ELECTRICITY COMPANY OF GHANA

PROPOSAL FOR REVIEW IN DISTRIBUTION SERVICE CHARGE

JUNE 2013

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1 Introduction

The Ghanaian electricity market in the past year has faced some serious challenges as a result of inadequate power supply leading to the curtailment of load to customers. This has led to disruption of many business activities which has impacted negatively on their profits. More importantly, the ability of Electricity Company of Ghana (ECG) to satisfy its customers has seriously been affected. ECG is certainly not happy about this situation since the company's corporate image has been seriously dented in recent times.

1.1 Brief Background

The present state of the electricity distribution network is due to the inability of ECG to raise enough revenue to finance critical capital investment projects. Historically, the Distribution Service Charge (DSC) has not been cost reflective. Although there have been intermittent adjustments in the DSC, they have been inadequate and therefore deepened the investment gap.

Usually, electricity rate setting is done taking into consideration certain policies and directives. These policies and directives ensure that specific revenue targets as well as quality of service delivery targets are achieved within a specific time frame. The challenge has been to ensure that policy objectives embedded in the tariff adjustment are achieved. The attainment or otherwise of these objectives reflects projected revenues or revenue shortfalls. This issue is very significant especially in the case of electricity distribution where the utility is required to collect all revenues emanating from the operations of the various segments of the electricity sector and make payments to all suppliers.

Historically, ECG has had to collect revenue from its customers and pay the Volta River Authority (VRA) and Ghana Grid Company Limited (GRIDCo) for electricity supplied, on time. In the event that the policy objectives of the prevailing tariff are not achieved, it results in the squeezing of the DSC and hence, revenues available to finance company operations. Secondly, the consistent

depreciation of the cedi, increase in the prices of metals on the world and its effect on major distribution network assets has also contributed to the poor financial health of ECG.

Four (4) major issues have prevailed during the period June 2010 to date. First, most of the existing power generating plants are generally unavailable to meet the growing electricity demand in Ghana and therefore not reliable. Secondly, the inadequate capacity on the electricity distribution network has limited ECG's ability to provide the quality of service required by its customers. Thirdly, the need to ration power some months ago has further weakened the state of the sub-transmission and distribution network. Today, our suppliers continue to instruct us to ration power even though it is publicized that the Load Management Program (LMP) is over. The effect is that as ECG rations electricity supply, its customers are not satisfied with the service provided and therefore incur their wrath. Additionally, the company's network assets are continually being weakened due to frequent switching and hence, the need to replace them within a shorter time frame than expected. Presently, ECG is procuring distribution materials to address the expected challenges that will emanate from the ongoing LMP.

The fourth issue to discuss concerns the structure of the prevailing electricity tariff for which ECG has made numerous submissions to key stakeholders for redress. Due to the fact that customers embedded within the distribution network subsidise residential and non-residential customers whiles their counterparts connected to the transmission network are not required to do same, ECG has had to negotiate lower electricity tariffs to retain these high revenue-yielding customers. This represents a huge revenue loss to the company.

The situation was worsened when the Energy Commission (EC) allocated potentially high-revenue yielding areas of operations within the Tema enclave to another distribution company to operate and serve industrial customers. The point to make is that, the tariff is implemented by blending high revenue-yielding customers with life-line customers who may not be able to

even afford high electricity tariffs. As the high revenue-yielding customers are taken out of ECG's operations, the contribution of the low revenue-yielding customers will certainly not be enough to finance electricity distribution operations. To this effect, it has become very necessary to review the prevailing electricity tariff to first address the structural deficiencies and secondly, to bridge the existing revenue gap.

ECG's proposal has therefore been put together to reflect the above enumerated issues and make a firm case for a review in the DSC. Our motive is to acquire enough financing for corporate operations as well as make a modest return on our regulatory asset base.

1.2 Rationale/Objectives Underpinning Tariff Submission

In June 2010, electricity tariffs were adjusted upon the recommendation of key stakeholders to ensure that the financial health of the utilities is strengthened.

