CHAPTER 5
FINANCIAL PERFORMANCE AND PRICING POLICY

In chapter 4, operational performance of electricity supply industry in Kenya was analyzed using an innovative procedure termed as ‘Change-Point Analysis’. Long-term trends of key operational performance indicators of electricity supply industry in Kenya, such as installed capacity, generation capacity, PLF, electricity per capita consumption, transmission and distribution network, transmission and distribution losses, and employee productivity were examined for a period of 20 years. The results of change-point analysis indicated some critical changes in all the indicators analyzed.

This chapter focuses on the financial performance and pricing policy of Kenya electricity supply industry. The performance parameters for assessing the financial performance of the industry such as electricity sales, total revenue, average revenue, and average cost of electricity supply, net profit/loss, and capital expenditure, loan burden to the utility, tariff policy, and subsidies received from the government have been analyzed. The overall financial performance of the Kenya Power System has been examined from the period 1992-93 to 2011-13. The whole of this period has been divided into two equal parts, pre-reform period (1992-93 to 2002-2003) and post-reform period (2002-2003 to 2012-2013). Though, the initial reforms started in 1997. There was a delay in the implementation process which is why the period from 1997-2003 has been included as part of the pre-reform period in the study. The study tried to compare long-term critical change-points and pattern of financial performance indicators with economic development and policy reforms in the electricity supply industry in Kenya as the drivers of change.

5.1.1: Electricity Sales in Kenya

Kenya Power and Lighting Company which is in charge of retail supply of electricity sells electricity to various customers according to the Kenya Energy Regulatory Commission’s approved tariff rates, 2008. The consumer categories are grouped as domestic, commercial and industrial (small), commercial and industrial (medium &large), off-peak, street-lighting and rural electrification programme. These
various categories have been labeled in this study as small customers, large customers, off-peak customers, street lighting customers and rural electrification programme customers. Figure 5.1 presents change-point analysis of trend on electricity sold to small customers in Kenya for the past 20 years.

**Figure 5.1: Change Point Analysis of Trend on Electricity Sales to Small Customers in Kenya, 1993-2013**

Table 5.1: Change Point Analysis on Electricity Sales to Small Customers in Kenya, 1993-2013

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>(2006, 2006)</td>
<td>100%</td>
<td>1266</td>
<td>2184.9</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Annexure-4

**Note:** A* Small customers include domestic, commercial & industrial.

Figure 5.1 and Table 5.1 presents a plot of trend on electricity sales to small customers and change-point estimates during 1993-2013. The result indicates that for the past two decades, two major critical change-points have occurred for sale of electricity to small customers in Kenya. The first major critical change point occurred between 1998 and 2000 with a confidence level of 94 % while the second critical change point happened in 2006 with a confidence level of 100 %.
The graphical presentation in Figure 5.1 shows a constant increase in trend on electricity sold to small customers in Kenya from 1993 till 1998 when the first major critical change point was detected. The increase in trend on electricity sold to small consumers in Kenya from 1993 to 1998 is associated with increased demand from domestic and small commercial establishments’ especially small-scale industries (Jua Kali) as well as increased building extensions in the already existing town (Economic Survey, 1998 p.10).

The decline in trend on electricity sold to small customers from 1998 to 2000 is associated with power rationing imposed by KPLC the distribution company. This was as a result of shortage of electricity caused by the prolonged drought of 1998 to 2000. This shortage of electricity led to high cost of power. The second critical change happened when a number of policy reforms which were proposed in the Sessional paper No4, 2004 were implemented, the adoption of the Energy Act No.12, 2006 led to the formation of the Energy Regulatory commission 2006. At the same time the economy at this period was doing well with a growth rate of 6.2 percent. All these provide many reasons for the increased sale of electricity to small customers.

*Figure 5.2: Change Point Analysis of Trend on Electricity Sales to Large Customers in Kenya, 1993-2013*
Table 5.2: Change Point Analysis on Electricity Sales to Large Customers in Kenya, 1993-2013

Table of Significant Changes for Large Customers

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>(2003, 2003)</td>
<td>100%</td>
<td>2113.2</td>
<td>3038.5</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Note: B+ Large consumers include commercial industrial (medium), and commercial industrial (large).

There was one major critical change-point during the past two decades 2003 as indicated by the change-point estimates Table 5.2. The critical change-point is statistically significant with a confidence level >99%. Figure 5.2 indicates an increasing trend in electricity sold to large customers from 1993 to 1997 when there was a decline which proceeded till 2000. The decline is attributed to the shortage of power from 1998 to 2000. From 2001 to 2003, when the major critical change point occurred, the change happened after the country had just come out of a difficult economic drought period 2000-2002. The increase in trend is associated with improved weather conditions which resulted in improved water levels in hydro power dams. This made many large commercial and industrial customers who had stopped their production because of the high cost of power to resume production as power from hydro sources proved to be cheap than thermal generators.

This is the year when the government proposed an Economic Strategic Development Plan which encouraged the growth of many economic activities and government policies which triggered the economy to increase from 1.1 percent in 2002 to 2.8 percent in 2003. The company had revised the connection policy in order to expand the customer base through speeding up connection of new electricity supply applicants and also to encourage group schemes which were meant to reduce costs to individual applicants as they yield average additional revenue of Kenya Kshs.900 million annually (KPLC Annual Report, 2004).

Again, there was a decline in trend of electricity sold to large consumers in Kenya as from 2007 till 2009. The decline is associated with election violence 2007-2008 which showed many commercial activities shutdown as there was displacement of people and destruction of property. This was followed with the 2008-2009
droughts. The cost of electricity increased as there was decline in power supply especially from hydro based sources. This time the economy’s growth declined from 7 % realized in 2006-2007 financial year to 2.7 % in 2009 (Economic Survey, 2010)

Figure 5.3: Change Point Analysis of Trend on Electricity Sales to Off-Peak Customers in Kenya, 1993-2013

Table 5.3: Change Point Analysis on Sale of Electricity to Off-Peak Customers in Kenya, 1993-2013

Table of Significant Changes for Off-Peak Customers

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>(2000, 2001)</td>
<td>100%</td>
<td>103.09</td>
<td>57</td>
<td>1</td>
</tr>
<tr>
<td>2009</td>
<td>(2007, 2009)</td>
<td>97%</td>
<td>57</td>
<td>36.32</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Figure 5.3 and Table 5.3 represents a plot of electricity sales to off-peak customers’ trends and change-point estimates during 1993-2013. The results reveal two major critical change-points for the last 20 years in Kenya. The first major critical change point happened between 2000 and 2001 with a confidence level of 100 % while the second major critical change point happened between 2007 and 2009 with a confidence level of 97 %.
The graphical presentation shows a decline in trend for consumption of electricity by the Off-Peak consumers in Kenya from 1994 till 1999. The decline in trend is due to the shift of these customers from Off-Peak consumption to peak consumption as the interruptions in supply of electricity increased. There was further downward trend from 2000 the year when the first major critical change point is indicated till 2001 when again there was some slight upward trend till 2003.

