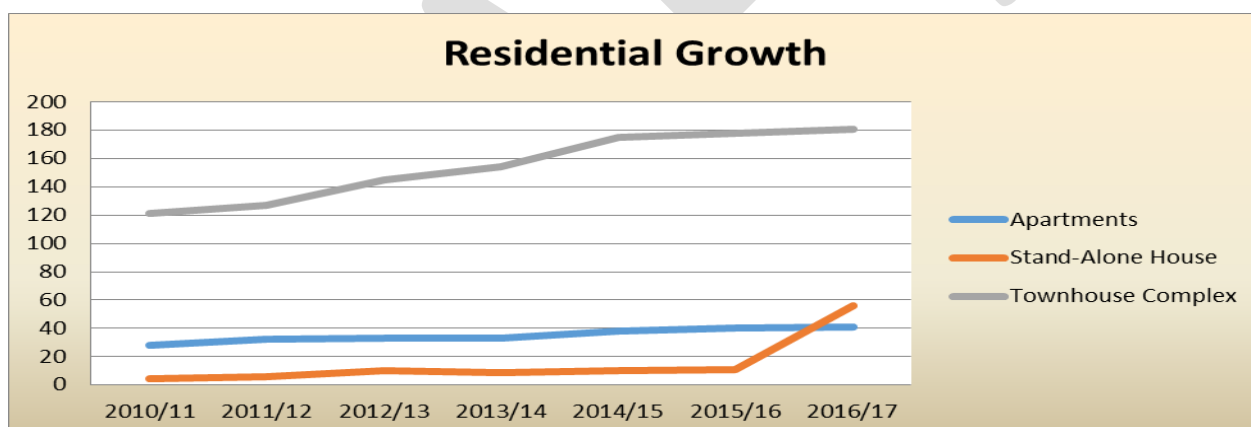
Graph 5: The public service growth of ToU customers

5.8 Transport growth



Graph 6: The transport sector growth of ToU customers

5.9 Residential growth



Graph 7: The residential growth of ToU customers

6. ECONOMIC GROWTH

There has been a decrease in the kWh consumption of Mangaung from the Eskom supply point. Although the number of customers has increased with an average of 6.3%, the kWh consumption has not realized this increase. The Eskom purchases are instead decreasing linearly year on year. This is of great concern to the utility as there will be less working capital to work with to maintain, refurbish and extend the network.

Although the distribution network has sufficient capacity at 323 000 kVA, the total demand has been decreasing. This decrease was established from the 2010/2011

financial year when tariff increases went up by 28.99%. kWh growth in the city prior to this tariff increase was in the region of 2.76% from the 2003/2004 financial year till the 2009/2010 financial year. The power station was also closed due to the running cost of it therefore all CENTLEC's supply had to be purchased from Eskom at Eskom's tariffs. The cost of these tariffs has been passed down to the consumer through the NERSA tariff approval process.

This is represented by the graphs below.

6.1 Nersa approved tariff increases

Table 3: Nersa approved tariff increases

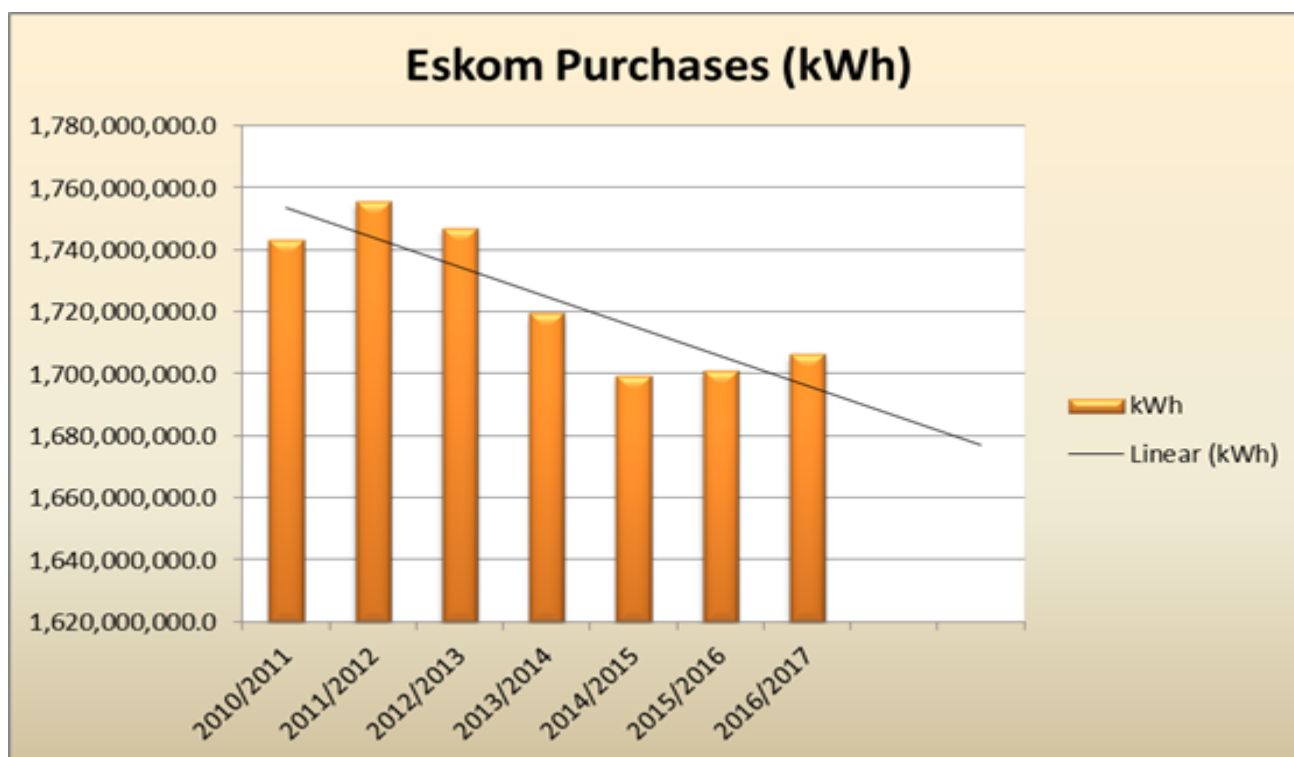
Financial Year	Tariff increase
2010/2011	28.99%
2011/2012	26.53%
2012/2013	6.12%
2013/2014	4.54%
2014/2015	7.32%
2015/2016	12.50%
2016/2017	5.46%

6.2 Eskom purchases kWh

Table 4: Eskom purchases kWh

Financial Year	kWh	% Increase/Decrease
2010/2011	1,743,354,878.1	-0.06%
2011/2012	1,755,764,818.0	-0.71%
2012/2013	1,747,214,023.8	-0.49%
2013/2014	1,719,643,005.0	-1.58%
2014/2015	1,699,636,958.0	-1.16%
2015/2016	1,701,381,513.8	0.10%
2016/2017	1,706,562,254.1	0.19%

6.3 Eskom Purchases (Kwh)

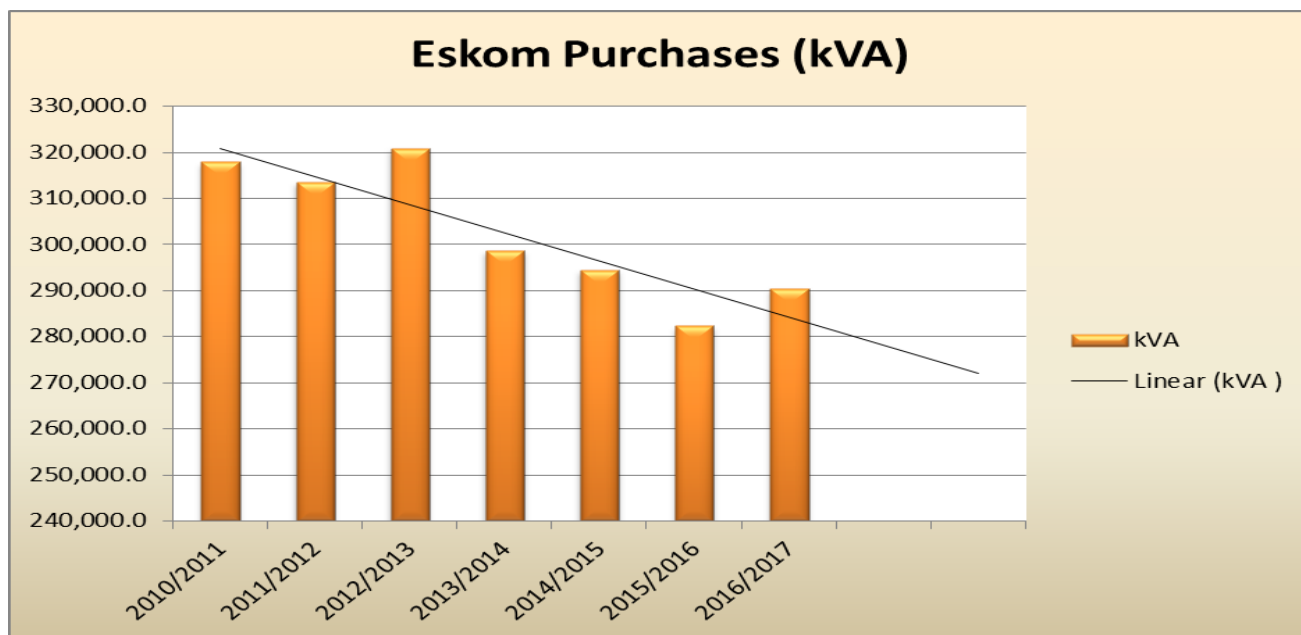


6.4 Eskom purchases KVA Bloemfontein

Table 4: Eskom purchases kVA Bloemfontein

Financial Year	Max kVA	% Increase/Decrease
2010/2011	317,874.5	-1.99%
2011/2012	313,497.0	-1.38%
2012/2013	320,818.2	2.34%
2013/2014	298,603.2	-6.92%
2014/2015	294,358.6	-1.42%
2015/2016	282,254.7	-4.11%
2016/2017	290,417.1	2.89%