ECG's large industrial customers who have secured licences from the EC raised objections to the structure of the June 2010 tariff and have refused to honour bills prepared over the period. The argument made is that, they have been over penalised through the high level of cross-subsidies imposed on them. As the situation prevails, ECG engaged them in negotiations to arrive at rates acceptable to both parties. This was done with the aim that, at the next major tariff review the issue will be sufficiently addressed. Consequently, ECG is drawing the attention of the Public Utility Regulatory Commission (PURC) to resolve this challenge during its major tariff review exercise.

It is recommended that the Cost of Service (CoS) approach to pricing of electricity services is explored and implemented to help address the above mentioned challenge. Through implementation of the June 2010 tariff, ECG acknowledges that customers such as steel companies whose electricity costs is about 40% of their total expenditure, need immense

support to stay in business. Additionally, customers in the Agric sector do not earn enough to be able to afford current electricity rates. ECG is proposing that considerations should be given to such customers through the structure of the tariff.

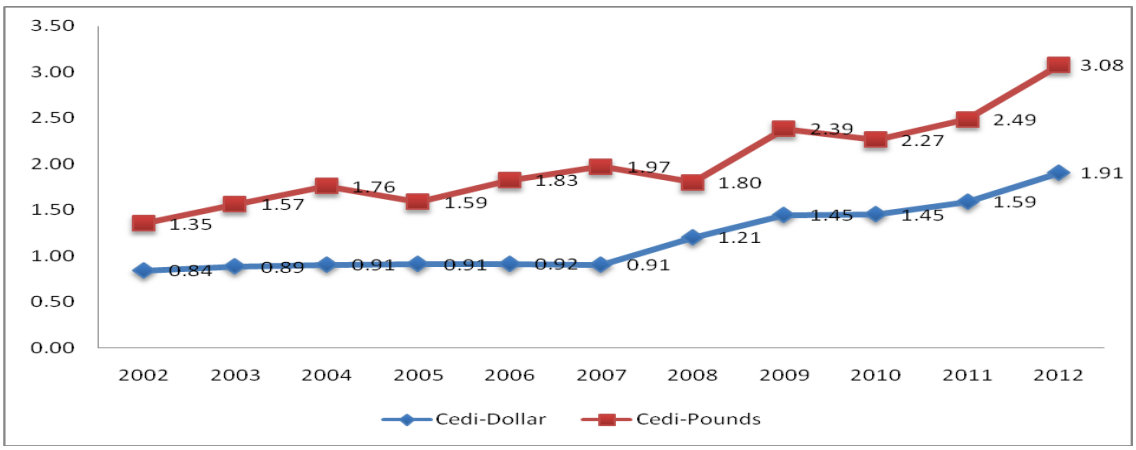
The variables underpinning the Automatic Tariff Adjustment Formula (ATAF) have adversely changed from 2012 to date. Additionally, world market prices of tools, materials and equipment are soaring. The impact on project cost is very enormous and therefore ECG is preparing this proposal for PURC's consideration. Our objective is to propose the adjustment of the DSC to cost reflective levels.

1.2.1 Macroeconomic and Market Driven Variables that affect ECG

(a) Exchange Rate

The Ghana cedi has witnessed major hikes which led to its significant depreciation between the periods 2007 to 2012 as illustrated in figure 1.1 below. Although adjustments have been made over the period for exchange rates, the level of compensation to electricity distribution has not reflected the rate of depreciation.

Figure 1.1: Trend in Exchange Rate (2002 – 2012)



Source: Ghana Statistical Service

ECG's challenge has been the fact that the level of exchange rate adjustment in the ATAF does not compensate the company enough for payment to Independent Power Producers (IPPs) whose prices are dollar denominated. A case in point is the current Power Purchase

Agreement (PPA) between ECG and Sunon Asogli Power Company Limited (SAPP). Most of these IPPs do not have the confidence and believe that the ATAM will compensate them for exchange rate losses and therefore still insist on maintaining the prevailing market rate.

(b) Prices of Imported Materials, Tools and Spare Parts

It is observed that over the period 2010 to date, project costs are soaring due to hikes in the cost of materials, tools and spare parts as well as increases in the cost of borrowing to finance projects.

1.3 Highlights of Major Issues Which Describe Structure of Tariff Submission

Based on ECG's experience in implementing the announced and gazetted tariff over the period, it has become relevant to propose a number of structural changes to the prevailing electricity tariff. The proposed changes are catalogued below.