From 2003 to 2005, there was a downward trend and then an upward trend from 2005 to 2007, and from 2009 a constant trend where the second major critical change point is indicated. The 2009 decline is associated with decline in electricity supply as there was drought. Again the consumers shifted from Off-Peak consumption to peak consumption. All the declines and increase in trend of consumption of electricity of these types of consumers is based on the supply of electricity available. This is because these types of consumers have two types of meters and they are supplied with interruptible electricity at cheaper cost.

Figure 5.4: Change Point Analysis of Trend on Electricity Sales to Street Light Customers in Kenya, 1993-2013
Table 5.4: Change Point Analysis on Sale of Electricity to Street Lighting Customers in Kenya, 1993-2013

Table of Significant Changes for Street Lighting (Gwh)

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
</table>

Source: Annexure-4

There is an indication from the plot of street lighting trend and change-point estimates during 1993-2013 that two critical change-points have occurred mostly in the years 2000 and 2007. All these changes are statistically significant with a confidence level of 99% as shown in Figure 5.4 and Table 5.4. With 95% confidence level, we are certain that the first critical change-point happened between 1998 and 2001, while the second happened in 2007. The first critical point is attributed to the shortages of power in this period and the rationing of power which was imposed nationwide by the Kenya Power and Lighting Company which is in-charge of transmission and distribution of power in Kenya. This made most of the public and local authority supplied with electrical energy for public lamps such as street lighting remaining with light most of the time (Economic Survey, 2001).

The second critical change happened at a time when the situation of electricity had improved. The economy of Kenya at this year was doing well growing at 6.5 percent. This can be attributed to the rehabilitation of Street-Lighting Programme by Nairobi City Council and other major towns which started in 2005. This led to the demand in electricity for street-lighting increase by 18.1 percent in 2005 when the local authority had installed streets lights in almost all major cities for security and traffic purposes (Economic Survey, 2006). The decline in trend after 2007 to 2011 is due to failure of the local governments to pay bills on time. This caused the supplier Kenya Power and Lighting Company reduce its services to the local governments. It is also due to lack of maintenance of the street lights which shows that most of the 2006-2007 installed street lights are not functional.
Figure 5.5: Change Point Analysis of Trend on Electricity Sales to the REP in Kenya, 1993-2013

Table 5.5: Change Point Analysis on Electricity Sale to REP Customers in Kenya, 1993-2013

Table of Significant Changes for REP Customers

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>(2000, 2003)</td>
<td>95%</td>
<td>138.23</td>
<td>180.78</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td>(2008, 2008)</td>
<td>97%</td>
<td>180.78</td>
<td>316.22</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Figure 5.5 and Table 5.5 represents a plot of electricity sales to the rural electrification Programme (REP) trend and change-point estimates during 1993-2013. For the past two decades, results indicate three major critical change-points. The first critical change happened in 1994. With 95% the first change occurred between 1994 and 2002 and the second between 2000 and 2003 and the third in 2008. The decline in trend indicated in 1999 till 2000 is associated with high cost of power and power rationing due to power shortage during these periods.

The first critical change-point happened at a time when Kenya was facing pressure from the International Monetary Fund (IMF) and World Bank to pursue comprehensive Structural Adjustment Facility (ESAF) programmes which the country had started to implement. There was also the completion of the National Rural
Electrification Master Plan 1998 which showed Kshs.313 million spent on extension of lines for 135 schemes which added the number of customers by 8980 from 47160 in 1996 to 56140 in 1997 (Economic Survey, 1998).

The second change-point coincides with the year when major economic reforms were introduced. The Kenya power sector was exposed to competitive Markets which gave Independent Power Producers an opportunity to contribute to the national grid. There was also recovery of the economy as the rain provided better yields for farmers based in the rural areas (KPLC Annual Report, 2003).

The third critical change is a beneficiary of the Rural Electrification Authority 2007 which coordinated the implementation of rural electrification projects. The REA came up with the Rural Electrification Master Plan. The master plan was divided into three major strategic phases, each phase covering five years. The first phase started from 2008-2012, and the second phase from 2012-2018 while the last phase was to end in 2022. In the first phase, there was a target of having 200,000 connections annually in the rural areas including all the public offices, institutions of learning and church buildings in the rural areas by 2012. It may also be due the Constituency Development Fund which was passed by parliament in 2003 which contributed much in the improvement of the economic status of the rural population. In this year also a number of rural electrification schemes were initiated.

Figure 5.6: Change Point Analysis of Trend on Total Electricity Sales in Kenya, 1993-2013
Table 5.6: Change Point Analysis on Total Electricity Sales in Kenya, 1993-2013

Table of Significant Changes for Total Sales of Electricity

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>(2000, 2002)</td>
<td>100%</td>
<td>3418.7</td>
<td>4365.1</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td>(2008, 2008)</td>
<td>98%</td>
<td>4365.1</td>
<td>6025.3</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Annexure-4

The plot of total electricity sales trend and change-point estimates in Figure 5.6 and Table 5.6 indicate that only two critical change-points have happened on the total electricity sales in Kenya for the past two decades. The critical change happened in the year 2002 with higher confidence level of 100%. As we have seen earlier, this was immediately after the country had come out of a difficult economic period which was caused by the severe drought experienced in 2000. Actually, this year electricity sales had recorded a significant decline of 9.9 percent from 3685.2 Gwh in 1999 to 3320.7 Gwh in 2000.

The decline was partly due to reduced demand by all categories of customers as a result of power rationing that was occasioned by KPLC, starting from June to December 2000, and partly due to higher tariffs. The year 2002 was a relief for the economy as the rains had started improving and there was some improvement in the generation of power from cheaper sources like hydro which encouraged many customers to demand electricity for their production.

The second critical change-point happened when production of electricity had increased to 10.9 percent in 2007 and the country was less dependent on imports which made electricity to be cheaper and the demand from all customer categories improved. The economy also had enjoyed a sound growth of 7.0 percent in 2007 (Economic Survey, 2007). There were major policy initiatives that were initiated by the government such as the enactment of the Energy Act No.12, 2006, the Rural Electricity Authority 2007 and the introduction of the long-term Economic Development Plan Vision 2030 in 2008. All these contributed to the increased electricity sales as many customers were connected to the national grid. Hence, we
can conclude that electricity sales in Kenya have shown an upward trend over the study period.