6.5 Eskom Purchases



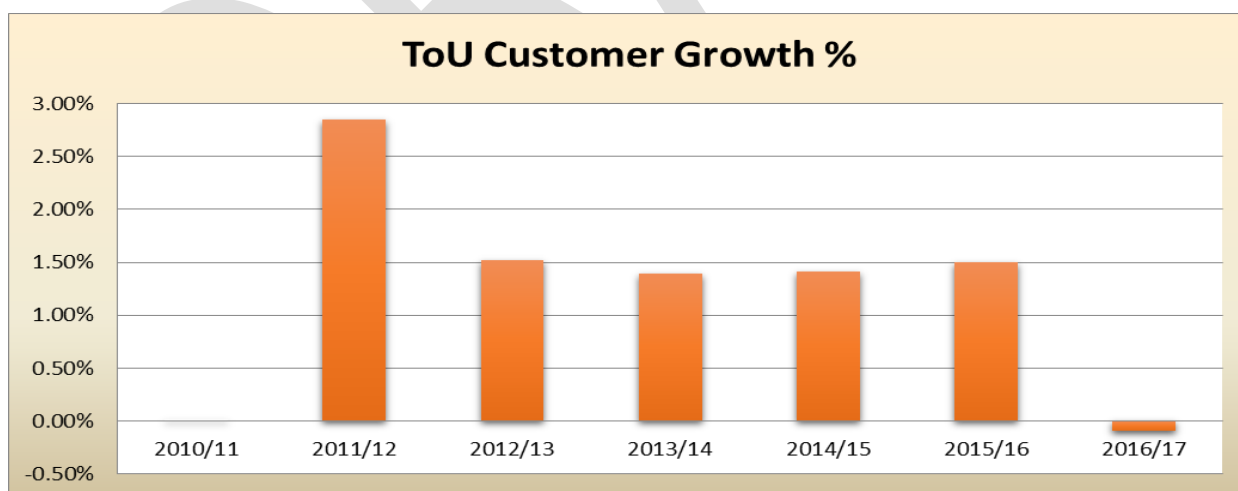
Graph 9: Eskom purchases kVA

Table 5: ToU kWh consumption

CENTLEC (SOC) LTD DRAFT ENERGY PLAN (2022-2023)

ToU kWh																
		2009/10	2010/11		2011/12		2012/13		2013/14		2014/15		2015/16		2016/17	
Category	Sub Category	Total kWh	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase
Agricultural	Farm	1,871,324.92	1,871,324.92	0.00%	1,976,037.17	5.60%	2,130,490.20	7.82%	1,966,934.41	-7.68%	2,549,316.92	29.61%	3,601,495.82	41.27%	2,790,671.89	-22.51%
Agricultural	Livestock Farming	3,204,028.96	3,204,028.96	0.00%	3,482,208.19	8.68%	2,630,793.63	-24.45%	2,677,909.06	1.79%	2,882,595.79	7.64%	2,342,832.67	-18.72%	2,905,442.73	24.01%
Commerce	Business Service	2,653,109.80	2,653,109.80	0.00%	2,800,423.51	5.55%	4,427,479.58	58.10%	6,805,963.38	53.72%	7,317,770.13	7.52%	6,264,182.53	-14.40%	14,364,955.24	129.32%
Commerce	Financial Service	-	-	0.00%	620.09	100.00%	86,990.22	13928.57%	97,929.76	12.58%	99,528.68	1.63%	95,975.78	-3.57%	441,419.40	359.93%
Commerce	Retail	578,014.58	578,014.58	0.00%	700,162.94	21.13%	1,334,584.54	90.61%	1,327,893.02	-0.50%	1,783,097.63	34.28%	2,008,169.68	12.62%	4,498,156.62	123.99%
Commerce	Wholesale	600,932.05	600,932.05	0.00%	658,913.43	9.65%	404,461.73	-38.62%	69,076.17	-82.92%	54,287.72	-21.41%	47,192.11	-13.07%	632,004.01	1239.22%
Industrial	Business Service	277,929,236.12	277,929,236.12	0.00%	281,127,926.92	1.15%	281,604,180.98	0.17%	282,000,989.06	0.14%	278,294,187.66	-1.31%	292,414,728.18	5.07%	286,619,478.06	-1.98%
Industrial	Financial Service	13,844,340.06	13,844,340.06	0.00%	13,043,225.31	-5.79%	12,595,670.65	-3.43%	12,684,082.37	0.70%	12,038,407.01	-5.09%	13,484,424.97	12.01%	13,494,450.71	0.07%
Industrial	Manufacturing of Goods	17,983,347.30	17,983,347.30	0.00%	20,810,203.14	15.72%	21,015,527.26	0.99%	20,860,890.69	-0.74%	19,020,802.95	-8.82%	15,347,298.54	-19.31%	14,959,654.84	-2.53%
Industrial	Production of Goods	31,154,653.08	31,154,653.08	0.00%	32,887,051.20	5.56%	33,448,712.20	1.71%	36,703,482.48	9.73%	40,194,208.29	9.51%	44,702,072.99	11.22%	45,824,116.66	2.51%
Industrial	Public Transport	32,531,275.76	32,531,275.76	0.00%	35,688,434.20	9.56%	39,743,832.46	11.36%	37,110,718.00	-6.63%	35,473,047.01	-4.41%	29,612,716.96	-16.52%	23,254,974.44	-21.47%
Industrial	Retail	46,973,309.82	46,973,309.82	0.00%	48,666,486.74	3.60%	53,462,572.87	9.86%	52,446,579.44	-1.90%	52,541,105.20	0.18%	55,533,716.88	5.70%	55,113,944.55	-0.76%
Industrial	Wholesale	11,042,126.89	11,042,126.89	0.00%	11,242,499.88	1.81%	11,246,211.09	0.03%	10,729,749.46	-4.59%	11,345,245.70	5.74%	11,565,543.33	1.94%	10,838,273.71	-6.29%
Public Service	Child Welfare	952,683.28	952,683.28	0.00%	910,445.92	-4.43%	884,135.39	-2.89%	813,760.19	-7.96%	770,731.34	-5.29%	767,906.05	-0.37%	709,160.70	-7.65%
Public Service	Church	1,045,441.24	1,045,441.24	0.00%	1,112,522.47	6.42%	1,188,489.52	6.83%	1,229,043.57	3.41%	1,359,105.10	10.58%	1,310,286.88	-3.59%	1,284,938.93	-1.93%
Public Service	Correctional Service	12,876,424.80	12,876,424.80	0.00%	15,487,328.05	20.28%	13,875,196.32	-10.41%	13,090,980.94	-5.65%	12,615,984.40	-3.63%	12,436,130.16	-1.43%	11,851,311.73	-4.70%
Public Service	Departmental	34,445,582.03	34,445,582.03	0.00%	38,436,037.50	11.58%	36,430,641.05	-5.22%	37,251,863.11	2.25%	39,804,735.90	6.85%	40,580,631.75	1.95%	39,946,559.71	-1.56%
Public Service	Fire Department	-	-	0.00%	-	0.00%	36,455.01	100.00%	62,943.46	72.66%	47,900.55	-23.90%	56,257.96	17.45%	139,752.15	148.41%
Public Service	Hospital	66,781,371.85	66,781,371.85	0.00%	66,279,559.97	-0.75%	66,701,406.63	0.64%	65,888,048.15	-1.22%	64,133,272.25	-2.66%	64,080,556.68	-0.08%	60,175,271.27	-6.09%
Public Service	Military	10,478,550.09	10,478,550.09	0.00%	18,742,817.03	78.87%	17,474,624.51	-6.77%	16,187,992.83	-7.36%	17,170,064.10	6.07%	15,746,084.87	-8.29%	15,594,444.14	-0.96%
Public Service	Police Station	2,730,598.58	2,730,598.58	0.00%	3,581,427.06	31.16%	3,620,523.05	1.09%	3,599,318.75	-0.59%	3,481,145.23	-3.28%	3,412,484.17	-1.97%	3,116,063.52	-8.69%
Public Service	Postal Service	1,172,444.02	1,172,444.02	0.00%	1,311,493.24	11.86%	1,221,358.71	-6.87%	1,204,289.31	-1.40%	1,106,772.28	-8.10%	955,883.85	-13.63%	860,130.04	-10.02%
Public Service	School	13,008,997.90	13,008,997.90	0.00%	13,474,277.26	3.58%	13,443,630.39	-0.23%	12,772,839.42	-4.99%	12,246,869.00	-4.12%	12,924,882.27	5.54%	12,443,157.48	-3.73%
Public Service	Sport & Recreation	2,534,787.36	2,534,787.36	0.00%	2,884,483.44	13.80%	2,879,169.91	-0.18%	5,291,912.69	83.80%	6,675,751.86	26.15%	6,640,930.27	-0.52%	7,082,130.84	6.64%
Public Service	Tertiary Education	57,419,004.24	57,419,004.24	0.00%	60,593,810.02	5.53%	61,559,839.13	1.59%	61,615,759.99	0.09%	60,737,185.59	-1.43%	62,326,918.53	2.62%	59,166,027.28	-5.07%
Public Service	Water & Sanitation	23,457,442.72	23,457,442.72	0.00%	21,108,486.13	-10.01%	23,194,924.23	9.88%	25,463,099.91	9.67%	23,026,011.18	-9.57%	16,963,415.33	-26.33%	17,208,692.25	1.45%
Residential	Apartments	6,313,094.32	6,313,094.32	0.00%	6,943,694.64	9.99%	8,065,191.66	16.15%	7,688,497.46	-4.78%	7,988,011.06	3.90%	9,104,201.64	13.97%	9,035,698.81	-0.75%
Residential	Stand-Alone House	433,449.03	433,449.03	0.00%	441,606.63	1.88%	495,084.45	12.11%	515,712.62	4.17%	474,658.10	-7.96%	447,982.95	-5.62%	1,288,143.10	187.54%
Residential	Townhouse Complex	49,407,426.32	49,407,426.32	0.00%	53,422,832.57	8.13%	54,215,292.26	1.48%	56,412,243.07	4.05%	58,019,989.40	2.85%	61,026,023.58	5.18%	58,288,849.52	-4.49%
Transport	Airport	2,601,771.62	2,601,771.62	0.00%	2,427,750.00	-6.69%	2,614,502.83	7.69%	2,524,076.37	-3.46%	2,545,441.31	0.85%	2,679,706.73	5.27%	2,750,599.61	2.65%
Transport	Public Transport	1,320,416.74	1,320,416.74	0.00%	1,778,145.45	34.67%	1,907,338.42	7.27%	1,773,107.20	-7.04%	1,712,145.19	-3.44%	1,699,970.47	-0.71%	1,422,437.07	-16.33%
		727,345,185.46	727,345,185.46	0.00%	762,020,910.11	4.77%	773,939,310.85	1.56%	778,867,686.34	0.64%	777,509,374.57	-0.17%	790,180,604.55	1.63%	778,101,311.01	-1.53%