1.3.1 Two Part Tariff for Residential and Single Tariff for Non-Residential Customers

For easy tariff implementation and an effective resolution to the compound house problem, ECG proposes that the current blocks of about four (4) for residential customers and three (3) for non-residential customers be further collapsed into a one (1) block tariff for both residential and non-residential customers. This proposal excludes life line customers whose rates are determined through government policy, hence for residential customers, we can have a life line tariff group and the rest given one rate per kilowatt hour as the cost of electricity.

ECG is investigating the impact of such a policy and will furnish the commission with the results has provided the results when completed. The aim of this proposal is to sufficiently address the compound house problem and also make it relatively easy to bill residential customer.

1.3.2 Introduction of Cost of Service in Allocating Cost

For sustainability in the provision of electricity services to all current and potential customers, ECG is re-emphasizing on the need to develop and implement tariffs that are based on the Cost of Service (CoS) provided to each customer group. The advantage of this approach is to introduce some form of fairness in electricity pricing and therefore address the situation where certain groups of customers are driven out of business because of high electricity rates. One consideration that has to be made is the expected revenues from the various economic activities customers pursue since this could be used to determine the level of affordability and hence, the ability to pay for electricity services.

2 Initiatives Undertaken

In an effort to improve electricity distribution services, ECG has undertaken a number of projects including system loss reduction projects, capacity expansion and service delivery improvement projects. A detailed list of all completed projects, on-going projects and projects currently under negotiation for financing by Development Partners have been attached in the Appendices. The completed projects are valued at GH¢151.54Million whiles that of the ongoing projects are valued at GH¢1,574.77Million.

In addition, there are projects under negotiation for financing which have been categorised in two packages. The first package is to be financed by the Millennium Challenge Corporation – Compact II while the second package is scheduled for financing by a consortium comprising the World Bank, African Development Bank (AfDB) and State Secretariat for Economic Affairs (SECO) under GEDAP III.

The completed projects span from 2011 to 2012. Details of individual projects and their respective impact on ECG's network and level of service quality rendered to customers are provided in the Appendices.

2.1 Projects Undertaken

ECG has carried out a number of projects since 2011 worth GH¢151.54Million to improve network reliability, reduce system losses and to improve system voltages. However, growth in demand has made it impossible to satisfactorily serve customer needs due to release of suppressed demand.

2.1.1 Sub-Transmission Projects

Sub-Transmission Projects were undertaken in the Eastern, Volta, Ashanti, Western, and Greater Accra Regions. Some of the completed projects include new Primary Substations in Koforidua and Akim Oda, a Switching Station at Bunso and the renovation and expansion of the old Koforidua Primary Substation. A detailed list of all completed Sub-transmission projects have been provided in the Appendices.

2.1.2 Distribution Projects

A number of distribution projects were carried out in all ECG Operational Areas. Low voltage network improvement projects, supply of distribution materials as well as Regional System Improvement Projects were undertaken. Please refer to the Appendices for details of the projects, year of completion, cost and its associated impact on the surrounding communities.

2.1.3 Other Projects

Other projects including Training and Capacity Development and review of Technical Specifications, Construction Standard & Design guidelines were also executed during this period. Please refer to the Appendices for details.

2.2 Ongoing Projects

In our effort to reduce system losses and bring it to the required regulatory level of 21% and below, ECG has embarked on a project to replace meters within the Teshie District and the Accra West Region, and optimize the use of distribution network assets through the elimination of

equipment overloads. The project is introducing smart meters with GPS facility to replace the existing metering system which has numerous challenges. The challenges included ECG's accessibility to meters installed and the concealment of service tails to prevent easy detection of energy theft. The project, which is being executed BXC GH Ltd. (the local representatives of FXXC China) will address this challenge by installing the meters outside the customers' premises. Whiles vending is done automatically through radio communication which is supported by the telecommunication companies, the customer has a display unit (interface) installed in the premises to provide information on the amount of credit available for use.