Figure 5.7: Change-Point Analysis of Trend on Total Revenue from Sale of Electricity in Kenya as from 1993-2013

![Figure 5.7](image)

Table 5.7: Change Point Analysis on Total Revenue from Sales of electricity in Kenya, 1993-2013

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>(1999, 1999)</td>
<td>99%</td>
<td>12182</td>
<td>24254</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>(2006, 2006)</td>
<td>100%</td>
<td>24254</td>
<td>65905</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Figure 5.7 shows change-point analysis trend on total revenue of electricity sales in Kenya during 1993-2013. The results unravel two major critical change points 1999 and 2006 for total revenue from electricity sales in Kenya over the past two decades. All the two critical change-points are statistically significant with (>95%) level of significant as shown in Table 5.7. However, the long-term trend revealed a greater change in total revenue on electricity sales in Kenya between 1999 and 2001. To our surprise, the period when there was shortage of power in the country as reflected by many indicators, the revenue on sales increased. This means that consumers were screwed to meet the high cost of power production during these periods. The Electricity Regulatory Board which was in charge of regulating electricity tariffs and collection of bills gave out their first tariff order in 1999 which showed a great improvement in revenue collection. The graphical presentation of
trend line in Figure 5.7 also shows that, the rate of increase in total revenue on electricity sales slowed down after 2001 but regained progress ever since 2003.

The slowdown is consistent with the economic constraints the country went through since the severe drought of 2000. The accelerated increase in total revenue from sale of electricity from 2003 is associated with improvement in weather conditions and major economic policies taken by the government through the long-term Economic Strategic Development, 2003 and the suggestions that emerged from the Sessional Paper No. 4 of 2004. From this period the economy grew at a rate above 4 percent up to 2006. This is also the period when the proposed Energy Regulatory Commission in 2004 Sessional Paper No. 4 to replace the earlier Electricity Regulatory Board of 1998 was adopted through the Energy Act 2006. This together with many other policy changes made the number of customers increase hence the increase in total revenue. The total number of customers has increased up to 1,737,341 from 593,621 and in 2003 up to 2,330,962 customers (KPLC Annual Report, 2014) Revenue had grown by 2.9 percent to 6.0 billion in 2012-2013. Therefore, we can conclude that this was the cause of the second critical change-point.

Figure 5.8: Change-Point Analysis of Trend on Average Revenue on Sale of Electricity in Kenya, 1993-2013.
Table 5.8: Change Point Analysis on Average Revenue from Sale of Electricity in Kenya, 1993-2013

The trend assessment of average revenue for the period 1993-2013, through ‘Change-Point Analysis Technique’ shows that for the past 20 years, Kenya Power and Lighting Company experienced two major critical change points. The first major critical change point happened between 2000 and 2001 with a confidence level of 100% while the second change point happened between 2007 and 2009 with a confidence level of 98% as shown in Table 5.8.

The greater change observed in 2000-2001 is suspect since during this year the economy was doing badly. This means that the burden of the high cost of electricity was switched to customers hence the increase in average revenue. There was shortage of electricity which resulted to the increase in imports and use of expensive emergence generators. The use of generators and the importation of power together with IPPs charging high cost for the electricity supplied to KenGen were expected to reduce revenue but instead the revenue increased.

There was a decline in trend in average revenue of electricity sold in Kenya from 2001 to 2003. The decline maybe associated with the Tariff Orders of 2001 where the Electricity Regulatory Board had revised the tariff downwards by Kshs 1.6 for all consumer categories (ERB Tariff Orders, 2001). The second critical change which happened in 2007-2009 is attributed to the formed Energy Regulatory Commission in 2006 which had also revised the tariffs upwards in 2008 and also indentified more customers by designing a new tariff structure which covered more customers. It is impressive that for the last 20 years the average revenue has been above the average cost except in 2000 and 2001.
5.1.2: Cost of Power Supply

The cost of supply of power represents the cost incurred by the utility to supply power to the ultimate consumers. It comprises operating expenditure, i.e. administrative expenditure, depreciation, fuel cost and power purchase cost. Since, generation and distribution are unbundled in Kenya, fuel cost is indicated in the power purchase cost. Figures and Tables, 5.9, 10, 11, 12, 13, 14, and 15 present the cost of supply of electricity to different customer categories in Kenya from 1993-2013.

Figure 5.9 and Table 5.9 presents a plot of average cost for small customers’ trend and change-point estimates during 1993-2013. During the past 20 years, results indicate two major critical change-points. The first major critical change point happened in 2001 with a confidence level of 100 % while the second major critical change point happened between 2007 and 2009 with a confidence level of 94 %.

The graphical presentation in Figure 5.9 shows an increasing trend in cost of electricity to small customers from 1993 to 2001 when the first major critical change point is indicated. The increase is attributed to the poor financial performance due to high operating expenses, increase in tariff towards realignment of consumer tariffs towards LRMC in 1994, introduction of automatic foreign exchange formula to shield company from adverse exchange rates and the adjustment of tariffs to reflect 100 % LRMC in 1999.

Figure 5.9: Change-Point Analysis of Trend on AC of Electricity for Small Customers in Kenya 1993-2013.
The 2001 critical change-point happened when electricity cost had increased because of the decline in electricity generation as there was no enough rain to the hydro based power plants. The decline of hydro-generation necessitated supplementing the shortfall with the more expensive fuel-based generation at a time when the price of fuel was exceptionally high. This showed the cost of electricity go high and there was decline on demand of electricity from all categories of customers who were hit by the economy which experienced a drop in the GDP growth rate to -0.3 percent from 1.4 percent in 2000, thus eroding the purchasing power of all categories of customers (KPLC Annual Report, 2001). The decline seen from 2001 to 2005 is attributable to better rains and the tariff review of 2001 as the government wanted to recover the economy’s growth.

Again after 2005, there was an increasing trend till 2009 when the second major critical change point is indicated. This is attributed to the decline in rain which showed imports grow and the increase in Retail Base Tariffs for KPLC in 2008. There was also volatility of International Crude Oil Prices which influenced domestic prices of petroleum products and electricity. The increase in the use of thermal power generation since there was drought is another cause of increased cost of electricity at this period (Economic Survey, 2010).