6.3 Tou customer kwh growth %

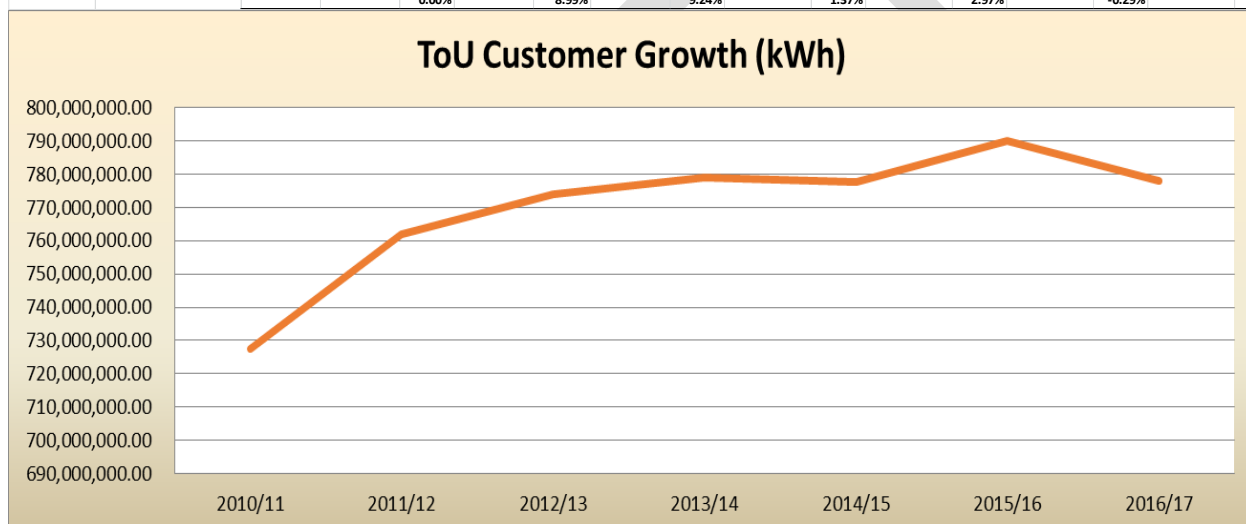


Graph 11: ToU Customer kWh Growth %

6.4 ToU Customer kWh Growth

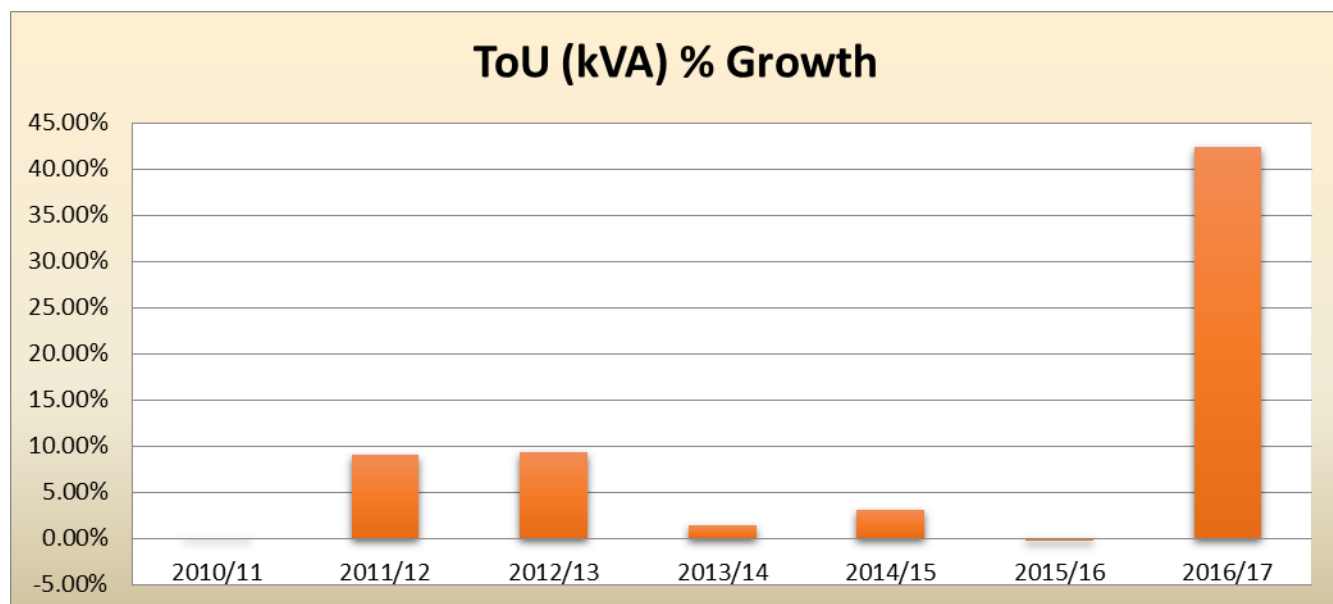
CENTLEC (SOC) LTD DRAFT ENERGY PLAN (2022-2023)

ToU Customers (kVA)		2009/10		2010/11		2011/12		2012/13		2013/14		2014/15		2015/16		2016/17	
Category	Sub Category	Total kVA		Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase
Agricultural	Farm	6,311.77		6,311.77	0.00%	7,487.12	18.62%	8,628.21	15.24%	8,748.49	1.39%	9,807.57	12.11%	13,593.47	38.60%	11,433.99	-15.89%
Agricultural	Livestock Farming	8,664.35		8,664.35	0.00%	9,146.64	5.57%	9,304.48	1.73%	7,486.85	-19.53%	7,789.26	4.04%	7,367.06	-5.42%	7,693.97	4.44%
Commerce	Business Service	13,284.36		13,284.36	0.00%	13,331.47	0.35%	18,355.68	37.69%	26,868.30	46.38%	27,994.21	4.19%	23,539.76	-15.91%	61,565.91	161.54%
Commerce	Financial Service	-		-	0.00%	22.89	100.00%	369.71	0.00%	425.67	0.00%	427.64	0.00%	419.93	0.00%	1,870.13	345.35%
Commerce	Retail	1,849.70		1,849.70	0.00%	2,315.46	25.18%	4,538.46	96.01%	4,612.64	1.63%	6,699.44	45.24%	7,221.21	7.79%	16,886.73	133.85%
Commerce	Wholesale	2,951.10		2,951.10	0.00%	2,946.14	-0.17%	1,907.25	-35.26%	957.92	-49.77%	976.54	1.94%	838.50	-14.14%	3,573.03	326.12%
Industrial	Business Service	789,372.91		789,372.91	0.00%	798,842.87	1.20%	798,153.13	-0.09%	800,081.58	0.24%	805,688.76	0.70%	848,019.81	5.25%	835,839.28	-1.44%
Industrial	Financial Service	46,415.53		46,415.53	0.00%	44,334.19	-4.48%	42,220.70	-4.77%	41,019.62	-2.84%	39,573.20	-3.53%	43,458.43	9.82%	41,792.07	-3.83%
Industrial	Manufacturing of Goods	55,117.73		55,117.73	0.00%	64,786.13	17.54%	66,174.66	2.14%	66,550.96	0.57%	64,169.47	-3.58%	51,642.48	-19.52%	49,731.79	-3.70%
Industrial	Production of Goods	111,471.41		111,471.41	0.00%	112,049.71	0.52%	113,600.05	1.38%	119,443.58	5.14%	128,614.94	7.68%	136,221.15	5.91%	143,642.63	5.45%
Industrial	Public Transport	112,779.82		112,779.82	0.00%	123,615.29	9.61%	127,975.33	3.53%	124,757.09	-2.51%	123,742.49	-0.81%	105,218.45	-14.97%	96,225.56	-8.55%
Industrial	Retail	131,795.31		131,795.31	0.00%	136,541.28	3.60%	150,286.04	10.07%	147,337.89	-1.96%	149,858.76	1.71%	155,733.88	3.92%	153,938.62	-1.15%
Industrial	Wholesale	32,326.89		32,326.89	0.00%	33,836.85	4.67%	33,737.00	-0.30%	31,749.46	-5.89%	33,312.41	4.92%	32,775.34	-1.61%	32,147.85	-1.91%
Public Service	Child Welfare	3,235.48		3,235.48	0.00%	3,040.00	-6.04%	2,946.91	-3.06%	2,891.02	-1.90%	2,768.93	-4.22%	2,588.27	-6.52%	2,255.14	-12.87%
Public Service	Church	5,127.97		5,127.97	0.00%	5,638.77	9.96%	5,690.76	0.92%	6,237.28	9.60%	6,287.15	0.80%	5,923.94	-5.78%	6,513.66	9.95%
Public Service	Correctional Service	36,583.52		36,583.52	0.00%	39,338.74	7.53%	33,630.11	-14.51%	32,142.26	-4.42%	32,577.18	1.35%	31,160.80	-4.35%	30,102.18	-3.40%
Public Service	Departmental	112,965.50		112,965.50	0.00%	123,077.63	8.95%	119,532.10	-2.88%	121,373.02	1.54%	124,857.61	2.87%	128,501.75	2.92%	122,698.57	-4.52%
Public Service	Fire Department	-		-	0.00%	-	0.00%	96.21	100.00%	161.94	0.00%	133.19	0.00%	197.33	0.00%	628.73	218.62%
Public Service	Hospital	150,540.81		150,540.81	0.00%	148,334.85	-1.47%	148,256.73	-0.05%	148,472.29	0.15%	145,660.12	-1.89%	145,849.28	0.13%	137,758.83	-5.55%
Public Service	Military	25,421.68		25,421.68	0.00%	40,023.79	57.44%	38,889.12	-2.83%	36,749.23	-5.50%	37,690.91	2.56%	36,630.50	-2.81%	34,396.51	-6.10%
Public Service	Police Station	8,201.67		8,201.67	0.00%	10,069.51	22.77%	10,209.58	1.39%	9,872.78	-3.30%	9,987.05	1.16%	9,805.33	-1.82%	9,079.82	-7.40%
Public Service	Postal Service	3,894.62		3,894.62	0.00%	4,190.94	7.61%	4,113.72	-1.84%	4,278.45	4.00%	4,253.29	-0.59%	3,645.54	-14.29%	3,088.11	-15.29%
Public Service	School	44,930.88		44,930.88	0.00%	47,816.52	6.42%	50,314.54	5.22%	49,901.21	-0.82%	48,718.70	-2.37%	52,604.72	7.98%	54,137.46	2.91%
Public Service	Sport & Recreation	20,024.41		20,024.41	0.00%	17,764.66	-11.28%	20,705.49	16.55%	31,490.34	52.09%	32,574.81	3.44%	41,306.10	26.80%	38,681.39	-6.35%
Public Service	Tertiary Education	138,795.28		138,795.28	0.00%	151,553.65	9.19%	149,508.77	-1.35%	150,508.69	0.67%	148,072.32	-1.62%	151,424.74	2.26%	145,773.15	-3.73%
Public Service	Water & Sanitation	60,390.37		60,390.37	0.00%	49,698.79	-17.70%	56,652.70	13.99%	65,098.41	14.91%	68,389.28	5.06%	55,368.31	-19.04%	51,820.67	-6.41%
Residential	Apartments	23,031.86		23,031.86	0.00%	22,592.04	-1.91%	26,348.46	16.63%	25,488.80	-3.26%	26,223.36	2.88%	28,993.40	10.56%	29,473.89	1.66%
Residential	Stand-Alone House	1,879.93		1,879.93	0.00%	1,827.50	-2.79%	2,084.84	14.08%	2,203.52	5.69%	2,229.45	1.18%	2,047.40	-8.17%	6,764.28	230.38%
Residential	Townhouse Complex	162,384.45		162,384.45	0.00%	155,354.41	-4.33%	157,722.09	1.52%	166,255.45	5.41%	175,614.56	5.63%	176,558.40	0.54%	168,003.84	-4.85%
Transport	Airport	5,216.02		5,216.02	0.00%	4,959.39	-4.92%	5,343.57	7.75%	5,324.35	-0.36%	5,252.59	-1.35%	5,547.58	5.62%	5,544.06	-0.06%
Transport	Public Transport	5,415.29		5,415.29	0.00%	6,333.08	16.95%	6,809.15	7.52%	6,471.97	-4.95%	6,642.52	2.64%	6,462.53	-2.71%	5,495.26	-14.97%
					0.00%		8.99%		9.24%		1.37%		2.97%		-0.29%		42.33%