The financing of about US$170Million is being provided by the Contractor and recovered through the expected gains made in the reduction of the system losses over a period of 10 years. This is an initiative which ECG is not directly transferring to its customers because the gains in the system loss reduction are enough to pay for the project. Additionally, gains from this project are apportioned in an 80/20 ratio; that is, 80% of the gains are accrued to the Contractor and 20% to ECG.

As part of the project, an energy audit will be conducted through secondary sub-station transformer metering as well as proper metering of all customers within defined boundaries. Furthermore, the sub-transmission and low voltage networks will be optimized by eliminating overloads and providing redundancies.

2.2.1 Prepayment Metering Project in the two (2) Ashanti Regions

Prepayment Metering has been used as a strategy to address revenue collection challenges across ECG operational areas. The cost involved makes it unreasonable to deploy it to rural communities; hence ECG intends to deploy it across all urban areas.

Numerous projects have been implemented in phases to provide prepayment metering to ECG's cherished customers in most regional capitals. ECG currently has about 30% of its total customer

population using prepaid meters and is in the process of extending it to districts that qualify. Currently, two major prepayment metering projects have been designed for the replacement of the existing customer meters in the two Ashanti Regions to split-type prepayment meters.

(a) Ashanti East Region

ECG intends to replace the meters of all residential customers with prepayment meters capable of performing the following functions:

- Two way communication via GPRS to enable remote meter reading and monitoring;
- Instant reporting of meter tampering to ECG;
- Load cash credits via Short Message Service (SMS); and,
- Contains a data warehouse of all customers as well as personnel who operate or interact with it.

As part of this project, all concealed service tails would be exposed and made visible. The meters would also be secured in sealed enclosures to prevent meter tampering. This project is being financed by the World Bank and other donors under the Ghana Energy Development and Access Project (GEDAP).

(b) Ashanti West Region

In the Ashanti West Region, ECG has successfully concluded negotiations with Ghana Electro Meter (GEM) to pre-finance the supply and installation of about 204,000 Non-Special Load Tariff (NSLT) meters; management and operation of the system over a 6-year period. As part of the project, the smart prepaid meters would be secured in an enclosure and the customers' service connections exposed to prevent electricity theft. ECG is using regional revenues to repay the project cost of GHS103Million over the 6-year period.

2.2.2 Use of Data Loggers for Non-SLT Billing

In recent times, the company is investing heavily in technologies to speed up the billing process and therefore shorten the bill delivery period. One technology ECG has introduced in line with this is the use of data loggers for NSLT customer billing. The advantage of using this system is that it instantly validates meter readings and process bills for printing and distribution. It must be emphasized that NSLT customers who are on credit metering make up about 49% of ECG's total customer population.

The pilot implementation of the data logger technology is currently ongoing in the Volta Region and three (3) other districts namely Saltpond, Nsawam and Ada. It is ECG's intention to deploy the project in 2013 to all operational areas in order to maximize the benefits of the system.

2.2.3 Automatic Meter Reading (AMR) Technology

There has been the urgent need for ECG to use appropriate technologies to gather vital customer data on time for the purpose of billing and planning the company's commercial operations. The AMR technology was introduced to serve this purpose for reading meters of ECG's industrial customers (SLTs).

The advantage of using this system is that real time energy consumption data for all industrial customers could be automatically acquired by reading the meters remotely. Currently, the system is in place for low (LV), medium (MV) and high voltage (HV) customers. In the case of NSLT customers, ECG is installing smart meters with GSM communication technology to allow real time meter reading.

The associated installed meter is also capable of storing client's consumption data which could be downloaded regularly for further processing. Any attempt to tamper with the meter or any of its facilities sends a signal to ECG's monitoring servers for immediate attention. ECG has

recovered about GHS9Million since the commencement of the use of AMR on its network. The amount was realized through the correction of anomalies in customer data for industrial customers.

2.2.4 Secondary Substation Metering

In a bid to properly account for energy purchased and distributed, ECG is using secondary substation metering to facilitate its efforts to reduce system losses to beyond regulated levels. It is intended that secondary substation metering would be deployed across all operational areas to ensure that the above outlined objective is achieved.

Currently, this exercise has been made complementary to a number of prepayment metering projects under implementation in Accra. Other related projects are scheduled to commence shortly in the Ashanti and Tema regions of ECG.