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>(2001, 2001)</td>
<td>100%</td>
<td>3.78</td>
<td>7.96</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Table 5.9: Change Point Analysis on A C of Electricity for Small Customers in Kenya, 1993-2013

Table of Significant Changes for Small Customers (kshscents)
Confidence Level for Candidate Changes = 50%, Confidence Level for Inclusion in Table = 90%, Confidence Interval = 95%, Bootstraps = 1000, Without Replacement, MSE Estimates, Analyze Ranks
The trend assessment of average cost of electricity on medium customers in Kenya during the 1993-2013. Through ‘Change-Point Analysis’ we show that, in the past 20 years, Kenya experienced two major critical change points in average cost of electricity on medium customers. The first major critical change point happened between 2000 and 2001 with a confidence level of 100 % while the second major critical change point happened in 2010 with a confidence level of 100 %.

The graphical presentation in Figure 5.10 shows that the trend for average cost of electricity on medium customers had a constant increase from 1993 till 2000 when the first major critical change point is indicated. The change is associated with the financial constraints the company was faced with that is, the increase of tariff towards
realignment of consumer tariffs towards LRMC 1994, the introduction of automatic foreign exchange formula to shield company from adverse exchange rates in 1996, adjustment of tariffs to reflect 100 % LRMC in 1999 and the high charges from IPPs from 1999 to 2000 as there was shortage of power. The cost of electricity increased on all customer categories due to low production of electricity and high imports from Uganda and the use of expensive thermal generators.

After 2001, there was decline in trend for cost of electricity on medium consumers till 2005, and then again, the trend increased till 2009. The increase in trend is associated with the 2001 tariff review where tariffs on all customer categories were reduced by Kshs 1.6, the 2005 tariff review and the improved rains. The sharp decline in trend as from 2009 to 2013 is due to the change in tariff structure in 2008 where the medium customers were companied with the large consumers (KPLC Annual Report, 2009).

Figure 5.11 and Table 5.11 shows change-point analysis for average cost for large customers’ trends during 1993-2013. The results unravel three major critical change-points. The first major critical change point happened in 1997 with a confidence level of 90 %, the second happened between 2001 and 2003 with a confidence level of 91 % while the third major critical change point happened between 2007 and 2009 with a confidence level of 94 %.

The graphical presentation in Figure 5.11 shows a constant increase in trend from 1993 till 1998 when the first major critical point is indicated. At this time, the company was performing financially poor and could not raise funds for its operations and had to increase tariffs. The increase in tariffs was due to the realignment of consumer tariffs towards LRMC in 1994, high cost of power from IPPs, adjustment of tariffs to reflect 75 % LRMC and introduction of automatic foreign exchange formula to shield company from adverse exchange rates.
After 1998, the trend remained constant till 2001 when the second major critical change point is indicated. This is attributed to the reforms in 1997 when the Electricity Regulatory Board was formed and the participation of IPPs who eased the financial crisis of the company together with the donors that started funding some projects. The sharp increase in 1999 to 2001 is due to power shortage caused by 1999-2000 drought, increase in imports and use of emergency generators which showed cost of electricity increase and the adjustment of tariffs to reflect 100% LRMC in 1999. There was a decline in trend from 2001 to 2005. The decline is due to tariff
review by ERB which lessened cost by Kshs 1.6 to all consumers. From 2005 to 2009, when the Second major change point was detected, the trend was constantly increasing. There was a decline in 2009 which is attributed with the 2008-2009 dry spell which resulted to the use of expensive thermal generators and the increase in Retail Base Tariffs for KPLC, which had unchanged since 2000.

Figure 5.12: Change-Point Analysis of Trend in AC of Electricity for Off-Peak Customers in Kenya, 1993-2013.

Table 5.12: Change Point Analysis on AC of Electricity for Off-Peak Customers in Kenya, 1993-2013

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>(1999, 2012)</td>
<td>100%</td>
<td>4.79</td>
<td>0.295</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Figure 5.12 and Table 5.12 presents ‘Change-Point analysis’ trend line plot and estimates of critical change-points for average cost for off-peak customers in Kenya during the period 1993-2013. The assessment of the trend line plot and estimate of change-points indicates that Kenya experienced one major critical change-point 2012 in the last 20 years. The confidence interval indicates that the change happened between 1999 and 2012. The sharp increase in trend of average cost of
electricity to Off-peak customers between 1999 and 2001 is as a result of the adjustment of tariffs by Electricity Regulatory Board to reflect 100 % LRMC in 1999. It was also as a result of high cost of power from IPPs, increased imports and the use of emergency generators due to shortage of power.

From 2001 to 2003, the trend declined sharply again due to the fluctuation of international oil prices, improved rains and the reduced use of emergency thermal generators. There was again a constant increase in trend as from 2003 to 2005. The increase was due to increase in tariffs as well as the high cost of power from IPPs. From 2005 to 2009, there was a decline in trend in the cost of power to the off-peak customers. The decline was due to improved power supply as the IPPs contribute to the capacity addition. The increase in trend from 2009 to 2011 was due to increase in retail base tariffs for KPLC in 2008, shortage of power in 2009 which was caused by 2008-2009 droughts and the high cost charges from IPPs and use of emergency generators. It declined towards 2012 when the major critical change point is indicated. This was due to subsidies given by the government to encourage industrialization (Government of Kenya, 2012).

Figure 5.13: Change-Point Analysis of Trend on AC of Electricity for Street Lighting in Kenya, 1993-2013.
The trend assessment of average cost of electricity to street lighting customers during the period 1993-2013, through ‘Change-Point Analysis’ show that in a period of 20 years, Kenya experienced two critical change points in the trend of average cost of electricity to street lighting customers. The first major critical change point was detected between 2004 and 2006 with a high confidence level of 100%. The second major critical change point was detected between 2008 and 2013.

The graphical presentation in Figure 5.13 shows a constant increase in trend of average cost of electricity to street lighting customers from 1993 to 2002. The increase is attributed to the increase in tariffs towards realignment of consumer tariffs towards LRMC in 1994, the introduction of automatic fuel adjustment formula 1994 and also the 1996 adjustment of tariffs to reflect 75% LRMC and the introduction of IPPs in generation in 1996-1997. There was a decline in trend of cost of electricity to street lighting between 2001 and 2003. This decline is due to improvement in power supply as generation from cheaper sources such as hydro power plants as rain improved.

There is a constant increase in trend in average cost of electricity supply to street lighting from 2004 when the first major critical change point is indicated to 2011 when again there is a sharp decline in trend till 2013 when the second major critical change point is indicated. The increase is attributed to the high cost of power from IPPs, 2005 retail electricity tariff review policy, increase in retail tariffs for KPLC in 2008 and use of emergence generators due to shortage of power in 2009.

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>(2004, 2006)</td>
<td>100%</td>
<td>5.41</td>
<td>17.74</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>(2008, 2013)</td>
<td>91%</td>
<td>17.74</td>
<td>9.69</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Annexure-4
which was caused by the 2008-2009 dry spell. The decline from 2011 to 2013 is due to the introduction of Feed in Tariff policy on geothermal, solar, wind, biomass and small hydro’s in 2010.