Graph 12: ToU Customer kWh Growth

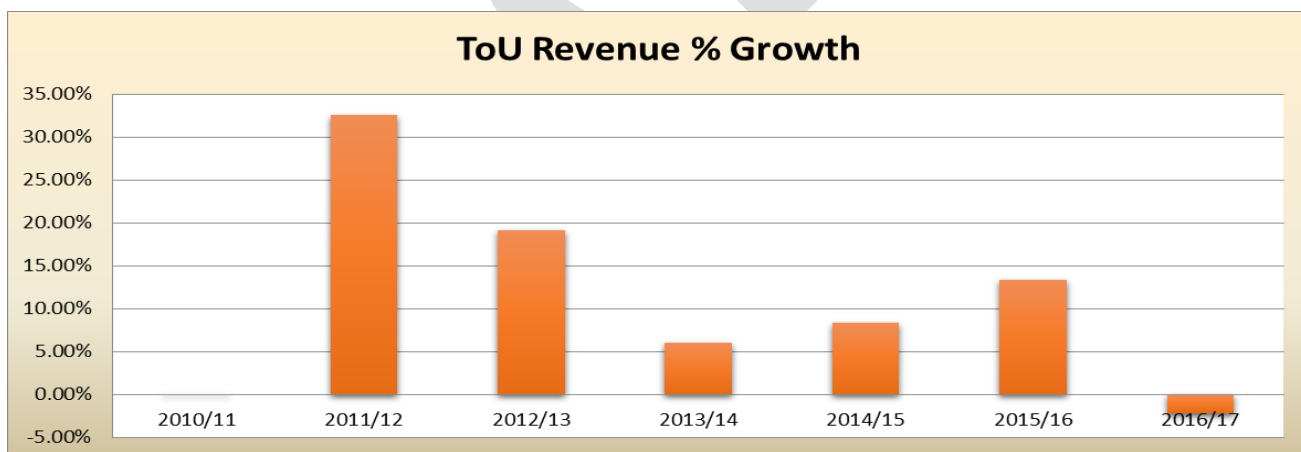
6.5 ToU (KVA) percentage growth



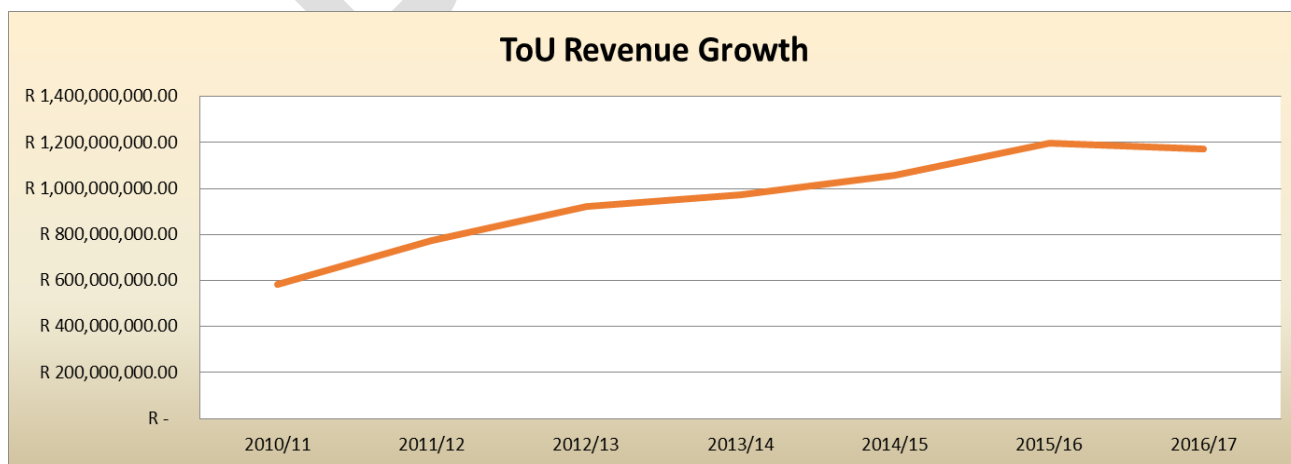
CENTLEC (SOC) LTD DRAFT ENERGY PLAN (2022-2023)