2.2.5 Use of Live-Line Work for Operations

Live-line work refers to conducting routine maintenance and minor fault rectifications on the distribution network without having to create a power outage. The benefits of being able to conduct such routine operations on the live distribution network include an elimination of planned network outages and a drastic reduction in the durations of unplanned network outages. This would also result in a reduction in key reliability indices such as the System Average Interruption Duration Index (SAIDI), the System Average Interruption Frequency Index (SAIFI) and the Customer Average Interruption Duration Index (CAIDI).

Previous attempts at inculcating live-line work into main stream ECG operations have not been as successful as envisaged due to a plethora of reasons, some of which include lack of adequate employee development in live-line work and a lack of the requisite safety tools and equipments. ECG has therefore engaged a Consultant to properly train its technical staff in live-line operations across the various voltage levels (i.e. 33kV, 11kV and LV levels), provide the

required tools and equipments and develop a training manual in live-line work procedures taking ECG's existing safety guidelines into account. Currently, training for the first batch of ECG Engineers in the Sub-Transmission Division, Accra West and Accra East Regions is underway. The training and capacity building exercise is expected to be completed within 79 weeks.

2.2.6 Installation of SCADA and Secondary Automation Equipment

ECG is revamping its SCADA equipments in Accra and Tema through the installation of modern facilities to effectively monitor remotely, the operation of the distribution grid. The systems installed some years back became obsolete when ABB Europe curtailed the manufacture of spares and vital components of the former equipment and therefore making it almost impossible to operate the network remotely.

Additionally, GEDAP I is installing rural SCADA facilities in Kumasi and Takoradi to ensure that all rural feeders are remotely controlled and operated efficiently. Similar facilities shall be installed in other operational regions to improve ECG's network outage response time.

2.2.7 Network Automation and Voltage, Current and Time (VIT) Projects

The VIT concept is a means of increasing the reliability of the 11kV network. The VIT Scheme works by quickly detecting faulty portions of the 11kV network for isolation. This allows for quick rectification and restoration of faults resulting in a reduction in the SAIDI, SAIFI and CAIDI.

Currently, ECG is conducting a pilot project on three (3) 11kV feeders in the Accra East Region at a cost of One Hundred and Fifty Nine Thousand, One Hundred and Fifty US Dollars (USD159,150). It is intended that this project would be replicated on many other 11kV feeders on our system.

2.2.8 Civil Works Projects

In a bid to get electricity services to the door step of our cherished customers, ECG intends to establish fully functional customer service centres and district offices in most communities to facilitate payment of bills, reporting of faults, applications for new service connections and to ensure quick response time to faults reported and rectification. Additionally, ECG frequently constructs and renovates the following types of structures:

- Primary and Secondary Substations;
- Duty posts and residential facilities for staff;
- Warehouses for stores and materials; and,
- Workshops for vehicle repairs

2.3 Compliance with Directives of the Commission

Generally, ECG has made itself available to the PURC and the Energy Commission to constantly discuss pertinent issues related to the provision of electricity services to our cherished customers. ECG has also responded and complied with directives issued by our regulators, and enjoyed a very cordial and transparent relationship in the execution of the company's mandate.

In recent times, the need to procure additional power generation to augment existing generation requires a strong collaboration between ECG, PURC and EC to successfully engage IPPs, sign contracts and implement them to achieve desired results.

As a company, we look forward to strengthening this collaboration and partnership that exists between ECG and its regulators to ensure that the company satisfy its customers and electricity consumers in Ghana.

3 Key Policy Issues for Tariff Consideration

As mentioned in our introduction, the current tariff structure has a number of challenges which ECG is tabling for consideration under the current tariff review exercise. These issues in most instances have resulted in a heavy loss of revenue to the company. The key policy issues are as follows:

3.1 Cross Subsidies

The practice where high voltage customers with Bulk Customer Licenses are charged higher rates to support residential customers has resulted in a number of challenges to the implementation of the current tariff. ECG has in recent times, been negotiating new tariff rates in response to appeals from its Bulk Customers (BCs), especially, the steel companies whose cost element is mainly driven by the cost of electricity.