Figure 5.14: Change-Point Analysis of Trend on AC of Electricity to REP Customers in Kenya, 1993-2013.

Table 5.14: Change Point Analysis on AC of Electricity to REP Customers in Kenya, 1993-2013

Table of Significant Changes for REP Customers (kshs.cents)
Confidence Level for Candidate Changes = 50%, Confidence Level for Inclusion in Table = 90%, Confidence Interval = 95%, Bootstraps = 1000, Without Replacement, MSE Estimates, Analyze Ranks

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
</table>

Source: Annexure-4

Figure 5.14 and Table 5.14 presents change point estimates and trend on average cost of electricity to Rural Electrification Programme (REP) customers in Kenya during the period 1993-2013. For the past two decades, results indicate two major critical change-points in average cost of electricity supply to REP customers. There is 95 % confidence interval that the first change happened between 1999 and 2003 with a confidence level of 96% while the second major critical change point happened between 2006 and 2009 with a confidence level of 98.
The graphical presentation in Figure 5.14 indicates that the trend in average cost of electricity supply to the REP customers kept on rising from 1993 to 1998 when the trend declined till 2001. The decline in trend between 1998 and 2001 is attributed to the subsidies provided by the government of 3% of the electricity supplied to the rural customers in 2001.

There was a constant increase from 2000 to 2009 when again there was a sharp increase in trend. The constant increase in trend is attributed to retail tariffs remaining unchanged from 2000. The increase in trend from 2009 to 2010 is due to the increase in retail tariffs in 2008 and the high cost of electricity from IPPs. The decline in trend after 2009 to 2012 is due to the subsidies given by the government of the 5% out of the petroleum levy introduced in 2009.

Figure 5.15: Change-Point Analysis of Trend in Average Cost of Electricity in Kenya, 1993-2013.

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>(2000, 2001)</td>
<td>100%</td>
<td>3.6571</td>
<td>7.6544</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Annexure-4
Figure 5.15 and Table 5.15 presents change-point estimates and trend on average cost of electricity in Kenya during 1993-2013. During the past 20 years, results indicate two major critical change-points. The first major critical change point happened between 2000 and 2001 with a confidence level of 100% while the second major critical change point happened between 2007 and 2009 with a confidence level of 99%.

The graphical presentation in Figure 5.15 indicates an increasing trend of average cost of electricity supply in Kenya from 1993 till 1999. The constant increase in average cost of electricity supply in Kenya from 1993-1999 is attributed to a number of factors such as the increase in tariffs towards realignment of consumer tariffs towards LRMC in 1994, introduction of automatic fuel adjustment formula in 1994, high charges of electricity generated by IPPs, introduction of automatic foreign exchange formula to shield company from adverse exchange rates in 1996 and the adjustment of tariffs to reflect 75 % LRMC 1996.

The trend increased sharply between 1999 and 2001 when the first major critical change point is detected. This is attributed to the use of expensive emergency thermal generators, adjustment of tariffs to reflect 100 % LRMC in 1999, high charges of electricity generated from IPPs, and the increase in imports which was due to the increased international oil prices in 2001 (KPLC Annual Report, 2001). From 2001 to 2004, there was a decline in trend of average cost of power supply. The decline is due to normalized international oil prices and increase in power generated from cheaper sources such as hydro as rains improved. Again the trend increased constantly till 2009 when second critical change point is indicated. The constant increase in trend in average cost of electricity from 2004 to 2009 is due to retail tariffs remaining unchanged since 2000. The change in trend in 2009 is due to the increased tariffs in 2008, use of expensive thermal generators, high charges from IPPs as a result of the dry spell experienced in the country between 2008 and 2009 (Economic Survey, 2010).

5. I.3: Capital Structure

Capital structure here may mean the various sources of finance or the components which are included in the capital formation of all companies. The Kenya Power Sector always depends on internal plus external sources as a universal set for
the company. Traditionally, the internally generated funds included equity contributions from the Government and debt financing. The significant part of the external funding has been foreign currency loans from multilateral agencies such as the World Bank, Japanese Bank of International Cooperation (JBIC), African Development Bank (ADB) and the European Investment Bank (EIB) with loans being guaranteed or lent by the Government.

Because of the poor financial performance and the restriction imposed by the financial institutions in the early 1990s as discussed in chapter 1. There was a need for the power sector to change the mode of financing if they had to acquire the huge capital resources. Through the National Energy Policy 2003, it was suggested that reforms be introduced to open the sector to competitive market or to shift from government sponsored debt financing to corporate-sponsored borrowing. The emphasis are in making the sector more commercial in nature and efficient as it will be fully responsive to market forces and to open the sector to the private sources of finance and a shift from bank loans to bond markets (KPLC Annual Report, 2004). Through these suggestion 30 percent of the shares were registered in Nairobi Stock Exchange in 2005. The growth of some of the capital sources of Kenya Power Sector are discussed in Figure 5.18, and Figure 5.19. Figure 5.18 represents capital expenditure of Kenya Power Utility from 1993-2013.

Figure 5.16: Change-Point Analysis of Trend on Capital Expenditure of Kenya Power Utility, 1993-2013
The trend assessment of capital expenditure through ‘Change-Point Analysis’ shows that, in the past two decades, Kenya Power and Lighting Company experienced one major critical change point between 2005 and 2006 with a confidence level of 100% in its capital expenditure as shown in Table 5.16. The graphical presentation of trend line in Figure 5.18 also shows that the capital expenditure in the power sector in Kenya was low from 1993-2003. This period coincides with the period of pre-reforms. The increase is realized as from 2003 onwards to 2013. A number of reforms were introduced during these periods and these reforms indicate that the power sector received more attention from the government and the private investors. All these have seen the power sector expand its customer base and also increase power generation. In 2013, the cumulative capital expenditure by the Rural Electrification programme (REP) rose to Kshs50 billion from Kshs45 billion in 2012, a sign that the government is committed to expand electricity to rural areas (Economic Survey, 2014).

### 5.1.4: Loan Burden to the Utility

In Kenya loans are part of the main sources of capital formation in the publicly owned utilities. The Kenyan government extensively uses this source to guarantee public utilities under the terms of the government and the loan lender. The potential Kenya Power Customers can access loans from a number of financial institutions both locally and internationally because it has entered into several agreements aimed at helping customers. The loans are paid back upon agreed terms either in full payment of certain percentage of interest of the lent or the loan may become a grant to the government of Kenya for example the agreement between the government of Kenya and that of Swiss on the mixed credit, upon which the balance of the loan was upon
full payment of 50 percent of the amount, was and it lent was to became a grant to the
government of Kenya which the last payment was done in December 2007.