ToU Customer Revenue		2009/10		2010/11		2011/12		2012/13		2013/14		2014/15		2015/16		2016/17	
Category	Sub Category	Total Revenue	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	
Agricultural	Farm	R 1,640,208.48	R 1,640,208.48	0.00%	R 2,369,421.86	44.46%	R 3,109,134.72	31.22%	R 3,149,892.75	1.31%	R 3,878,365.98	23.13%	R 5,834,222.89	50.43%	R 4,720,464.50	-19.09%	
Agricultural	Livestock Farming	R 2,390,415.48	R 2,390,415.48	0.00%	R 3,255,673.17	36.20%	R 3,370,599.04	3.53%	R 3,418,639.66	1.43%	R 3,881,100.12	13.53%	R 3,745,487.63	-3.41%	R 4,124,611.93	10.12%	
Commerce	Business Service	R 2,950,408.59	R 2,950,408.59	0.00%	R 4,086,378.15	38.50%	R 6,156,460.18	50.66%	R 9,085,966.63	47.58%	R 10,415,935.33	14.54%	R 9,467,289.05	-9.19%	R 22,452,511.92	137.16%	
Commerce	Financial Service	R -	R -	0.00%	R 1,265.04	100.00%	R 101,239.38	7902.85%	R 124,153.94	22.63%	R 137,612.03	10.84%	R 150,423.13	9.31%	R 684,756.64	355.22%	
Commerce	Retail	R 532,685.15	R 532,685.15	0.00%	R 854,453.48	60.40%	R 1,650,679.40	93.19%	R 1,818,646.53	10.18%	R 2,612,750.19	43.66%	R 3,044,100.91	16.51%	R 6,884,678.83	126.49%	
Commerce	Wholesale	R 644,668.31	R 644,668.31	0.00%	R 858,796.44	33.22%	R 709,335.91	-17.40%	R 269,255.55	-62.04%	R 236,815.54	-12.05%	R 82,232.20	-65.28%	R 1,005,703.67	1123.00%	
Industrial	Business Service	R 220,825,449.33	R 220,825,449.33	0.00%	R 283,216,213.16	28.25%	R 334,253,502.65	18.02%	R 358,405,072.00	7.23%	R 384,032,786.89	7.15%	R 451,333,867.12	17.52%	R 438,494,404.86	-2.84%	
Industrial	Financial Service	R 12,179,559.55	R 12,179,559.55	0.00%	R 14,740,440.42	21.03%	R 16,823,548.82	14.13%	R 17,695,289.48	5.18%	R 18,215,832.04	2.94%	R 22,103,843.66	21.34%	R 21,584,374.34	-2.35%	
Industrial	Manufacturing of Goods	R 14,579,901.13	R 14,579,901.13	0.00%	R 21,253,974.97	45.78%	R 25,607,325.15	20.48%	R 27,575,818.66	7.69%	R 27,676,465.24	0.36%	R 25,709,702.64	-6.99%	R 23,803,143.32	-7.60%	
Industrial	Production of Goods	R 26,281,758.46	R 26,281,758.46	0.00%	R 34,362,182.24	30.75%	R 41,390,080.75	20.45%	R 48,103,289.89	16.22%	R 55,946,868.65	16.31%	R 68,522,810.64	22.88%	R 69,581,496.05	1.55%	
Industrial	Public Transport	R 26,260,544.63	R 26,260,544.63	0.00%	R 36,344,288.03	38.40%	R 44,661,372.75	22.88%	R 46,628,921.46	4.41%	R 49,328,912.14	5.79%	R 47,902,279.46	-2.89%	R 38,610,507.48	-19.40%	
Industrial	Retail	R 37,359,163.06	R 37,359,163.06	0.00%	R 49,222,433.76	31.75%	R 63,967,328.78	29.96%	R 67,678,223.92	5.80%	R 72,741,432.60	7.48%	R 84,940,712.42	16.77%	R 82,756,445.94	-2.57%	
Industrial	Wholesale	R 9,339,987.12	R 9,339,987.12	0.00%	R 12,133,344.42	29.91%	R 14,764,611.41	21.69%	R 14,755,074.81	-0.06%	R 16,383,678.13	11.04%	R 18,081,860.39	10.37%	R 17,011,501.11	-5.92%	
Public Service	Child Welfare	R 890,617.54	R 890,617.54	0.00%	R 1,067,423.34	19.85%	R 1,137,038.58	6.52%	R 841,685.50	-25.98%	R 968,850.36	15.11%	R 1,035,012.06	6.83%	R 993,507.87	-4.01%	
Public Service	Church	R 1,161,080.51	R 1,161,080.51	0.00%	R 1,629,383.54	40.33%	R 1,748,063.05	7.28%	R 1,477,064.32	-15.50%	R 1,828,754.17	23.81%	R 1,933,810.91	5.74%	R 1,995,805.07	3.21%	
Public Service	Correctional Service	R 9,497,076.63	R 9,497,076.63	0.00%	R 14,332,251.94	50.91%	R 15,890,003.93	10.87%	R 16,205,843.81	1.99%	R 16,977,619.52	4.76%	R 18,784,879.03	10.64%	R 17,704,866.65	-5.71%	
Public Service	Departmental	R 30,418,973.12	R 30,418,973.12	0.00%	R 42,624,494.33	40.12%	R 48,944,224.41	14.83%	R 60,186,770.72	22.97%	R 59,331,450.42	-1.42%	R 67,065,536.64	13.04%	R 64,979,319.94	-3.15%	
Public Service	Fire Department	R -	R -	0.00%	R -	0.00%	R 49,222.96	100.00%	R 94,147.39	91.27%	R 85,528.02	-9.16%	R 104,231.32	11.87%	R 236,779.21	127.17%	
Public Service	Hospital	R 47,649,234.80	R 47,649,234.80	0.00%	R 60,051,729.29	26.03%	R 72,516,881.88	20.76%	R 77,502,116.33	6.87%	R 82,765,103.15	6.79%	R 92,565,268.78	11.84%	R 85,536,148.25	-7.59%	
Public Service	Military	R 7,123,761.41	R 7,123,761.41	0.00%	R 16,725,176.54	134.78%	R 18,314,900.87	9.50%	R 18,371,090.15	0.31%	R 21,096,527.66	14.84%	R 22,542,762.95	6.86%	R 21,697,441.53	-3.75%	
Public Service	Police Station	R 2,508,238.86	R 2,508,238.86	0.00%	R 4,037,674.57	60.98%	R 4,968,914.15	23.06%	R 5,103,036.14	2.70%	R 5,732,761.42	4.29%	R 5,774,889.85	7.48%	R 5,299,658.27	-8.51%	
Public Service	Postal Service	R 1,019,544.68	R 1,019,544.68	0.00%	R 1,457,959.85	43.00%	R 1,647,931.50	13.03%	R 1,744,820.30	5.88%	R 1,827,403.69	4.73%	R 1,727,582.74	-5.46%	R 1,494,196.72	-13.51%	
Public Service	School	R 12,116,247.70	R 12,116,247.70	0.00%	R 16,159,939.22	33.37%	R 17,830,040.89	10.33%	R 13,702,578.93	-23.15%	R 15,618,422.08	13.98%	R 18,068,492.42	15.69%	R 18,277,939.57	1.16%	
Public Service	Sport & Recreation	R 3,318,442.76	R 3,318,442.76	0.00%	R 4,322,252.90	30.25%	R 3,892,079.25	-9.95%	R 7,099,463.74	82.41%	R 9,973,597.49	40.48%	R 11,097,602.72	11.27%	R 8,119,434.03	-26.84%	
Public Service	Tertiary Education	R 41,357,955.27	R 41,357,955.27	0.00%	R 55,954,586.76	35.29%	R 67,038,657.48	19.81%	R 71,923,501.76	7.29%	R 77,190,709.31	7.32%	R 89,235,794.59	15.60%	R 84,844,429.24	-4.92%	
Public Service	Water & Sanitation	R 16,660,943.20	R 16,660,943.20	0.00%	R 18,985,721.09	13.95%	R 25,464,894.16	34.13%	R 30,812,718.32	21.00%	R 31,296,324.82	1.58%	R 27,436,754.58	-12.34%	R 26,436,292.09	-3.65%	
Residential	Apartments	R 6,099,102.62	R 6,099,102.62	0.00%	R 8,296,140.47	36.02%	R 10,545,705.35	27.12%	R 8,272,686.80	-21.55%	R 10,001,279.67	20.90%	R 12,853,347.47	27.37%	R 12,853,347.47	0.00%	
Residential	Stand-Alone House	R 513,379.58	R 513,379.58	0.00%	R 649,164.27	26.45%	R 716,369.99	10.35%	R 638,763.15	-10.83%	R 677,463.40	6.06%	R 689,527.11	1.78%	R 2,067,370.21	199.82%	
Residential	Townhouse Complex	R 44,407,185.28	R 44,407,185.28	0.00%	R 59,226,392.65	33.37%	R 67,412,618.11	13.82%	R 56,463,218.03	-16.24%	R 69,840,251.68	23.69%	R 79,522,431.21	13.86%	R 79,672,490.07	0.20%	
Transport	Airport	R 1,867,992.91	R 1,867,992.91	0.00%	R 2,201,466.19	17.85%	R 2,727,252.56	23.88%	R 2,944,280.05	7.96%	R 3,136,384.19	6.52%	R 3,759,220.93	19.86%	R 3,768,053.81	0.23%	
Transport	Public Transport	R 1,384,150.06	R 1,384,150.06	0.00%	R 2,252,553.58	62.74%	R 2,791,937.18	23.95%	R 2,766,046.61	-0.93%	R 2,926,409.29	5.91%	R 3,156,778.94	7.76%	R 2,670,387.52	-15.36%	
R 582,978,676.23		R 582,978,676.23	0.00%	R 772,673,175.69	32.54%	R 920,201,955.22	19.09%	R 974,858,077.35	5.94%	R 1,056,407,631.77	8.37%	R 1,197,808,113.24	13.39%	R 1,197,808,113.24	0.00%		