3.2 Compound House Challenge

After a critical analysis of the current tariff structure which has four (4) different bands within the residential customer group, ECG wishes to suggest that a two-part tariff (i.e. life line tariff and a flat rate for all other residential customers) be introduced. In the case of non-residential customers, the company suggest the introduction of one flat rate as the price for electricity.

The benefit of this approach is to first address the compound house issue and allow ECG to apply electricity rates in a non-discriminatory manner to bill its customers especially in compound houses. Secondly, this approach will make it relatively easy for ECG to bill its customers through the various prepayment metering technologies under implementation. The present tariff structure which involves a four tier price structure for residential customers and a three tier structure for non-residential customers imposes a lot of challenges on metering and billing operations. Besides it makes the cost of prepaid meters expensive since it must have the ability to absorb more tariff bands.

3.3 Wheeling Charge

With the advent of the issuance of BC licenses, BCs can negotiate power purchases with suppliers of their choice. In certain cases, to facilitate supply to certain BCs, power would have to be wheeled through the ECG distribution network. Transporting the power through ECG's distributing network imposes certain costs for which ECG is not reimbursed.

It is therefore being proposed that the PURC should set up a mechanism for computing wheeling charges for customers embedded within our distribution network but are not supplied by ECG.

3.4 Time of Use (ToU)

There have been arguments and suggestions to introduce Time of Use (ToU) pricing in the structure of Ghana's electricity tariffs. First of all, ToU pricing reshapes the load duration curve; assists in technical loss reduction during peak hours; and generates more revenue for the utility. This impact is fairly understood to occur within some networks with a large industrial consumption which significantly occurs during peak hours.

The consumption pattern of ECG customers is characterised by a peak which occurs between the hours of 7-11pm each day. The periods between 11pm and 7am the following day, is characterised by a relatively lower consumption pattern. The point to emphasise is that, at peak hours consumption is largely made up of residential consumption and with little contribution from the industrial customers. In fact, in recent times, industry has been compelled to manage their consumption due to major ongoing power rationing programs emanating from power generation shortfalls. This therefore may make it ineffective to implement ToU pricing on only industrial customers.

If we further consider including residential and non-residential in the ToU pricing, the impact would largely be realised. However, it is not clear whether the gains to be derived from the ToU

pricing strategy would be mitigated by the cost of replacing meters for ECG's over 2.5 Million customers.

As presented in Section 2.2.3 above, ECG is currently using the AMR Technology to record the consumption of its bulk customers as well as high voltage customers. It will therefore be easy to implement ToU pricing for this class of customers. By implementing a time-of-use tariff regime which offers slightly lower tariff rates for off-peak consumption, some of the peak time activities which contribute to the peak demand will be shifted to the off peak period; thus, reducing the excessive demand on our equipment during peak period.

3.5 Rural electrification

ECG greatly appreciates the efforts of GoG in electrifying new communities across its operational areas. The company is glad to have partnered with MoE to achieve the gains of increasing the level of rural electrification from about 65% in 2009 to 75% in 2011. This is really a significant gain.

The company however is challenged with the maintenance and operation of these networks once they are handed over. It is recognized that in the rate determination process, rural network assets are added to ECG's total network assets and an average DSC determined for the company's operations.

In reality, rural network assets yield revenues less than half of the average DSC because customers within these areas are largely life line customers whose consumption are within 50 units. In our rate setting, it is planned that revenues to be derived from rural network assets are equivalent to the average DSC. However, the reality is that rural network assets yield less than 50% of the expected revenues from a unit sale of electricity.

ECG is putting this issue before PURC to find an appropriate solution that will offer the opportunity to further expand rural network assets across its operational areas. The recommendation to this issue is that a separate case should be made for rural network assets to attract a higher return than all other network assets. By this recommendation, the DSC for rural network assets should be determined separately from ECG's normal network assets so that specific revenues would be allocated to rural networks.

4 Proposed Service Delivery and Efficiency Improvements During Tariff Period

ECG is currently undertaking a number of capital investment projects aimed at modernising the distribution network and making it more efficient. Some of these projects, such as the System Loss Reduction Project, are already underway while others like the Network Automation and Voltage, Current and Time (VIT) Projects are yet to fully take off. All these projects are expected to be completed and fully functional during the tariff period.

