UNIVERSITY OF NAIROBI

School of Engineering

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

ENERGY AUDITING IN AN INDUSTRIAL PLANT

(A Case of East Africa Cable Industries Ltd)

A Project Report Submitted in Partial Fulfillment of the

Requirement for The award of the Degree of Master of Science

in Energy Management of the University of Nairobi

BY

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DECLARATION

This Project Report is my original work and has not been submitted for examination to any university.

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My special gratitude goes to the Late Professor Makau Luti, who inspired me to undertake this Couse way back before enrolling at the University, and guided me through the Couse work. As my lecturer he was always available for me and explained everything i needed to know in his field of specialization. As my project supervisor, he ensured that i consult with him regularly.

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Last but not least, I sincerely thank my beloved wife Susane and my children Anne, Esther and Daniel who kept encouraging me to finish my Couse and spared their time to assist me wherever i needed help, including staying late without feeling disturbed.

ABSTRACT

Various studies in different countries have shown that significant energy efficiency improvement opportunities exist in the industrial sector, many of which are cost-effective. These energy-efficiency options include both cross-cutting as well as sector-specific measures. However, industrial plants are not always aware of energy-efficiency improvement potentials. Conducting an energy audit is one of the first steps in identifying these potentials. Even so, many plants do not have the capacity to conduct an effective energy audit. In some countries, government policies and programs aim to assist industry to improve competitiveness through increased energy efficiency. However, usually only limited technical and financial resources for improving energy efficiency are available, especially for small and medium-sized enterprises. Information on energy auditing and practices should, therefore, be prepared and disseminated to industrial plants

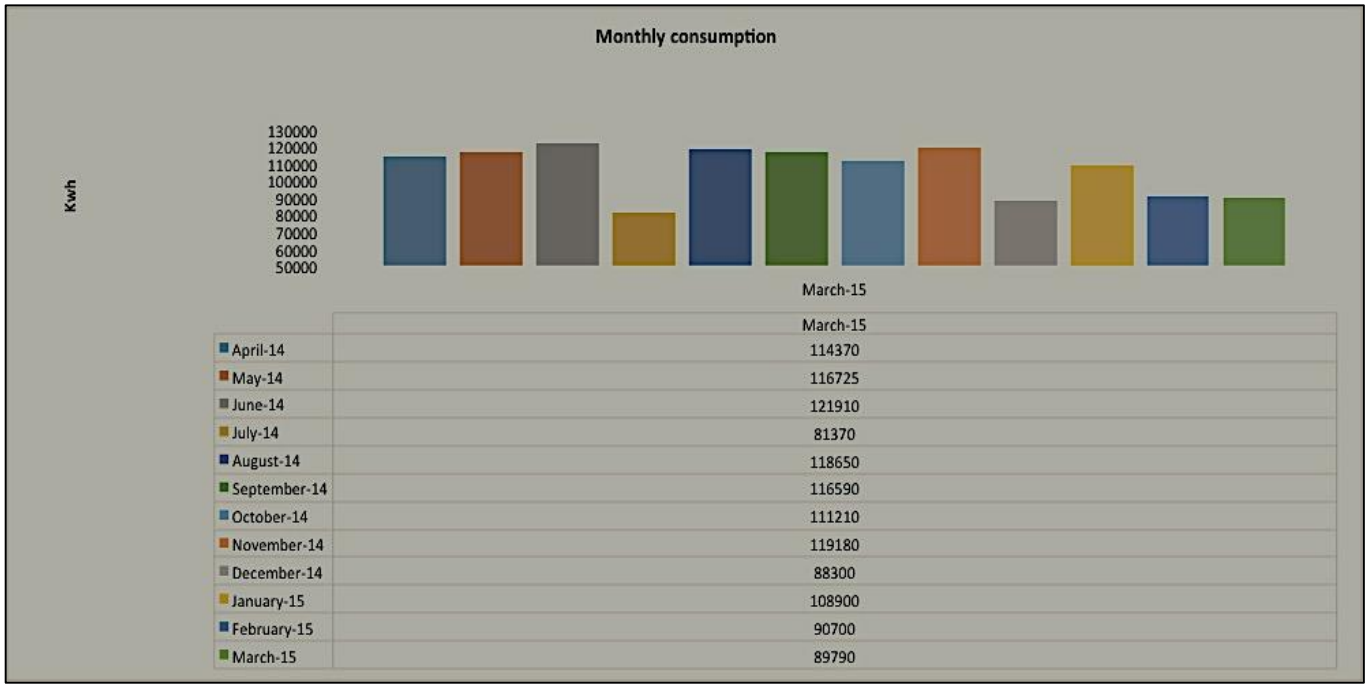
LIST OF ABREVIATIONS

PF	Power factor
kW	Kilowatt
EUI	Energy use Intensity
Kwh	Kilowatt hour
IRR	Internal Rate of Return
NPV	Net Present Value
ECM	Energy Conservation Measures
ECS	Electrical Energy Consumed
ELF	Electrical Load Factor
OLF	Occupancy Load Factor
Q	Discharge Capacity of Water
ES	Energy Savings
EACL	East African Cables Limited
M&V	Measurement and Verification
SFE	Stacking Fault Energy
TCO	Total Cost of Ownership

EXECUTIVE SUMMARY

An energy audit was conducted at East African cables Addis plant to investigate the energy potential of the facility and possible savings.

The main objective of this energy audit was to identify and analyse Energy Conservation Measures (ECMs) that could reduce energy costs as well as provide the client a means of better understanding energy use in the factory. The graph, figure 1 below presents the energy consumption at the factory during the baseline period. The period chosen for the factory was a 12-months from April 2014 to March 2015.



	March-15
April-14	114370
May-14	116725
June-14	121910
July-14	81370
August-14	118650
September-14	116590
October-14	111210
November-14	119180
December-14	88300
January-15	108900
February-15	90700
March-15	89790

Figure 1: Electricity consumption over baseline period

Energy Saving Measures

The audit entailed interviews with site management and staff, measurement of energy parameters using various audit instruments, identification of energy efficiency opportunities and a financial analysis of the energy conservation (efficiency) measures that covered life cycle cost and IRR. This approach takes into account the energy savings and maintenance costs during the life of the project. The audit report provides financial justification for the key energy conservation measures which financial institutions can easily adopt with little or no change.

MEASURE DESCRIPTION	ELEC SAVINGS (KWH)	TOTAL ANNUAL COST SAVINGS (KES)	CO2 EMISSIONS REDUCTION (TONS)	MEASURE COST(KES)	IRR (OVER LIFE OF MEASURE)	NPV	SIMPLE PAYBACK (YR)
Solar Leasing		**2,342,700.00**	**38**	-	-	-	-
Power Factor Correction		**236,995.00**	**-**	**200,000.00**	-	-	**immediate**
Compressor Leaks	**241344**	**4,826,888.00**	**79**	**1,250,000.00**	**-**	**17,017,274**	**3 months**
Lighting	**181247**	**3,624,946.00**	**60**	**4,858,200.00**	**72%**	**7,293,181**	**1.34**
Totals	**539726**	**11,031,529.00**	**177**	**5,208,200.00**	**-**	**-**	**-**

A summary of the recommended energy conservation measures, annual energy savings and cost savings are tabulated below. key energy conservation measures which financial institutions can easily adopt are also highlighted.

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CHAPTER ONE

1.0 Introduction

Energy Audit is defined as the verification,monitoring andanalysis of Energy use including submission of technical report containing all the recommendations for improving energy efficiency with cost analysis and an action plan to reduce consumption. Most energy sources used in industry include Electricity,Natural gas, Oil and other fuels.Electrical energy is the most expensive and the most important form of purchased energy used at the factory. For this reason, its use must be confined to a minimum for efficient and economic operation. Because of its flexibility, electricity offers advantages over the conventional fossil fuels, and efforts to conserve electricity can result in significant cost savings.[1] In non-oil producing countries like Kenya, where energy resources are scarce and production of electricity is very costly, energy conservation studies are of great importance.

The primary objective of this energy report is to identify and evaluate opportunities for electrical energy conservation at East African Cables plant.

The factors to be considered when discussing and quantifying energy conservation measures include,electrical energy savings (kWh),electrical demand savings (kW),electrical energy cost savings (Kes) and Payback period (months)

Benefits of Audit in industrial facility will include:

a) Financial benefits which contribute to reduction in operating costs or increase in the profits of the organization.
b) Operational benefits that assist the management of industries site improve the comfort,safety and productivity.
c) Enviromental benefits like reduction in CO2 Concentrations or other greenhouse gases and emmission [2]

1.1Background of the Facility Audited

East African Cables Limited is a Kenya-based company. The Company is engaged in the manufacture and sale of electrical cables and conductors. The Company's main products are manufactured cables for applications in domestic and Industrial lighting, as well as transmission and distribution of electricity. It has four manufacturing facilities , two in Nairobi Kenya, one in Dar es Salaam Tanzania, and one in Eastern DRC. Its product portfolio includes Copper electrical cables and conductors for domestic as well as industrial applications PVC and XLPE based products, Aluminum conductors and cables used for power distribution and transmission over national gridlines AAC, ACSR and ABC products Telecommunication and data cables. Telecommunication and data cables include local area network cables, fiber optic cables and related accessories.

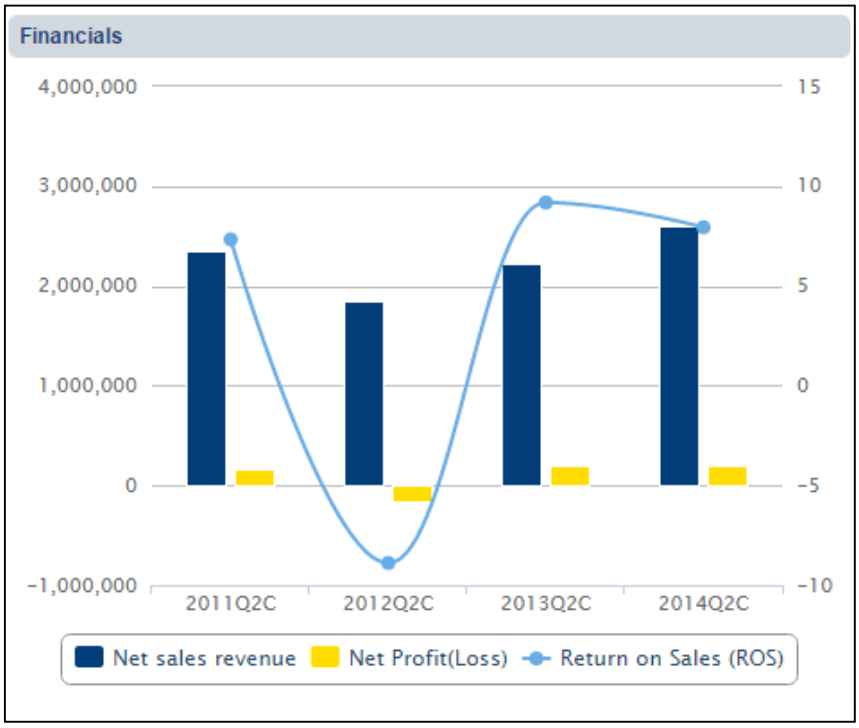


Figure 1.1 EACL Financials

The baseline period of 2014 to 2015 was found to be a good point of comparison for energy use. This is because co-incidentally from the financials above, this period had the highest sales revenue of the past three years. Despite enjoying a good market share and command in the cable manufacturing industry with an enterprise value of over 6.4 billion KS. EACL believes there is still room for improvement and this is what has motivated the company to undertake this energy audit.

1.2 Scope of the Audit

The audit is a general energy audit conducted in line with ISO 50001 standards. The audit was conducted over a two-month period of October,2015 to November 2015 and consisted of an analysis of energy use per machine as well as water and diesel consumption over the same twelve month period.

1.3 Objectives of the audit

The objectives of an energy audit can vary from one plant to another. In this case,, the energy audit was conducted to understand how energy is used within the plant and to find opportunities for improvement and energy saving. Sometimes, energy audits are conducted to evaluate the effectiveness of an energy efficiency project or program specifically;

i. To clearly identify the types, sources and costs of energy used during the period 2014 to 2015.
ii. To understand how energy is being used, and possibly wasted
iii. To identify and analyse alternatives such as improved operational techniques and/or new equipment that could substantially reduce the energy costs.
iv. To perform an economic analysis on alternatives identified, and determine the most cost-effective option for the factory.

1.4 Major Energy Consuming Machines

The Organization has been incurring high expenditures on Energy use and wants to understand the reason for this major Energy Consuming .The major energy consuming machines were identified by a simple walkthrough.These machines include

- Factory Machines,
- Compressors ,
- Storage and Lighting
- Extruders among others.

CHAPTER TWO

LITERATURE REVIEW:

2.0 Introduction to Industrial Energy Auditing

An energy audit is a key to assessing the energy performance of an industrial plant and for developing an energy management program. The typical steps of an energy audit are:

i. preparation and planning
ii. data collection and review
iii. plant surveys and system measurements
iv. observation and review of operating practices
v. data documentation and analysis
vi. reporting of the results and recommendations

2.1 Definition of energy auditing

There are several relatively similar definitions of an energy audit [3], defines energy auditing as "The verification, monitoring and analysis of the use of energy and submission of technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption."

2.2 Types of Energy Audits

The type of industrial energy audit conducted depends on the function, size, and type of the industry, the depth to which the audit is needed, and the potential and magnitude of energy savings and cost reduction desired. Based on these criteria, an industrial energy audit can be classified into two types: a preliminary audit (walk-through audit) and a detailed audit (diagnostic audit).

a) Preliminary Audit (Walk-through Audit)

In a preliminary energy audit, readily-available data are mostly used for a simple analysis of energy use and performance of the plant. This type of audit does not require a lot of measurement and data collection. These audits take a relatively short time and the results are more general, providing common opportunities for energy efficiency. The economic analysis is typically limited to calculation of the simple payback period, or the time required paying back the initial capital investment through realized energy savings.

b) Detailed audit (Diagnostic audit)

For detailed (or diagnostic) energy audits, more detailed data and information are required. Measurements and a data inventory are usually conducted and different energy systems (pump, fan, compressed air, steam, process heating, etc.) are assessed in detail. Hence, the time required for this type of audit is longer than that of preliminary audits.

The information to be collected during the detailed Audit includes:-

(a) Energy consumption by type,by department,by major items of process equipment,by end-use.
(b) Material balance data
(c) Energy cost and tariff data
(d) Process and material flow diagrams
(e) Generation and distribution of site services such as compressed air,steam.
(f) Sources of energy supply,such as electricity from the grid or self generation.
(g) Potential for fuel substitution,process modification and use of cogeneration systems.[4]

The results of these audits are more comprehensive and useful since they give a more accurate picture of the energy performance of the plant and more specific recommendation for improvements. The economic analysis conducted for the efficiency measures recommended typically simple payback period and usually include the calculation of an internal rate of return (IRR), net present value (NPV), and often also life cycle cost (LCC).

2.3 Making an Audit Plan

An audit plan outlines the audit strategy and procedure. The plan helps the auditors to check the consistency and completeness of the audit process and make sure nothing important is neglected or overlooked. The audit plan should provide the following (CIPEC 2009):

i. Scope of the audit
ii. Time of the audit and its duration as well as the timeline for each step of the audit process
iii. Elements of the audit that have a high priority
iv. Responsibilities and tasks of each audit team member

v. Format of the audit report and its outline

2.4 Preparing an Audit Checklist

The audit checklist helps the auditor to conduct the work in a systematic and consistent way. The checklist should include:

i. Steps to be taken during the energy audit
ii. Data and information that should be collected
iii. Existing measurement instrument and the data recorded
iv. Required measurements during the energy audit and the list of parameters to be measured
v. Major equipment to be assessed in more detail
vi. List of main components of the results section of the audit report, for guidance
vii. Other major concerns and considerations

2.5 Conducting the initial walk-through visit

The purpose of the initial walk-through visit is for the energy audit team to become familiar with the facility to be audited. The auditors can go through the processes and utilities that they will audit in detail later.

2.6 Collecting Energy Bills and available Data and Information

Energy bills along with other current and historical energy- and production-related data and information should be collected at the beginning of the audit process. The more historical data available, the better the auditor can understand the performance of the plant at differing times of day, in various seasons, and under diverse production conditions. The data that can be collected at the beginning of an energy audit include the followings:

i. Energy bills and invoices (electricity and fuels) for the last 2 to 3 years
ii. Monthly production data for the last 2 to 3 years
iii. Climatic data for the period in which the auditing is conducted
iv. Possible archived records with measurements from existing records
v. Architectural and engineering plans of the plant and its equipment
vi. Status of energy management and any energy-saving measures implemented
vii. General information about the plant (year of construction, ownership status, renovations, types of products, operation schedule, operating hours, scheduled shut-downs, etc.)

2.7 Conducting the Preliminary Analysis

The preliminary analysis helps the energy auditor to better understand the plant by providing a general picture of the plant energy use, operation, and energy losses. This effort provides enough information to undertake any necessary changes in the audit plan.

In the preliminary analysis, a flowchart can be constructed that shows the energy flows of the system being audited. An overview of unit operations, important process steps, areas of material and energy use, and sources of waste generation should be presented in this flowchart

2.8 Analyzing Energy Bills

Energy bills, especially those for electricity and natural gas, are very useful for understanding and analyzing a plant's energy costs.

2.9 Electricity Bills

Several costs are usually included in the electricity bill. Most electric rates include a fixed service (or customer) charge that is constant regardless of the amount of electricity used, and a per kilowatt-hour (kWh) rate for the amount of electricity consumed. Most electricity bills (except for very small facilities) also include a demand charge per kilowatt (KW). The demand charge is based on the highest (or peak) electricity use each month, averaged over a short time period (usually 15 minutes). On some bills, demand cost and kWh cost are combined and shown as a single cost.

There is also a time-of-use charge in most industrial consumer electric bills. Based on the time in which the electricity is used, prices per kWh and per KW will vary. The other item in industrial electric bills is the charge for "reactive power" which is based on the types of electrical loads in a plant. For example, facilities with many electric motors may pay a penalty due to the increased electric transmission capacity needed for large inductive loads. Understanding rates is also important for planning energy-efficiency retrofits. To predict energy cost savings with the highest accuracy, savings must be calculated based on the time they occur and the rates in effect during each time period (California Energy Commission 2000).

Based on the data and information derived from the electricity bills, several calculations can be made.

2.10 Calculating electricity use per day (kWh/day)

Electricity use in the period covered by the electricity bill can be divided by the number of the days given in the bill. Since reading periods in the bills can vary, kWh/day is more useful for

identifying consumption trends than the total billed kWh. This can be used later to accurately calculate the monthly electricity use and can also be used for graphical analysis.

2.11 Calculating the Load Factor (LF)

The load factor is the ratio of the energy consumed during a given period (in the electricity bill) to the energy which would have been consumed if maximum demand had been maintained throughout the period.

$$Load\ Factor(\%) = \frac{\text{Total kWh for the billing period x 100}}{\text{Peak Demand X no. of Days X 24 Hours}}$$

Maximum demand and total kilowatts – hours are obtained from past electricity bills normally the load factor is less than 100% that is the energy consumed is less than the maximum power demand at any time in the period multiplied by the total period time in general if the load factor in a plant is reduced the total cost of electricity will be higher (morvay and gvozdenac 2008) in other words the load factor is a useful method of determining if a plant is utilizing its energy consuming equipment on a consistence basis (higher lf) of using the equipment for the shortest duration (lower LF) thereby paying a demand penalty.

The simplest method for reducing peak loads is to schedule production activities in a way that the big electricity power users do not operate at the peak time at all or at least some of them do not operate at the same time if possible machine scheduling is the practice of turning equipment on or off depending on the time of day, day of week day or other variables and production Coal and fuel oil bills[5]

The actual use of coal and fuel oil is difficult to track accurately because consumption is not usually metered. Monthly consumption is typically estimated based on fuel delivery dates and may not correspond to actual consumption. Coal consumption can be estimated from the combustion efficiency and energy output of coal-fired equipment. Oil consumption can be obtained from meters on the outflow of oil storage tanks if such meter exists. If the meter is not installed on fuel oil consuming equipment, then the same method for the estimation of coal consumption can also be used for fuel oil as well.

2.12 Graphical analysis of historical energy use

Graphical analysis of hourly/daily/monthly/yearly energy use for each type of energy used in a plant can help to better understand the energy use pattern in the plant. Sometimes the patterns are unexpected and can lead to opportunities to modify the way energy is used and save energy. For example, one might not normally expect a heavy process industry like cement industry to exhibit a seasonal variation in energy use because of weather changes. Despite this, if a seasonal pattern shows up in the graphical analysis, this may suggest the need to investigate for the possible sources of energy losses[3]

It is common for a plant's operating conditions or capacities to vary over the year. Therefore, the variation of energy use alone may not truly reflect the condition of energy efficiency in a plant. Thus, it is much better and more accurate to conduct this type of graphical analysis of a plant's energy intensity (EI), which is the energy use per unit of production. Energy intensity can be calculated by using monthly energy consumption data obtained from energy bills and the monthly production data.Energy

$$Energy\ Intensity\ (kWh\ or\ GJ/\ tonne)\ = \frac{\text{Energy consumption (kWh or GJ)}}{\text{Production (tonne)}}$$

A pie chart is another type of chart that can be used for graphical analysis of historical energy use and cost data. A pie chart can be used to show the share of various types of energy use and their costs graphically. Both monthly and annual data can be used for plotting such graph (Hooke et al. 2003).

2.13 Inventory and measurement of energy use

Gathering data through an inventory and measurement is one of the main activities of energy auditing. Without adequate and accurate data, an energy audit cannot be successfully accomplished. Some data are readily available and can be collected from different divisions of the plant being audited. Some other data can be collected through measurement and recording. The energy audit team should be well-equipped with all of the necessary measurement instruments. These instruments can be portable or installed in certain equipment (CRES 2000). The most common data measured during the auditing process are:

i. Liquid and gas fuel flows
ii. Electrical measurements, such as the voltage, current intensity and power, as well as power factor
iii. Temperatures of solid and liquid surfaces
iv. Pressure of fluids in pipes, furnaces or vessels
v. Exhaust gases emissions (CO2, CO, O2 and smoke)
vi. Relative humidity
vii. Luminance levels

2.13.1 Electrical load inventory

Making an inventory of all electrical loads in a plant aims to answer two important questions: where the electricity is used? How much and how fast is electricity used in each category of load? One way to prioritize the electricity-saving opportunities is by the magnitude of the loads. Therefore, identifying and categorizing different loads in a plant can be useful. Because the inventory of the loads also quantifies the demand (i.e. how fast electricity is used) associated with each load or group of loads, it is valuable for further interpretation of the demand profile.

2.13.2 Thermal energy use inventory

An energy flow diagram is helpful for identifying thermal energy flows. The energy flow chart can show all energy flows into the facility, all outgoing flows from the facility to the environment, and all significant energy flows within the facility. The purpose of an energy flow diagram is not to describe a process in detail. In fact, it will generally not show specific devices and equipment that are found in its various sub-systems. The sum of the
energy outflows should equal energy inflows. With this information, it is often possible to see opportunities for energy saving and recovery.

CHAPTER THREE

METHODOLOGY:

3.1 Energy Audit Procedure

The general energy audit focused on identifying sections with potential of energy savings at East African Cables Ltd. And was conducted between the month of September and December,2015. The general procedure undertaken throughout the whole process, from site visit through to energy audit submission, can be broken down into the following.

i. Presentation and discussion of the audit and setting up of Energy Management Team.
ii. Collection of site data for Desktop Analysis and determination of energy consuming loads in the facility.
iii. Walk-through of Facility and Logging of loads to create an Energy balance
iv. Development of Energy Cost saving measures.
v. Presentation of Energy Cost saving Measures and discussion with client on proposed Energy Investment plan.

3.1.1 Presentation and discussion of the audit and setting up of Energy Management team

This involved:-

i. Getting together with the top management to give an overview of what the energy audit entails.
ii. An explanation of the Energy Management Regulations 2012 as aligned in the Energy Act.
iii. Setting up an Energy management committee.

3.1.2. Desktop Analysis, collection of site data and determination of energy consuming loads at the facility.

This involvesd three major steps outlined below:

i. Gathering preliminary data about the facility. This included obtaining the facility's layouts, equipment list and operating hours, identifying the largest energy consuming loads and collecting water and energy bills for the last 12 months.

ii. Gathering relevant tools required for the audit based on types of energy consuming equipment.

iii. Creating a record of energy use over the baseline period and co-relating this to the major energy drivers such as production.

3.1.3 Walk-through of the Facility and Logging Loads to Create an Energy Balance.

In this phase, a tour of the entire facility was carried out and operational patterns and equipment usage examined. This phase entailed:

i. Installation of Data loggers at the main incomer and the specific machine MCBs at the distribution board.

ii. ASHRAE level II walk through audit including staff interviews and taking of nameplate data of equipment at the site.

Table 3.0 Information Sources

	STAFF	**INFORMATION NEEDED**
1.	Maintenance Manager and Assistant	Walk through of the facility Responsible : Johnston kanene & Augustine Mutunga.
2.	Production Manager	Understanding Machine operation and operational hours. Responsible :Mr.Kiragu
3.	On site Intern	Assistance on understanding the site electrical installation. Responsible : Japheth Musyoki

3.1.4 Development of Energy Cost Saving Measures.

i. This step involved research (utilizing the current logged data and the equipment data sheets) in order to come up with feasible Energy Saving Implementation ideas.

ii. Once these are identified, the energy savings were identified and total cost of ownership analysis was carried out to see, if the ECM made any financial sense.

3.1.5 Presentation of Energy Cost saving Measures and formulation of Energy Investment plan.

i. Once the ECMs have been finalized and tabulated. A presentation meeting with the client to develop an investment plan.

ii. At the meeting the ECMs are discussed in detail with the client and a finalized investment plan is tabulated to complete the report.

3.2 Equipment used for the audit

Table 3.1 below gives the equipment used and the measurement outputs.

Tool	Measurement Output
Power Logger	Power Factor, Electricity Consumption, Harmonics,
Thermal Imager	Thermal profile of motors
Ultrasonic Leak Detector	Compressed Air leaks
Real Time monitor	Energy Consumption in real time.

Table 3.1 Equipment used for the audit

3.3 Data Analysis

The following is the information that was analysed in computing energy consumption in the plant, among others:

i. Analysis of metered data and respective energy cost on electricity and water consumption.

ii. 2. Analysing the respective electricity and water production, based on the production needs.

iii. 3. Analysing a 48 hours recording of energy consumption on each of the high energy consuming machine.

3.4 Assumptions :-

3.4.1 Measurement Assumptions

Systems are operating at their peak

3.4.2 Calculation Assumptions

(i) Only significant energy using areas were considered for energy savings

(ii) Conversion of diesel to kWh was assumed to be 11 kWh/Litre of diesel

3.4.3 Carbon Dioxide Emissions

1 kWh of electricity produces 0.4454 kg of CO_2 emission

3.4.4 Financial and Economic Analysis Assumptions

(i) Installation cost are assumed to be the current market rates

(ii) Inflation and bank interests are not factored in the calculations

(iii) Projects with more than a 4 year payback were ignored

CHAPTER FOUR

OBSERVATION AND ANALYSIS.

4.1 Demand and load profile analysis

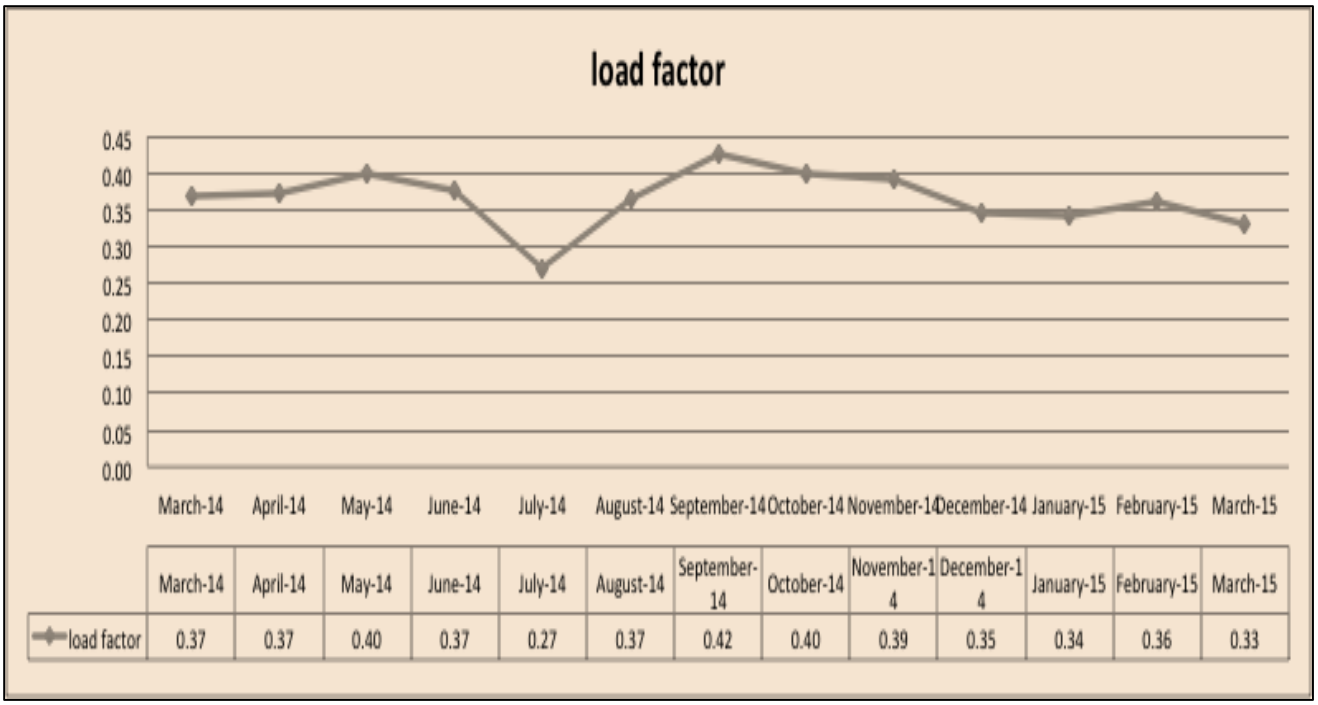
From the demand graph below we see that the month with the highest consumption June 2014 had a relatively low peak as compared to the highest peak demand month of June 2014, which had a max demand of 452 kva.