6.6 ToU Revenue growth in percentage



6.7 ToU revenue growth



6.8 ToU Top 20 customers (Kwh)

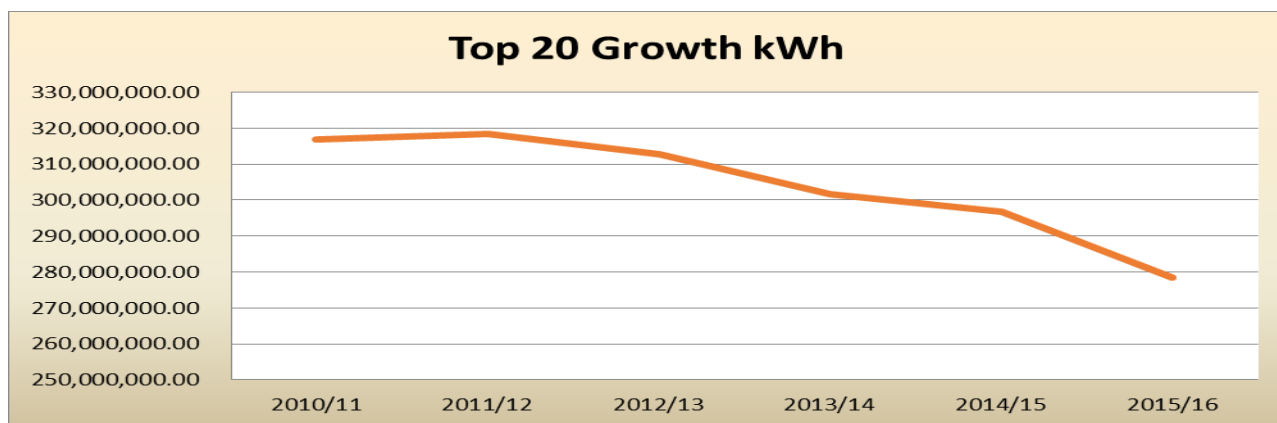
Top 20 Customers													
	2010/11	2011/12		2012/13		2013/14		2014/15		2015/16		2016/17	
Customer	Total kWh	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase	Total kWh	Increase
UOVS	45,246,439.97	47,300,481.98	4.54%	47,109,856.28	-0.40%	47,495,905.32	0.82%	47,428,198.63	-0.14%	48,688,532.15	2.66%	45,059,469.70	-7.45%
FDC 11 KV Feeder	36,076,296.94	36,204,442.63	0.36%	39,891,808.29	10.18%	39,420,506.90	-1.18%	38,740,444.77	-1.73%	42,974,872.32	10.93%	42,424,491.20	-1.28%
Loco Estoire (Spoornet)	32,396,644.80	35,528,648.41	9.67%	39,528,825.64	11.26%	36,937,714.80	-6.55%	35,313,427.20	-4.40%	29,437,582.80	-16.64%	23,084,023.20	-21.58%
Loch Logan Waterfront	29,052,080.63	28,989,399.85	-0.22%	26,729,741.25	-7.79%	26,861,842.55	0.49%	26,369,322.24	-1.83%	25,725,423.84	-2.44%	24,507,913.94	-4.73%
Universitas Hospital	19,220,122.50	19,011,838.73	-1.08%	18,751,660.51	-1.37%	17,030,117.43	-9.18%	15,539,676.46	-8.75%	14,881,916.52	-4.23%	13,897,371.00	-6.62%
Maselspoort Waterwerke en Dam	16,675,383.04	13,279,969.53	-20.36%	13,836,976.13	4.19%	14,100,748.04	1.91%	10,332,806.91	-26.72%	4,968,609.79	-51.91%	5,210,121.73	4.86%
Mimosa Mall	14,159,437.76	14,465,810.88	2.16%	14,808,571.52	2.37%	14,999,276.16	1.29%	14,092,599.57	-6.04%	14,050,183.04	-0.30%	13,333,022.08	-5.10%
Tempe Militêr Voere	10,472,124.49	18,742,817.03	78.98%	17,474,596.03	-6.77%	16,187,992.83	-7.36%	17,170,064.10	6.07%	15,746,084.87	-8.29%	15,594,444.14	-0.96%
Medi Clinic Hospital	10,414,730.82	10,338,503.05	-0.73%	10,409,477.15	0.69%	9,518,372.16	-8.56%	9,333,489.16	-1.94%	9,759,517.55	4.56%	9,181,628.63	-5.92%
Pelononi Hospital	10,298,708.80	10,163,040.02	-1.32%	10,547,680.58	3.78%	10,802,540.82	2.42%	10,491,818.43	-2.88%	11,146,776.28	6.24%	10,520,943.28	-5.61%
Woodland Hills Estate	9,949,956.73	10,585,832.62	6.39%	10,918,915.36	3.15%	11,346,515.97	3.92%	11,844,536.82	4.39%	14,591,393.12	23.19%	14,334,072.21	-1.76%
FVB Centre - Sanlam Plaza	9,585,510.40	9,559,909.14	-0.27%	6,983,413.90	-26.95%	8,696,270.40	24.53%	7,617,934.41	-12.40%	8,079,537.28	6.06%	7,519,173.76	-6.94%
Technikon OVS (CUT)	9,217,831.37	9,565,572.79	3.77%	10,396,237.92	8.68%	10,217,981.66	-1.71%	9,524,070.22	-6.79%	9,884,576.89	3.79%	9,895,456.49	0.11%
Pick & Pay - Fichardt Park	8,183,676.60	6,974,005.10	-14.78%	7,280,690.64	4.40%	6,911,288.50	-5.07%	6,740,126.36	-2.48%	6,850,774.80	1.64%	6,662,815.60	-2.74%
Oranje Hospital Merged	7,997,111.07	7,742,949.35	-3.18%	7,644,821.27	-1.27%	7,695,887.07	0.67%	7,267,087.43	-5.57%	6,588,900.49	-9.33%	5,975,873.40	-9.30%
Rosepark Hospital	7,594,630.08	7,565,261.18	-0.39%	7,386,196.51	-2.37%	7,070,295.54	-4.28%	7,167,310.92	1.37%	7,142,598.24	-0.34%	6,868,847.56	-3.83%
Grootvlei Prison - Dewetsdorp rd	7,592,862.88	8,375,138.77	10.30%	6,189,656.96	-26.09%	5,754,322.86	-7.03%	5,799,986.16	0.79%	5,927,126.64	2.19%	5,990,966.05	1.08%
National Hospital	7,396,777.26	7,485,365.83	1.20%	7,534,503.68	0.66%	7,056,612.12	-6.34%	6,418,198.04	-9.05%	6,084,060.16	-5.21%	5,616,757.44	-7.68%
Shoprite Checkers - Vereeniging	7,016,526.06	8,065,789.19	14.95%	8,357,454.79	3.62%	8,339,542.88	-0.21%	8,088,655.68	-3.01%	8,008,234.88	-0.99%	6,785,957.17	-15.26%
Middestad Centre - Elizabeth street	6,777,093.44	6,839,630.24	0.92%	6,563,868.19	-4.03%	6,331,999.68	-3.53%	6,349,996.14	0.28%	6,345,188.96	-0.08%	6,053,658.05	-4.59%
	305,323,945.65	316,784,406.33	3.75%	318,344,952.60	0.49%	312,775,733.69	-1.75%	301,629,749.66	-3.56%	296,881,890.61	-1.57%	278,517,006.63	-6.19%

Table 6: ToU Top 20 customers (Kwh)