4.1 Service Delivery and Efficiency Targets

Despite the major challenges facing ECG, the company continues to set targets which are in tandem with the provisions of LI 1937 and all associated LIs. The following objectives have been set for the year 2013:

"To achieve and sustain in 2013;

1. Customer-end voltage variation of less than 10%,
2. Customer loss hours of less than 10hrs/qtr(urban) and 25hrs/qtr (rural),
3. The average number of outages to the customer less than two times/qtr and each outage not more than 8hours in urban areas,
4. Response time to customer complaints of 24hrs (commercial) and 8hrs (technical) in urban areas,
5. New service delivery within 5 working days (post-payment without poles) and 15 working days (post-payments with up to 2 poles),

6. Revenue/sales ratio of 105% faces such as illegal connection, overloaded feeders and transformers, faulty meters coupled with the growing demand due to the rapid urbanisation and the various electrification projections been carried out, ECG is strategising to surmount these setbacks by setting the following service delivery and efficiency targets: and,
7. Reduce system losses (commercial and technical) by 2% point

The company is working assiduously to achieve the above targets. Currently, system losses are dwindling due to the interventions the company is making to address them. System losses have reduced from over 27% in previous years to 23.58% in 2012. This was achieved through the institution of proper accounting and audit procedures to for streetlights. Secondly, the interventions made in the form of secondary substation metering; network optimisation; the role of the Utility Courts; activities of the Loss Control Unit; have all contributed to the gains made by way of system losses.

Between 2011 and 2012 and in recent times, power generation has been a major challenge to ECG. Although ECG has its own network challenges which results in electricity outages to its customers, power outages in recent times have been largely caused by insufficient power generation from our suppliers to serve customers. The third and fourth quarters of 2012 saw an aggravation of the situation and a Load Management Program (LMP) was put in place to ration power. In the process, sections of the ECG network have been weakened and therefore have to be replaced. Today ECG's power suppliers as well as dispatch always will instruct ECG to shed load on a daily basis without putting in place a plan to identify the actual shortfall in power generation so that a carefully planned LMP could be put in place. ECG has always incurred the wrath of its customers because of the uncertainty in the power rationing being done. Hence power outages (i.e. the duration and number of outages) have increased.

To help address the challenges of power generation, ECG is rigorously in discussions with Independent Power Producers (IPPs) to contract additional generation for Ghana. Though this approach will result in an increase in cost of power generation, it will also introduce efficiency and reliability in power production.

4.2 Technical / Operating Performance Indicators/Indices

ECG has undertaken a number of interventions aimed at improving its performance in the area of quality and reliability of supply. In the year 2012, the company achieved the following 'ECG Global' reliability indices:

- SAIDI: 274hrs;
- SAIFI: 89 times;
- CAIDI: 11hrs.

The underperformance has been largely due to overloaded network. Other contributing factors include outages due to the growth of vegetation (bamboos, raffia trees, etc) interfering with the 11kV and 33kV networks, third party activities such as damage to distribution network assets, theft of installations (wires and cables, fuses, etc) and in some cases, careless drivers running into distribution poles and eventually displacing wires on the poles.

Currently, one time bush clearing and tree trimming is carried out on most of the feeders. ECG now proposes to increase the frequency of bush clearing and tree trimming in specific operational areas to four (4) times a year during the tariff period. The company also intends to replace its overhead line networks from copper conductors to aluminium which is less attractive to thievery. In the quest to combat third party damage and theft of conductors, ECG plans to intensify its public educational campaigns on various media platforms in 2013. Table 4.1 below shows the current situation and proposed improvement targets of operating performance indices for the tariff period.