Figure 4.0 : Demand EACL Addis over the baseline period

4.2 Load Factor Curve

Load factor, in essence, means efficiency. It is the ratio of actual kilowatt-hours used in a given period, divided by the total possible kilowatt -hours that could have been used in the same period, at the peak kW level established by the customer during the billing period.

A high load factor is “a good thing,” and a low load factor is a “bad thing.” A low load factor means that you are using electricity inefficiently relative to what you could be using if you were controlling your peak demand.



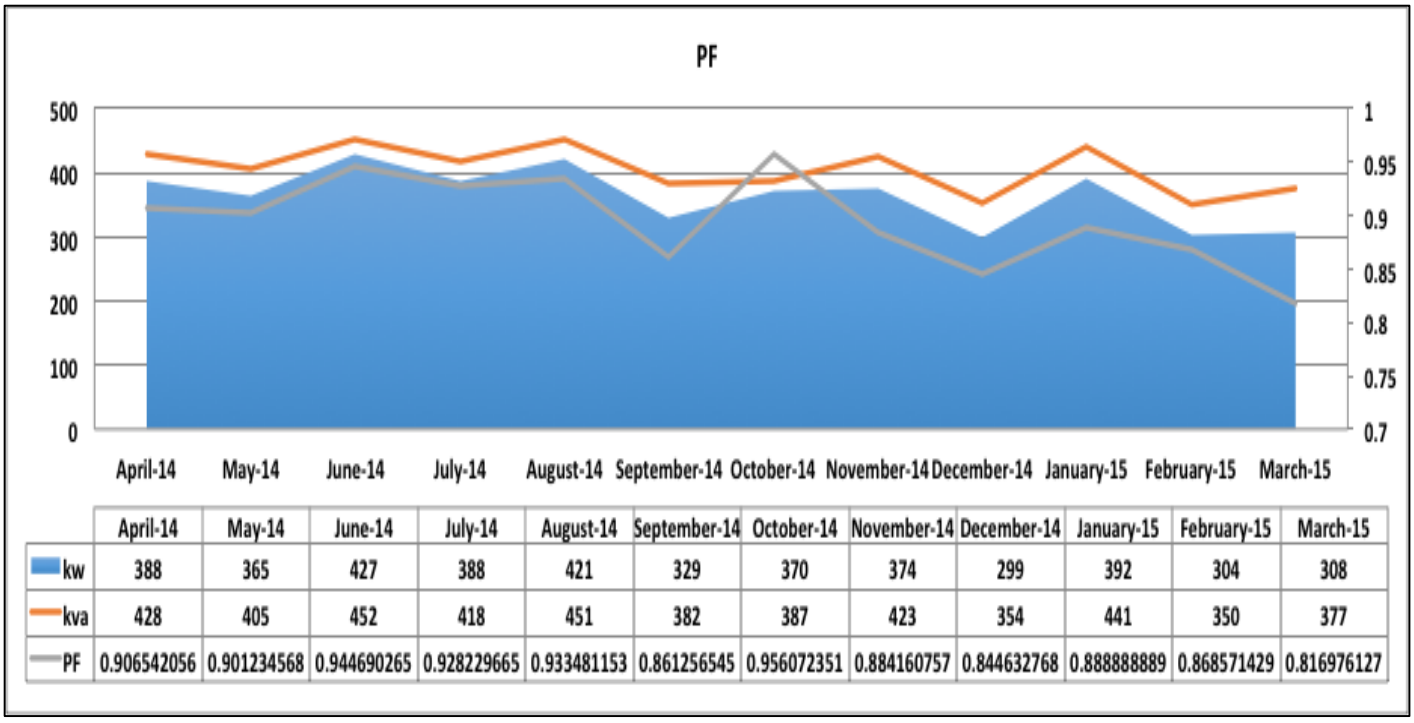
	March-14	April-14	May-14	June-14	July-14	August-14	September-14	October-14	November-14	December-14	January-15	February-15	March-15
load factor	0.37	0.37	0.40	0.37	0.27	0.37	0.42	0.40	0.39	0.35	0.34	0.36	0.33

Figure4.1: Load factor EACL Addis over the baseline period

The graph above shows the load factor profile of the facility, the facility uses between **25** and **45%** of the **available energy** provided by the utility company. This is quite low. Better measures need to be put in place to ensure that the machines running match the available energy. In other words a machine with a large load demand should be scheduled to run for a longer while even if the production demand dictates that it should be run for a short period during the billing period. The surplus produced can be used for future production needs.

The other option would be to utilize load demand shaving where there is a cap to the daily max demand over the billing period. Both these measures will bring significant overall savings to the facility and will help the facility manage their opex better.

4.3 Real versus Apparent Power



	April-14	May-14	June-14	July-14	August-14	September-14	October-14	November-14	December-14	January-15	February-15	March-15
kw	388	365	427	388	421	329	370	374	299	392	304	308
kva	428	405	452	418	451	382	387	423	354	441	350	377
PF	0.906542056	0.901234568	0.944690265	0.928229665	0.933481153	0.861256545	0.956072351	0.884160757	0.844632768	0.888888889	0.868571429	0.816976127

Figure 4.2: PF over the baseline period

The facility has not done a good job in containing their real versus apparent power above the recommended limit of 0.9. There are several instances where the PF falls below the 0.9 and as a result the facility was surcharged.

Table4.0: Cost of PF surcharge over baseline period

	Pf surcharge Period	Amount Paid (KShs)
1.	Jan-15	22,554.00
2.	Feb-15	55,816.00
3.	Mar-15	158,625.00
4.	Total	236,995.00

So far the facility has lost over 230,000kes in power factor surcharge to the utility company.

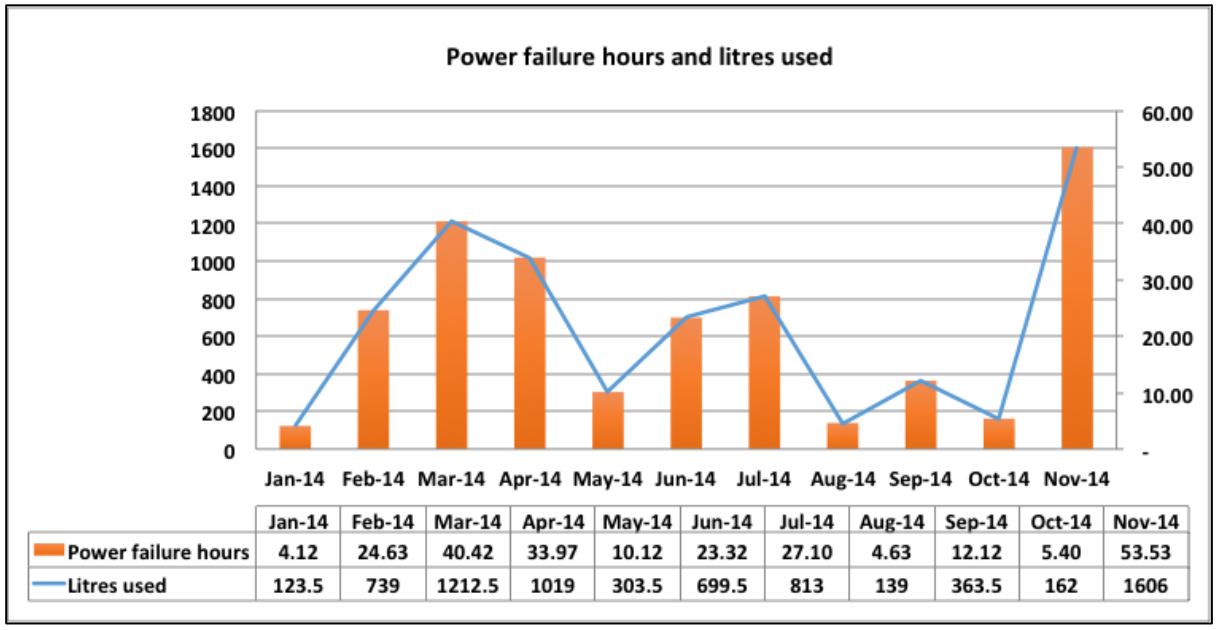
This cost can easily be avoided by installation of capacitor banks to provide the necessary reactive power.

4.4Energy Supply and End

The main source of energy to support daily activities in the factory is electricity. Kenya Power and Lighting supplies the East African Cables Ltd plant with electricity at 11kV that is stepped down by a single transformer to 415V. KPLC serves EACL Addis under the CI2 commercial tariff.

The facility has a 750 Kva generator.

The graph below shows the co-relation between diesel use and power failure hours.



	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14
Power failure hours	4.12	24.63	40.42	33.97	10.12	23.32	27.10	4.63	12.12	5.40	53.53
Litres used	123.5	739	1212.5	1019	303.5	699.5	813	139	363.5	162	1606

Figure 4.3: Power failure hours and Litres of diesel used over the baseline period

There is an almost perfect co-relation however after contacting the energy officer it was found that this are estimated values based on the run hours. EACL should do a better job of diesel management and install a fuel-monitoring gauge that should be recorded before every re-fill.

With this data it is **impossible to calculate the efficiency** of the generator. The results of the calculation are shown below.

4.5Carbon Dioxide Emission

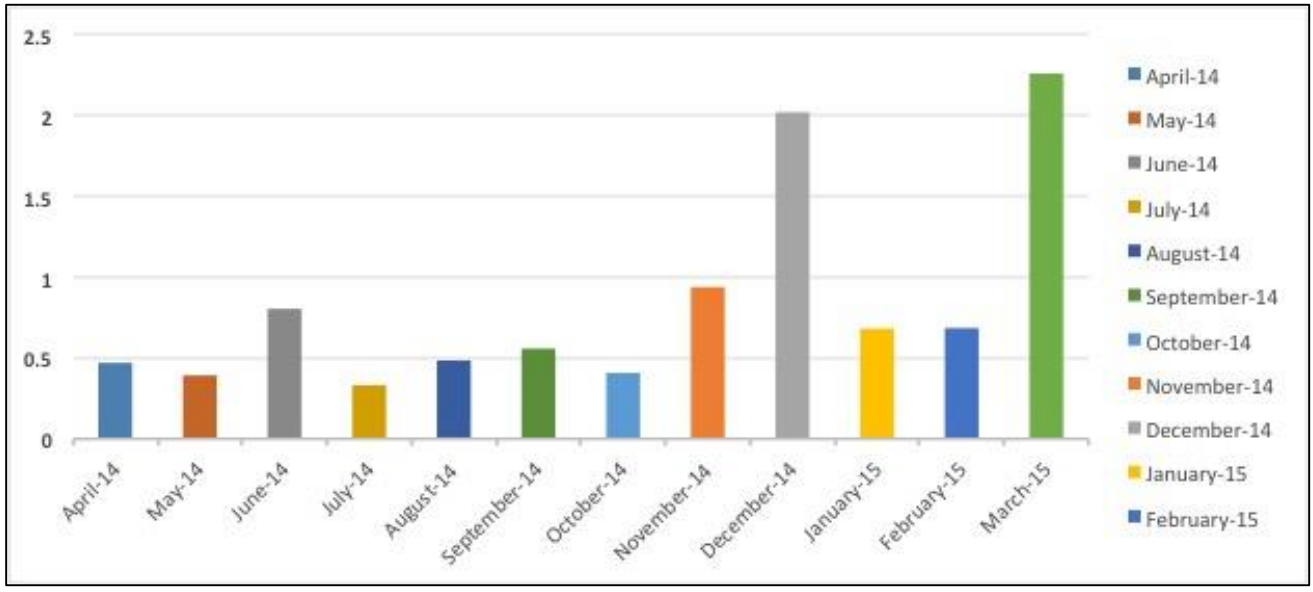


Figure 4.4: Carbon Foot print EACL Addis

The figure above shows the environmental carbon footprint of East African cables ton Co2/ton aluminium produced. The range varies from 0.33 to 2.2. This wide range could be an indication that:-

(i)Aluminum production is not the key energy driver at the facility.

(ii)The facility does not have good energy measures in place to optimize production.

4.6WATER CONSUMPTION

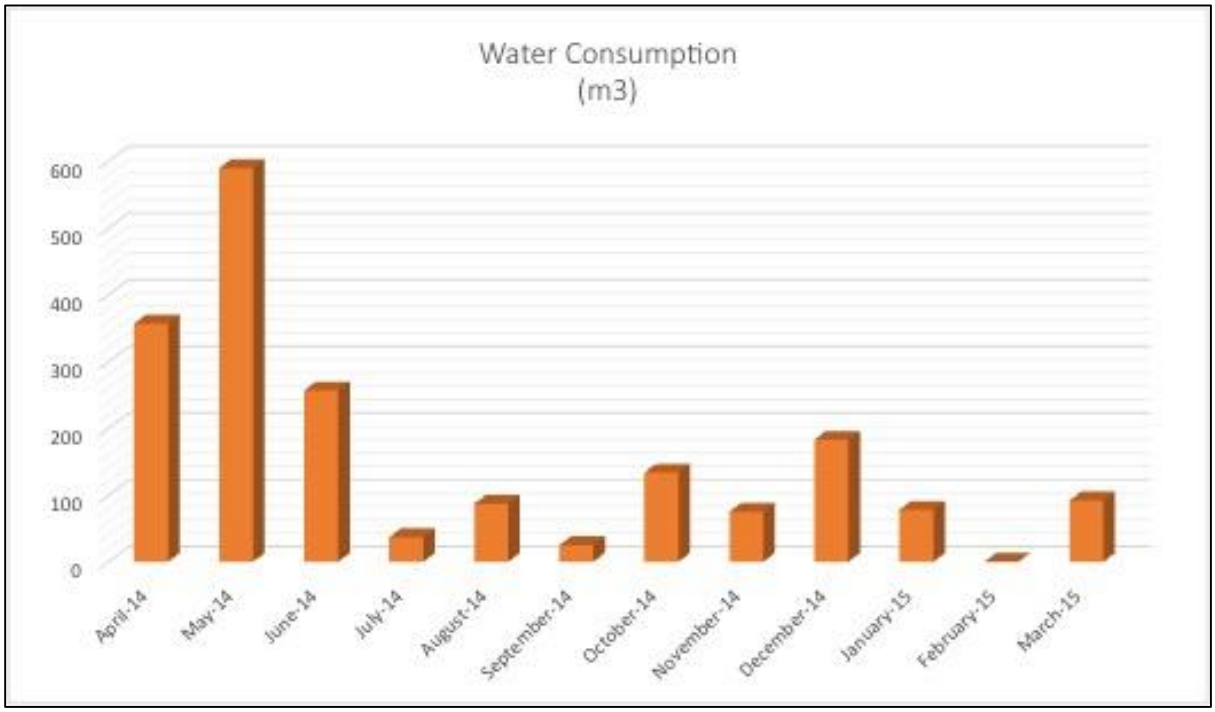


Figure 4.5 : Water use over the baseline period

The graph above shows the water use in the factory over the baseline period.

The graph below shows the co-relation between water usage in the factory versus production.

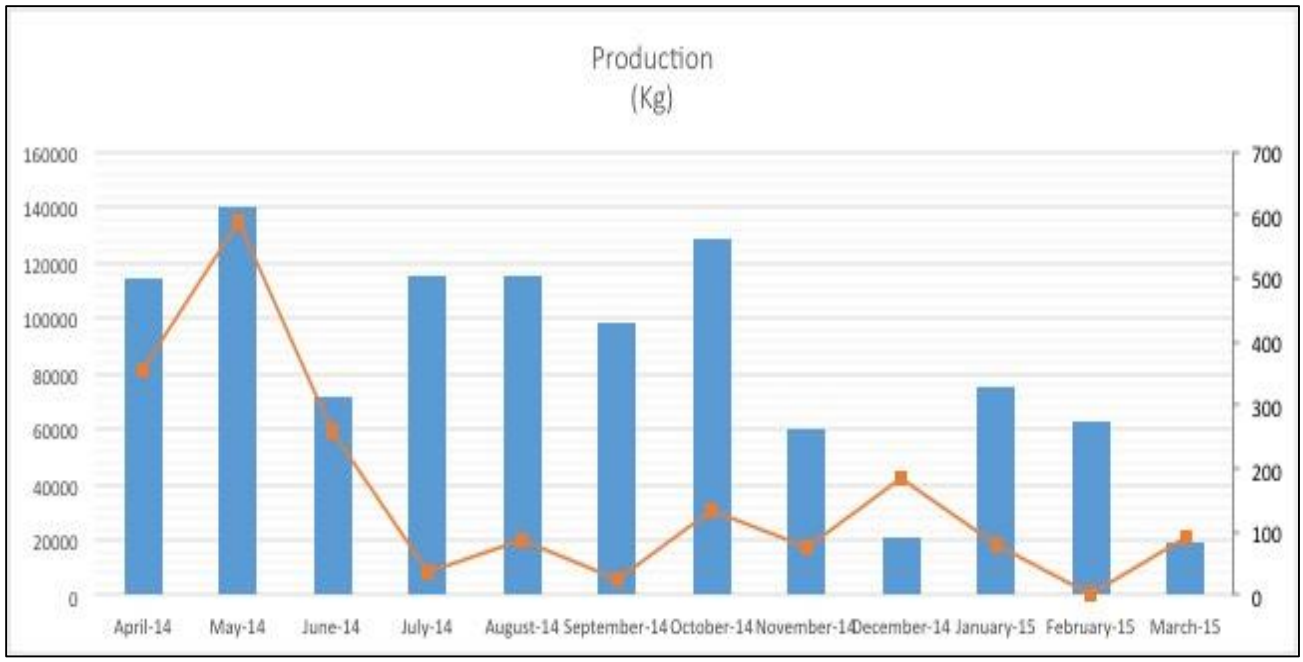


Figure 4.6 : Co-relation Water Versus Production

(Note: The water meter in the facility is not working. For this reason the water data cannot be trusted.)

4.7 FINDINGS AND DATA ANALYSIS

We have studied energy use; at East African Cables Addis. In addition to electricity and diesel use we also studied the water consumption at the factory to gain insight on how to conserve the same.

In this report we have confined our analysis of metered data to electricity data, diesel genset logs, lighting measurements, water bills and data gathered from several site visits.

From this data we were able to get an idea of the energy use and check for any preliminary energy conservation measures.

4.7.1 Comparative Electricity Use.

Analysis of the metered data and energy cost at the factory gave the following indices.

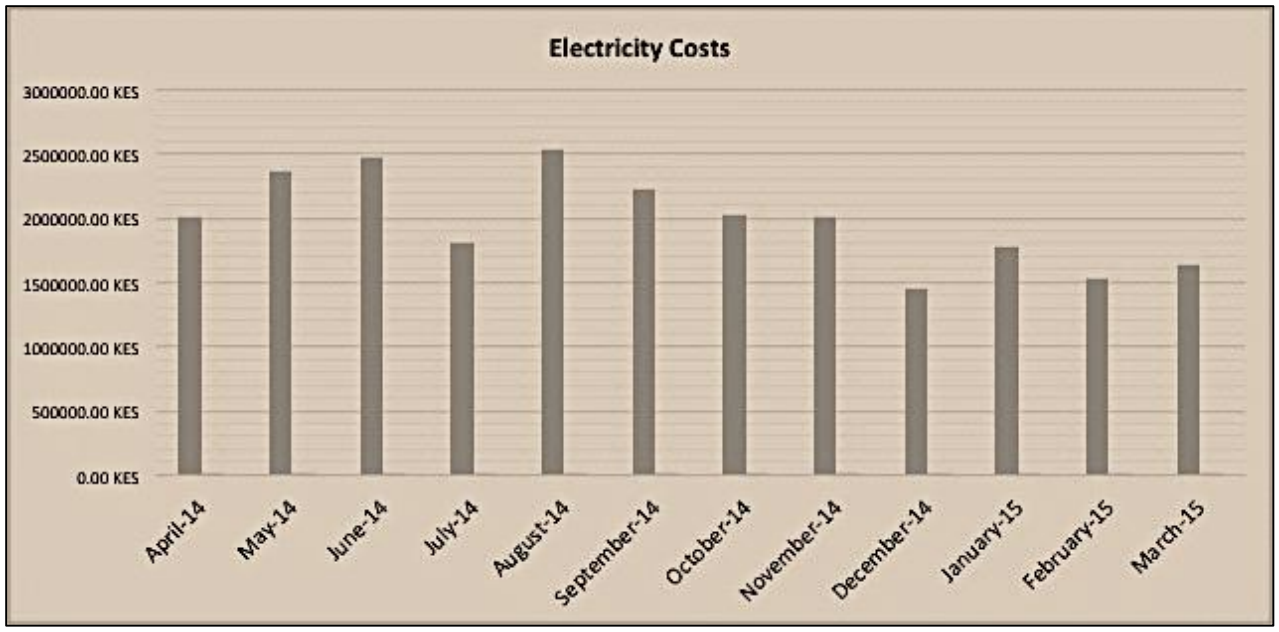


Figure 4.7 : Electricity costs over baseline period

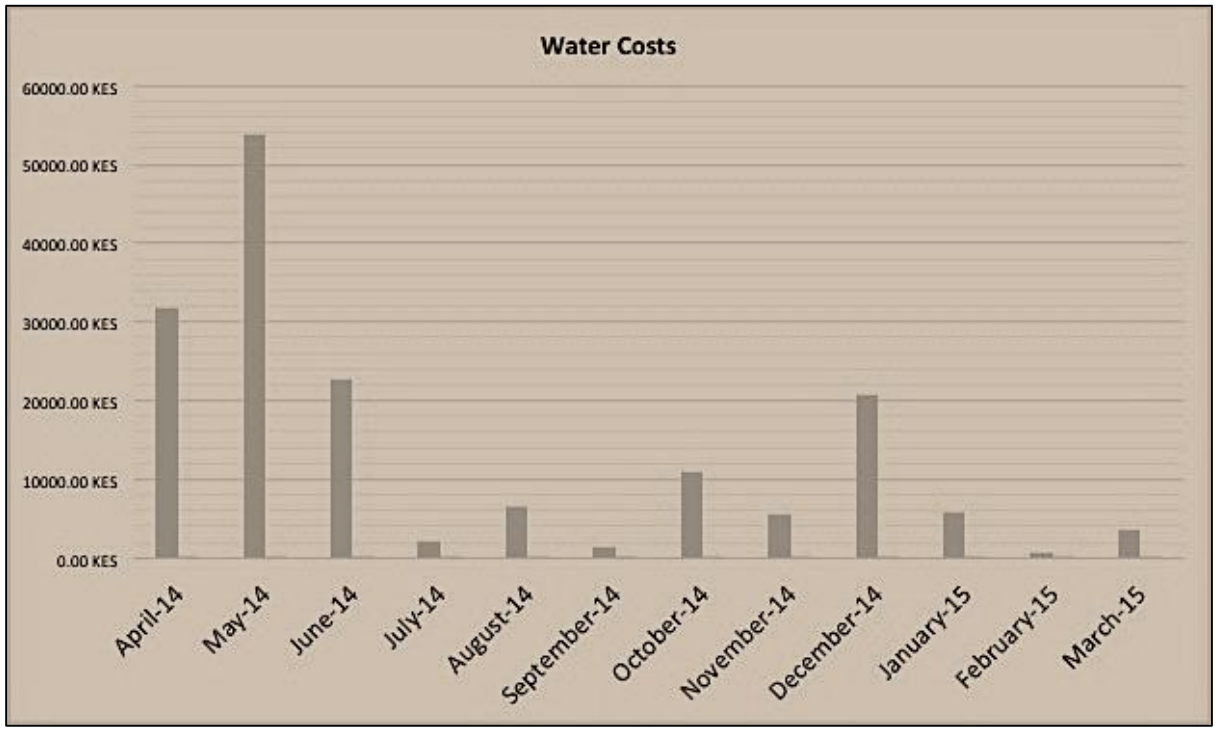


Figure4.8: Water costs over baseline period

Using these data we performed an analysis over the baseline period to find out the energy needs and the energy cost based on electricity and water consumption.

4.7.2 PRODUCTION NEEDS

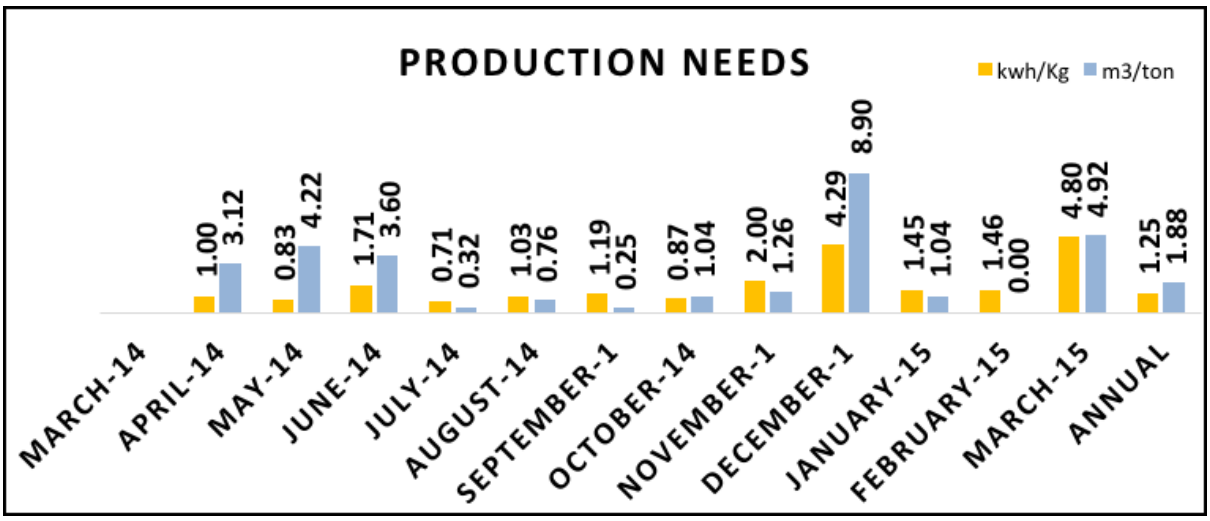


Figure 4.9: Production needs EACL Addis

The annual average energy need for production is about **1.25 kwh//kg and 1.88 cbm of water per ton of production.**

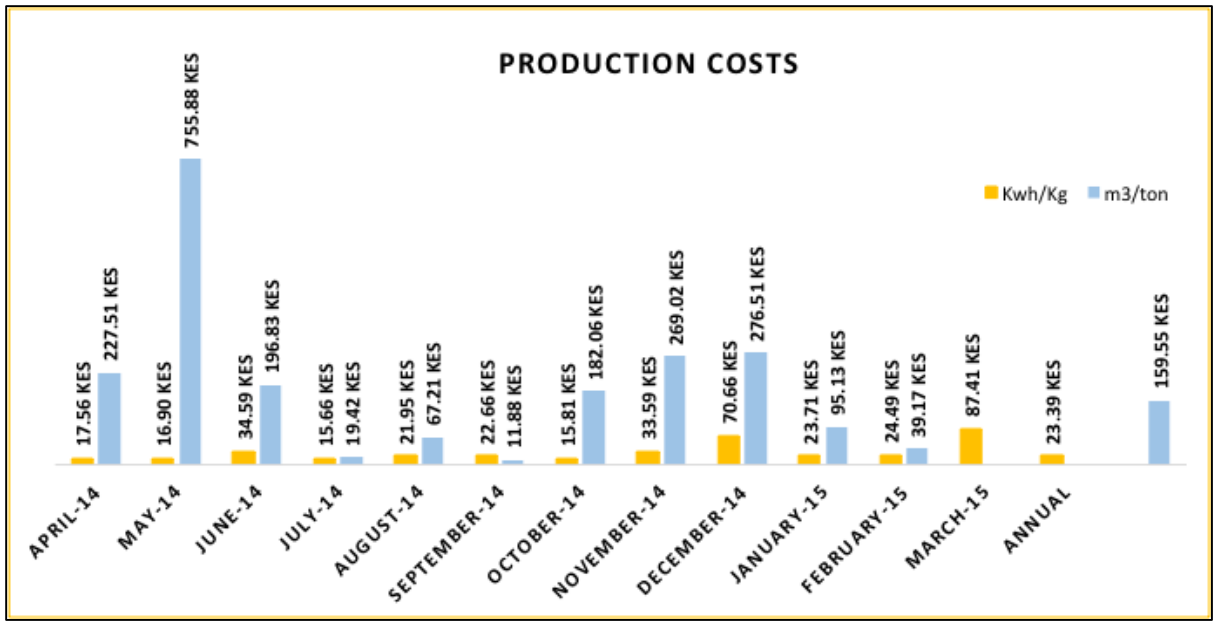


Figure 4.10 : Cost of Production Needs EACL Addis

The respective electric and water production costs based on the production needs are about **23.39 kes** for every kilogram of aluminium wire output and **160 kes** for every ton of aluminium wire produced at the facility.