Figure 5.17: Change-Point Analysis of Trend on Loan Burden on Kenya Power Utility, 1993-2013

Table 5.17: Change Point Analysis on Loan Burden on Kenya Power Utility, 1993-2013

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>(2000, 2000)</td>
<td>100%</td>
<td>13928</td>
<td>36008</td>
<td>2</td>
</tr>
<tr>
<td>2007</td>
<td>(2007, 2007)</td>
<td>100%</td>
<td>36008</td>
<td>248040</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Annexure-7

The trend assessment of loan burden to Kenya power sector from 1993 to
2013 through ‘Change-Point Analysis’ shows that, in a period of 20 years, Kenya
Power and Lighting Company experienced two major critical change points between
2000 and 2007 as shown in Table 5.17. All the two change points are statistically
significant with above 99 percent confidence level.

As shown from graphical presentation of trend line in Figure 5.17, the loan
extended to the Kenya power utility has increased over the years. The trend is
constant as from 1993-2005, then after 2007, there was a tremendous increase up to
2013. There is an indication that before reforms 1993 to 2003 the loan extended to the
utility was limited. This could be because at this period the utility was performing
poorly financially and the various institutions lending loans were reluctant extending any loan facility. This resulted to the introduction of reforms in the Kenya power sector as stated in chapter 1 and chapter 3 of this study.

But after reforms 2003 to 2013, there is a great extension of credit to the utility in the form of loans. This may be attributed to the opening of the sector to the private investors and also exposing the utility to the market competition as it was suggested in the long-term Economic Development Strategy of 2003 and the Sessional Paper No 4, 2004 by the government of Kenya. The 2008 long-term economic plan Vision 2030 is another contributing factor for the rise in the loan facility to the power sector. This has compelled the government to go in for more loans as means to raise capital to expand the transmission network and also increase generation. Like the recently signed loan by the Kenyan government with American Conglomerate General Electric through World Bank for Kshs 8.9 million to implement projects that seek to develop cheap power from renewable sources (Government Press, 2014). All these show that Kenya power sector loan burden keeps increasing.

5. 1. 5: Commercial Profit/Loss

The commercial profit/loss is the gap between total revenue receivables and total expenditure in a given period/year. There are two important components which are taken into account when analyzing commercial profit/loss. These are Gross profit and Net profit. Gross profit here refers to the difference between sales revenue and cost of supply. It may also mean all revenues minus all expenses including the cost of electricity sold, the selling, and administrative cost and non-operating costs. Gross profit sometimes is used to describe profit before tax, while Net profit is defined as profit after all expenses and tax has been deducted and is what the company owners takes away. In monetary terms gross profit is always a higher value as compared to net profit. When making judgment on how well the company has performed financially. In this study, we analyzed only net profit because it gives us a better estimate and therefore is worth more in terms of useful information.
Figure 5.18: Change-Point Analysis of Trend on NP/L in Kenya Power and Lighting Utility 1993-2013

Table 5.18: Change Point Analysis on Net Profit/Loss in Kenya Power Utility, 1993-2013

<table>
<thead>
<tr>
<th>Period</th>
<th>Confidence Interval</th>
<th>Conf. Level</th>
<th>From</th>
<th>To</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>(1999, 2004)</td>
<td>99%</td>
<td>1284.7</td>
<td>12080</td>
<td>3</td>
</tr>
<tr>
<td>2008</td>
<td>(2008, 2009)</td>
<td>92%</td>
<td>12080</td>
<td>36606</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Annexure-4

Figure 5.18 and Table 5.18 presents ‘Change-Point analysis’ trend line plot and estimates of critical change-points for Net Profit/Loss in Kenya Power and Lighting Company during the period 1993-2013. The assessment of the trend line plot and estimate of change-points indicates that Kenya Power and Lighting Company experienced two major critical change-points. The first critical major point happened between 1999 and 2004 with a confidence level of 99 % while the second major critical major point happened between 2008 and 2009 with a confidence level of 92.

The graphical presentation in Figure 5.20 indicates a constant trend in net profit/loss in Kenya Power and Lighting Company from 1993 to 2004 when the first critical change point is indicated. The lack of growth is attributed to poor financial performance of the company, high transmission and distribution losses, lack of investment which forced the company to fund its own operating expenditure,
economic constraint the country faced during this period, the shortage of electricity for sale caused by shortage of rainfall in the country since 1998 to 2001.

However, the commercial profits started to improve again after 2004-05 financial year until 2012-13 which coincides with the second critical change-point. The improvement in the financial performance was due to the improvement in the sales, better weather conditions and more rain hence improved generation capacity, reduction in transmission and distribution losses to less than 20 percent. The 2005 and 2008 tariff adjustments were made to take care of the fuel problem through automatic adjusts Fuel Oil Cost Adjustment (FOCA) and Foreign Exchange Rate Fluctuation Adjustment (FERFA) fluctuate from one billing period to the next depending on the cost of fuel and the prevailing exchange rate relative to the base value.

The two-tier policy to the medium and large (Commercial and Industrial) consumers was brought back to single tariff policy which was applicable to all consumers. To check the long term financial performance on profits of Kenya Power Utility in relation to investments of the company so as to ascertain the return on investment and also to see if the utility has been able to attract private investors to encourage competition as it was one of the objectives that triggered reforms in the sector.

5. II: Pricing Policy

Kenya Energy Regulatory Commission (KERC) was established in 2006 to replace Kenya Electricity Regulatory Board (KERB) which was in place since 1998 when electricity sector introduced reforms. KERC is entrusted with the task of regulating electricity tariffs in Kenya. Since its inception KERC has issued five tariff orders for different slabs and consumer categories in the years 1999, 2002, 2005, 2008 and the latest in 2012. The first three were undertaken by its predecessor KERB which was there since 1998 as by the Electricity Act No. 11, 1997.

One of the main objectives of the formation of the Energy Regulatory Commission was to focus on the appropriate power transmission pricing model. This was to deal with fluctuations in the average tariffs due to global petroleum fuel prices which are volatile and attracted by strong demand from the East (Sessional paper 4,
Two statements in the National Energy Policy (Government of Kenya, 2004) guide electricity pricing in Kenya. Where the market structure permits the energy prices are to be determined by the market mechanism.

However, where it is necessary to regulate prices because of the nature of the energy services such as electricity distribution which is by nature a virtual monopoly, government ensures efficiency pricing and a fair return on investments (Government of Kenya, 2004: section 6.6.5, clause 1). The Kenya Energy Regulatory Commission settled with the Long Run Marginal Cost model of pricing which has seen tariffs increase upwards.