6.9 Top 20 kWh percentage growth



Graph 13: Top 20 kWh % growth

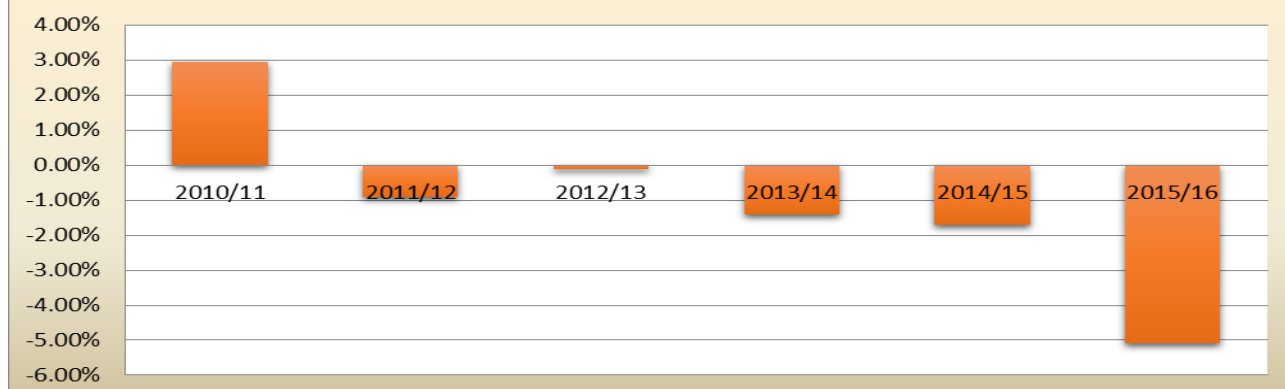


Graph 14: Top 20 kWh % growth

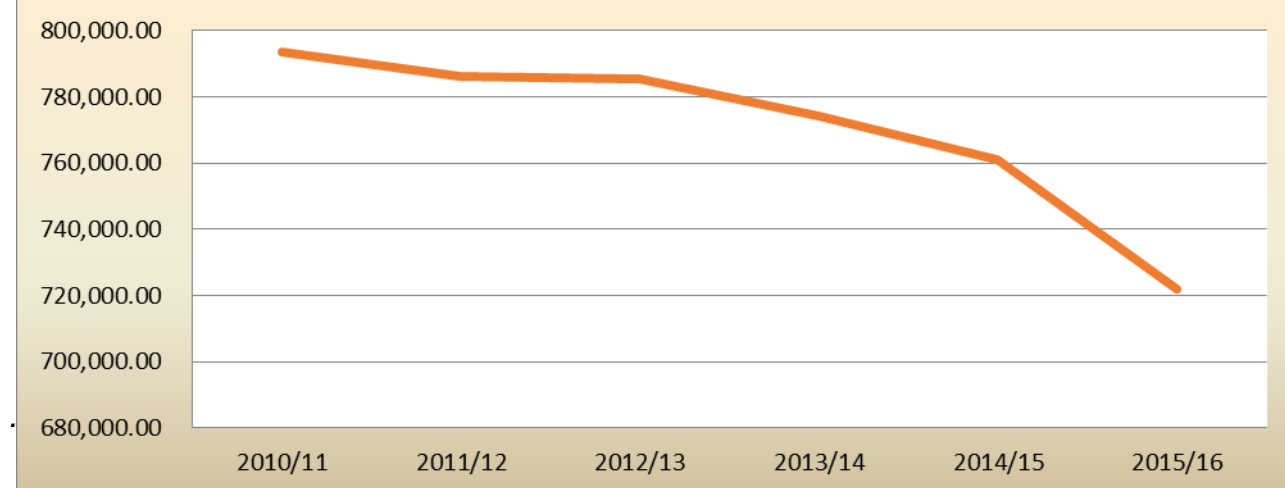
6.9 Top 20 customers KVA

Top 20 customers kVA													
	2010/11	2011/12		2012/13		2013/14		2014/15		2015/16		2016/17	
Customer	Total kVA	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase	Total kVA	Increase
UOVS	100,237.72	110,846.09	10.58%	106,771.23	-3.68%	109,133.50	2.21%	109,016.24	-0.11%	111,627.93	2.40%	105,307.75	-5.66%
FDC 11 KV Feeder	84,352.35	83,268.30	-1.29%	91,188.40	9.51%	94,412.20	3.54%	96,938.00	2.68%	110,876.00	14.38%	110,663.93	-0.19%
Loco Estoire (Spoonnet)	112,155.98	122,888.47	9.57%	127,051.38	3.39%	124,046.60	-2.37%	123,105.40	-0.76%	104,557.60	-15.07%	95,603.20	-8.56%
Loch Logan Waterfront	71,150.47	72,596.42	2.03%	67,482.62	-7.04%	66,430.10	-1.56%	66,958.20	0.79%	65,603.60	-2.02%	63,454.65	-3.28%
Universitas Hospital	38,996.71	37,658.30	-3.43%	37,011.46	-1.72%	34,557.00	-6.63%	31,950.80	-7.54%	30,991.90	-3.00%	29,893.50	-3.54%
Maselspoort Waterwerke en Dam	41,909.19	28,861.30	-31.13%	31,356.09	8.64%	34,466.80	9.92%	30,949.40	-10.21%	19,795.60	-36.04%	17,571.17	-11.24%
Mimosa Mall	35,000.84	34,581.91	-1.20%	35,298.85	2.07%	34,383.80	-2.59%	32,442.40	-5.65%	31,406.70	-3.19%	29,864.45	-4.91%
Tempe Militêr Voere	22,917.49	40,023.79	74.64%	38,841.76	-2.95%	36,749.23	-5.39%	37,690.91	2.56%	36,630.50	-2.81%	34,396.51	-6.10%
Medi Clinic Hospital	23,383.44	22,768.99	-2.63%	23,206.60	1.92%	20,310.80	-12.48%	19,814.90	-2.44%	20,744.30	4.69%	19,762.40	-4.73%
Pelonomi Hospital	19,866.99	19,340.60	-2.65%	20,124.27	4.05%	20,722.00	2.97%	21,550.40	4.00%	23,136.70	7.36%	21,766.62	-5.92%
Woodland Hills Estate	25,695.53	24,200.20	-5.82%	25,178.86	4.04%	26,200.50	4.06%	27,027.70	3.16%	31,720.90	17.36%	31,168.20	-1.74%
FVB Centre - Sanlam Plaza	28,649.35	28,207.90	-1.54%	21,211.94	-24.80%	24,717.60	16.53%	22,188.30	-10.23%	23,458.60	5.73%	21,551.72	-8.13%
Technikon OVS (CUT)	27,151.51	26,625.50	-1.94%	28,241.92	6.07%	27,178.80	-3.76%	25,716.10	-5.38%	25,968.40	0.98%	25,532.27	-1.68%
Pick & Pay - Fichardt Park	19,738.80	19,174.07	-2.86%	19,790.37	3.21%	19,309.20	-2.43%	18,769.60	-2.79%	19,183.60	2.21%	18,255.88	-4.84%
Oranje Hospital Merged	22,484.40	22,059.56	-1.89%	20,650.81	-6.39%	21,397.73	3.62%	19,482.66	-8.95%	17,972.12	-7.75%	15,699.22	-12.65%
Rosepark Hospital	15,869.18	15,933.40	0.40%	15,462.49	-2.96%	14,808.80	-4.23%	15,224.60	2.81%	15,111.00	-0.75%	14,886.20	-1.49%
Grootvlei Prison - Dewetsdorp rd	24,636.05	24,793.84	0.64%	17,971.00	-27.52%	17,010.20	-5.35%	18,059.20	6.17%	17,362.50	-3.86%	17,283.15	-0.46%
National Hospital	18,339.60	18,810.90	2.57%	18,702.40	-0.58%	17,680.20	-5.47%	15,857.90	-10.31%	14,892.10	-6.09%	13,948.99	-6.33%
Shoprite Checkers - Vereeniging	17,548.12	20,190.78	15.06%	20,168.62	-0.11%	21,287.90	5.55%	21,318.30	0.14%	20,981.60	-1.58%	18,530.87	-11.68%
Middestad Centre – Elizabeth street	20,786.20	20,645.27	-0.68%	20,514.86	-0.63%	20,524.70	0.05%	20,047.70	-2.32%	18,777.50	-6.34%	16,840.72	-10.31%
	770,869.93	793,475.60	2.93%	786,225.91	-0.91%	785,327.66	-0.11%	774,108.71	-1.43%	760,799.15	-1.72%	721,981.39	-5.10%

ToU kVA % Growth

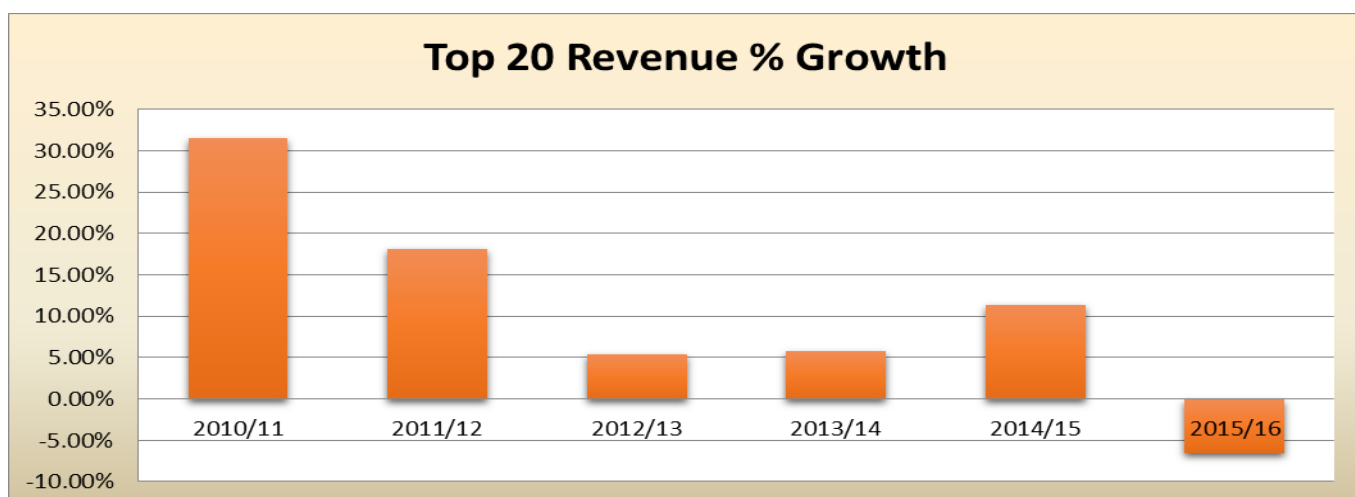


Top 20 ToU kVA Growth

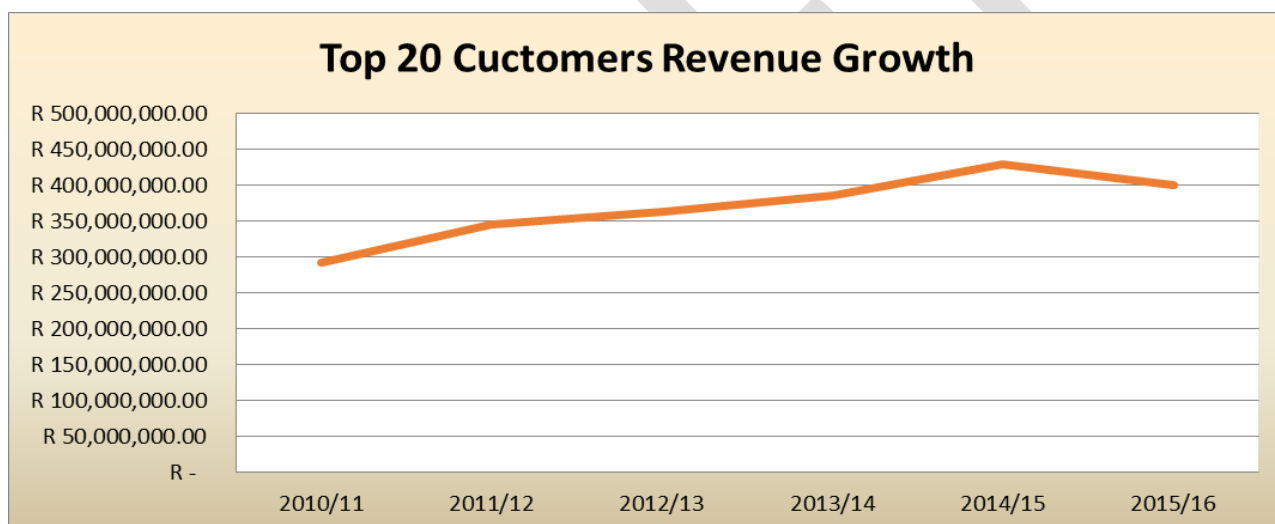


Top 20 Customers Revenue													
	2010/11		2011/12		2012/13		2013/14		2014/15		2015/16		2016/17
Customer	Total Revenue		Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue	Increase	Total Revenue
UOVS	R 31,083,459.06	R	41,990,974.81	35.09%	R 48,982,974.25	16.65%	R 53,223,140.34	8.66%	R 58,149,435.06	9.26%	R 67,565,763.19	16.19%	R 62,793,182.26
FDC 11 KV Feeder	R 26,151,826.07	R	32,640,898.04	24.81%	R 41,962,436.70	28.56%	R 43,365,178.98	3.34%	R 47,214,962.30	8.88%	R 60,899,707.14	28.98%	R 61,540,228.47
Loco Estoire (Spoonet)	R 26,047,737.00	R	36,031,679.36	38.33%	R 44,304,104.93	22.96%	R 46,315,990.63	4.54%	R 49,017,167.86	5.83%	R 47,549,998.53	-2.99%	R 38,272,922.32
Loch Logan Waterfront	R 20,927,225.32	R	26,687,116.80	27.52%	R 29,301,147.89	9.80%	R 31,719,684.50	8.25%	R 33,965,327.99	7.08%	R 37,239,523.96	9.64%	R 35,005,467.13
Universitas Hospital	R 12,892,434.25	R	16,101,802.74	24.89%	R 18,968,001.04	17.80%	R 18,970,118.75	0.01%	R 18,739,881.35	-1.21%	R 20,100,782.57	7.26%	R 18,648,420.20
Maselspoort Waterwerke en Dam	R 11,616,323.52	R	11,530,629.20	-0.74%	R 14,390,720.61	24.80%	R 16,551,442.63	15.01%	R 13,763,648.26	-16.84%	R 8,807,533.89	-36.01%	R 8,263,207.27
Mimosa Mall	R 10,354,776.55	R	13,221,350.80	27.68%	R 16,036,517.91	21.29%	R 17,518,033.84	9.24%	R 17,761,837.63	1.39%	R 19,647,309.49	10.62%	R 18,409,537.86
Tempe Militêr Voere	R 6,935,297.74	R	16,725,176.54	141.16%	R 18,307,646.72	9.46%	R 18,371,090.15	0.35%	R 21,096,527.66	14.84%	R 22,542,762.95	6.86%	R 21,697,441.53
Medi Clinic Hospital	R 7,315,477.60	R	9,152,032.66	25.11%	R 11,007,257.34	20.27%	R 10,924,708.22	-0.75%	R 11,532,415.38	5.56%	R 13,497,417.94	17.04%	R 12,528,402.85
Pelonomi Hospital	R 6,968,116.85	R	8,678,307.25	24.54%	R 10,756,890.95	23.95%	R 11,966,124.24	11.24%	R 12,955,949.14	8.27%	R 15,537,549.26	19.93%	R 14,302,487.69
Woodland Hills Estate	R 7,606,584.85	R	10,027,813.12	31.83%	R 12,308,982.12	22.75%	R 10,134,619.48	-17.66%	R 13,033,571.19	28.60%	R 17,178,306.77	31.80%	R 17,819,282.97
FVB Centre - Sanlam Plaza	R 7,510,422.70	R	9,418,441.80	25.40%	R 8,373,273.02	-11.10%	R 10,845,440.57	29.52%	R 10,286,439.93	-5.15%	R 12,142,609.90	18.04%	R 11,159,258.13
Technikon OVS (CUT)	R 7,358,533.74	R	9,437,083.44	28.25%	R 12,207,343.86	29.36%	R 12,740,472.09	4.37%	R 12,934,659.44	1.52%	R 14,926,059.40	15.40%	R 14,797,384.39
Pick & Pay - Fichardt Park	R 5,876,993.28	R	6,618,044.45	12.61%	R 8,031,337.87	21.36%	R 8,404,252.30	4.64%	R 8,813,609.12	4.87%	R 10,134,560.14	14.99%	R 9,640,623.81
Oranje Hospital Merged	R 6,587,234.13	R	8,199,221.18	24.47%	R 9,707,751.09	18.40%	R 10,511,103.95	8.28%	R 10,758,713.05	2.36%	R 11,162,123.81	3.75%	R 9,769,222.54
Rosepark Hospital	R 5,230,738.23	R	6,621,709.37	26.59%	R 7,751,673.13	17.06%	R 8,062,361.92	4.01%	R 8,832,209.05	9.55%	R 9,936,227.35	12.50%	R 9,380,821.17
Grootvlei Prison - Dewetsdorp rd	R 5,902,913.32	R	7,966,248.66	34.95%	R 7,595,858.03	-4.65%	R 7,572,342.36	-0.31%	R 8,200,586.67	8.30%	R 9,414,848.34	14.81%	R 9,396,753.15
National Hospital	R 5,412,826.01	R	7,105,915.99	31.28%	R 8,654,131.82	21.79%	R 8,680,478.22	0.30%	R 8,741,096.34	0.70%	R 9,197,837.54	5.23%	R 8,445,369.04
Shoprite_Checkers - Vereeniging	R 5,027,270.23	R	7,425,199.09	47.70%	R 8,909,154.48	19.99%	R 9,903,255.40	11.16%	R 10,528,766.06	6.32%	R 11,712,354.72	11.24%	R 10,016,178.06
Middestad Centre - Elizabeth street	R 5,359,108.70	R	6,772,109.75	26.37%	R 7,737,964.40	14.26%	R 8,221,689.57	6.25%	R 8,832,189.59	7.43%	R 9,656,346.95	9.33%	R 8,924,915.52
	R 222,165,299.15	R	292,351,755.06	31.59%	R 345,295,168.17	18.11%	R 364,001,528.14	5.42%	R 385,158,993.07	5.81%	R 428,849,623.83	11.34%	R 400,811,106.37