4.7.3 Summary of Findings: -

4.7.3.1 Energy Consuming Areas/Machines

The pie chart below shows the percentage share of the energy by the various areas in the facility.

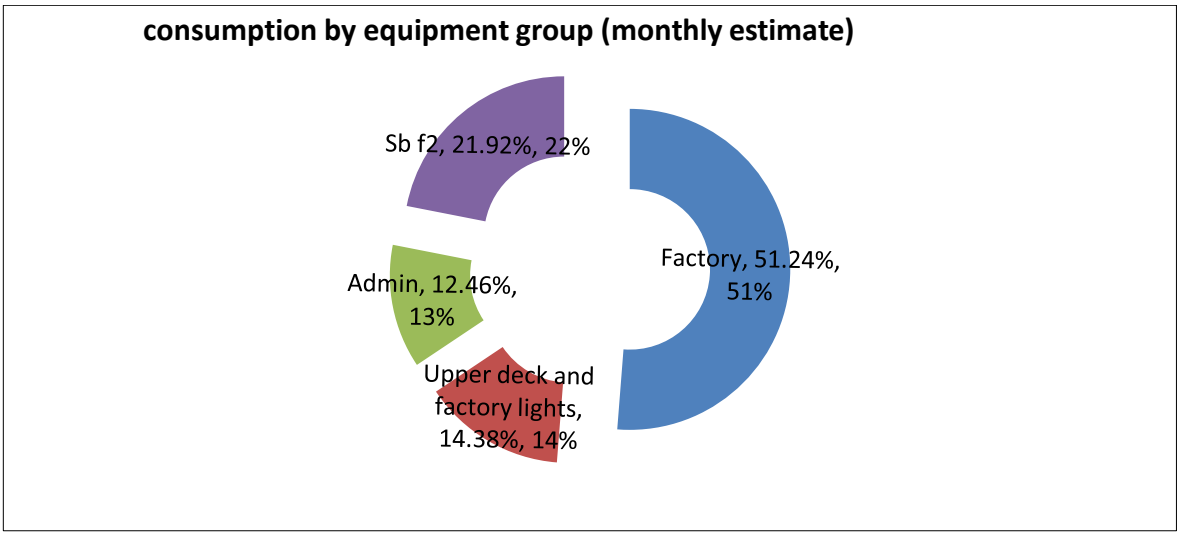


Figure 4.11: Consumption by Equipment group

(i) The factory has the largest share at **51.24%**

(ii) Switchboard F2 has the second largest share at **22%**. This switchboard serves the compressor primarily.

(iii) The Upper deck (that houses the engineers), the store and factory lights take up **14%** of the energy.

(iv) The Admin that houses management offices takes up **13%** of the energy.

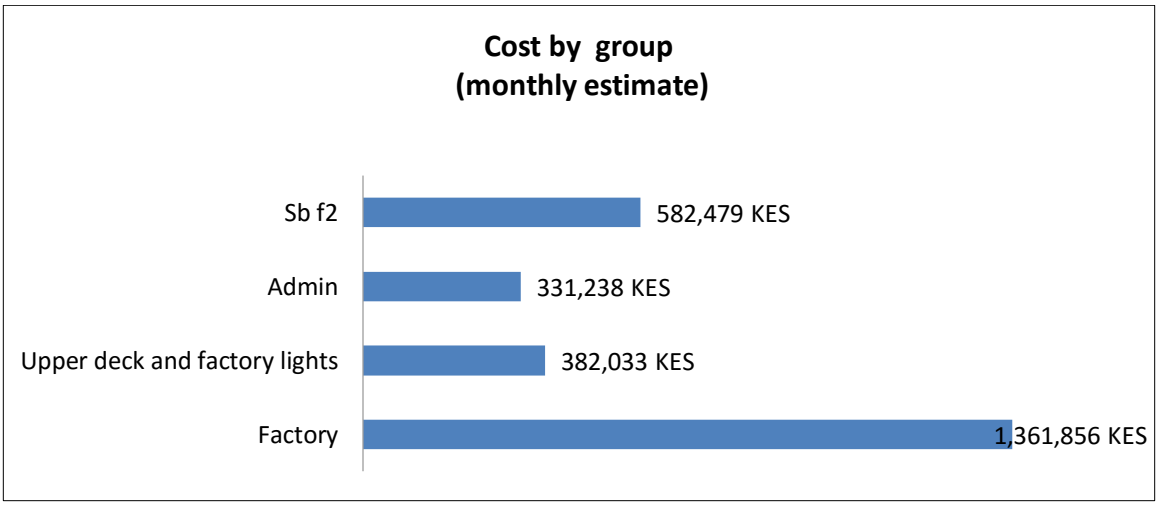


Figure 4.12 : Energy cost of each Area

- The factory has the highest monthly cost estimate at **1,361,856 kes**.
- Switchboard f2 has the second highest monthly cost estimate at **582,479 kes**.

For the factory the Energy balance is:-

The main advantage of an energy balance diagram is that all energy inputs can be quantified and balanced against all energy outputs.[6]

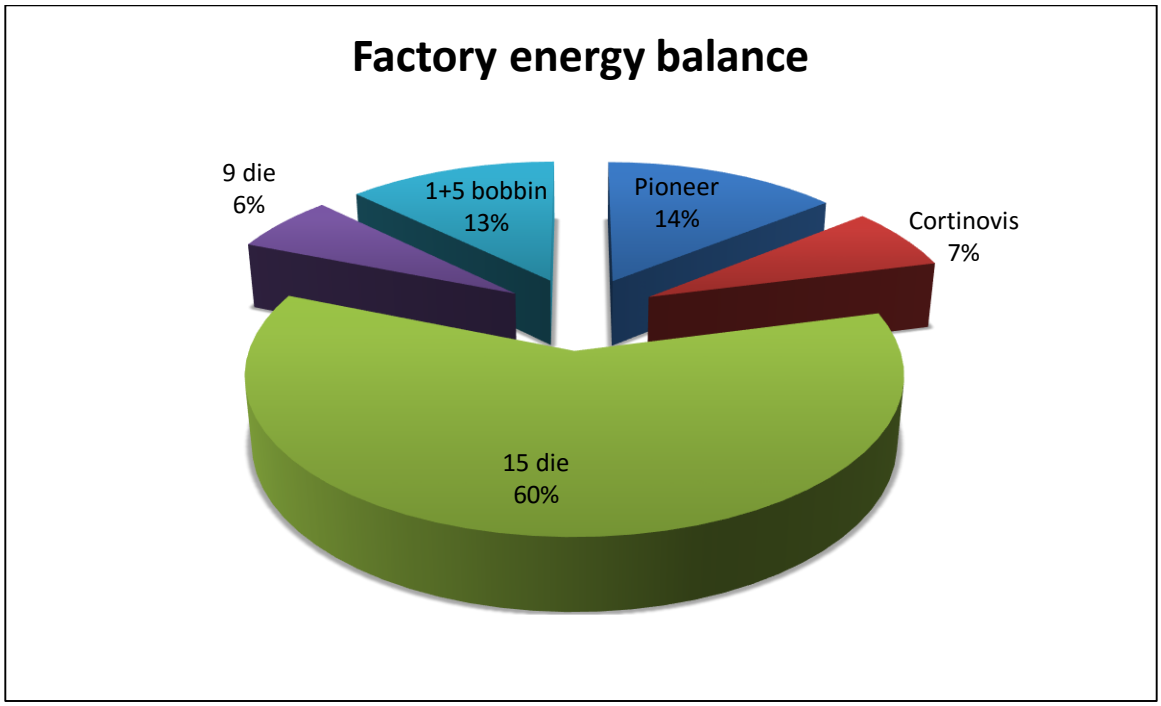
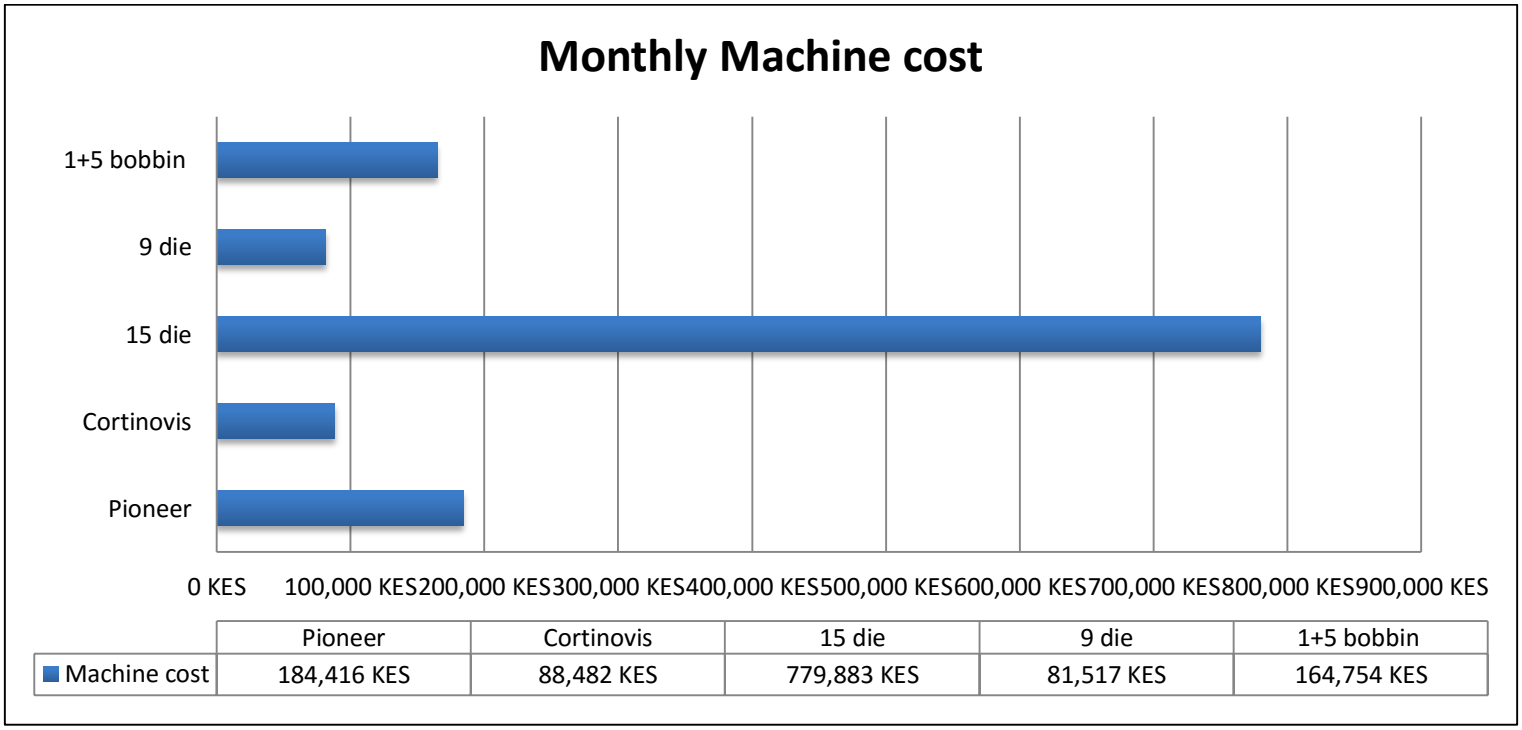


Figure 4.13 : Energy balance at the Factory



	Pioneer	Cortinovis	15 die	9 die	1+5 bobbin
Machine cost	184,416 KES	88,482 KES	779,883 KES	81,517 KES	164,754 KES

Figure 4.14 : monthly machine cost

Admin Energy Balance

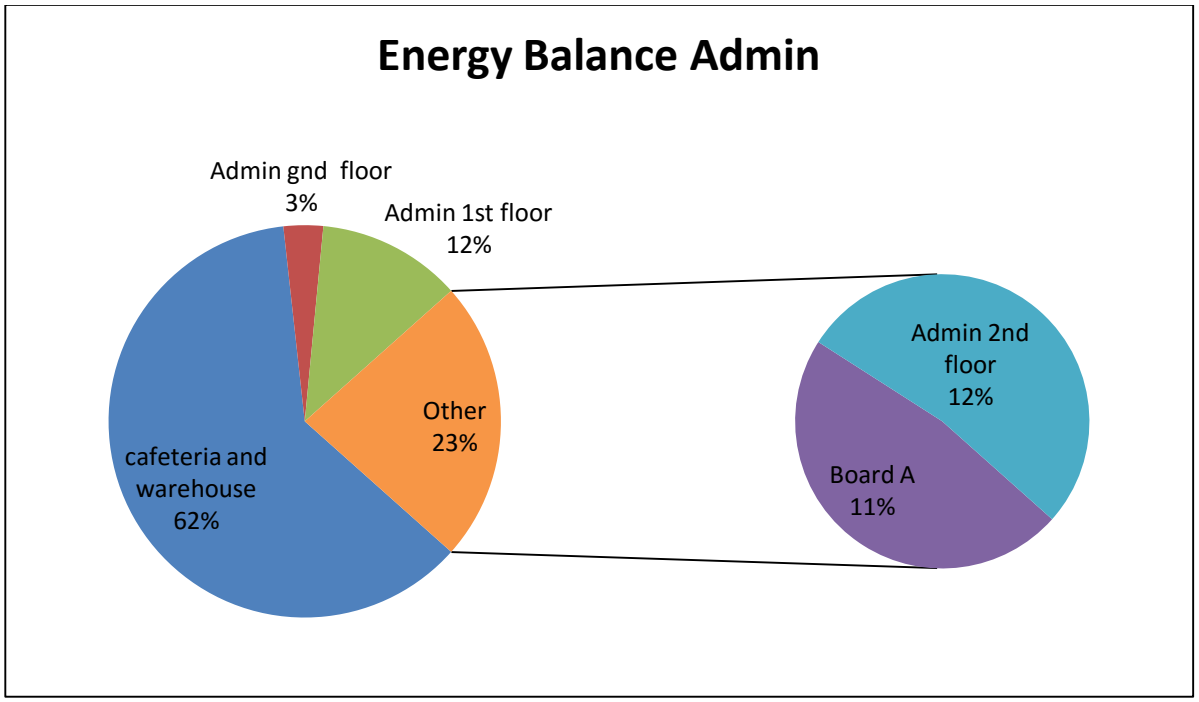


Figure 4.17 Energy Balance :Administration Block

There is potential of significantly bringing down these costs and these ECMs have been highlighted in chapter 5.

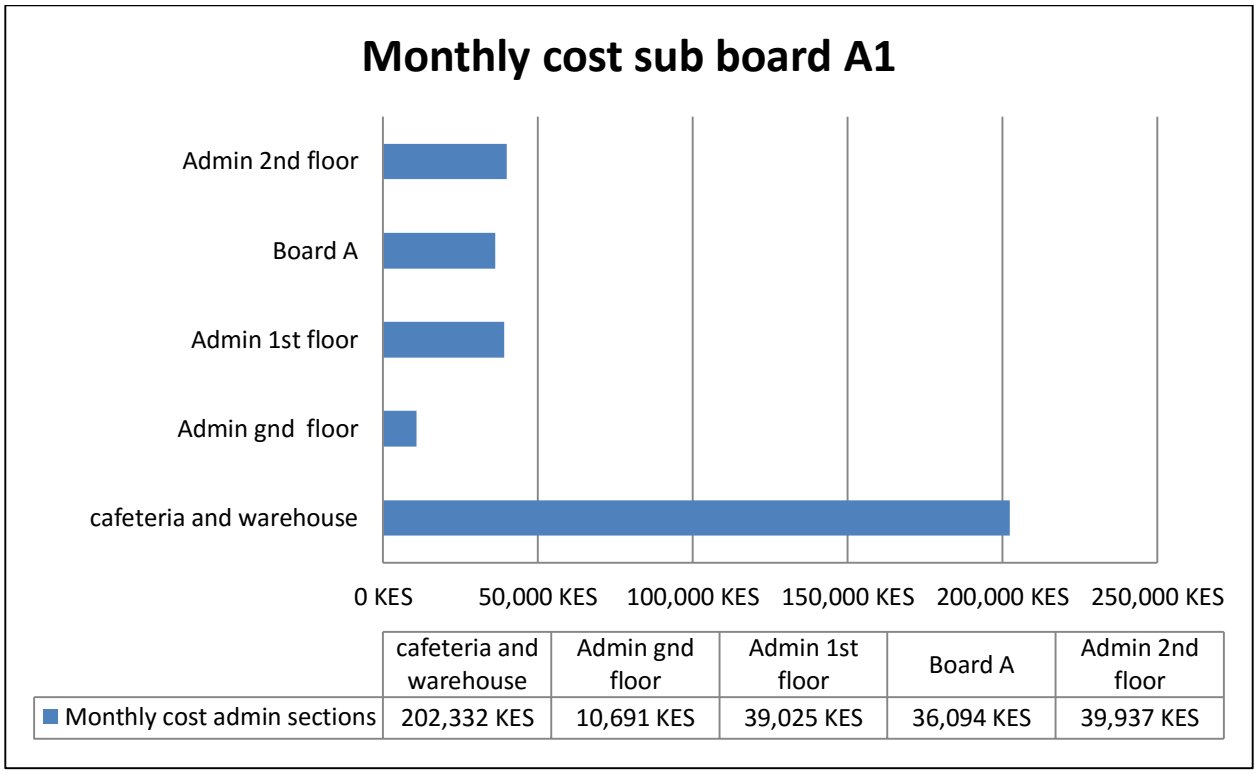


Figure 4.18 monthly costs on sub board A1

4.7.3.2 Areas logged

It took a 48-hour recording of energy consumption on each machine in the factory. These have been highlighted below.

I. Main Incomer

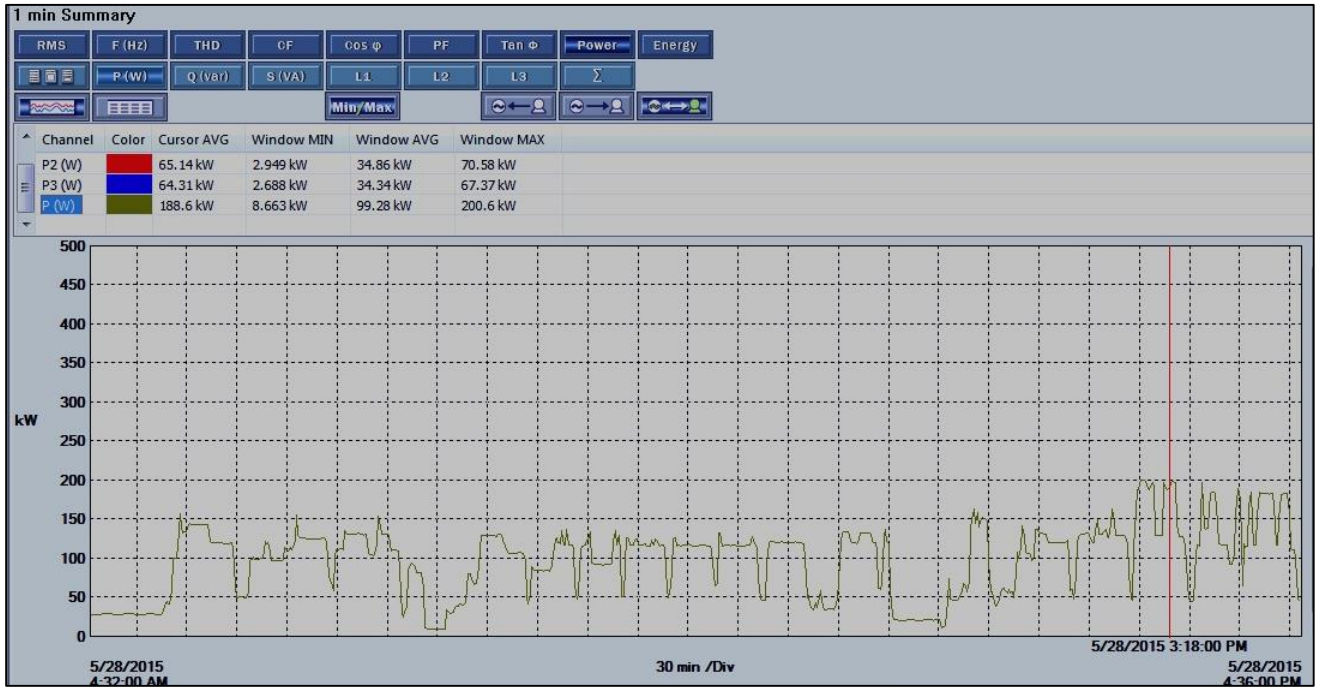


Figure 4.19 ; Kw Demand

Figure 4.20 : Power Factor

II. 15 die Drawer

Figure 4.21:Power log on 15 Die Drawer Machine

III. Cortinovis

Figure 4.22: Power logg on Cortinovis Machine

The Cortinovis should be integrated with soft starters/ capacitors on the load side of the motor.

As seen here the starting demand can go up to **30 Kw** while the running load only runs at **lower than 10 kw**. This results in a low overall PF and also the large in-rush current increases the maintenance cost of the machine and lowers the overall efficiency.

IV. 1 n 5 bobbin

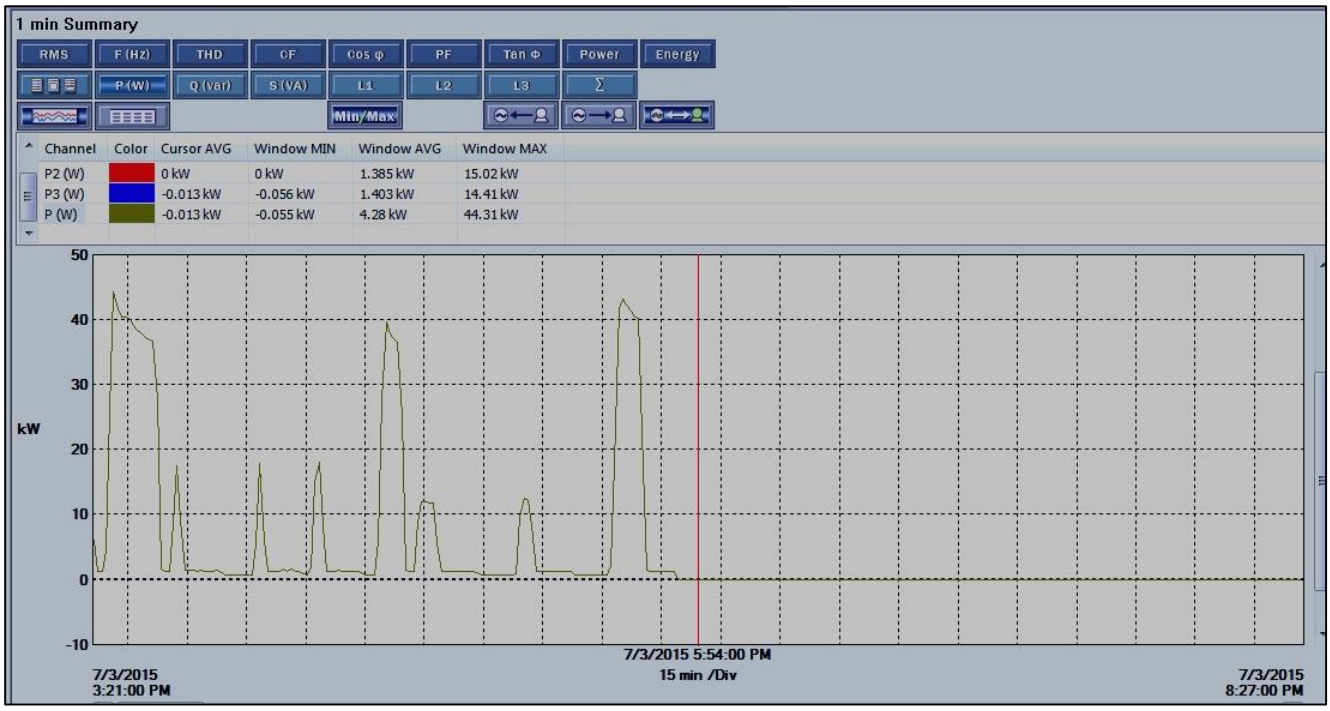


Figure 4.23 Power log on 1 n bobbin Machine

V. Pioneer tubular strander

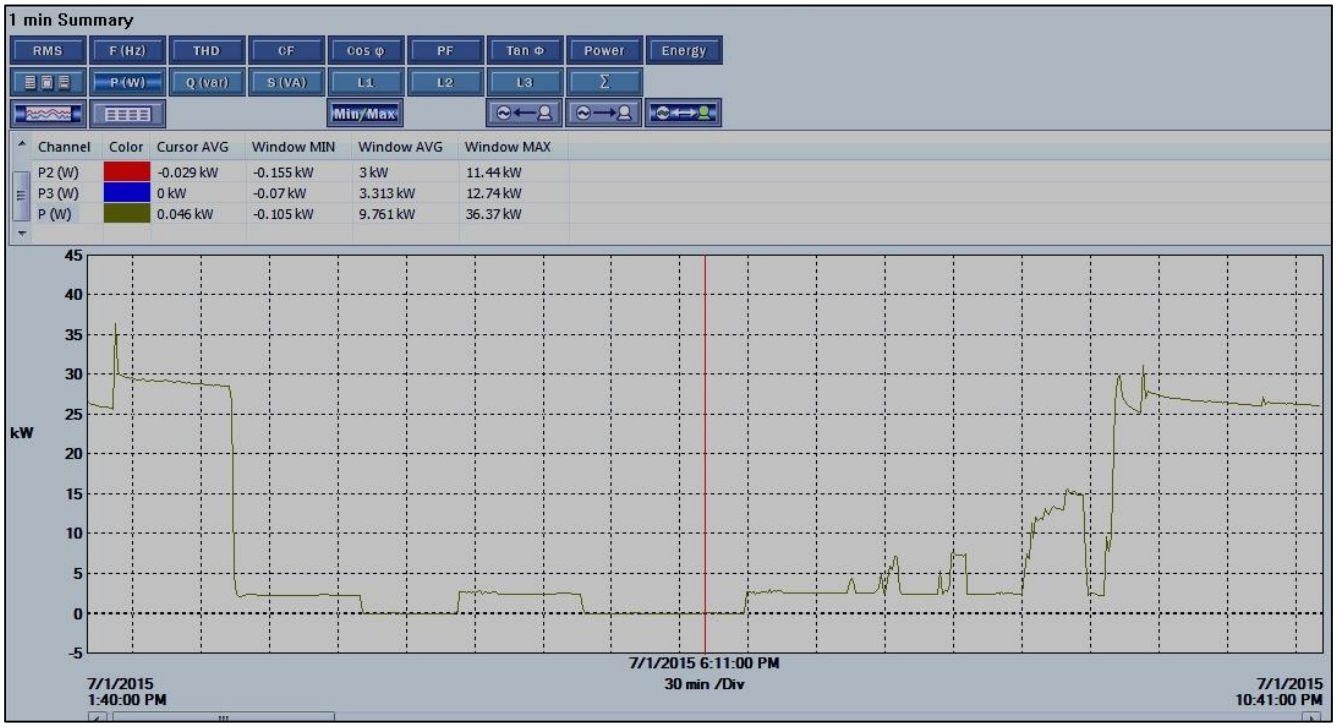


Figure 4.24 Power Logg on Pioneer Strander Machine

VI. Compressor 45kw

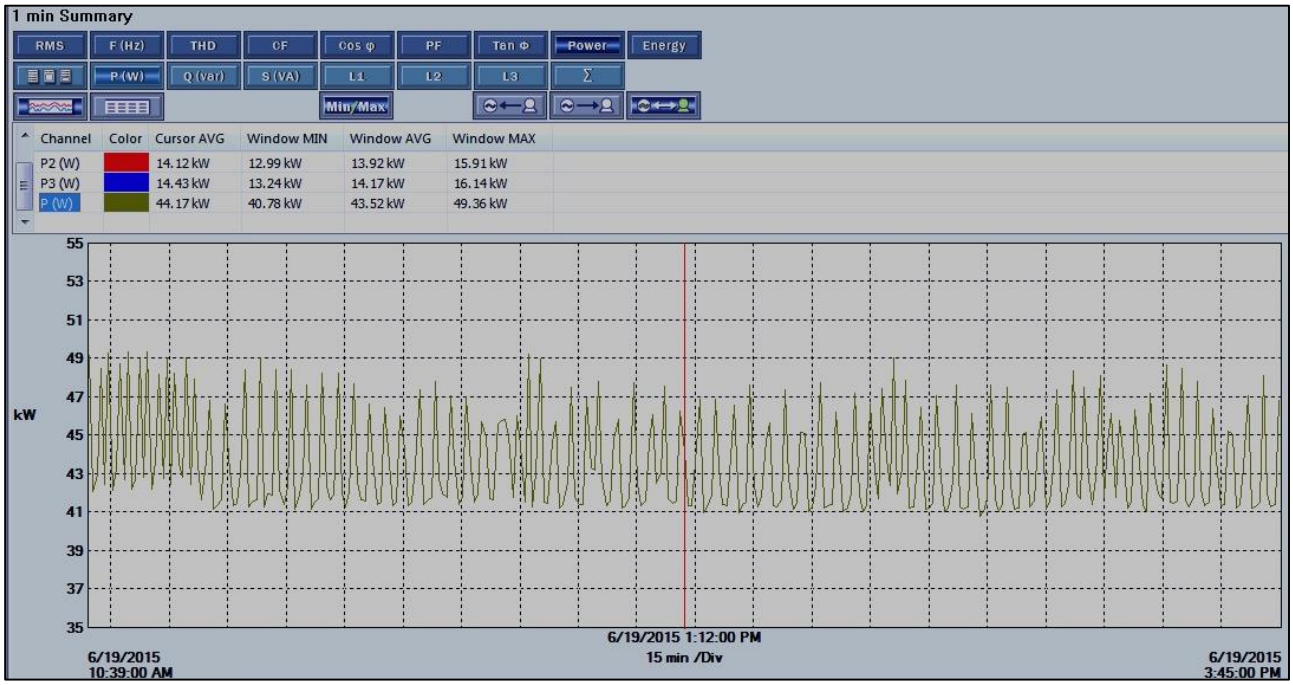


Figure 4.25 Power log on Compressor Machine

The compressor is fully loade is high the efficiency since it runs a d going above the 45KW rating. Going as high as 49 kw. This means that of the motor t above 85% loading.