5. II.1: Tariffs and Tariff Structure

The tariff structure and the terms for the supply of electricity should be in accordance with the principles prescribed by the commission. The substantial changes in the tariffs structure of Kenya power sector first occurred in 2005 when revisions were done to reflect long-run marginal costs and automatically pass-through changes in the fuel costs and exchange rate movements. The Energy Act, 2006 describes all tariffs charged for electrical energy should be justified and reasonable. Any review is filed with the commission for its approval not later than forty-five days before the proposed effective date. The commission has discretion to suspend a schedule of tariffs increase for up to five months. The consumers are classified into various categories on the basis of the type of consumers and quantity of energy demand. The current electricity tariff structure for KPLC has been in place since July 2008.

As per existing tariff policy in Kenya various categories of consumers were being charged tariff at different rates as per the new tariff Order for the FY 2007-08. Moreover, the tariff structure is not uniform across the categories of consumers. The tariff structure for domestic sales has a slab system on the basis of electricity consumption. There are three slabs and the first slab covers the electricity consumption 0 units up to 50 units per month. The consumer electricity tariff structure is such that there is cross-subsidy whereby the high electricity consumers subsidize the low consumers. The life-line consumers utilize less than 50kwh/per month and pay the generation cost only. The second slab covers the consumption levels between 51 Units to 1,500 units per month and third slab were applicable for consumption above 1500 units per month.
The commercial and Industrial power supply has been classified into five Groups, commercial industrial 1 (CI1) with consumption of 415 units up to 3 phase, commercial industrial 2 (CI2) with consumption of 15,000 units, commercial industrial 3 (CI3) with consumption units over 15,000, commercial industrial 4 (CI4) with no limit in consumption, and lastly commercial industrial 5 (CI5) with no limit in consumption Power supply on the basis of connected load. It may also be noted that some consumer categories were charged tariff rates consistently at higher rates than the domestic consumers without any socio-economic rationale. This implies that tariff rates do not have any systematic relationship with the cost of supply. Socio-economic, world oil price increase and political considerations appear to have played crucial role in the formation of tariff structure. Irrational pricing policy has its serious implications for the utility as well as the economy. To ensure financial viability of the system, the tariff rates must reflect cost of supply. The cost of supply depends on the following: (i) quantity of energy supplied, (ii) maximum demand, (iii) load factor, (VI) diversity factor (v) location, (VI) time of load incidence, (vii) seasonal variations of load and (viii) power factor.

5. II.2: Cost Recovery

The cost recovery is measured by taking sales revenue as a ratio of cost. Mathematically it is calculated as shown:

\[
\text{Cost Recovery Ratio} = \frac{\text{Average Revenue}}{\text{Average Cost}} \times 100
\]

**Figure 5.19: Change-Point Analysis of Trend in Cost Recovery Ratio from Sale of electricity in Kenya 1993-2013**
Figure 5.19 and Table 5.19 shows change-point analysis for Cost Recovery Ratio (CRR) trends during the period 1993-2013. The results unravel two major critical change-points. The first major critical change point happened between 1995 and 2009 with a confidence level of 91% while the second major critical change point happened between 1996 and 2013 with a confidence level of 96%. The graphical presentation of trend line in Figure 5.19 also shows that the rate of recovery declined from 1993-1995 when the first major critical change point is indicated. This sharp decline is associated with the poor financial performance which the company was facing at this period. The high transmission and transmission losses (16%), high operating expenditure as the company was not receiving any financial aid and increase in international oil prices. The sharp increase up from 1996 to 1999 is attributed with adjusting of tariffs to reflect 75% LRMC 1996, introduction of automatic foreign exchange formula to shield company from adverse exchange rates 1996.

There was a sharp decline in trend of cost recovery ratio between 1999 and 2002. The increase is due to high transmission and distribution losses of 21.3% in 2002, increase in international oil prices 2001, system outages due to 1999-2000 droughts and fraud from Westmont, Iberafrica (IPP) Nyanja (Report, 2003). From 2003-2009, there was constant increase in trend of cost recovery ratio of electricity. The continuous increase is associated with improved rains which increased power supply, the commitment of the company to reduce transmission and distribution losses less to 14.5% in 2005 which showed transmission and distribution losses decline to 16% by 2008. The 2009-2013 declines are associated with the 2008-2009 droughts.
The electronic billing system introduced in 2010 has helped so much in ensuring the bills are paid in time and customers receive efficient services.

5. II.3: Issues of Subsidies

Subsidies may be defined as the contribution made by the government to pay for the difference between the price of electricity and the actual cost of electricity supply to make electricity affordable to the consumers especially the low income group. There are two types of subsidies, i.e. Pre-tax subsidies which arise when energy consumers pay less than the supply cost of energy and tax subsidies where the tax imposed on energy is not high enough to account for all the energy consumption, including on the environment.

Subsidies are said to crowd out public spending that support growth, including infrastructure, education, health care, and the social safety net. It is said that some countries end up spending more on energy subsidies in the name of economic welfare of their population while they end up ignoring other areas of infrastructure. Energy subsidies are also considered problematic to the global economy and the environment till the leaders in G20 summit held in Pittsburgh in 2009 acknowledged it and the leaders pledged to eliminate all inefficient fossil fuel subsidies over the medium form. This issue has been a point of debate because of the level of development which many countries are in and the failure to agree on the best level of subsidies to be provided by under-developed countries as compared to those of developed countries.

It is said that subsidies may encourage inequality because mostly those who benefit are the upper-income groups since they are the largest consumers of energy. For example the poor in Africa do not benefit much from electricity subsidies since there are a few consumers connected to the electricity grid. For example, the 5 percent of the rural population in Kenya as stated in chapter one. This is because of their poor economic status and the nature of subsidies being conveyed through controlled by prices and the subsidy you receive is related to the amount of electricity you consume. Kenya and Uganda in the East Africa have been taken as the best examples to be emulated on the reforms they have made on electricity. Kenya approached the issue through engaging the stakeholders’ particularly large consumers by intensive negotiations on the objectives and benefits of the reforms.
In Kenya, subsidies for electricity supplied are incurred by the state-owned companies who supply electricity to various categories of consumers at subsidized prices. KERC, the electricity regulatory commission, pursues the policy of cross-subsidization to generate surplus revenue to compensate the losses on account of subsidized electricity supply provided to commercial, industrial and off-peak consumers. Subsidies estimates are as a result of average domestic prices and cost-recovery prices that cover production and investment as well as distributional losses and the non-payment of electricity bills. The subsidies/surplus from the sale of electricity to various categories of consumers has been presented in Table 5.20. It depicts that revenue surplus due to power supply increased from the FY1992-93 to the FY 1998-99. In the FY 2001-02, there was a deficit of -36.66 the deficit was recovered by the sector being subsided. Later after this period again the there has been a surplus till 2013-14.