Table 7: ToU Top 20 customers



Graph 15: Top 20 revenue% growth



Graph 16: Top 20 revenue growth

7. ENERGY EFFICIENCY

Improved energy efficiency has a very big impact on energy demand. Due to the municipality not having the required data to quantify the effects of energy efficiency projects, this cannot be tabled.

Energy efficiency improvements have been fuelled by factors such as high energy prices. The municipality may provide an incentive for the use of more energy efficiency equipment and appliances, or even switching to alternative energy sources.

Technological developments and the adoption of technologies that are more energy efficient, methods and processes such as geyser control have reduced total energy consumption and the demand.

By applying the correct energy efficiency in a particular region, less energy intensity will be realized from that region. Energy efficiency can be monitored by the utility by implementing appropriate policies and standards which generally promote the adaptation of more efficient equipment, appliances and methods and that will also generate revenue for the utility.

8. ENERGY PRICES

Energy prices have an impact on final energy demand. It can be seen that when electricity prices increased from Eskom, the growth began to reduce

9. CLIMATE

Climate change affects the quantity of energy consumed. Local climate and weather patterns have a significant impact not only on the quantity of energy demanded, but also on the form of energy demanded. There are high winds in the Eastern Cape therefore wind farms have been established in that area. Dealesville has a high source of solar energy hence the establishment of PV plants in that area.

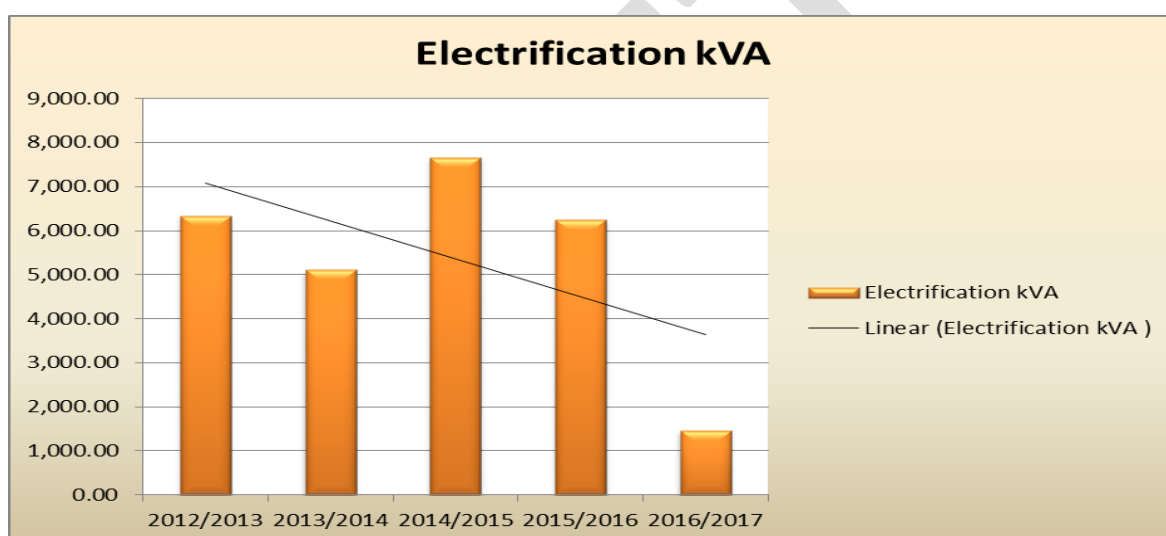
9.1 GROSS DOMESTIC PRODUCT AND GROSS VALUE-ADDED PER SECTOR

The Gross Domestic Product (GDP) is one of the primary indicators of a countries economic performance and has been widely used as a proxy to estimate energy demand. Historical GDP figures were obtained from Statistics South Africa, while projections of the

9.2 PERCENTAGE OF HOUSEHOLDS WITH GRID CONNECTION

Universal access to modern forms of clean energy is a strategic objective of the Department of Energy. Electrification is a cornerstone of social upliftment and has been proven to positively contribute to South Africa's developmental goals.

Project name	Number of sites	Year	kVA	Total kVA per FY
Khotsong Phase 1	900	2012/2013	2250	6335
Khotsong Phase 2	1634		4085	
Electrification of Khotsong phase	399	2013/2014	997.5	5102.5
Electrification of Caleb Motshabi phase 5	511		1277.5	
Electrification of Khayelitsha	863		2157.5	
Electrification of Bloemside (Heidedal Extension 11)	92		230	
Electrification of Bloemside (Heidedal Extension 12)	65		162.5	
Electrification of Bloemside (Heidedal Extension 13)	111		277.5	
Electrification of Bloemside 7	427	2014/2015	1067.5	7655
Electrification Khayelitsha	500		1250	
Electrification of Caleb Motshabi	1880		4700	
Electrification of Magashule Square	51		127.5	
Electrification of Namibia Square	76		190	
Electrification of Sonderwater	128		320	
Electrification of Bloemside 7	600	2015/2016	1500	6250
Electrification Khayelitsha	100		250	
Electrification of Caleb Motshabi	1800		4500	
Electrification Khayelitsha	420	2016/2017	1050	1457.5
Electrification of Van Stadensrus	163		407.5	



10. ENERGY MODELING

To do the energy modeling, key parameters need to be agreed upon by the utility. A technical and financial expert working group will be established to design and implement a solution for the solar plant. A software simulation will also be of necessity for the project as the data is of a large amount. All energy projects must be South African or joint ventures with South African partners. All energy projects must be technologically feasible, economically viable and with adequate accuracy of costs.

Below are examples of assumptions and constraints that need to be followed.

- Twenty-year planning period

- Process performance data and costs and commodity prices at 1 January 2001 values
- Net discount Rate
- Inflation rate
- Population Growth
- GDP Growth
- Coal price increase for Sasol

To develop the model structure; it is imperative to consider the following,

- Research, collect and collate required data, including energy and economic data
- Configure the database on which the calculations were done
- Determine the primary planning assumptions and scenarios
- Populate and refine the reference energy system
- Undertake the calculations and analyse the results

The integrated energy and resource planning process considers physical, technical, resource and economic considerations. The modelling process cannot by itself account for matters pertaining to sociological effects, political imperatives, global changes etc.

11. WHICH TECHNOLOGY WOULD SUIT CENTLEC?

CENTLEC plans to create solar power which would enhance the network capacity to inspire and motivate a new generation of renewable energy in communities around the MMM area. As an electricity distribution company in the area of Bloemfontein, the company is driven by an appreciation of the environment and a desire to preserve it. This form of energy will have the power to transform the way people around our communities use electricity, improving socio-economic activities and the environment. Hence, for the project to materialize, suitable large open spaces are required to construct the proposed solar plant.

The following properties were identified as suitable sites for the proposed construction of the solar plant:

- RE of farm Klipfontein 716, Bloemfontein.
- Portion 2 of farm Rockland 684, Bloemfontein.

- RE of farm Uitvlugt 2336, Bloemfontein.
- On 500m buffer zone around NEWWTP on farm Sunnyside 2620
- Farm Bloemfontein 654 portion 321
- RE of farm Bloemfontein 654
- RE of farm Bloemindustria

Solar: Solar PV and CSP with storage present excellent opportunities to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Solar technologies also present the greatest potential for job creation and localisation. Incentive programmes and special focused programmes to promote further development in the technology, as well as solar roll-out programmes, should be pursued.

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12.ANNEXURE A

12.1 Proposed PV Plant drawings