VI EACL subswitch a1

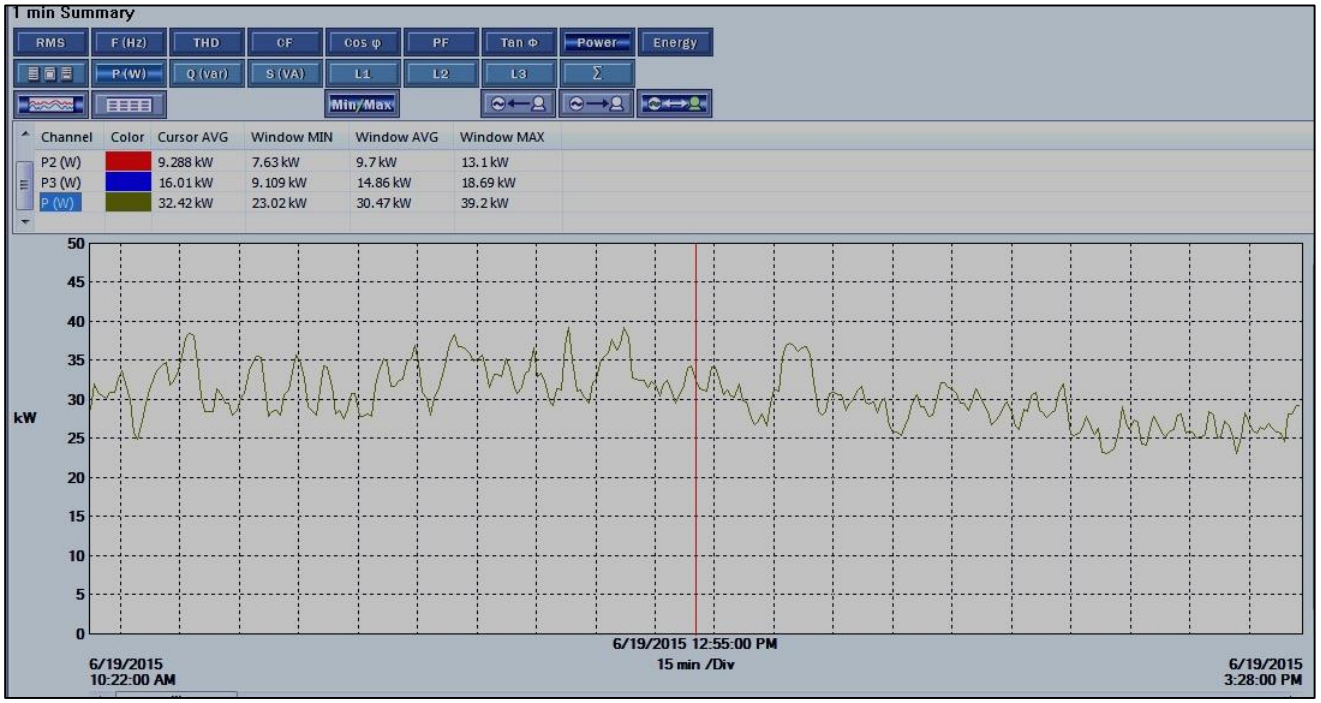


Figure 4.26 Power log on Subswitch a1

This serves the main administration building the cafeteria and the customer care section. The maximum kw demand is about 40 KW.

VII. Cafeteria and warehouse

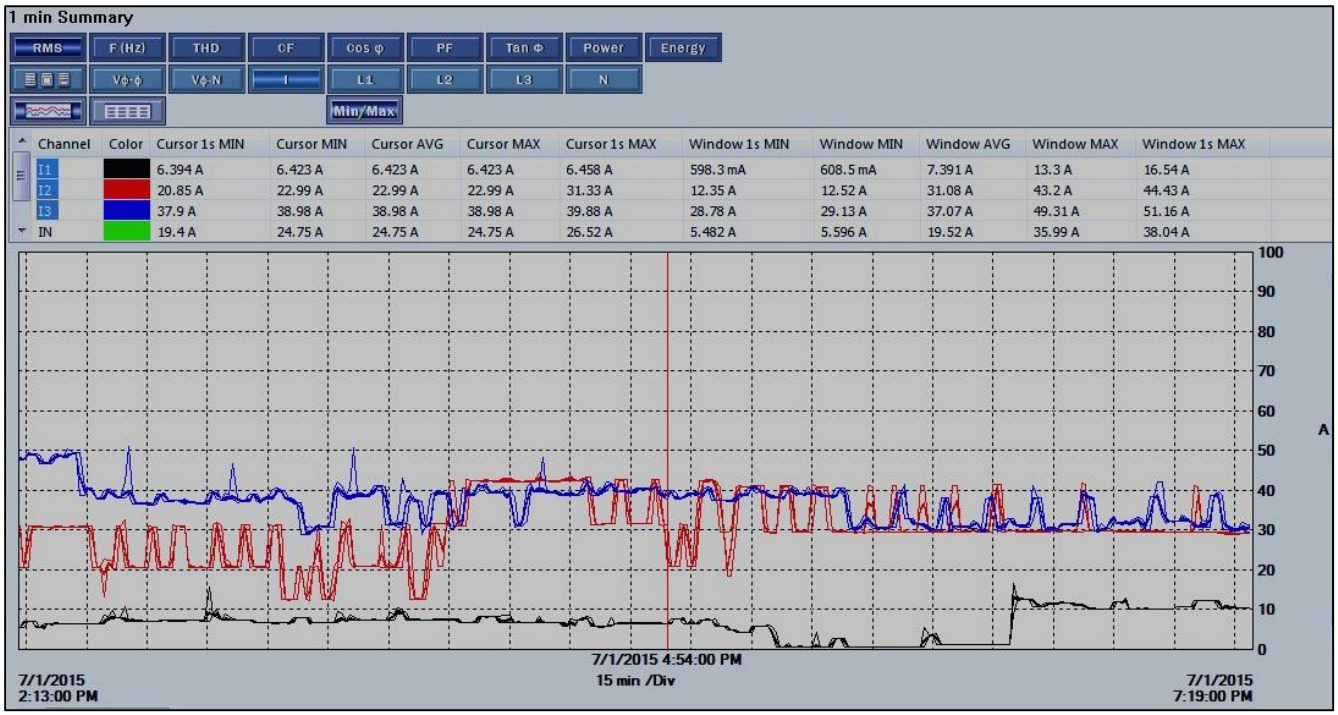


Figure 4.27:Phase Current Measurement in the Cafeteria and warehouse.

The phases in the cafeteria are unbalanced, EACL should undertake re-balancing and shift some loads to the first phase. This will help in demand management as well as power factor.

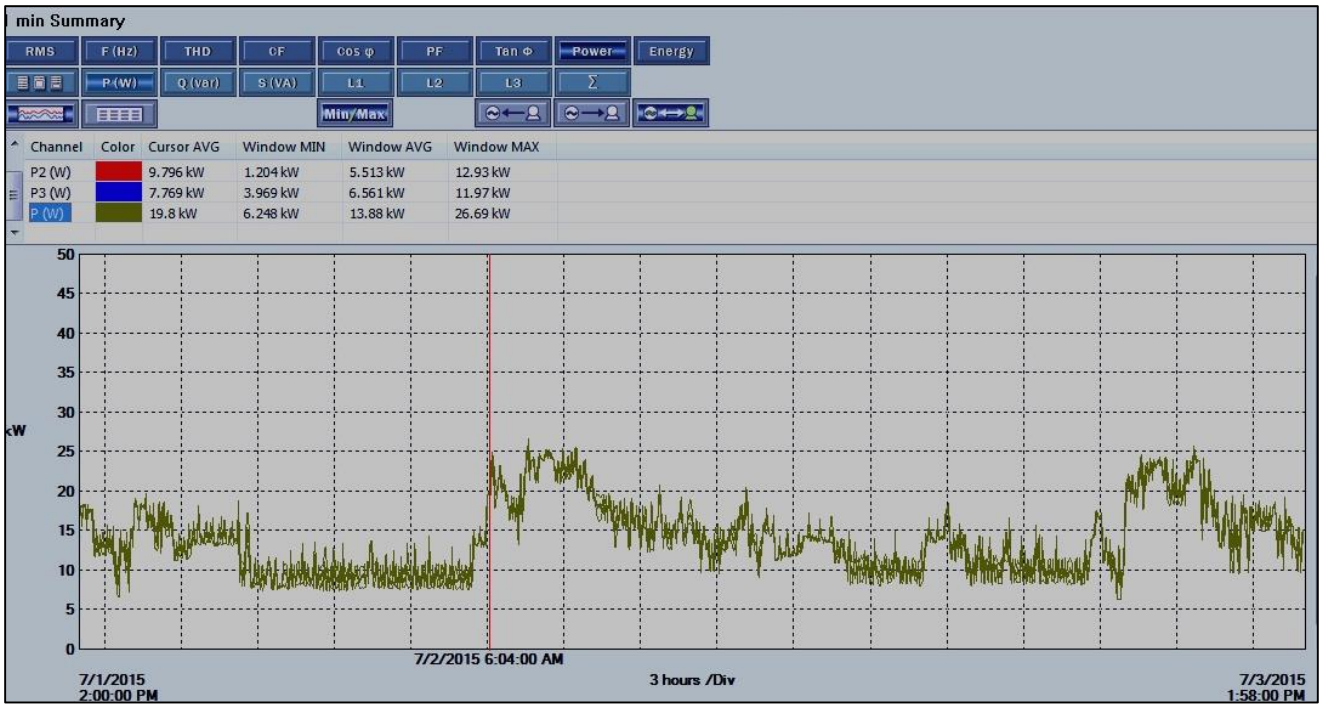


Figure 4.28 : Kw Demand Profile for Cafeteria.

There is a base load of 10Kw at night, which must be the warehouse load since the cafeteria is closed at night. The load picks up at about 6 am to 25 kw which is around the time the cafeteria staff gets in.

VIII. Admin Ground floor

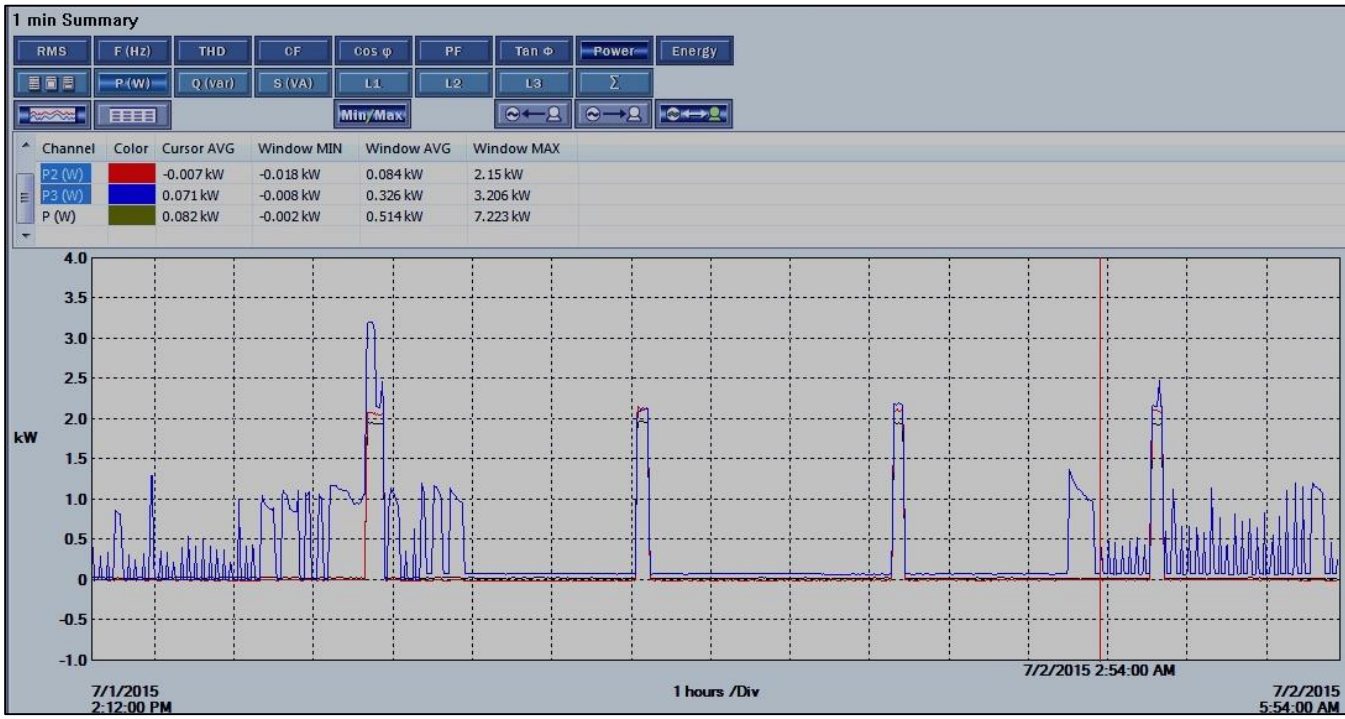


Figure 4.29 : Administration Ground Floor

There is a pump that turns on every four hours. This pump should be checked since it may be pumping water when there is no need. EACL should also invest in a soft start for this pump motor since as can be seen from the graph the inrush current is quite large at start up.

IX. Admin First floor

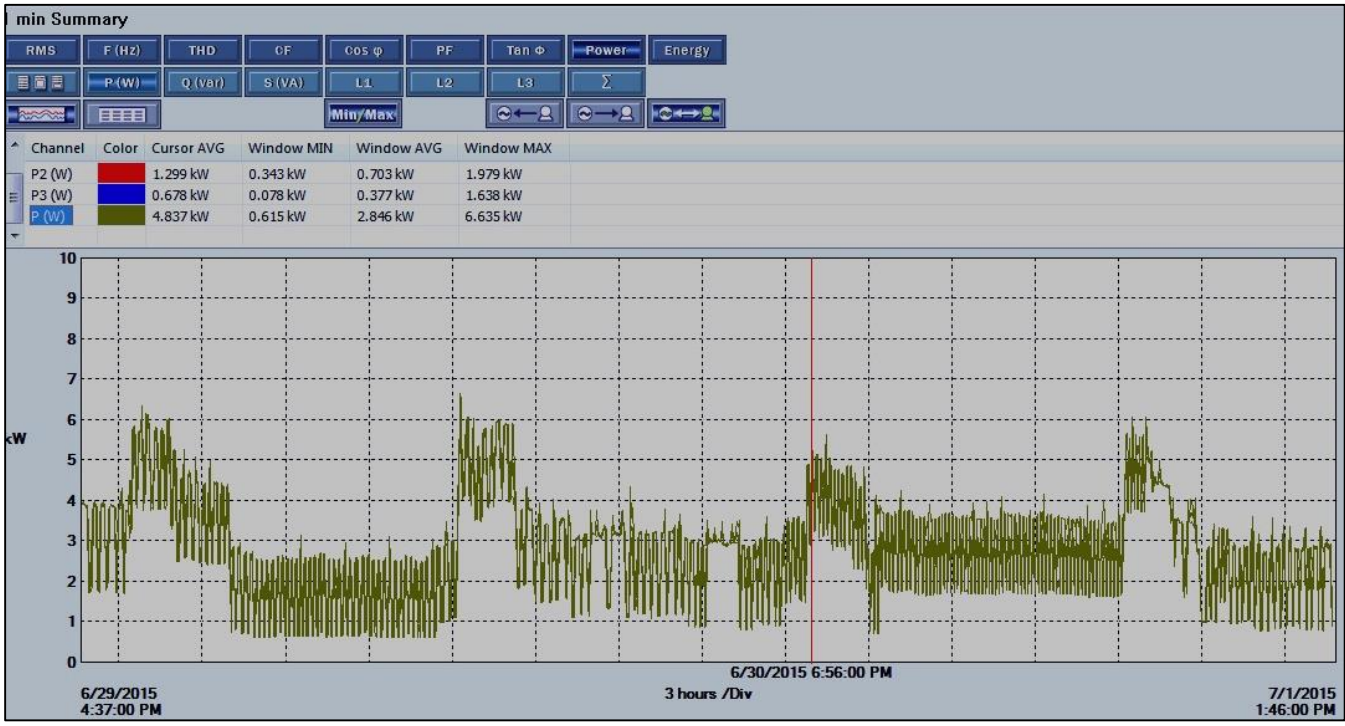


Figure 4.30 : Administration First Floor

X. Admin Second floor

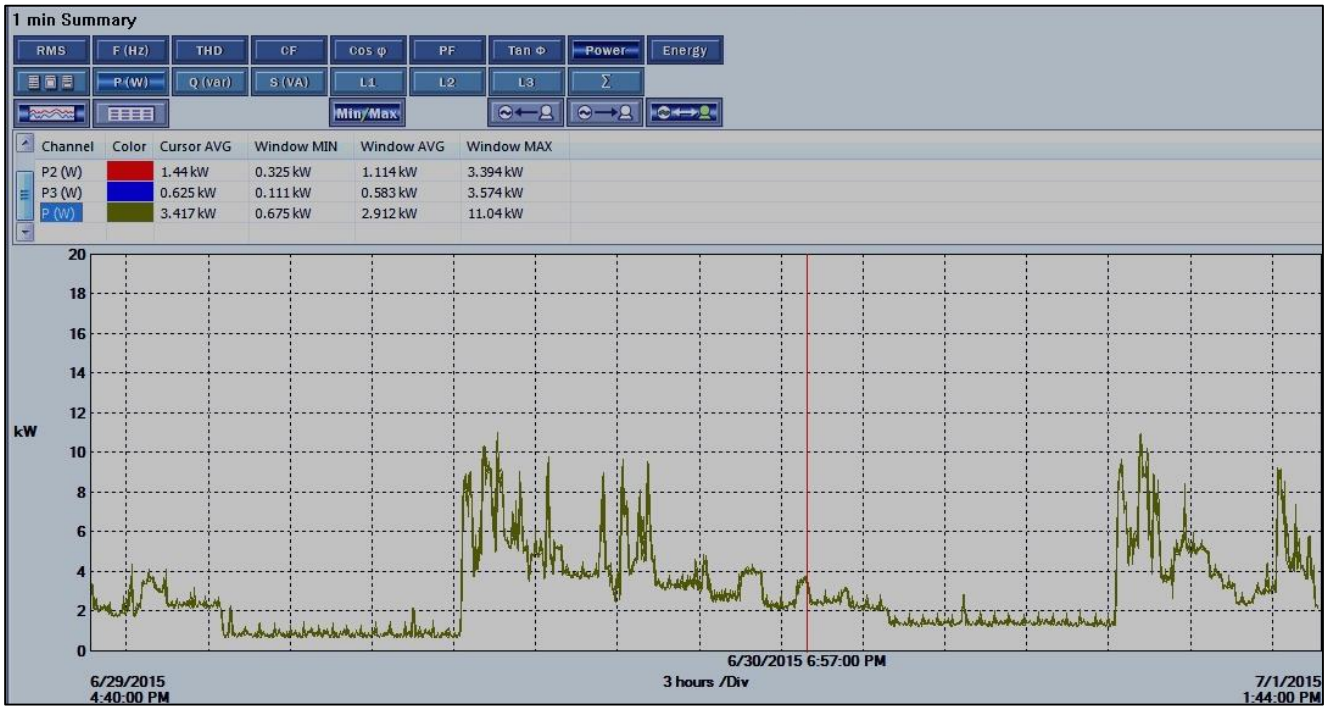


Figure 4.31 Administration Second Floor

XI. Lighting

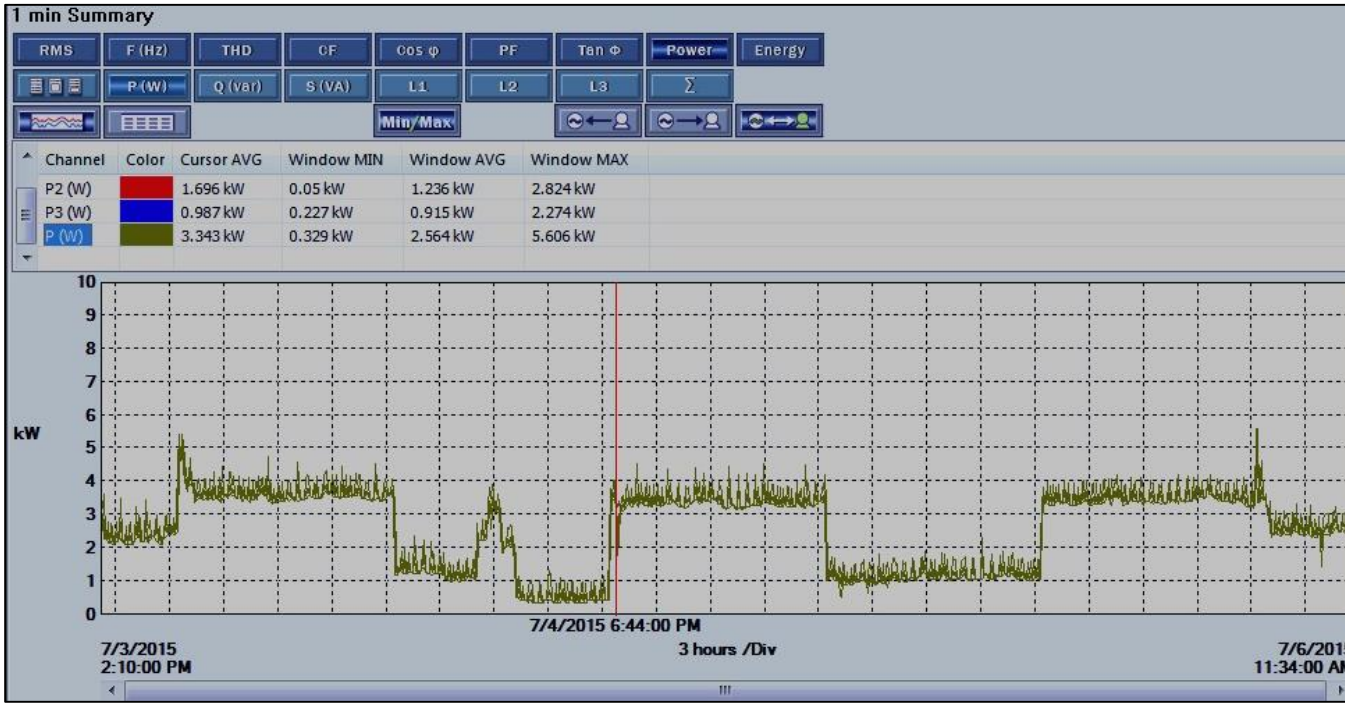


Figure 4.32 : Out door Lighting

CHAPTER FIVE

DISCUSSIONS OF RESULTS

5.1 General Energy Saving Recommendations

The following Energy Saving opportunities at the facility were identified:

5.2 Compressor

Compressed air is sometimes regarded as the fourth utility after electricity, water and gas, however it is usually an expensive resource for a business. Producing compressed air takes more than 10 units of electrical power to provide 1 equivalent unit of compressed air. This means a small decrease in compressed air usage can result in significant electricity savings. Compressors that are usually left on when there is no demand can waste energy as power is used to supply air through the leaks in the distribution system, and even when off-load compressors can use up to 20-70% of the full load power. In addition fewer run-hours will reduce maintenance costs. Typical compressed air systems are capable of up to 30% energy savings by better control, maintenance schedules, a comprehensive leak detection and repair scheme, machine selection and heat recovery. Further savings can be achieved by reviewing the current end users of compressed air and identifying suitable alternatives which may be more energy efficient.[7]

The facility at Addis Ababa road has a GA45+ air compressor. The process map below highlights the complete compressed air system.

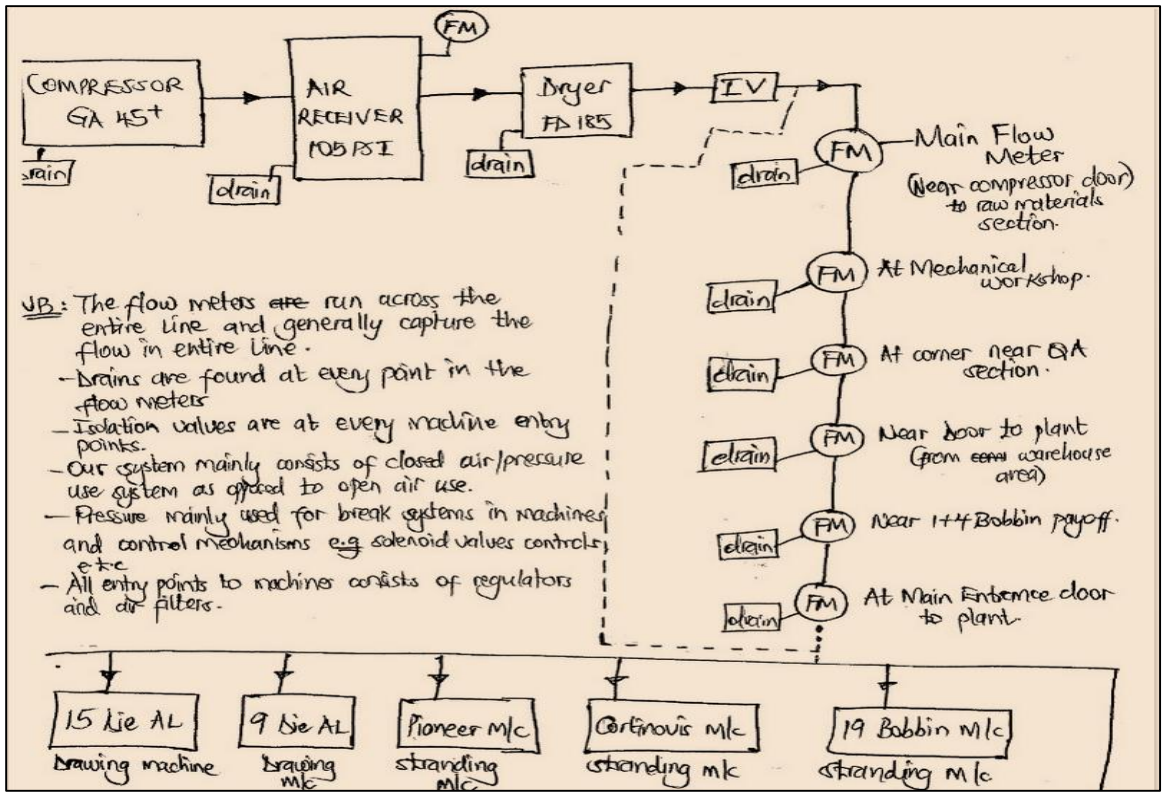


Figure 5.1 compressed air system flow sketch diagram

Compressed air is one of the most expensive uses of energy in a manufacturing plant. About eight horsepower of electricity is used to generate one horsepower of compressed air.