**Table 5.20: Subsidies/Surplus (Kshs/Kwh)**

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>+0.48</td>
<td>+2.49</td>
<td>+0.51</td>
<td>-3.79</td>
<td>+1.19</td>
<td>+1.86</td>
<td>+4.89</td>
<td>+4.78</td>
</tr>
<tr>
<td>Medium</td>
<td>+0.71</td>
<td>+3.45</td>
<td>+1.28</td>
<td>-5.02</td>
<td>+1.51</td>
<td>+0.55</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Large</td>
<td>+0.32</td>
<td>+2.66</td>
<td>-0.07</td>
<td>-5.68</td>
<td>+0.29</td>
<td>-0.51</td>
<td>-0.94</td>
<td>-0.95</td>
</tr>
<tr>
<td>Off-Peak</td>
<td>+0.16</td>
<td>+2.29</td>
<td>-0.74</td>
<td>-10.14</td>
<td>+3.09</td>
<td>-1.57</td>
<td>-14.61</td>
<td>-13.14</td>
</tr>
<tr>
<td>Street-Lighting</td>
<td>+0.57</td>
<td>+2.43</td>
<td>+0.51</td>
<td>-7.49</td>
<td>+4.54</td>
<td>+7.69</td>
<td>-8.27</td>
<td>+9.41</td>
</tr>
<tr>
<td>REP</td>
<td>+0.59</td>
<td>+4.03</td>
<td>+0.85</td>
<td>-4.54</td>
<td>+1.89</td>
<td>+1.06</td>
<td>+4.00</td>
<td>+5.74</td>
</tr>
<tr>
<td>Total</td>
<td><strong>2.85</strong></td>
<td><strong>17.35</strong></td>
<td><strong>2.34</strong></td>
<td><strong>-36.66</strong></td>
<td><strong>12.51</strong></td>
<td><strong>9.08</strong></td>
<td><strong>14.93</strong></td>
<td><strong>5.84</strong></td>
</tr>
</tbody>
</table>

Source: KPLC Annual Reports for Various Years.

Table 5.20 shows that there was a surplus in all other categories of consumers all over the years of study except the FY-2001-02 when all categories of consumers were subsidized. This happened due the economic constraint which the country had
gone through as a result of the severe drought which had hit the country as from 1998 to 2002. From the Tariff Order for the FY2006-07, the distribution licenses have mentioned in their ARR filings that significant portion of subsidy of previous year was still unpaid. This meant that the government of Kenya was abdicating its responsibility. From Table 5.20, it can be seen that the total quantum of subsidy for large consumers increased from the FY 1998-99 to the FY 2013-14. This is due to the two-tie policy which the electricity regulatory body had introduced in 1999 as an incentive to these consumers to change their production timings from Peak (day) to off-peak(night). It needs to be noted that the small and medium consumers continued to generate surplus revenue over the study period except in the FY 2001-02 when all categories of consumers were subsidized.

This is an indication that subsidies benefit those who consume more electricity and are in the high income group and not the poor as it was meant to be in Kenya. Because the small and medium consumers seem to cross-subsidize the large consumers as shown form Table 5.20. In the case of off-peak consumers the amount of subsidy increased many folds from Kshs-0.74 million in the FY 1998-99 to Kshs-13.14 million in 2013-14. The increase in subsidies may also be attributed to the government policy of ensuring that they electrify all public facilities in the rural areas. This is seen to happen more after the introduction of Rural Electrification Authority in 2006 onwards.

From the above analysis, we found out that retail electricity supply in Kenya is undertaken by Kenya Power and Lighting Company. Electricity is sold to different categories of customers as per the Tariff structure 2008, defined by the Energy Regulatory Commission. In general, electricity sales showed an upward trend as shown in Figure5.6 except a decline between 1999 and 2000. All categories of customers indicated an upward trend of electricity sales in the past 20 years of study except electricity sales to off-peak customers which showed a downward trend as shown in Figure5.3. More electricity was sold to large customers followed by small customers, Rural Electricity Programme, off-peak and street lighting customers respectively. The critical change-points in Table 5.6 indicated that, during the period when there was drought and the economy was performing poor the sales of electricity to all categories of customers declined and when the rains improved and the economy also improved the sales increased to all categories of customers.
The trend for total revenue from sales increased upwards throughout the period of study though change in trend was indicated more in between 1999 and 2001. This was as a result of the adjustment of the tariffs to reflect 100% LRMC which was done by Electricity Regulatory Board which was established in 1998 and the increase in number of customers. The constant increase in revenue as from 2001 to 2007 was due to the increase in the number of customers as well as the tariffs remaining unchanged since 2000.

The trend for average revenue increased constantly except in between 2000-2003 and 2009-2010 when there was a decline. The decline in 2000-2003 was due to shortage of power and the economic status of the economy. When average revenue had declined the average cost was high at the same time between 2000-2003 and 2008-2010. During these periods all customers were charged high tariffs. The increase in cost of electricity in 2008-2010 was due to the tariff increase in 2008 when Energy Regulatory Commission revised the tariffs and also due to the high cost of power purchased from IPPs and use of emergence generators due to 2008-2009 droughts. The findings overall indicated that the Energy Regulatory Commission adjusted tariffs to seal the company from exchange rate fluctuations, during the period of shortage and also IPPs charged high cost to recover their cost of production. This was more evident when there was drought and shortage of power. The investment in thermal generators which most IPPs use is the main cause of high cost of power in Kenya.

We found out that capital expenditure is a component of internal plus external sources. There are also 30 percent bonds in Nairobi Stock Exchange as from 2005. The expenditure on power sector has been constantly low the trend increased more after 2003 onwards. The increase is due to the government policy of Energy Sector Recovery Projects (ESRP) 2004. Loans are the main sources of capital formation in Kenya Power Sector and it has been constantly low as from 1993 to 2005 when the trend increased upwards till 2013. This is due to the government efforts to work with development partners to ensure increased access to electricity in Kenya through (ESRP).

Electricity prices in Kenya are supposed to be determined by the market mechanism but KERC responsible of fixing tariffs and regulating electricity prices follows long-run marginal cost model of pricing. Different Customers categories are
charged according to the units consumed. The tariffs are described as just and reasonable by the Energy Act No.12, 2006. Kenya pursues cross-subsidies policy across different categories of customers to compensate the losses on account of subsidized electricity supply.