Energy Saving Recommendation: -

5.1.2 Reducing Pressure supplied to Machines.

At EACL Addis Ababa road the compressor controls are set up as shown below:-

Current	bar
Load	6.1
Unload]	7.2

This large range causes the compressor to be unloaded frequently. This is poor compressor control and leads to increased maintenance cost as well as higher energy costs.

The graph below shows the recommended compressor control settings.

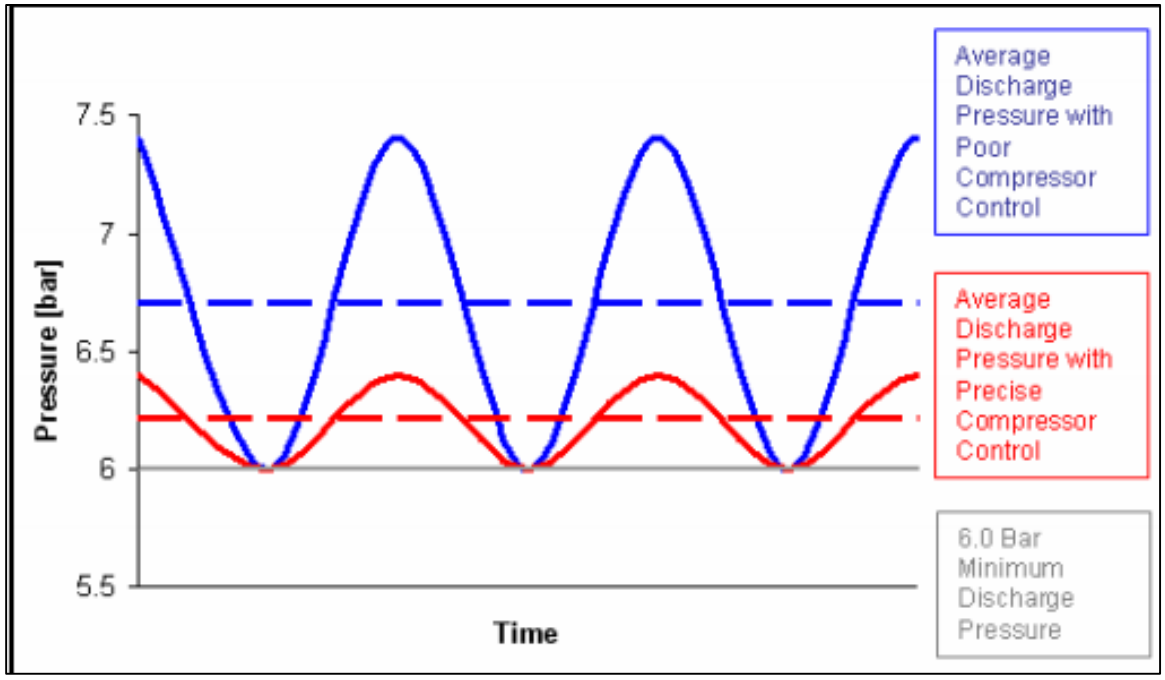


Figure 5.2 recommended new pressure settings.

A walk through of the individual equipment revealed that the highest-pressure demand required by the machines was about 6 bar (15-die).

Reducing the pressure required by the machines significantly cuts on the energy cost.

Controls as shown below at the plant and so far the energy savings have been highlighted in the graphs below.

Compressor with reduced pressure band

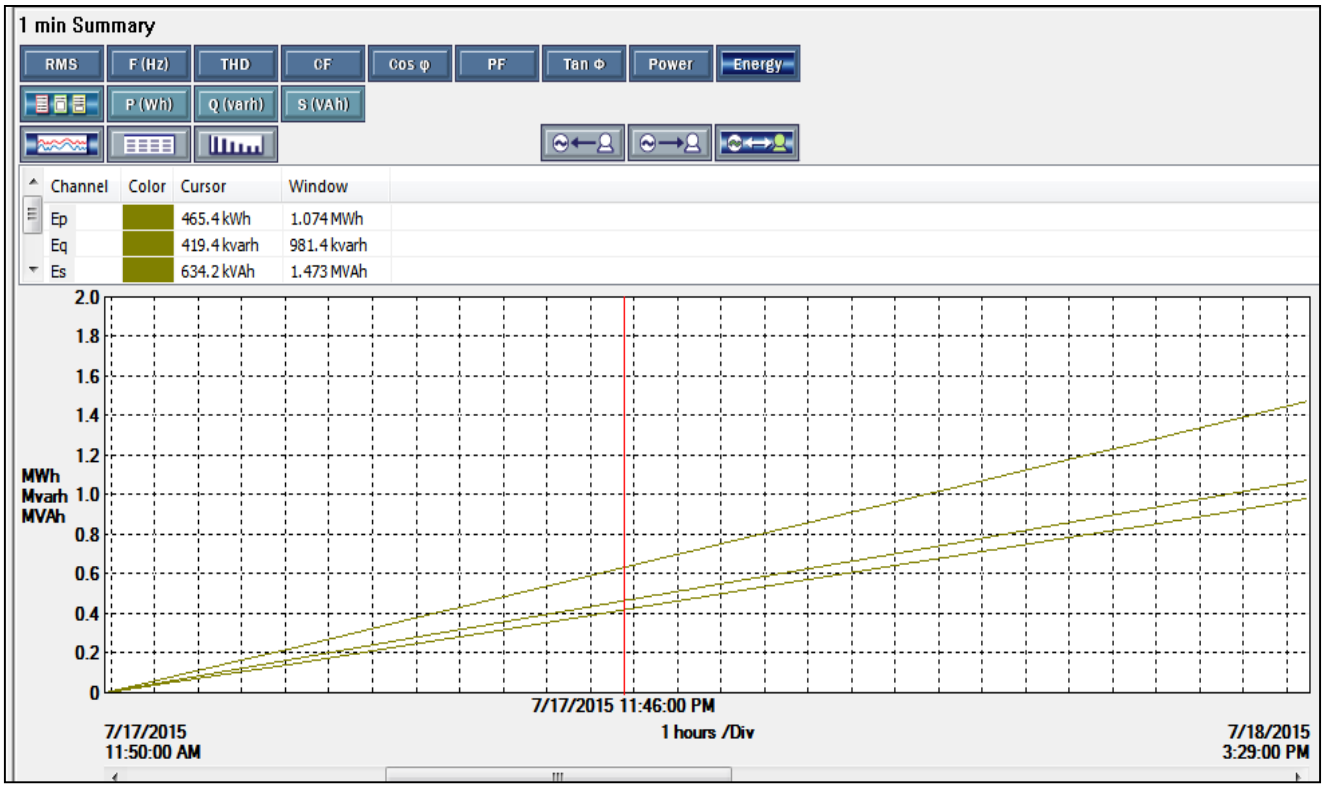
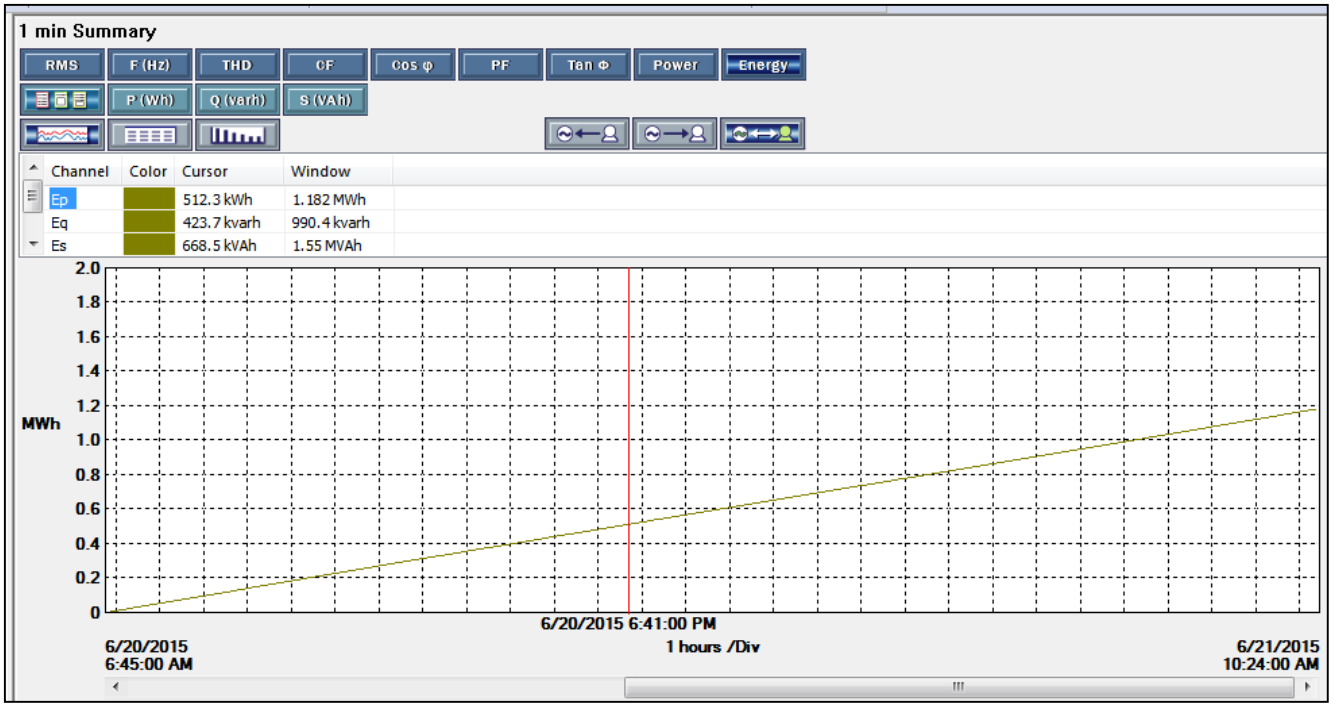
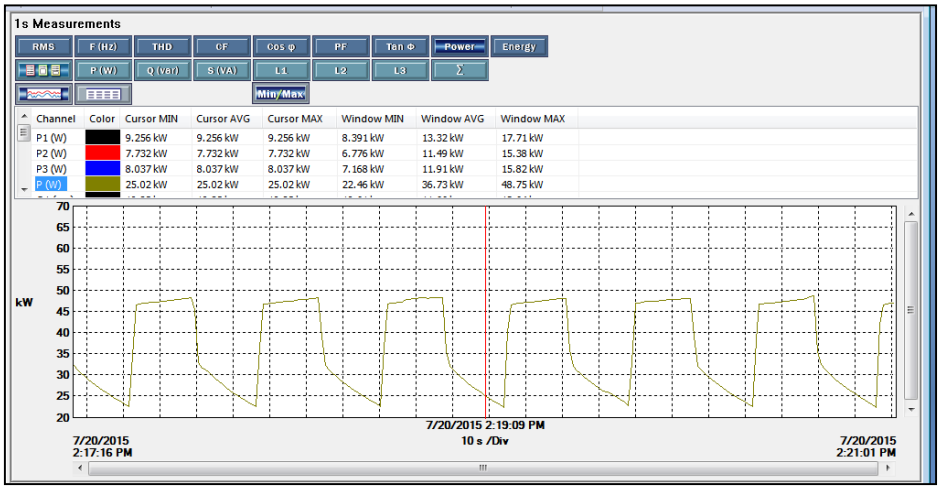


Figure 5.3 : Reduced Pressure

After Pressure change (unload changed to 6.6 bar) – Energy consumption 465 kwh.



Figire 5.4 Before Pressure change at 7.2 bar 512 kWh



Savings by reducing Air compressor settings to	bar
Load	5.9
Unload	6.2

Energy Savings: -

Energy Use compressor before	349,488.00
Savings	32,081.91

The next step would be looking at reducing the number of load/unload cycles. The more frequently a compressor cycles within a given time period, the less efficient it is.

This can either be done by incorporating a larger receiver or by increasing the pressure band.

5.1.3 Compressed Air Leaks

With the help of the Energy Officer at EACL Addis, Ms. Lydia Mugure,it was possible to carry out a leak analysis test, which should now be a part of the Maintenance schedule at the plant going forward.

The results of the test are summarized below.

Leakage Rate EACL		%	
Test 1			
Loading		43	**65%**
Unloading		23	
Test 2			
Loading		35	**65%**
Unloading		19	
Test 3			
Loading		48	**74%**
Unloading		17	
Test 4			
Loading		42	**72%**
Unloading		16	
	Average		69%
	kwh	kes	
Contributions by leaks over entire year	241,344.42	4,826,888.45	

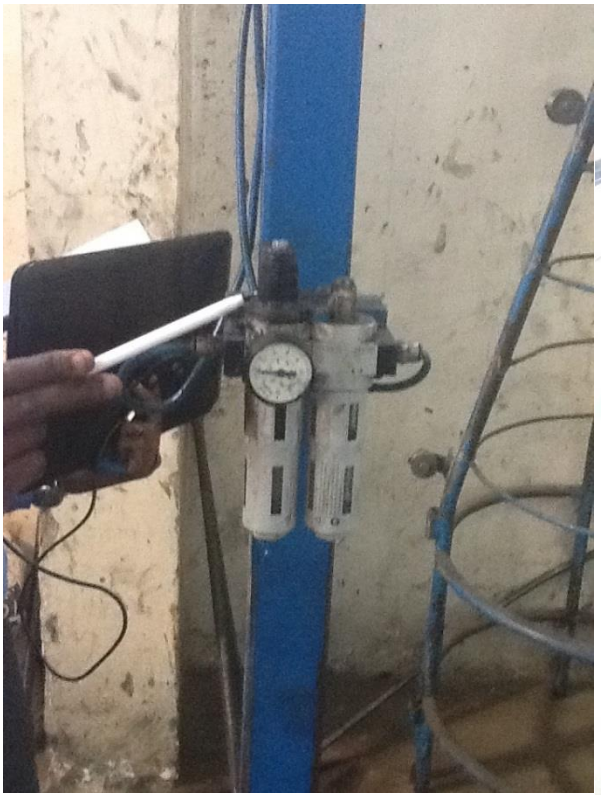
Figure5.5: Compressed Air Leak Contribution at EACL Addis Ababa Road

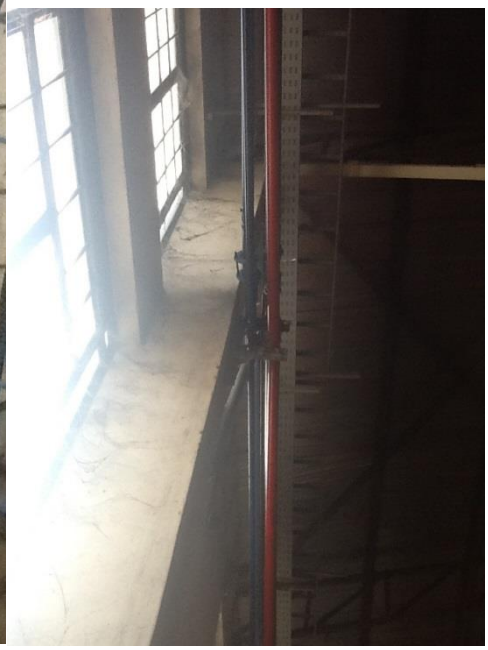
The leaks at the facility contribute to an average of 69% of the energy used by the compressor. This is a huge amount of wasted energy and should be addressed immediately. The cost contribution of these leaks annually is over **4,826,000 kes.**

Best practices recommend that the leakage rate be less than 10%.

The pictures below show some of the areas with Leaks in the facility.

For joint leaks, the facility should look into push to connect pipe joints instead of threaded joints.





Lighting:

Lighting is essential for making the work environment safe and for allowing staff to perform their tasks comfortably. It can be a significant energy user accounting for up to 40% of an organisation's electricity bill. Even making small adjustments to lighting can significantly improve the working environment, help reduce electricity consumption and, at the same time, minimise CO2 emissions and save money.[7]

A complete retrofit of the lighting equipment at EACL Addis factory is proposed. The existing fluorescent fixtures, sodium Parking Lamps and HFS et.al will be retrofitted with more efficient equipment, primarily Light Emitting Diodes (LEDs). Energy savings and demand savings will result from this retrofit. An additional benefit will be enhanced quality of lighting, as the new fixtures will provide improved color rendering and reduced flicker.

A location-by-location inventory of fixture counts and types was made. This inventory of all existing lighting equipment, including their ratings, is provided in the table below. During the lighting survey, fixture types (lamp/ballast combinations) present in this facility were identified. Samples of the most common fixture types were measured to determine the fixture power under actual operating conditions.

Lighting at EACL Current Addis

KEY;

Table 1: Inventory Current Lighting EACL Addis

A1	1500mm, 1X58W SINGLE BATTEN FLUORESCENT SURFACE MOUNTED LUMINAIRE
A1E	As above but with emergency kit
A2	1500mm, 2X58W TWIN BATTEN FLUORESCENT SURFACE MOUNTED LUMINAIRE
R1	1500 mm, 1X58W SINGLE STANDARD WATER PROOF IP65 FLUORESCENT LUMINAIRE
R2	1500 mm, 2X58W SINGLE STANDARD WATER PROOF IP65 FLUORESCENT LUMINAIRE

D1	1500mm,1X58W SINGLE FLUORESCENT LUMINAIRE WITH STEEL LACQUERED LOUVRED- SURFACE MOUNTED
D2	1500mm,2X58W SINGLE FLUORESCENT LUMINAIRE WITH STEEL LACQUERED LOUVRED- SURFACE MOUNTED
B1	1200mm, 1X36W SINGLE BATTEN FLUORESCENT SURFACE MOUNTED LUMINAIRE COMPLETE WTH LAMP AND GEAR
B1E	As above but with emergency kit
B2	1200mm, 2X36W SINGLE BATTEN FLUORESCENT SURFACE MOUNTED LUMINAIRE COMPLETE WTH LAMP AND GEAR
V	600mm, 18W SINGLE FLUORESCENT LUMINAIRE WITH OPAL ACRYLIC DIFFUSER
V1	1200mm, 36W SINGLE FLUORESCENT LUMINAIRE WITH OPAL ACRYLIC DIFFUSER
EXIT	MAINTAINED 8W FLUORESCENT WITH PORLYCARBONET DIFFUSER
N	16W 2D LUMINAIRE WITH WHITE POLYCARBONATE BODY WITH OPAL DIFFUSER AND 2D LAMP
LC	SUSPENDED 250W LOW BAY LUMINAIRE _ actual 290
a	70W VANDAL RESISTANT WALL MOUNTED SECURITY LIGHT
PL	PENDANT LUMINAIRE WITH LAMP AND SHADE
J4	600x600 mm 4X 1 8W RECESSED FLUORESCENT LUMINAIRE WITH CAT2 ALUMINIUM LOUVRE
JJ4	1200X600mm 4X140W RECESSED FLUORESECENT LUMINAIRE WITH CAT2 ALUMINUM LOUVRE
P	300X300mm, 2X 1 8W SURFACE MOUNTED FLUORESCENT LUMINAIRE
PE	As above but with emergency kit
FL	Flood light with sodium light
Z	400mm CITYSPACE FITTING WITH 70W HPS LAMP MOUNTED ON A 3.5m HIGH
Z1	As above but mounted on top of a 300m SPIGOT atop the boundary wall
HB	SUSPENDED 250W HIGH BAY LUMINAIRE
CH	Chandalier
G1	1200mm,1X36W SINGLE RECESSED MODULAR FLUORESCENT LUMINAIRE WITH METAL GRID LOUVRES
G2	1200mm,2X36W SINGLE RECESSED MODULAR FLUORESCENT LUMINAIRE WITH METAL GRID LOUVRES

Led	LED lights

Table 2 : Lighting and Operational Hours

	Daily Operational Hours	kwh		Daily Operational Hours	kwh	
Warehouse Grnd Floor			**Finished Goods Store**			**Security Office**
40(A2)	24	111.36	18(A2)	16	33.408	2(B2)
			12(J4)	16	13.824	3(Q1)
		111.36			47.232	
Admin Second Floor			**Upper Level Plant**			**Plant Grnd Floor**
32(J4)	18	41.472	88(J4)	18	41.472	67(A1)
15(N)	18	4.32	15(B1)	18	9.72	14(AIE)
1(B1)	18	0.648	2(BIE)	18	1.296	1(P.E)
2(V)	18	0.648	2(P.E)	18	1.296	2(P)
15(P)	18	9.72	10(N)	18	2.88	2(A2)
15(LV)	18	4.86	2(VT)	18	0.648	18(A)
36(L)	18	11.664				
2(P.E)	18	1.296				

Daily Operational Hours	kwh		Daily Operational Hours	Kwh
		Security Gate Lights		
10	1.44	18(Z1)	12	54
10	1.74			
	3.18			
		Security lights(Wall Mounted)		
18	69.948	20(Z)	12	60
18	14.616			
18	0.648			
18	1.296			
18	4.176			
18	18.792			

Table 3: Cost of Current Lighting at EACL Addis

	Daily	Monthly	Annual	Annual cost
Admin	270.072	8,214.69	98,576.28	1,971,525.60
Dining	69.96	2,127.95	25,535.40	510,708.00
Security	117.18	3,564.23	42,770.70	855,414.00
Plant	172.868	5,258.07	63,096.82	1,261,936.40
Storage	158.592	4,823.84	57,886.08	1,157,721.60
				5,757,305.60

The table below summarizes the proposed lighting upgrades

Table 4 : Proposed Lighting Upgrade

	Proposed Replacement
A1	DirecT8 LEDS
A1E	
A2	DirecT8 LEDS
R1	DirecT8 LEDS
R2	DirecT8 LEDS
D1	DirecT8 LEDS
D2	DirecT8 LEDS
B1	DirecT8 LEDS
B1E	
B2	DirecT8 LEDS
V	DirecT8 LEDS
V1	DirecT8 LEDS
EXIT	

N LC A	Radia LED
J4 JJ4 P PE	luminos led 600*600 panel
Z Z1	Squat Led 3000K
HB CH	65W CREE XB-D 5,900 Lumen LED Retrofit Kit

G1	DirecT8 LEDS
G2	DirecT8 LEDS
Led	No Replacement Required

Total Cost of Ownership Analysis

Table 5: TCO Lighting

	Cost	Annual Savings	Payback
Admin	2,161,500.00	862,772.40	2.51
Dining	215,000.00	422,524.00	0.51
Security	133,300.00	777,304.00	0.17
Plant	1,984,000.00	813,891.60	2.44
Storage	364,400.00	748,454.40	0.49
	4,858,200.00	3,624,946.40	1.34

The table above gives a summary of the savings that can be achieved by retrofitting the current lighting at the plant.

5.3 Solar Leasing:

Under a solar leasing arrangement a third party provider will be contracted to provide a solar power plant to EAC for use on an operational lease basis. Solar leases can typically be negotiated to require no up-front payments. A solar lease would allow EAC to replace part of its current grid electricity consumption with on-site generated solar electricity, which will be priced below current grid rates, thus generating savings on electricity expenses.

Below is a graph of the integration of a 300 kW solar power plant at the EAC Kitui Road site. Losses (red) would not be significant as most generated solar electricity (yellow) would be consumed (green) by the prevalent load (blue) at the site.

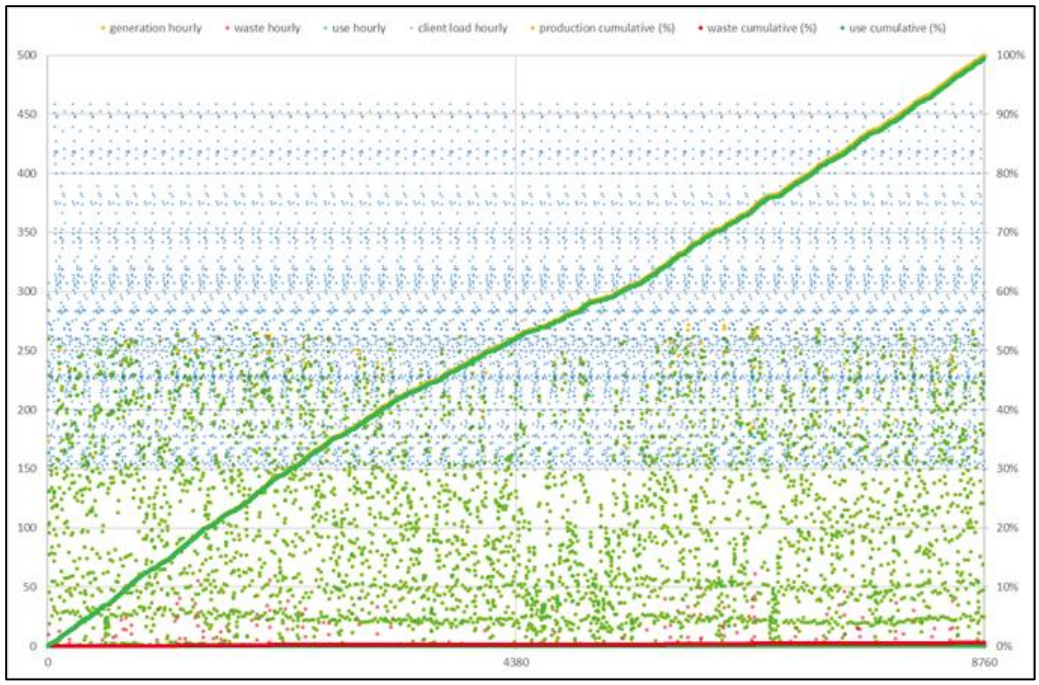


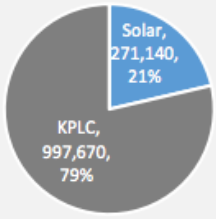
Figure 2 : Solar potential EACL

The Weekly graph below compares the minimum weekly load curve as derived from our onsite measurements, overlaid with the average, minimum and maximum solar power output over the course of a year from a 300 kW solar power plant.

The savings to be realized by adopting this measure are highlighted below: -

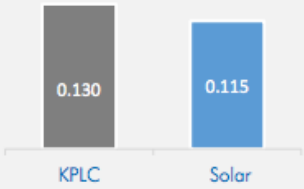
Technical parameters

Size of solar plant:	**160**	**kW**
Annual production:	**271,140**	**kWh**
Your current consumption:	1,268,810	kWh
Future solar share:	21.4%	of total
Type of installation:	roof mounted, fixed angle, low-voltage three phase interconnection	
Location of installation:	roof area of production hall	



Financial parameters

Our 1st year solar rate:	**0.115**	**USD/kWh**	*(inflates at 4 % per year)*
Your current rate:	0.130	USD/kWh	*(average CI2 tariff over past 12 months ex. VAT)*
Discount of solar rate:	**11.7%**	**less per kWh**	
1st year solar bills:	31,181	USD	
Cost at current rate:	35,322	USD	
1st year savings:	**4,141**	**USD**	
Current KPLC bills:	**165,292**	**USD/year**	*(at 12 month average rates and consumption)*
1st year KPLC bills:	129,969	USD	*(at 12 month average rates and consumption)*
1st year solar bills:	31,181	USD	*(at 12 month average rates and consumption)*
1st year total bills:	**161,151**	**USD**	
1st year cost reduction:	**2.5%**	**of total electricity expenses**	
25 year average savings:	23,427	USD/year	
25 year total savings:	585,673	USD over 25 years	



The 1st Year savings by adopting this measure are projected at about **414,100 KES.** The average savings over the term of the lease factoring in inflation are projected to be over **2,342,700 KES** per year.

5.4 Power Factor Correction:

Currently the facility has poor power factor. An analysis has been carried out and the report of the PF fix is highlighted below.

Kw	kva	PF	PHI	phi degrees	Phid	Required KVAR
352	451	0.780487805	0.675350615	38.69473992	0.348166021	119.4625241
308	377	0.816976127	0.614648621	35.21677189	0.348166021	84.07629623
304	350	0.868571429	0.518484048	29.70694771	0.348166021	52.28320834
392	441	0.888888889	0.47588225	27.26604445	0.348166021	50.33875875
299	354	0.844632768	0.564917502	32.36738863	0.348166021	65.84306563
374	423	0.884160757	0.486101773	27.85158	0.348166021	51.917656

The minimum required capacitance is about **150 kvar.**

5.5 Monitoring and verification:

A critical (and often overlooked) step to ensure on-going energy optimization projects is measurement and verification of your energy performance and savings. Energy savings cannot be measured directly, as savings are the absence of something, a void, and you cannot measure a void. Measurement and Verification or M&V is a process used to construct an energy baseline. An energy baseline is the characterization and visualization of energy consumption given certain energy drivers (like production, climatic conditions, occupancy, etc.

Once a baseline has been established one can effectively evaluate performance. A direct comparison between energy usage year-on-year is not a direct comparison because production volumes, occupancy, climatic conditions could differ widely between one year and the next.

Energy Auditors will adopt a Measurement and Verification system for each Energy conservation measure proposed. The standard to be used for this is IPMVP:-

5.5.1 Lighting:

(IPMVP Option A: Estimated and Short Term Measurements.)

The variables affecting savings from this lighting project are fixture powers and hours of operation. Fixture powers will be measured on a sample of the most common fixture types. For less common fixture types, fixture power will be based on a table of standard fixture powers or manufacturer's data.

Operating hours will be measured on a sample of space types during the Detailed Energy Survey. The measured hours will then be used to estimate the energy and demand savings during performance period and will not be adjusted even if the actual operating schedules change. Equipment numbers and locations will not vary, and operating hours are not projected to change after the project is implemented.

The M&V Plan for this retrofit assumes:

(i) Operating hours will be measured before the retrofit. The hours for the lighting fixtures will be the same before and after the equipment retrofit for the purpose of energy savings calculations.

(ii) Interactive effects on heating and cooling equipment from the lighting retrofit will not be considered.

(iii) Lighting levels will not decrease as a result of the lighting equipment retrofit. Existing lighting levels have been measured and recorded for each area.

5.5.2 Solar Leasing.:

(IPMVP Option C: Whole Facility Analysis.)

Savings are determined by measuring energy use at the whole facility level. This will be accomplished by using real time monitoring at the main incomer and analysis of utility bills to determine the savings achieved.

5.5.3 compressed air leaks:

(IPMVP Option A. Partially Measured Retrofit Isolation Savings are determined by partial field measurement of the energy use of the system(s) to which an ECM was applied,)

a monitor was installed at the circuit breaker serving the compressor. This logged data will be compared to the data before the measure to obtain the savings,

CHAPTER SIX

CONCLUSIONS.

The results from the energy audit revealed that there is a great potential for energy savings at East African Cables Ltd Factory Addis Road.

Our energy experience over many years has shown that an organization's attitude to energy management has a fundamental effect on the way that it uses energy. Although it is possible to save energy through technical 'fixes' alone, in the long term, it is the attitude of the people working in the organization that has the biggest impact.

We advise East African Cables Ltd to follow the following action points;

Action Points

- Attitudes are worth more than technology. The best technology will not reduce energy use unless attitudes are right – new equipment badly run is less effective than old equipment well run.
- Tenant involvement and consultation should be the first priority – with an enthusiastic client, the rest is easy.
- A well-run suggestion scheme can pay big financial dividends.

5.4.1Motivation and Training:

The long-term success of any energy management program will be ultimately dependent on the people who operate it. Sustaining the momentum of an energy management program is a continuing challenge and depends to a large extent on maintaining a general ethos of energy *awareness* throughout the organization. Top level *commitment* to the challenge is an essential component, providing the driving force behind any campaign. Without the full backing of management, little is likely to be achieved in the long-term. In addition to commitment, *leadership* is required at all levels - high level leadership to authorize necessary resources and to act as a corporate 'champion'. Furthermore, for energy management to be truly effective, energy reduction needs to be the responsibility of everybody.

Energy Efficiency can be considered as an effective option for increasing profit and competition as well as creating an attractive marketing case for East African Cables Ltd. Having listed all the different remedies that can lead to electrical energy conservation, the implementation of these recommendations is very crucial to realize any savings.

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APPENDICES

Appendix A:

Electric Load Factor (ELF):

$$ELF = \frac{kWh(\text{for the period})}{kW(\text{max in period}) * \text{hours in period}}$$

Occupancy Load Factor (OLF):

$$OLF = \frac{\text{occupied hours in period}}{24 \times \text{days in the period}}$$

Table 6: ELF And OLF

Appendix B: Details of instrumentation used –Parameters monitored Duration: 2 Weeks

ELECTRICAL			
VOLTAGE MEASUREMENT	**RANGE**	**RESOLUTION**	*** ACCURACY (% of Reading)**
50/60Hz	42.5 to 69Hz	–	±0.1Hz
Single-Phase RMS Voltages	10 to 1000Vrms	0.1V	±0.2% Rdg ± 0.2V
Phase-to-Phase RMS Voltages	17 to 1700Vrms	0.1 to 1V	±0.2% Rdg ± 0.4V
400Hz	340 to 460Hz	–	–
Single-Phase RMS Voltages	10 to 600Vrms	0.1V	±1% Rdg ± 1V
Phase-to-Phase RMS Voltages	17 to 1200Vrms	0.1 to 1V	±1% Rdg ± 1V
DC	100 to 1000V	0.1V	±1% Rdg ± 3V (typical)
PT Ratios	Programmable from 50V to 65,0000V	0.01V to 0.1V	–
CURRENT MEASUREMENT			
Current Probe: MiniFlex• Sensor MA193***	200mA to 100Arms	1 to 100mA	±1.2% ± 50mA
	0.8A to 400Arms	10 to 100mA	±1.2% ± 0.2A
	4A to 2000Arms	0.1 to 1A	±1.2% ± 1A
	20A to 10,000Arms	0.1 to 10A	±1.2%
CT Ratios	Programmable from 1:1 to 25,000:1 (probe dependent)		
POWER MEASUREMENTS			
Active Power (P)*	-2 to 2GW	0.001W	±0.5% Rdg ± 0.005% Pnom
Reactive Power (Q)*	-2 to 2Gvar	0.001var	±1% Rdg ± 0.01% Qnom
Apparent Power (S)*	0 to 2GVA	0.001VA	±0.5% Rdg ± 0.005% Snom
Power Factor	-1 to +1	0.001	± 0.05
Tangent ϕ (active/reactive power ratio)	-3.2 to +3.2	0.001	± 0.02
ENERGY MEASUREMENTS			
Active Energy (EP)	0 to 4 x 10^{18}	1Wh	±0.5% Rdg
Reactive Energy (EQ)	0 to 4 x 10^{18}	1varh	±2% Rdg
Apparent Energy (ES)	0 to 4 x 10^{18}	1Vah	±0.5% Rdg
THD	± 655%		
Individual Harmonics	1 to 50 displayed in percentage; 1 to 7 at 400Hz		
External Supply	110V/250V (10%) @ 50/60Hz; 400Hz		
Back-Up Power Source/Charge Time	Rechargeable 8.4V NiMH battery pack / Approximately 5 hours		
Battery Life	30 minutes minimum, 60 minutes typical		
MECHANICAL			
Communication Ports	USB 2.0, Ethernet (RJ45), Wireless *Bluetooth* Class 1 **		
Dimension/Weight	10.08 x 4.92 x 1.46" (256 x 125 x 37mm) / <1kg		
Case/Index of Protection	Double insulated, rubber over-molded, polycarbonate UL94 V1 rated / IP54 non operating		
Mounting/Security	Embedded magnets on back side, keyhole slot on back side / Kensington anti-theft system		
DISPLAY			
Display Type for Model PEL 103	2.63 x 2.16" (67 x 55mm), four line, monochrome, backlit LCD with adjustable brightness and contrast		
ENVIRONMENTAL / SAFETY			
Operating Temperature/Relative Humidity	50° to 122°F (10° to 50°C) / up to 85%		
Storage Temperature	-4° to 122°F (-20° to 50°C) with batteries; -4° to 158°F (-20° to 70°C without batteries)		
Safety Rating/CE Rating	Complies with IEC 61010-1:Ed3, and IEC 61010-2-030:Ed1 for 1000V CAT III / 600V CAT IV, Pollution Degree 2 / Yes		


MODEL PEL 103
16.62
4.156
20.78
PF
POWER & ENERGY LOGGER

E-gauge

Figure ?

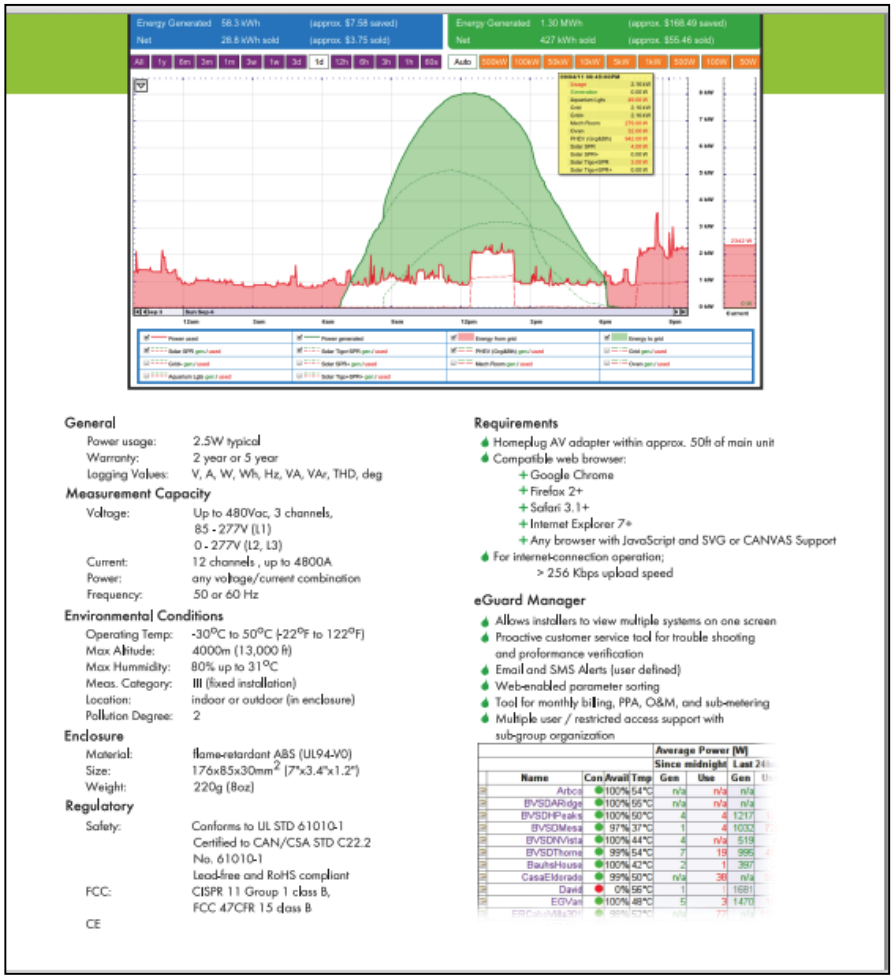
General
Power usage: 2.5W typical
Warranty: 2 year or 5 year
Logging Values: V, A, W, Wh, Hz, VA, VAr, THD, deg
Measurement Capacity
Voltage: Up to 480Vac, 3 channels,
85 - 277V (L1)
0 - 277V (L2, L3)
Current: 12 channels , up to 4800A
Power: any voltage/current combination
Frequency: 50 or 60 Hz
Environmental Conditions
Operating Temp: -30°C to 50°C (-22°F to 122°F)
Max Altitude: 4000m (13,000 ft)
Max Hummidity: 80% up to 31°C
Meas. Category: III (fixed installation)
Location: indoor or outdoor (in enclosure)
Pollution Degree: 2
Enclosure
Material: flame-retardant ABS (UL94-V0)
Size: 176x85x30mm^2 (7"x3.4"x1.2")
Weight: 220g (8oz)
Regulatory
Safety: Conforms to UL STD 61010-1
Certified to CAN/CSA STD C22.2
No. 61010-1
Lead-free and RoHS compliant
FCC: CISPR 11 Group 1 class B,
FCC 47CFR 15 class B
CE
Requirements
Homeplug AV adapter within approx. 50ft of main unit
Compatible web browser:
+ Google Chrome
+ Firefox 2+
+ Safari 3.1+
+ Internet Explorer 7+
+ Any browser with JavaScript and SVG or CANVAS Support
For internet-connection operation;
> 256 Kbps upload speed
eGuard Manager
Allows installers to view multiple systems on one screen
Proactive customer service tool for trouble shooting and proformance verification
Email and SMS Alerts (user defined)
Web-enabled parameter sorting
Tool for monthly billing, PPA, O&M, and sub-metering
Multiple user / restricted access support with sub-group organization
Average Power (W)
Since midnight
Last 24
Name
Con/Avail
Tmp
Gen
Use
Gen

Figure ?

Appendix C: data and perfomance plots of Machines audited

Compressor: -

COMPRESSOR DATA SHEET

Rotary Compressor: Fixed Speed

MODEL DATA - FOR COMPRESSED AIR			
1	Manufacturer: **Atlas Copco**		
2	Model Number: **GA45-125 AP**	Date:	**6/15/2012**
	[X] Air-cooled [ ] Water-cooled	Type:	**Screw**
	[X] Oil-injected [ ] Oil-free	# of Stages:	**1**
3*	Rated Capacity at Full Load Operating Pressure [a, e]	**271**	acfm [a,e]
4	Full Load Operating Pressure [b]	**125**	psig [b]
5	Maximum Full Flow Operating Pressure [c]	**132**	psig [c]
6	Drive Motor Nominal Rating	**60**	hp
7	Drive Motor Nominal Efficiency	**93.9**	percent
8	Fan Motor Nominal Rating (if applicable)	**3.9**	hp
9	Fan Motor Nominal Efficiency	**85.0**	percent
10*	Total Package Input Power at Zero Flow [e]	**13.2**	kW [e]
11	Total Package Input Power at Rated Capacity and Full Load Operating Pressure [d]	**55.3**	kW [d]
12*	Specific Package Input Power at Rated Capacity and Full Load Operating Pressure [e]	**20.4**	kW/100 cfm [e]

Figure ?

Appendix D: Author taking some Measurementsd

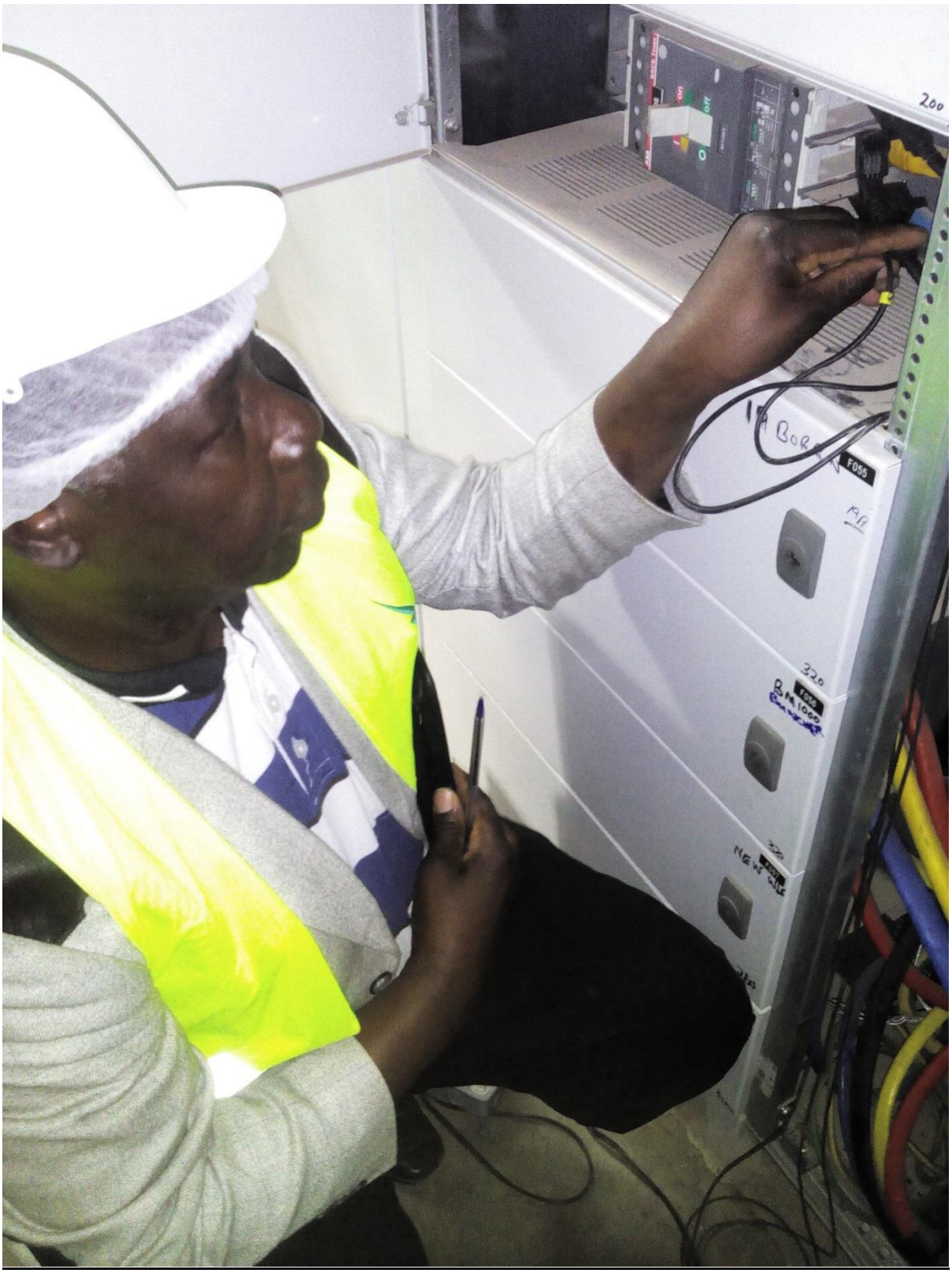

Figure ?

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APPENDIX E

POWER FACTOR CALCULATIONS

Calculation of the energy savings

In order to calculate power factor correction for your installation, your should follow the steps below:

Step 1 – Calculate Actual Load (kW)

(Load) Power **kW** = Volts **V** x √**3** x Current **I** x Power factor **Pf**

Step 2 – Calculate Required Power Factor Correction (kVAr)

Power Factor Correction **kVAr** = Power **kW** (**TanΦi – TanΦd**)

Φi = Cos^{-1} Initial Power Factor Pf

Φd = Cos^{-1} Required Power Factor Pf

Step 3 – Calculate Actual Power Factor Correction [kAVrl

Actual Power Factor Correction Pf = Cos (**Tan^{-1}** (**TanΦi** – **Correction kVAr**/**Power kW**))

Typical Power Factor Correction available in multiples of 25kVAR's.

At the end of the spreadsheet you will get the calculation of the energy savings for above power factor correction.

1. Initial Current (Amps)
2. Original Load (kVA)
3. Corrected Current (Amps)
4. Corrected Load (kVA)

5. Reduction in Current (Amps)
6. Reduction in Load (kVA)
7. Annual CO2 Savings (kg C02)

Calculation of the energy savings

In order to calculate power factor correction for your installation, your should follow the steps below:

Step 1 – Calculate Actual Load (kW)

(Load) Power **kW** = Volts **V** x √**3** x Current **I** x Power factor **Pf**

Step 2 – Calculate Required Power Factor Correction (kVAr)

Power Factor Correction **kVAr** = Power **kW** (**TanΦi – TanΦd**)

Φi = Cos^{-1} Initial Power Factor Pf

Φd = Cos^{-1} Required Power Factor Pf

Step 3 – Calculate Actual Power Factor Correction [kAVrl

Actual Power Factor Correction Pf = Cos (**Tan^{-1}** (**TanΦi** – **Correction kVAr**/**Power kW**))

Typical Power Factor Correction available in multiples of 25kVAR's, for further details please Contact Blakley Electrics Technical Department.

At the end of the spreadsheet you will get the calculation of the energy savings for above power factor correction.

1. Initial Current (Amps)
2. Original Load (kVA)
3. Corrected Current (Amps)
4. Corrected Load (kVA)
5. Reduction in Current (Amps)
6. Reduction in Load (kVA)
7. Annual CO2 Savings (kg C02)

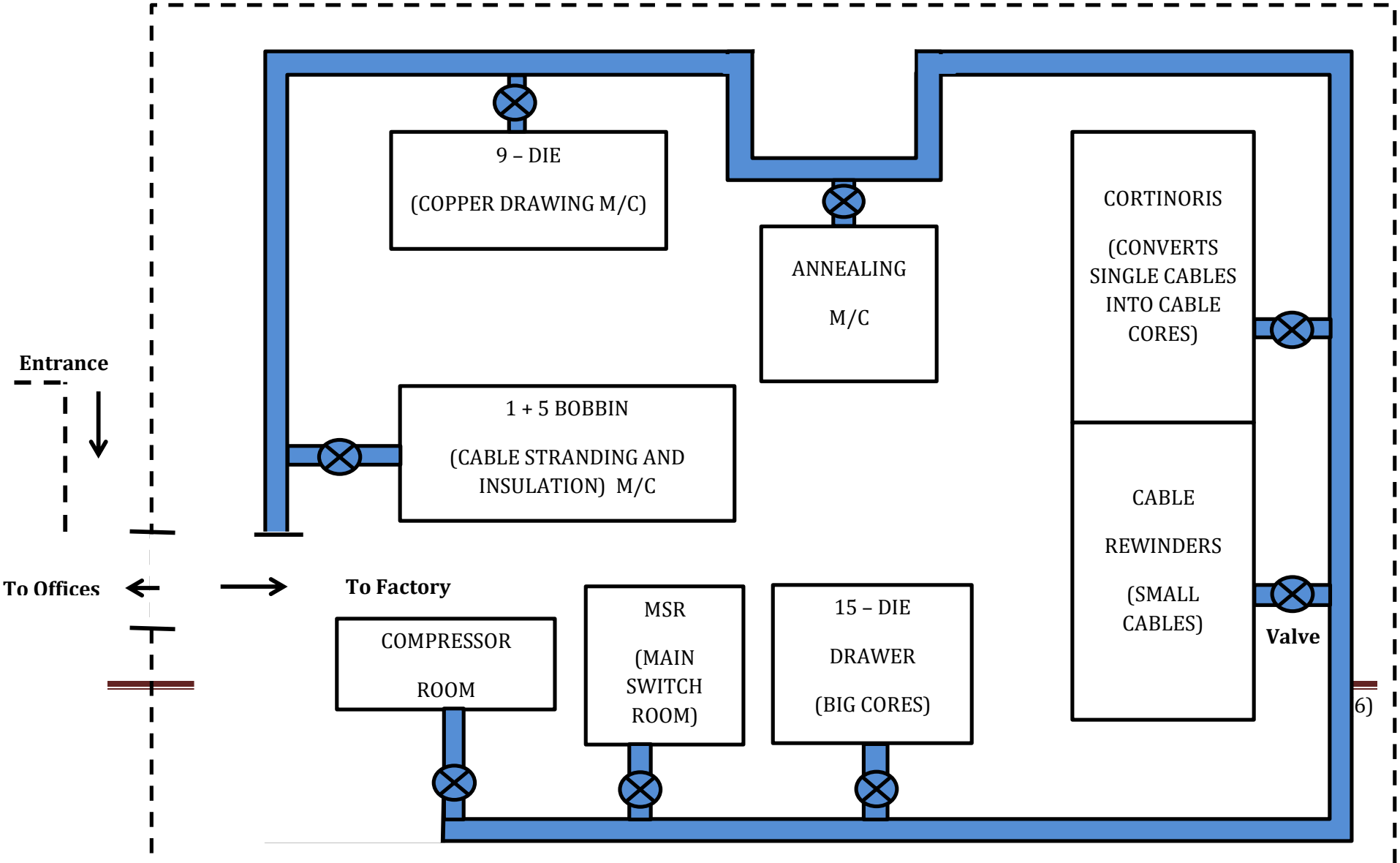
APPENDIX F

COPIES OF ELECTRICITY BILLS FOR THE FACILITY

APPENDIX G

COPIES OF WATER BILLS FOR THE FACILITY

EACL FACTORY LAYOUT PLAN



MARCH 2014

Electricity Bill

Kenya Power

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

Contract No. / Account No: *2544023*

CITY SQUARE DLY

dwanjiri@eacables.com

2544023-01-27/03/2014-1	1,815	29/03/2014	05/04/2014

Bill Number: (LOW RATE, PF) | Maximum Authorised Load (KW) : | Date of Issue: 209 / 8176 ADDIS | Date Due: RD

Method of Charge No.: | Supply Location:

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Conversion Factor	Consumption
HIGH RATE (C2)	8083213	2313850	2367020	1	53170
LOW RATE (C2)	8083213	2114970	2169640	1	54670
DEMAND KVA (C2)	8083213		406	1	406
DEMAND KW (C2)	8083213		383	1	383
	28/02/2014 - 27/03/2014 (Act)		0.94		

KVAh/KWh : | Consumption Period : | Power Factor :

BILLING DETAILS

BILLING CONCEPT	AMOUNT IN SHILLINGS
FIXED CHARGE	4,500.00
HIGH RATE CONSUMPTION	398,775.00
LOW RATE CONSUMPTION	410,025.00
FUEL COST CHARGE 519.0 cents/kwh	559,689.60
FOREX ADJ. 5.0 cents/kwh	5,392.00
INFLATION ADJ. 9.0	9,705.60
WARMA LEVY 5.0	5,392.00
ERC Levy 3.0 cents/kwh	3,235.20
REP Levy 5.00 %	40,440.00
MAXIMUM DEMAND KVA	211,120.00
POWER FACTOR SURCHARGE (0kwh)	0.00
VAT 16.00 %	255,873.15
20140324-PAYMENT	-2,203,512.60
20140324-ADVANCE PAYMENT	-0.40
Round Adjustment	0.05
	1,904,147.20

The monthly bill is Kshs. 1,904,147.20

v2.01 EMAIL.20140329_03.03.21ac 1361 0176 20

This electricity bill is payable before 05/04/2014.
Notice is hereby given that if this bill is not paid within fourteen days from 05/04/2014, i.e on 19/04/2014 , your supply shall be liable to disconnection without any further notice to you.
Should the supply be disconnected, in addition to settling the outstanding amount, you will be required to pay the applicable Reconnection (RC) fee before reconnection.The RC fees are as follows: Sh580 for cut-out RC or Sh3,828 for pole RC or Sh13,920 for service line RC.The said RC fees are inclusive of an 16% VAT charge. In addition, you will also be required to top up your deposit to 2 times your average monthly bill

Total Amount:

All enquiries to Customer Service Eng. NAIROBI SOUTH P.O. BOX 30177, NAIROBI TEL: 020-3211547

customercarenairobi@kplc.co.ke

THE KENYA POWER Central Office Stima Plaza Kolobot Road P.O. Box 30099 Nairobi Tel: 3201000 Fax: 3514495 VAT Reg No. 0010656 PIN: 0005109K

E-mail: EAST AFRICAN CABLES Website: www.kplc.co.ke PO BOX 18243 NAIROBI

To be posted with cheque payments. ALL CHEQUES PAYABLE TO KENYA POWER & LIGHTING COMPANY LIMITED

Customer's Name: 2544023-01-27/03/2014-1 Postal Address: 1,904,147.20

Date Due: Bill Number: Amount: Form Serial Number:

1A7A6698B52D4F71F5F6C6CF6B7F757045607DCA 0926 00483562 1403311252 AIP06600761

Electricity Bill

Contract No. / Account No: 2544023-01

A/3/15

APRIL 2014

Kenya Power

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

CITY SQUARE DLY 7

dwanjiru@eacables.com

Bill Number :
2544023-01-27/04/2014-1

Maximum Authorised Load (KW) :
1,815

Date of Issue:
29/04/2014

Date Due:
06/05/2014

Method of Charge No.:
CI2 (HIGH/LOW RATE, PF)

Deposit: KShs. 0.00

Supply Location:
PLT / 209 / 8176 ADDIS ABABA RD

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Conversion Factor	Consumption
HIGH RATE (C2)	8083213	2367020	2421380	1	54360
LOW RATE (C2)	8083213	2169640	2229650	1	60010
DEMAND KVA (C2)	8083213		428	1	428
DEMAND KW (C2)	8083213		388	1	388

KVAh/KWh :

Consumption Period :
27/03/2014 - 27/04/2014 (Act)

Power Factor :
0.91

BILLING DETAILS

BILLING CONCEPT	AMOUNT IN SHILLINGS
BALANCE BROUGHT FORWARD	1,904,147.10
FIXED CHARGE	4,500.00
HIGH RATE CONSUMPTION	407,700.00
LOW RATE CONSUMPTION	450,075.00
FUEL COST CHARGE 519.0 cents/kwh	593,580.30
FOREX ADJ	0.00
INFLATION ADJ. 9.0	10,293.30
WARMA LEVY 5.0	5,718.50
ERC Levy 3.0 cents/kwh	3,431.10
REP Levy 5.00 %	42,888.75
MAXIMUM DEMAND KVA	222,560.00
POWER FACTOR SURCHARGE (0kwh)	0.00
VAT 16.00 %	270,193.37
20140417-PAYMENT	-1,904,147.10
20140417-ADVANCE PAYMENT	-0.35

The monthly bill is KShs. 2,010,940.30

v2.01 EMAIL 20140429_02.58.46ac 1083 0176 20

This electricity bill is payable before 06/05/2014.
Notice is hereby given that if this bill is not paid within fourteen days from 06/05/2014, i.e on 20/05/2014 , your supply shall be liable to disconnection without any further notice to you.
Should the supply be disconnected, in addition to settling the outstanding amount, you will be required to pay the applicable Reconnection (RC) fee before reconnection.The RC fees are as follows. Sh580 for cut-out RC or Sh3,828 for pole RC or Sh13,920 for service line RC.The said RC fees are inclusive of an 16% VAT charge. In addition, you will also be required to top up your deposit to 2 times your average monthly bill

Round Adjustment 0.03

Total Amount: 2,010,940.00

All enquiries to Customer Service Eng. NAIROBI SOUTH P.O. BOX 30177, NAIROBI TEL. 020-3211547

E-mail: customercarenairobi@kplc.co.ke

Website: www.kplc.co.ke

To be posted with cheque payments. **ALL CHEQUES PAYABLE TO KENYA POWER & LIGHTING COMPANY LIMITED**

Customer's Name: EAST AFRICAN CABLES

Postal Address: PO BOX 18243 NAIROBI

Date Due: 06/05/2014

Bill Number: 2544023-01-27/04/2014-1

Amount: KShs. 2,010,940.00

Form Serial Number:

13F467625A8D22F894D461EE96E43C3902AC3A70 024L 03531183 1404300528 ALP06000705

Electricity Bill (Duplicate)

Kenya Power

2544023

Contract No. / Account No. :
2544023 - 01

ADDIS

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

JUNE 2014

Bill Number :	Billing Frequency :		
2544023 - 01 - 30/06/2014 - 1	MONTHLY	01/07/2014	09/07/2014

Method of Charge No. :
CI2 HIGH/LOW RATE, PFv

Maximum Authorised Load (KVA) :
1815

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

These are the calculations for your bill.

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Reading Constant	Consumption (Units)
DEMAND KW	008083213	365	427	1	427
DEMAND KVA	008083213	405	452	1	452
LOW RATE	008083213	2285330	2347480	1	62150
HIGH RATE	008083213	2474870	2534630	1	59760

KVAh/KWh :

Consumption Period :
27/05/2014 - 30/06/2014 (Act)

Power Factor :
.0.94

BILLING DETAILS

BILLING CONCEPTS		Amount (Ksh)
BALANCE BROUGHT FORWARD		4,210,952.71
FIXED CHARGE		4,500.00
HIGH RATE CONSUMPTION (units billed: 59760 kwh)		448,200.00
LOW RATE CONSUMPTION (units billed: 62150 kwh)		466,125.00
FUEL COST CHARGE	722.0 cts/kwh	880,190.20
FOREX ADJ.	28.0 cts/kwh	34,134.80
INFLATION ADJ	9.0 cts/kwh	10,971.90
WARMA LEVY	5.0	6,095.50
ERC Levy	3.0 cts/kwh	3,657.30
REP Levy	5.00 %	45,716.25
MAXIMUM DEMAND KVA		235,040.00
POWER FACTOR SURCHARG		.00
VAT	16.00 %	332,665.90
30/05/2014-PAYMENT		-2,010,939.99
25/06/2014-PAYMENT		-2,200,012.70
Round adjustment		-0.03
Total Amount :		**2,467,296.87**

The monthly bill is KShs. 2467296.85

*As per the Electricity Regulatory Board Levy Order, 1998, Legal Notice No. 95.

**As per the Electric Power (Rural Electrification Programme Levy) Order, 1998, Legal Notice No. 96.

Issue Date : 01/07/2014

VAT Reg. No. : 00106085 PIN : P000591096X E = Estimated Consumption

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

Date Due :	Bill Number :	Amount :	Form Serial Number :
09/07/2014	2544023 - 01 - 30/06/2014 - 1	Ksh 2,467,296.87	

Electricity Bill

Kenya Power

Contract No. / Account No:

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

CITY SQUARE DLY 7

ADDIS

JULY 2014

dwanjiru@eacables.com

Bill Number :	Maximum Authorised Load (KW) :	Date of Issue:	Date Due:
2544023-01-27/07/2014-1	1,815	30/07/2014	06/08/2014

Method of Charge No.:	Deposit: KShs. 0.00	Supply Location:
CI2 (HIGH/LOW RATE, PF)		PLT / 209 / 8176 ADDIS ABABA RD

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Conversion Factor	Consumption
HIGH RATE (C2)	8083213	2534630	2578540	1	43910
OW RATE (C2)	8083213	2347480	2384940	1	37460
DEMAND KVA (C2)	8083213		418	1	418
DEMAND KW (C2)	8083213		388	1	388

KVAh/KWh :	Consumption Period :	Power Factor :
	30/06/2014 - 27/07/2014 (Act)	0.93

BILLING DETAILS

BILLING CONCEPT	AMOUNT IN SHILLINGS
BALANCE BROUGHT FORWARD	2,467,296.90
FIXED CHARGE	4,500.00
HIGH RATE CONSUMPTION	362,257.50
LOW RATE CONSUMPTION	309,045.00
FUEL COST CHARGE 722.0 cents/kwh	587,491.40
FOREX ADJ. 30.0 cents/kwh	24,411.00
INFLATION ADJ. 18.0	14,646.60
WARMA LEVY 6.0	4,882.20
ERC Levy 3.0 cents/kwh	2,441.10
REP Levy 5.00 %	33,565.12
MAXIMUM DEMAND KVA	217,360.00
POWER FACTOR SURCHARGE (0kwh)	0.00
VAT 16.00 %	243,153.84
20140725-PAYMENT	-2,467,296.87
Round Adjustment	0.04
Total Amount:	**1,803,753.80**

The monthly bill is KShs. **1,803,753.80**

v2.01 EMAIL.20140730_13.17.27 253 0176 20

This electricity bill is payable before 06/08/2014.
Notice is hereby given that if this bill is not paid within fourteen days from 06/08/2014, i.e on 20/08/2014 , your supply shall be liable to disconnection without any further notice to you.
Should the supply be disconnected, in addition to settling the outstanding amount, you will be required to pay the applicable Reconnection (RC) fee before reconnection.The RC fees are as follows: Sh580 for cut-out RC or Sh3,828 for pole RC or Sh13,920 for service line RC.The said RC fees are inclusive of an 16% VAT charge. In addition, you will also be required to top up your deposit to 2 times your average monthly bill

E-mail: customercarenairobi@kplc.co.ke

Website: www.kplc.co.ke

All enquiries to Customer Service Eng., NAIROBI SOUTH, P.O. BOX 30177, NAIROBI, TEL. 020-3211547

To be posted with cheque payments. **ALL CHEQUES PAYABLE TO KENYA POWER & LIGHTING COMPANY LIMITED**

Customer's Name:	Postal Address:
EAST AFRICAN CABLES	PO BOX 18243 NAIROBI

Date Due:	Bill Number:	Amount:	Form Serial Number:
06/08/2014	2544023-01-27/07/2014-1	KShs. 1,803,753.80	

111C

Kenya Power

Electricity Bill (Duplicate)

2544023

Contract No. / Account No. :
2544023 - 01

AD

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

~~SEPT~~ AUG 2014

Bill Number :	Billing Frequency :		
2544023 - 01 - 28/08/2014 - 1	MONTHLY	28/08/2014	05/09/2014

Method of Charge No. :
CI2 HIGH/LOW RATE, PFv

Maximum Authorised Load (KVA) :
1815

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

These are the calculations for your bill.

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Reading Constant	Consumption (Units)
DEMAND KW	008083213	388	421	1	421
DEMAND KVA	008083213	418	451	1	451
LOW RATE	008083213	2384940	2442430	1	57490
HIGH RATE	008083213	2578540	2639700	1	61160

KVAh/KWh :

Consumption Period :
27/07/2014 - 28/08/2014 (Act)

Power Factor :
0.93

BILLING DETAILS

BILLING CONCEPTS		Amount (Ksh)
BALANCE BROUGHT FORWARD		1,803,753.76
FIXED CHARGE		4,500.00
HIGH RATE CONSUMPTION (units billed: 61160 kwh)		504,570.00
LOW RATE CONSUMPTION (units billed: 57490 kwh)		474,292.50
FUEL COST CHARGE	722.0 cts/kwh	856,653.00
FOREX ADJ.	28.0 cts/kwh	33,222.00
INFLATION ADJ.	18.0 cts/kwh	21,357.00
WARMA LEVY	5.0	5,932.50
ERC Levy	3.0 cts/kwh	3,559.50
REP Levy	5.00 %	48,943.12
MAXIMUM DEMAND KVA		234,520.00
POWER FACTOR SURCHARG		.00
VAT	16.00 %	340,658.32
25/08/2014-PAYMENT		-1,803,753.80
25/08/2014-ADVANCE PAYMENT		-.20
Round adjustment		0

Total Amount : 2,528,207.70

The monthly bill is KShs. 2528207.94

*As per the Electricity Regulatory Board Levy Order, 1998, Legal Notice No. 95.

**As per the Electric Power (Rural Electrification Programme Levy) Order, 1998, Legal Notice No. 96.

Issue Date : 28/08/2014

VAT Reg. No. : 00106085 PIN : P000591096X E = Estimated Consumption

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

Date Due :	Bill Number :	Amount :	Form Serial Number :
05/09/2014	2544023 - 01 - 28/08/2014 - 1	Ksh 2,528,207.70	

Electricity Bill (Duplicate)

2544023

Contract No. / Account No. :
2544023 - 01

AADS
SEPT 2014

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

Bill Number :	Billing Frequency :		
2544023 - 01 - 27/09/2014 - 1	MONTHLY	28/09/2014	06/10/2014

Method of Charge No. :
CI2 HIGH/LOW RATE, PFv

Maximum Authorised Load (KVA) :
1815

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

These are the calculations for your bill.

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Reading Constant	Consumption (Units)
DEMAND KW	008083213	421	329	1	329
DEMAND KVA	008083213	451	382	1	382
LOW RATE	008083213	2442430	2499510	1	57080
HIGH RATE	008083213	2639700	2699210	1	59510

KVAh/KWh :

Consumption Period :
28/08/2014 - 27/09/2014 (Act)

Power Factor :
0.86

BILLING DETAILS

BILLING CONCEPTS		Amount (Ksh)
BALANCE BROUGHT FORWARD		2,528,207.70
FIXED CHARGE		4,500.00
HIGH RATE CONSUMPTION (units billed: 59510 kwh)		490,957.50
LOW RATE CONSUMPTION (units billed: 57080 kwh)		470,910.00
FUEL COST CHARGE	571.0 cts/kwh	665,728.90
FOREX ADJ.	17.0 cts/kwh	19,820.30
INFLATION ADJ.	18.0 cts/kwh	20,986.20
WARMA LEVY	5.0	5,829.50
ERC Levy	3.0 cts/kwh	3,497.70
REP Levy	5.00 %	48,093.37
MAXIMUM DEMAND KVA		198,640.00
POWER FACTOR SURCHARG		.00
VAT	16.00 %	299,446.86
24/09/2014-PAYMENT		-2,528,207.00
Round adjustment		0.03
Total Amount :		**2,228,411.03**

The monthly bill is KShs. 2228410.33

*As per the Electricity Regulatory Board Levy Order, 1998, Legal Notice No. 95.

**As per the Electric Power (Rural Electrification Programme Levy) Order, 1998, Legal Notice No. 96.

Issue Date : 28/09/2014

VAT Reg. No. : 00106085 PIN : P000591096X E = Estimated Consumption

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

Date Due :	Bill Number :	Amount :	Form Serial Number :
06/10/2014	2544023 - 01 - 27/09/2014 - 1	Ksh 2,228,411.03	

Electricity Bill (Duplicate)

2544023

Contract No. / Account No. :
2544023 - 01

ADDIS
OCT 2014

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

Bill Number :	Billing Frequency :		
2544023 - 01 - 27/10/2014 - 1	MONTHLY	28/10/2014	05/11/2014

Method of Charge No. :
CI2 HIGH/LOW RATE, PFv

Maximum Authorised Load (KVA) :
1815

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

These are the calculations for your bill.

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Reading Constant	Consumption (Units)
DEMAND KW	008083213	329	370	1	370
DEMAND KVA	008083213	382	387	1	387
LOW RATE	008083213	2499510	2555060	1	55550
HIGH RATE	008083213	2699210	2754870	1	55660

KVAh/KWh :

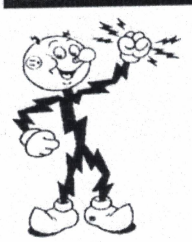
Consumption Period :
27/09/2014 - 27/10/2014 (Act).

Power Factor :
0.96

BILLING DETAILS

BILLING CONCEPTS		Amount (Ksh)
BALANCE BROUGHT FORWARD		2,228,411.03
FIXED CHARGE		4,500.00
HIGH RATE CONSUMPTION (units billed: 55660 kwh)		459,195.00
LOW RATE CONSUMPTION (units billed: 55550 kwh)		458,287.50
FUEL COST CHARGE	479.0 cts/kwh	532,695.90
FOREX ADJ.	23.0 cts/kwh	25,578.30
INFLATION ADJ.	18.0 cts/kwh	20,017.80
WARMA LEVY	5.0	5,560.50
ERC Levy	3.0 cts/kwh	3,336.30
REP Levy	5.00 %	45,874.12
MAXIMUM DEMAND KVA		201,240.00
POWER FACTOR SURCHARG		.00
VAT	16.00 %	272,242.32
Round adjustment		-0.03
Total Amount :		**4,256,938.77**

The monthly bill is KShs. 2028527.74



*As per the Electricity Regulatory Board Levy Order, 1998, Legal Notice No. 95.

**As per the Electric Power (Rural Electrification Programme Levy) Order, 1998, Legal Notice No. 96.

Issue Date : 28/10/2014

VAT Reg. No. : 00106085 PIN : P000591096X E = Estimated Consumption

Customers' Name :
EAST AFRICAN CABLES

Supply Location :
PLT / 209 / 8176 ADDIS ABABA RD

Date Due :	Bill Number :	Amount :	Form Serial Number :
05/11/2014	2544023 - 01 - 27/10/2014 - 1	Ksh 4,256,938.77	

Electricity Bill (Duplicate)

2544023

Contract No. / Account No. :
2544023 - 01

ADDIS
NOVEMBER
2014

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

Bill Number :	Billing Frequency :		
2544023 - 01 - 27/11/2014 - 1	MONTHLY	28/11/2014	06/12/2014

Method of Charge No. : CI2 HIGH/LOW RATE, PFv

Maximum Authorised Load (KVA) : 1815

Customers' Name : EAST AFRICAN CABLES

Supply Location : PLT / 209 / 8176 ADDIS ABABA RD

These are the calculations for your bill.

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Reading Constant	Consumption (Units)
DEMAND KW	008083213	370	374	1	374
DEMAND KVA	008083213	387	423	1	423
LOW RATE	008083213	2555060	2611810	1	56750
HIGH RATE	008083213	2754870	2817300	1	62430

KVAh/KWh :

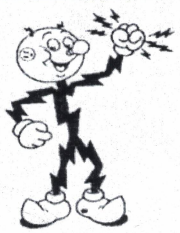
Consumption Period : 27/10/2014 - 27/11/2014 (Act)

Power Factor : 0.88

BILLING DETAILS

BILLING CONCEPTS		Amount (Ksh)
BALANCE BROUGHT FORWARD		4,256,938.77
FIXED CHARGE		4,500.00
HIGH RATE CONSUMPTION (units billed: 62430 kwh)		515,047.50
LOW RATE CONSUMPTION (units billed: 56750 kwh)		468,187.50
FUEL COST CHARGE	347.0 cts/kwh	413,554.60
FOREX ADJ.	30.0 cts/kwh	35,754.00
INFLATION ADJ.	18.0 cts/kwh	21,452.40
WARMA LEVY	5.0	5,959.00
ERC Levy	3.0 cts/kwh	3,575.40
REP Levy	5.00 %	49,161.75
MAXIMUM DEMAND KVA		219,960.00
POWER FACTOR SURCHARG		.00
VAT	16.00 %	268,552.96
27/11/2014-PAYMENT		-1,726,730.60
Round adjustment		-0.02
Total Amount :		**4,533,913.28**

The monthly bill is KShs. 2005705.11



*As per the Electricity Regulatory Board Levy Order, 1998, Legal Notice No. 95.

**As per the Electric Power (Rural Electrification Programme Levy) Order, 1998, Legal Notice No. 96.

Issue Date : 28/11/2014

VAT Reg. No. : 00106085 PIN : P000591096X E = Estimated Consumption

Customers' Name : EAST AFRICAN CABLES

Supply Location : PLT / 209 / 8176 ADDIS ABABA RD

Date Due : 06/12/2014

Bill Number : 2544023 - 01 - 27/11/2014 - 1

Amount : Ksh 4,533,913.28

Form Serial Number :

Electricity Bill

ADDIS

DECEMBER 2014

Contract No. / Account No: 2544023-01

Kenya Power

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

SKaminju@eacables.com;dwanjiru@eacables.com

Bill Number :	Maximum Authorised Load (KW) :	Date of Issue:	Date Due:
2544023-01-27/12/2014-1	1,815	30/12/2014	06/01/2015

Method of Charge No.: CI2 (HIGH/LOW RATE, PF)

Deposit: KShs. 0.00

Supply Location: PLT / 209 / 8176 ADDIS ABABA RD

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Conversion Factor	Consumption
HIGH RATE (C2)	8083213	2817300	2861390	1	44090
LOW RATE (C2)	8083213	2611810	2656020	1	44210
DEMAND KVA (C2)	8083213		354	1	354
DEMAND KW (C2)	8083213		299	1	299

KVAh/KWh :

Consumption Period : 27/11/2014 - 27/12/2014 (Act)

Power Factor : 0.84

BILLING DETAILS

BILLING CONCEPT	AMOUNT IN SHILLINGS
BALANCE BROUGHT FORWARD	4,533,913.30
FIXED CHARGE	4,500.00
HIGH RATE CONSUMPTION	363,742.50
LOW RATE CONSUMPTION	364,732.50
FUEL COST CHARGE 287.0 cents/kwh	253,421.00
FOREX ADJ. 33.0 cents/kwh	29,139.00
INFLATION ADJ. 18.0	15,894.00
WARMA LEVY 5.0	4,415.00
ERC Levy 3.0 cents/kwh	2,649.00
REP Levy 5.00 %	36,423.75
MAXIMUM DEMAND KVA	184,080.00
POWER FACTOR SURCHARGE 0.06 (0kwh)	0.00
VAT 16.00 %	194,481.44
20141202-PAYMENT	-2,528,208.00
Round Adjustment	0.01
Total Amount:	**3,459,183.50**

The monthly bill is KShs. 1,453,478.20

v2.01 EMAILLP.20141230_05.40.13 265 0176 20

X - Your account is in arrears and you are due for disconnection without any further warning.

All enquiries to Customer Service Eng. NAIROBI SOUTH P.O. BOX 30177, NAIROBI TEL. 020-3211547

E-mail: customercarenairobi@kplc.co.ke Website: www.kplc.co.ke

To be posted with cheque payments. ALL CHEQUES PAYABLE TO KENYA POWER & LIGHTING COMPANY LIMITED

Customer's Name:	Postal Address:
EAST AFRICAN CABLES	PO BOX 18243 NAIROBI

Date Due:	Bill Number:	Amount:	Form Serial Number:
06/01/2015	2544023-01-27/12/2014-1	KShs. 3,459,183.50	

68C9E1070454ACBF78ACCFD76EB2738CD1E6AD7F 0288 03507676 1412300914 ALP06000729

Electricity Bill (Duplicate)

2544023

Contract No. / Account No. : 2544023 - 01

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

JAN 2015

Bill Number :	Billing Frequency :		
2544023 - 01 - 30/01/2015 - 1	MONTHLY	30/01/2015	07/02/2015

Method of Charge No. : CI2 HIGH/LOW RATE, PFv

Maximum Authorised Load (KVA) : 1815

Customers' Name : EAST AFRICAN CABLES

Supply Location : PLT / 209 / 8176 ADDIS ABABA RD

These are the calculations for your bill.

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Reading Constant	Consumption (Units)
DEMAND KW	008083213	299	392	1	392
DEMAND KVA	008083213	354	441	1	441
LOW RATE	008083213	2656020	2704700	1	48680
HIGH RATE	008083213	2861390	2921610	1	60220

KVAh/KWh :

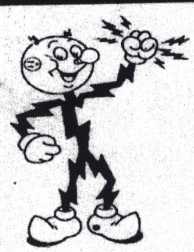
Consumption Period : 27/12/2014 - 30/01/2015 (Act)

Power Factor : 0.89

BILLING DETAILS

BILLING CONCEPTS		Amount (Ksh)
BALANCE BROUGHT FORWARD		3,459,183.47
FIXED CHARGE		4,500.00
HIGH RATE CONSUMPTION (units billed: 60220 kwh)		496,815.00
LOW RATE CONSUMPTION (units billed: 48680 kwh)		401,610.00
FUEL COST CHARGE	253.0 cts/kwh	275,517.00
FOREX ADJ.	29.0 cts/kwh	31,581.00
INFLATION ADJ.	23.0 cts/kwh	25,047.00
WARMA LEVY	5.0	5,445.00
ERC Levy	3.0 cts/kwh	3,267.00
REP Levy	5.00 %	44,921.25
MAXIMUM DEMAND KVA		229,320.00
POWER FACTOR SURCHARG		22,554.90
VAT	16.00 %	237,911.18
29/12/2014-PAYMENT		-2,005,910.00
21/01/2015-PAYMENT		-1,453,273.50
21/01/2015-ADVANCE PAYMENT		-204.69
Round adjustment		0.01
Total Amount :		**1,778,284.61**

The monthly bill is KShs. 1778489.33



*As per the Electricity Regulatory Board Levy Order, 1998, Legal Notice No. 95.

**As per the Electric Power (Rural Electrification Programme Levy) Order, 1998, Legal Notice No. 96.

Issue Date : 30/01/2015

VAT Reg. No. : 00106085 PIN : P000591096X E = Estimated Consumption

Customers' Name : EAST AFRICAN CABLES

Supply Location : PLT / 209 / 8176 ADDIS ABABA RD

Date Due : 07/02/2015

Bill Number : 2544023 - 01 - 30/01/2015 - 1

Amount : Ksh 1,778,284.61

Form Serial Number :

Electricity Bill

FEB 2015

Kenya Power

Contract No. / Account No: 2544023-01

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

CITY SQUARE DLY 7

SKaminju@eacables.com

Bill Number:	Maximum Authorised Load (KW):	Date of Issue:	Date Due:
2544023-01-27/02/2015-1	1,815	01/03/2015	08/03/2015

Method of Charge No.: CI2 (HIGH/LOW RATE, PF)

Deposit: KShs. 0.00

Supply Location: PLT / 209 / 8176 ADDIS ABABA RD

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Conversion Factor	Consumption
HIGH RATE (C2)	8083213	2921610	2968360	1	46750
OW RATE (C2)	8083213	2704700	2748650	1	43950
DEMAND KVA (C2)	8083213		350	1	350
DEMAND KW (C2)	8083213		304	1	304

KVAh/KWh :

Consumption Period : 30/01/2015 - 27/02/2015 (Act)

Power Factor : 0.87

BILLING DETAILS

BILLING CONCEPT	AMOUNT IN SHILLINGS
BALANCE BROUGHT FORWARD	1,778,284.60
FIXED CHARGE	4,500.00
HIGH RATE CONSUMPTION	385,687.50
LOW RATE CONSUMPTION	362,587.50
FUEL COST CHARGE 251.0 cents/kwh	227,657.00
FOREX ADJ. 41.0 cents/kwh	37,187.00
INFLATION ADJ. 23.0	20,861.00
WARMA LEVY 5.0	4,535.00
ERC Levy 3.0 cents/kwh	2,721.00
REP Levy 5.00 %	37,413.75
MAXIMUM DEMAND KVA	182,000.00
POWER FACTOR SURCHARGE 0.03 (0kwh)	55,816.50
VAT 16.00 %	204,207.44
20150224-PAYMENT	-1,778,284.10
Round Adjustment	0.01
Total Amount:	**1,525,174.20**

The monthly bill is KShs. **1,525,173.70**

5/3/2015

v2.01 EMAILLP.20150301_04.52.47 125 0178 20

This electricity bill is payable before 08/03/2015.

Notice is hereby given that if this bill is not paid within fourteen days from 08/03/2015, i.e on 22/03/2015 , your supply shall be liable to disconnection without any further notice to you.

Should the supply be disconnected, in addition to settling the outstanding amount, you will be required to pay the applicable Reconnection (RC) fee before reconnection.The RC fees are as follows: Sh580 for cut-out RC or Sh3,828 for pole RC or Sh13,920 for service line RC.The said RC fees are inclusive of an 16% VAT charge. In addition, you will also be required to top up your deposit to 2 times your average monthly bill

All enquiries to Customer Service Eng. NAIROBI SOUTH P.O. BOX 30177, NAIROBI TEL. 020-3211547

E-mail: customercarenairobi@kplc.co.ke

Website: www.kplc.co.ke

To be posted with cheque payments. ALL CHEQUES PAYABLE TO KENYA POWER & LIGHTING COMPANY LIMITED

Customer's Name:	Postal Address:
EAST AFRICAN CABLES	PO BOX 18243 NAIROBI

Date Due:	Bill Number:	Amount:	Form Serial Number:
08/03/2015	2544023-01-27/02/2015-1	KShs. 1,525,174.20	

F227341DEAF554FCC903448B723F7EE1D1C6D10 0996 03536483 1503011101 ALP06000725

Electricity Bill

Kenya Power

Contract No. / Account No: 2544023-01

MARCH 2015

EAST AFRICAN CABLES
PO BOX 18243
NAIROBI

CITY SQUARE PLY 7

SKaminju@eacables.com

Bill Number:	Maximum Authorised Load (KW):	Date of Issue:	Date Due:
2544023-01-27/03/2015-1	1,815	29/03/2015	05/04/2015

Method of Charge No.: CI2 (HIGH/LOW RATE, PF)

Deposit: KShs. 0.00

Supply Location: PLT / 209 / 8176 ADDIS ABABA RD

CONSUMPTION DATA

Consumption Type	Meter Number	Previous Reading	Current Reading	Conversion Factor	Consumption
HIGH RATE (C2)	8083213	2968360	3010600	1	42240
LOW RATE (C2)	8083213	2748650	2796200	1	47550
DEMAND KVA (C2)	8083213		377	1	377
DEMAND KW (C2)	8083213		308	1	308

KVAh/KWh :

Consumption Period : 27/02/2015 - 27/03/2015 (Act)

Power Factor : 0.82

BILLING DETAILS

BILLING CONCEPT	AMOUNT IN SHILLINGS
BALANCE BROUGHT FORWARD	1,525,174.20
FIXED CHARGE	4,500.00
HIGH RATE CONSUMPTION	348,480.00
LOW RATE CONSUMPTION	392,287.50
FUEL COST CHARGE 251.0 cents/kwh	225,372.90
FOREX ADJ. 17.0 cents/kwh	15,264.30
INFLATION ADJ. 23.0	20,651.70
WARMA LEVY 5.0	4,489.50
ERC Levy 3.0 cents/kwh	2,693.70
REP Levy 5.00 %	37,038.37
MAXIMUM DEMAND KVA	196,040.00
POWER FACTOR SURCHARGE 0.08 (8kwh)	168,625.35
VAT 16.00 %	219,395.48
20150325-PAYMENT	-1,525,174.20
Round Adjustment	0.00
Total Amount:	1,634,838.80

The monthly bill is KShs. 1,634,838.80

v2.01 EMAILLP.20150329_03.35.54 201 0176 20

This electricity bill is payable before 05/04/2015.

Notice is hereby given that if this bill is not paid within fourteen days from 05/04/2015, i.e on 19/04/2015 , your supply shall be liable to disconnection without any further notice to you.

Should the supply be disconnected, in addition to settling the outstanding amount, you will be required to pay the applicable Reconnection (RC) fee before reconnection.The RC fees are as follows: Sh580 for cut-out RC or Sh3,828 for pole RC or Sh13,920 for service line RC.The said RC fees are inclusive of an 16% VAT charge. In addition, you will also be required to top up your deposit to 2 times your average monthly bill

All enquiries to Customer Service Eng. NAIROBI SOUTH P.O. BOX 30177, NAIROBI TEL. 020-3211547

E-mail: customercarenairobi@kplc.co.ke

Website: www.kplc.co.ke

To be posted with cheque payments. ALL CHEQUES PAYABLE TO KENYA POWER & LIGHTING COMPANY LIMITED

Customer's Name:	Postal Address:
EAST AFRICAN CABLES	PO BOX 18243 NAIROBI

Date Due:	Bill Number:	Amount:	Form Serial Number:
05/04/2015	2544023-01-27/03/2015-1	KShs. 1,634,838.80	

0E3FD86944EB156262BF70462B1CDCC01A6A511A 0950 03550482 1503290742 ALP06000725

NAIROBI WATER COMPANY

COPY BILL

HEAD OFFICE, KAMPALA ROAD P.O. BOX 30656, G.P.O. 00100 NAIROBI, KENYA.
TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

1619208

JAN 2014

WATER BILL

BROTHERS SEYANI
P O BOX 60070-00200
NAIROBI

NAIROBI CENTRAL, 209/8176 ADIS ABABA, , 0, 16-16-1B
ATHI-ADDIS ABABA ROAD

ACCOUNT NO.: 1619208

Category: INDUSTRIAL

Old Account No.:

Book-Itinerary No.: 8525

Next Reading Date: 05/02/2014

Bill No.: 198657903

Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGES (KES.)
Bal. B/fwd						65877.65
TOTAL CONSUMPTION						
WATER	5155047	50601	51134	9.67	18.71	180.93
				19.33	28.07	28.07
				29	42.89	1243.81
				475	53.80	25555.00
SEWER				9.67	14.03	135.67
				9.67	14.03	135.67
				9.67	14.03	135.67
				9.67	14.03	135.67
METER RENT						435.00
PAYMENTS Rcv'd	15213754					-65878.00
	15213754					-65878.00
ADJUSTMENTS						0.00
	0.00	0.00		0.00	48599.08	48599.08

DEBT ANALYSIS

Debt above 60 days:	Debt within 60 days: (06/01/2014 to 04/02/2014)	Debt within 30 days: (ACTUAL)	Current:	TOTAL DUE
05/02/2014		12/02/2014		05/02/2014

Consumption Period:

Estimated/Actual Bill:

Payment inclusive upto

PAY YOUR OUTSTANDING BILL PROMPTLY TO AVOID DISCONNECTION

Billing Date:

Due Date:

Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

19/02/2014

NAIROBI WATER COMPANY

HEAD OFFICE, KAMPALA ROAD P.O. BOX 30656, G.P.O. 00100 NAIROBI, KENYA.
TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

SEVANI & OTHERS
P O BOX 60070-00200
NAIROBI
KENYA

NAIROBI CENTRAL
209/81/0 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

WATER BILL

FEB 2014

1619208

ACCOUNT NO.: 8525

Category: INDUSTRIAL	Old Account No.: 0	Book-Itinerary No.: MTHC
Meter Reading Date: 03/03/2014	Bill No.: 200319414	Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						48599.08
WATER	5155047	51134	51591	9	18.71	168.39
				18	28.07	505.26
				27	42.89	1158.03
				403	53.80	21681.40
SEWER						
				9	14.03	126.27
				18	21.05	378.90
				27	32.17	868.59
				403	40.35	16261.05
METER RENT						405.00
PAYMENTS= 1542201	20140220					-48600.00
ADJUSTMENTS						0.00

Pay 41552.89

DEBT ANALYSIS

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	TOTAL DUE
0.00	0.00	0.00	41552.89	41552.89

Consumption Period: 04/02/2014 To 03/03/2014	Estimated/Actual Bill: ACTUAL	Payment inclusive upto 04/03/2014
Billing Date: 04/03/2014	Due Date: 11/03/2014	Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Avenue w.e.f 31st March 2014

You can pay your Bills at any of the following Centres:

NAIROBI DAM CHARAN CENTRE, MSA RD. COMCRAFT HOUSE KAMPALA ROAD PANGANI OFFICE KAREN SHOPPING CENTRE THE MALL, WESTLANDS
K-REP BANK, POSTAL OFFICES IN NAIROBI, EQUITY BANK, CO-OPERATIVE BANK, BARCLAYS BANK.

NOTICE IS HEREBY GIVEN THAT IF THIS BILL IS NOT PAID BY 18/03/2014 YOUR SUPPLY WILL BE DISCONNECTED WITHOUT FURTHER NOTICE.

NAIROBI WATER COMPANY

HEAD OFFICE, KAMPALA ROAD P.O. BOX 30656, G.P.O. 00100 NAIROBI, KENYA.
TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

MARCH 2014

SEVANTH DAY ADVENTHERS
P O BOX 30070-00200
NAIROBI
KENYA

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

WATER BILL

1619208
ACCOUNT NO.: 8525

INDUSTRIAL
Category:

0
Old Account No.:

MTHC
Book-Itinerary No.:

02/04/2014
Meter Reading Date:

201866381
Bill No.:

3
Property Sequence:

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						41552.89
WATER	5155047	51591	51950	10	18.71	187.10
				20	28.07	561.40
				30	42.89	1286.70
				299	53.80	16086.20
SEWER						
				10	14.03	140.30
				20	21.05	421.00
				30	32.17	965.10
				299	40.35	12064.65
METER RENT						450.00
PAYMENTS= 1556657	20140315					-41553.00
ADJUSTMENTS						0.00

	INITIAL
GOODS RECEIVED BY	
INVOICE CERTIFIED BY.	
INVOICE CHECKED BY	

DEBT ANALYSIS

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	TOTAL DUE
0.00	0.00	0.00	32162.45	32162.45

03/03/2014
To 02/04/2014
Consumption Period:

ACTUAL
Estimated/Actual Bill:

04/04/2014
Payment inclusive upto

03/04/2014
Billing Date:

11/04/2014
Due Date:

Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Avenue w.e.f 31st March 2014

You can pay your Bills at any of the following Centres:

NAIROBI DAM CHARAN CENTRE, MSA RD. COMCRAFT HOUSE KAMPALA ROAD PANGANI OFFICE KAREN SHOPPING CENTRE THE MALL, WESTLANDS
K-REP BANK, POSTAL OFFICES IN NAIROBI, EQUITY BANK, CO-OPERATIVE BANK, BARCLAYS BANK.

18/04/2014

NAIROBI WATER COMPANY

HEAD OFFICE, KAMPALA ROAD P.O. BOX 30656, G.P.O. 00100 NAIROBI, KENYA.
TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

1619208

APRIL 2014

SEYANI BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

WATER BILL

1619208

ACCOUNT NO.: 8525

INDUSTRIAL
Category:

0
Old Account No.:

MTHC
Book-Itinerary No.:

05/05/2014
Meter Reading Date:

202932981
Bill No.:

3
Property Sequence:

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						32162.45
WATER	5155047	51950	52307	11	18.71	205.81
				22	28.07	617.54
				33	42.89	1415.37
				291	53.80	15655.80
SEWER						
				11	14.03	154.33
				22	21.05	463.10
				33	32.17	1061.61
				291	40.35	11741.85
METER RENT						495.00
PAYMENTS= 1572417	20140416					-32162.00
ADJUSTMENTS						0.00

DEBT ANALYSIS				TOTAL DUE
Debt above 60 days: 0.00	Debt within 60 days: 0.00	Debt within 30 days: 31810.86	Current: 0.00	31810.86

02/04/2014 To 05/05/2014
Consumption Period:

ACTUAL
Estimated/Actual Bill:

05/05/2014
Payment inclusive upto

05/05/2014
Billing Date:

12/05/2014
Due Date:

Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AN RETAINED BY CUSTOMER

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Ave

You can pay your Bills at any of the following Centres:

NAIROBI DAM CHARAN CENTRE, MSA RD. COMCRAFT HOUSE KAMPALA ROAD PANGANI OFFICE KAREN SHOPPING CENTRE THE MALL, WESTLANI
K-REP BANK POSTAL OFFICES IN NAIROBI EQUITY BANK, CO-OPERATIVE BANK, BARCLAYS BANK

NOTICE IS HEREBY GIVEN THAT IF THIS BILL IS NOT PAID BY 19/05/2014 YOUR SUPPLY WILL BE DISCONNECTED WITHOUT FURTHER NOTICE

NAIROBI WATER
Improving Lives

TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

KEBS ★ 1619208 ★

SEVANI BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

WATER BILL

MAY 2014

1619208

ACCOUNT NO.: 8525

Category: INDUSTRIAL	Old Account No.: 0	Book-Itinerary No.: MTHC
Meter Reading Date: 04/06/2014	Bill No.: 204357208	Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						31810.86
WATER	5155047	52307	52897	10	18.71	187.10
				20	28.07	561.40
				30	42.89	1286.70
				530	53.80	28514.00
SEWER						
				10	14.03	140.30
				20	21.05	421.00
				30	32.17	965.10
				530	40.35	21385.50
METER RENT						450.00
PAYMENTS= 1592783	20140522					-31810.00
ADJUSTMENTS						0.00

pay 53,912/=

DEBT ANALYSIS

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	TOTAL DUE
0.00	0.86	0.00	53911.10	53911.96

Consumption Period: 05/05/2014 To 04/06/2014	Estimated/Actual Bill: ACTUAL	Payment inclusive upto 09/06/2014
Billing Date: 06/06/2014	Due Date: 16/06/2014	Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AN
RETAINED BY CUSTOMER

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Ave

You can pay your Bills at any of the following Centres:

NAIROBI DAM CHARAN CENTRE, MSA RD. COMCRAFT HOUSE KAMPALA ROAD PANGANI OFFICE KAREN SHOPPING CENTRE THE MALL, WESTLAND
K-REP BANK, POSTAL OFFICES IN NAIROBI, EQUITY BANK, CO-OPERATIVE BANK, BARCLAYS BANK.

NOTICE IS HEREBY GIVEN THAT IF THIS BILL IS NOT PAID BY 23/06/2014 YOUR SUPPLY WILL BE DISCONNECTED WITHOUT FURTHER NOTICE

A RECONNECTION FEE OF KSH 500.00 WILL BE CHARGED ON ISSUANCE OF DISCONNECTION SERVICE ORDER

ALL ENQUIRIES TO NWC OFFICES.

NAIROBI WATER COMPANY

HEAD OFFICE, KAMPALA ROAD P.O. BOX 30656, G.P.O. 00100 NAIROBI, KENYA.
TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke

NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

SEYANI BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

WATER BILL

NAIROBI CENTRE
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

JUNE 2014

ACCOUNT NO.: 1619208 8525

Category: INDUSTRIAL	Old Account No.: 0	Book-Itinerary No.: MTHC
Meter Reading Date: 02/07/2014	Bill No.: 205675934	Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
~~BAL. B/FWD~~						53911.96
WATER	5155047	52897	53154	9.33	18.71	174.56
				18.67	28.07	524.07
				28	42.89	1200.92
				201	53.80	10813.80
SEWER						
				9.33	14.03	130.90
				18.67	21.05	393.00
				28	32.17	900.76
				201	40.35	8110.35
METER RENT						420.00
PAYMENTS= 1613218	20140625					-53912.00
ADJUSTMENTS						0.00

O.K.
~~Appln.~~
09/07/2014

DEBT ANALYSIS				TOTAL DUE
Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	
0.00	0.00	0.00	22668.32	22668.32

Consumption Period: ~~04/06/2014~~ To 02/07/2014	Estimated/Actual Bill: ACTUAL	Payment inclusive upto 04/07/2014
Billing Date: 04/07/2014	Due Date: 11/07/2014	Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Avenue w.e.f 31st March 2014

You can pay your Bills at any of the following Centres:

NAIROBI DAM CHARAN CENTRE, MSA RD. COMCRAFT HOUSE KAMPALA ROAD PANGANI OFFICE KAREN SHOPPING CENTRE THE MALL, WESTLANDS
K-REP BANK, POSTAL OFFICES IN NAIROBI, EQUITY BANK, CO-OPERATIVE BANK, BARCLAYS BANK.

NOTICE IS HEREBY GIVEN THAT IF THIS BILL IS NOT PAID BY 18/07/2014 YOUR SUPPLY WILL BE DISCONNECTED WITHOUT FURTHER NOTICE.

NAIROBI WATER COMPANY

HEAD OFFICE, KAMPALA ROAD P.O. BOX 30656, G.P.O. 00100 NAIROBI, KENYA.
TELEPHONE: 020-3988598/000, 5013598/000, FAX: 020-552126 / 020-552133
EMAIL: info@nairobiwater.co.ke WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

1619208

SEYANI BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

NAIROBI WATER
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

WATER BILL

JULY 2014

ACCOUNT NO.: 1619208 8525

Category: INDUSTRIAL	Old Account No.: 0	Book-Itinerary No.: MTHC
Meter Reading Date: 04/08/2014	Bill No.: 206822851	Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						22668.32
WATER	5155047	53154	53191	11	18.71	205.81
				22	28.07	617.54
				4	42.89	171.56
SEWER						
				11	14.03	154.33
				22	21.05	463.10
				4	32.17	128.68
METER RENT						495.00
PAYMENTS= 1630878	20140723					-22668.00
ADJUSTMENTS						0.00

DEBT ANALYSIS				TOTAL DUE
Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	
0.00	0.00	0.32	2236.02	2236.34

Consumption Period: 02/07/2014 To 04/08/2014	Estimated/Actual Bill: ACTUAL	Payment inclusive upto 05/08/2014
Billing Date: 05/08/2014	Due Date: 12/08/2014	Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI WATER COMPANY LTD.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Ave

You can pay your Bills at any of the following Centres:

NAIROBI DAM CHARAN CENTRE, MSA RD. COMCRAFT HOUSE KAMPALA ROAD PANGANI OFFICE KAREN SHOPPING CENTRE THE MALL, WESTLANDS
K-REP BANK, POSTAL OFFICES IN NAIROBI, EQUITY BANK, CO-OPERATIVE BANK, BARCLAYS BANK.

NOTICE IS HEREBY GIVEN THAT IF THIS BILL IS NOT PAID BY 19/08/2014 YOUR SUPPLY WILL BE DISCONNECTED WITHOUT FURTHER NOTICE.

NAIROBI CITY WATER & SEWERAGE COMPANY LTD.

NAIROBI WATER
Improving Reliability

HEAD OFFICE, KAMPALA ROAD INDUSTRIAL AREA, NAIROBI
TELEPHONE: +254 203 988 000
EMAIL: info@nairobiwater.co.ke
WEBSITE: www.nairobiwater.co.ke

NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

1619208

EYANI BROTHERS
O BOX 60070-00200
AIROBI
ENYA

WATER BILL

AUG 2014

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

1619208

ACCOUNT NO.: 8525

Category: INDUSTRIAL

0
Old Account No.:

MTHC
Book-Itinerary No.:

Meter Reading Date: 02/09/2014

208186964
Bill No.:

3
Property Sequence:

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
~~L B/FWD~~						2236.34
ATER	5155047	53191	53278	9.67	18.71	180.93
				19.33	28.07	542.59
				29	42.89	1243.81
EWER				29	53.80	1560.20
				9.67	14.03	135.67
				19.33	21.05	406.90
				29	32.17	932.93
TER RENT				29	40.35	1170.15
						435.00
YMENTS= 1646817	20140816					-2237.00
JUSTMENTS						0.00

8/9/2014

	INITIAL
GOODS RECEIVED BY	
INVOICE CERTIFIED BY	
INVOICE CHECKED BY	

DEBT ANALYSIS

TOTAL DUE

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	
0.00	0.00	0.00	6608.18	6608.18

04/08/2014
To 02/09/2014
onsumption Period:

ACTUAL
Estimated/Actual Bill:

04/09/2014
Payment inclusive upto

04/09/2014
lling Date:

11/09/2014
Due Date:

Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI CITY WATER AND SEWERAGE COMPANY LTD ONLY

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

YOU CAN PAY YOUR WATER BILLS AT ANY OF THE FOLLOWING AUTHORIZED PAY POINTS:

Regional Offices & Business Centres: Cameo Building 1st Floor, Kenyatta Avenue, CBD. - Head Office, Kampala Road, Industrial Area Nairobi. - The Mall, Lower Ground Floor, Westlands. - Western Region: Parklands Plaza, Chiromo Lane; - Northern Region: Showbe Plaza; Pangani. - Eastern Region: Pinnacle House, Spine Road Kayole. - North Eastern Region: Eastleigh Section III, 18th Street. - Kasarani: Kasarani/ Mwiki Rd, Opposite Kasarani Police station. - Southern Region: Woodley, Off Joseph Kangethe Road. - Central Region: Enterprise Plaza, Enterprise Road, Industrial Area. Karen Shopping Centre, Opposite Karen Police Station.

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Avenue w.e.f 31st March 2014

Agents: The Co-operative Bank of Kenya - K-Rep Bank - Citi- Bank - Barclays Bank of Kenya Ltd - Equity Bank Ltd - Housing Finance of Kenya - Postal Corporation of Kenya: **Service Providers:** Nakumatt Supermarket outlets - MPESA Business No. 444400 - Airtel Money - Jambo Pay - Pay-Net.

18/09/2014

NAIROBI CITY WATER & SEWERAGE COMPANY LTD.

NAIROBI WATER
Improving Reliability

HEAD OFFICE, KAMPALA ROAD INDUSTRIAL AREA, NAIROBI
TELEPHONE: +254 203 988 000
EMAIL: info@nairobiwater.co.ke
WEBSITE: www.nairobiwater.co.ke

★ 1619208 ★

NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

SEPT 2014

SEYANI BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

WATER BILL

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

1619208

ACCOUNT NO.: 8525

Category: INDUSTRIAL	Old Account No: 0	Book-Itinerary No.: MTHC
Meter Reading Date: 03/10/2014	Bill No: 209641443	Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						6608.18
WATER	5155047	53278	53303	10.3	18.71	193.27
				14.67	28.07	411.79
SEWER						
				10.33	14.03	144.93
				14.67	21.05	308.80
METER RENT						465.00
PAYMENTS= 1668669	20140919					-6608.00
ADJUSTMENTS						0.00

DEBT ANALYSIS

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	TOTAL DUE
0.00	0.00	0.18	1523.79	1523.97

Consumption Period:	Estimated/Actual Bill:	Payment inclusive upto
02/09/2014 To 03/10/2014	ACTUAL	06/10/2014
Billing Date: 06/10/2014	**Due Date:** 13/10/2014	**Contract Deposits**

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI CITY WATER AND SEWERAGE COMPANY LTD ONLY

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

YOU CAN PAY YOUR WATER BILLS AT ANY OF THE FOLLOWING AUTHORIZED PAY POINTS:

Regional Offices & Business Centres: Cameo Building 1st Floor, Kenyatta Avenue CBD. - Head Office, Kampala Road, Industrial Area Nairobi. - The Ma Lower Ground Floor, Westlands. - Western Region: Parklands Plaza, Chiromo Lane. - Northern Region: Showbe Plaza, Pangani. - Eastern Region: Pinnac House, Spine Road Kayole. - North Eastern Region: Eastleigh Section III, 18th Street. - Kasarani: Kasarani/ Mwiki Rd, Opposite Kasarani Police station Southern Region: Woodley, Off Josuph Kangethe Road. - Central Region: Enterprise Plaza, Enterprise Road, Industrial Area. Karen Shopping Centr Opposite Karen Petrol Station.

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Ave

Agents: The Co-operative Bank of Kenya - K-Rep Bank - Citi Bank - Barclays Bank of Kenya Ltd - Equity Bank Ltd - Housing Finance of Kenya - Pos Corporation of Kenya - Service Providers: Nakumatt Supermarket [illegible] Business No. 8444 30 - Airtel Money - Pambo Pay - Pay-Net

20/10/2014

NAIROBI CITY WATER & SEWERAGE COMPANY LTD.

NAIROBI WATER

HEAD OFFICE, KAMPALA ROAD INDUSTRIAL AREA, NAIROBI
TELEPHONE: +254 203 988 000
EMAIL: info@nairobiwater.co.ke
WEBSITE: www.nairobiwater.co.ke

* 1 6 1 9 2 0 8 *

NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

WATER BILL

OCT 2014

SEYANI BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

1619208

ACCOUNT NO.: 8525

Category: INDUSTRIAL	Old Account No.: 0	Book-Itinerary No.: MTHC
Meter Reading Date: 04/11/2014	Bill No.: 210879408	Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
BAL. B/FWD						1523.97
WATER	5155047	53303	53437	10.6	18.71	199.64
				21.33	28.07	598.73
				32	42.89	1372.48
				70	53.80	3766.00
SEWER						
				10.67	14.03	149.70
				21.33	21.05	449.00
				32	32.17	1029.44
				70	40.35	2824.50
METER RENT						480.00
PAYMENTS= 1688999	20141023					-1524.00
ADJUSTMENTS						0.00

DEBT ANALYSIS

Debt above 90 days:	Debt within 60 days:	Debt within 30 days:	Current:	TOTAL DUE
0.00	0.00	0.00	10869.46	10869.46

Consumption Period: 03/10/2014 To 04/11/2014	Estimated/Actual Bill: ACTUAL	Payment inclusive upto: 09/11/2014
Billing Date: 05/11/2014	Due Date: 17/11/2014	Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI CITY WATER AND SEWERAGE COMPANY LTD ONLY.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

YOU CAN PAY YOUR WATER BILLS AT ANY OF THE FOLLOWING AUTHORIZED PAY POINTS:

Regional Offices & Business Centres: Cameo Building 1st Floor, Kenyatta Avenue, CBD. - Head Office, Kampala Road, Industrial Area Nairobi. - The Mal[illegible] Lower Ground Floor, Westlands. - Western Region: Parklands Plaza, Chiromo Lane. - Northern Region: Showbe Plaza; Pangani. - Eastern Region: Pinnac[illegible] House, Spine Road Kayole. - North Eastern Region: Eastleigh Section III, 18th Street. - Kasarani: Kasarani Mwiki Rd. Opposite Kasarani Police station. - Southern Region: Woodley, Off Joseph Kangethe Road. - Central Region: Enterprise [illegible], Enterprise Road, Industrial Area. Karen Shopping Centre Opposite Karen Police Station

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Avenue w.e.f 31st March 2014

Agents: The Co-operative Bank of Kenya - [illegible] Bank - [illegible] Bank - Barclays Bank of [illegible] Bank Ltd - Housing Finance of Kenya - Posta Corporation of Kenya. **Service Providers:** [illegible] Money - Jambo Pay - Pay-Net

24/11/2014

NAIROBI CITY WATER & SEWERAGE COMPANY LTD.

HEAD OFFICE, KAMPALA ROAD INDUSTRIAL AREA, NAIROBI
TELEPHONE: +254 203 988 000
EMAIL: info@nairobiwater.co.ke
WEBSITE: www.nairobiwater.co.ke

1619208

NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

SEYANT BROTHERS
P O BOX 60070-00200
NAIROBI
KENYA

NAIROBI CENTRAL
209/8176 ADIS ABABA
, 0, 16-16-1B ATHI-ADDIS

WATER BILL

NOV 2014

1619208

INDUSTRIAL

0

ACCOUNT NO.: 8525 MTHC

Category:

02/12/2014

Old Account No.: 211896111

Book-Itinerary No.: 3

Meter Reading Date:

Bill No.:

Property Sequence

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES)
BAL. B/FWD						10869.46
WATER	5155047	53437	53512	9.33	18.71	174.56
				18.67	28.07	524.07
				28	42.89	1200.92
				19	53.80	1022.20
SEWER						
				9.33	14.03	130.90
				18.67	21.05	393.00
				28	32.17	900.76
				19	40.35	766.65
METER RENT						420.00
PAYMENTS= 1708495	20141124					-10869.00
ADJUSTMENTS						0.00

DEBT ANALYSIS

TOTAL DUE

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	
0.00	0.00	0.46	5533.06	5533.52

04/11/2014
To 02/12/2014

ACTUAL

05/12/2014

Consumption Period: 04/12/2014

Estimated/Actual Bill: 12/12/2014

Payment inclusive upto

Billing Date:

Due Date:

Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI CITY WATER AND SEWERAGE COMPANY LTD ONLY.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

YOU CAN PAY YOUR WATER BILLS AT ANY OF THE FOLLOWING AUTHORIZED PAY POINTS:

Regional Offices & Business Centres: Cameo Building 1st Floor, Kenyatta Avenue, CBD. - Head Office, Kampala Road, Industrial Area Nairobi. - The Mall, Lower Ground Floor, Westlands. - Western Region: Parklands Plaza, Chiromo Lane; - Northern Region: Showbe Plaza, Pangani. - Eastern Region: Pinnacle House, Spine Road Kayole. - North Eastern Region: Eastleigh Section III, 18th Street. - Kasarani: Kasarani/ Mwiki Rd, Opposite Kasarani Police station. - Southern Region: Woodley, Off Joseph Kangethe Road. - Central Region: Enterprise Plaza, Enterprise Road, Industrial Area. Karen Shopping Centre, Opposite Karen Police Station

NCWSC will be relocating offices from KU Plaza(former Comcraft House) to Cameo Building Kenyatta Ave

Agents: The Co-operative Bank of Kenya - K-Rep Bank - Citi- Bank - Barclays Bank of Kenya Ltd - Equity Bank Ltd - Housing Finance of Kenya - Postal Corporation of Kenya - **Service Providers:** Nakumatt Supermarket outlets - M-PESA Business No. 444000 - AirtelMoney - Jambo Pay - Pay-Net

19/12/2014

NAIROBI CITY WATER & SEWERAGE COMPANY LTD.

HEAD OFFICE, KAMPALA ROAD INDUSTRIAL AREA, NAIROBI
TELEPHONE: +254 203 988 000
EMAIL: info@nairobiwater.co.ke
WEBSITE: www.nairobiwater.co.ke

NAIROBIWATER
Improving Reliability

COPY BILL

NCWSC VAT Number: 0161158Q NCWSC PIN Number: P051159494Q

WATER BILL

1619208

DEC 2014

BROTHERS SEYANI
P O BOX 60070-00200
NAIROBI

NAIROBI CENTRAL, 209/8176 ADIS ABABA, , 0, 16-16-1B
ATHI-ADDIS ABABA ROAD

ACCOUNT NO.: 1619208

Category: INDUSTRIAL

Old Account No.:

Book-Itinerary No.: 8525

Meter Reading Date: 08/01/2015

Bill No.: 213175300

Property Sequence: 3

Bill Items	Meter Number	Previous Reading	Present Reading	Consumption	Rate	CHARGE (KES.)
Bal. B/fwd						5533.52
TOTAL CONSUMPTION						
WATER	5155047	53512	53695	12.33	18.71	230.69
				24.67	28.07	28.07
				37	42.89	1586.93
				109	53.80	5864.20
SEWER				12.33	14.03	172.99
				12.33	14.03	172.99
				12.33	14.03	172.99
				12.33	14.03	172.99
METER RENT						555.00
PAYMENTS Rcv'd	0					0.00
	0					0.00
ADJUSTMENTS						0.00

DEBT ANALYSIS

Debt above 60 days:	Debt within 60 days:	Debt within 30 days:	Current:	TOTAL DUE
0.00	0.46	5533.06	15210.04	20743.56
02/12/2014 to 08/01/2015		ACTUAL		09/01/2015
09/01/2015		16/01/2015		15210

Consumption Period:

Estimated/Actual Bill:

Payment inclusive upto

No More Paper bills from January. Dial *396*40# or visit our website. Merry X-Mas and Happy New Year

Billing Date:

Due Date: 23/01/2015

Contract Deposits:

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI CITY WATER AND SEWERAGE COMPANY LTD ONLY.

THE RECEIPT MUST BE MACHINE PRINTED AND RETAINED BY CUSTOMER

YOU CAN PAY YOUR WATER BILLS AT ANY OF THE FOLLOWING AUTHORIZED PAY POINTS:

Regional Offices & Business Centres: Cameo Building 1st Floor, Kenyatta Avenue, CBD. - Head Office, Kampala Road, Industrial Area Nairobi. - The Mall, Lower Ground Floor, Westlands. - Western Region: Parklands Plaza, Chiromo Lane; - Northern Region: Showbe Plaza; Pangani. - Eastern Region: Pinnacle House, Spine Road Kayole. - North Eastern Region: Eastleigh Section III, 18th Street. - Kasarani: Kasarani/ Mwiki Rd, Opposite Kasarani Police station. - Southern Region: Woodley, Off Joseph Kangethe Road. - Central Region: Enterprise Plaza, Enterprise Road, Industrial Area. Karen Shopping Centre, Opposite Karen Police Station.

Agents: The Co-operative Bank of Kenya - K-Rep Bank - Citi- Bank - Barclays Bank of Kenya Ltd - Equity Bank Ltd - Housing Finance of Kenya - Postal Corporation of Kenya - Service Providers: Nakumatt Supermarket outlets - MPESA Business No. 444400 - Airtel Money - Jambo Pay - Pay Net

NAIROBI CITY WATER & SEWERAGE COMPANY LTD.

HEAD OFFICE, KAMPALA ROAD INDUSTRIAL AREA, NAIROBI
TELEPHONE: +254 203 988 000
EMAIL: info@nairobiwater.co.ke
WEBSITE: www.nairobiwater.co.ke
NCWSC VAT Number: 0163158Q NCWSC PIN Number: P051154940

JAN 2015

WATER BILL

BROTHERS SEYANI0

NAIROBI KENYA

214348580

ACCOUNT NO.: 1619208

Category: INDUSTRIAL

Bill Address: NAIROBI CENTRAL, 209/8176 ADIS ABABA, , 0, 16-16-1B ATHI-ADDIS ABABA ROAD

Bill Items	Meter Number	Previous Reading	Present Reading		Consumption	Rate	CHARGE KES
							20743.56
							0.00
WATER	5155047	53695	53773	1	8.67	18.71	162.22
					17.33	28.07	486.45
					26	42.89	1115.14
					26	53.80	1398.80
		0	0		8.67	14.03	121.64
		0	0		17.33	21.05	364.80
SEWER					78	30.41	2371.96
		0	0		26	32.17	836.42
		0	0		2626	40.35	1049.10
METER RENT					0	0.00	390.00

NAIROBI CITY WATER CO. Revenue / Customer Care Coordinator Central Region
20 FEB 2015
Sign:.....
P.O. Box 30656, NAIROBI

DEBT ANALYSIS

TOTAL DUE

Debt above 90 days	Debt 61 - 90 days	Debt 31 - 60 days	Current	
0.00	0.00	5533.56	390.57	5924.13

08/01/2015 - 03/02/2015 ACTUAL 10/02/2015

Register to receive your monthly bill on the phone by dialling *369*40#.Select option one and fill in your details. You can also register on our website.

CHEQUES SHOULD BE MADE PAYABLE TO NAIROBI CITY WATER AND SEWERAGE COMPANY LTD ONLY