Table 4.1: Operational Performance Indices

Benchmark Item	Index	Unit	Metro/Municipal	Urban	Rural
Regulatory Requirement	SAIDI	Hours	48	72	144
	SAIFI	Times	6	6	6
	CAIDI	Hours	8	12	24
Current Performance	SAIDI	Hours	248	190	206
	SAIFI	Times	69	88	124
	CAIDI	Hours	16	5	5
Projected Performance	SAIDI	Hours	172	133	144
	SAIFI	Times	48	62	87
	CAIDI	Hours	11	4	4

4.3 Financial Performance Indicators/Indices

The financial performance of the period 2008-2012 is depicted under Financial Matrix Table 1 below. ECG's gross profit fell from GHS104Million to GHS75Million in 2009 and stabilized around GHS150Million in 2010 and 2011. The main reasons accounting for the minimal gross profit are system losses, inadequate DSC and increasing Bulk Supply Tariff (BST). During the period under review the company recorded marginal operating profit of between GHS47Million – GHS38Million from 2008-2010 but turned negative thereafter to GHS41.0Million and GHS83 in 2011 and 2012 respectively. Rate of Return (ROR) on Average Net Fixed Assets (ANFA) in service achieved for the period was therefore appalling, from a low of 3.54% to -3% (negative). This was against a backdrop of 10% ROR (in USD terms) required to attract requisite finance to upgrade and expand ECG's networks.

On the other hand the financial matrix in Table one was bolstered with accrued revenue from street light energy shortfall recovery, expected from Government of Ghana (GOG).

The Finance Matrix under Table 2 below discounted revenue from street light energy shortfall recovery, given that related receipts from GoG had been checkered. This also exhibited clearly

the financial performance of the company as per the tariff rates approved, which showed a worse financial performance situation compared to Table 1.

In the midst of all these, ECG incurred capital expenditure from GHS67Million in year 2008 to GHS481 in 2012 as shown in tables 1 and 2, to meet an increasing demand for electricity and replacing of obsolete and damaged equipment.

The poor operating profit recorded with its associated low ROR on ANFA did not present ECG attractive to financial institution for medium to long terms loans. External finance, therefore, came mainly from donor financial institutions through GoG. However, the current low middle income status of Ghana means that funding from this source would wane in the near future. Because of ECG's inability to source commercial finance due to poor financial performance, it had to rely on a relatively higher cost short-term credit, with ramification on cash flows, rendering it difficult to honour its financial obligations as they fall due.

Financial Matrix **Table 1**

		2008	2009	2010	2011	2012- Expected	% increase (2008 - 2011)
		GHS' in Millions	GHS' in Millions	GHS' in Millions	GHS' in Millions	GHS' in Millions	
1	Net Sales	598.00	616.00	985.00	1,216.00	1,409.00	103.34
2	Gross Profit	104.00	75.00	159.00	148.00	301.00	42.31
3	Operating Profit	47.00	32.00	38.00	(41.00)	(83.00)	(187.23)
4	ANFA	1,326.00	1,623.00	1,764.00	2,511.00	2,763.00	89.37
5	Capital Expenditure	67.00	160.00	223.00	437.00	481.00	552.24
6	ROR on ANFA,% (using profit)	3.54	1.97	2.15	1.63	(3.00)	

Financial Matrix - Less Street Light Recovery Shortfall **Table 2**

		2008	2009	2010	2011	2012- Expected	% increase (2008 - 2011)
		GHS' in Millions	GHS' in Millions	GHS' in Millions	GHS' in Millions	GHS' in Millions	
1	Net Sales	566.00	584.00	942.00	1,165.00	1,352.90	105.83
2	Gross Profit	72.00	43.00	116.00	97.00	244.90	34.72
3	Operating Profit	15.00	(48.00)	(5.00)	(92.00)	(139.10)	(713.33)
4	ANFA	1,326.00	1,623.00	1,764.00	2,511.00	2,763.00	89.37
5	Capital Expenditure	67.00	160.00	223.00	437.00	481.00	552.24
6	ROR on ANFA, % (using profit)	1.13	(2.96)	(0.28)	3.66	(5.03)	

5 Key Challenges Likely to Impact Service Delivery

Key factors that are most likely impact heavily on the company's level of service delivery are discussed below.

5.1 Metering Including Prepayment Metering

ECG has had challenges with the supply of adequate meters to meet the demand of our customers. This challenge can partly be attributed to the failure of suppliers to meet supply timelines. To overcome this challenge, ECG intends to take proactive measures that will facilitate the quick and timely delivery of meters, to ECG's district offices where they are needed.

Over the years, ECG has introduced prepayment meters to enhance revenue collection. However, due to inadequate monitoring some customers tend to bypass the meters and steal electricity. To remedy this situation, ECG intends to improve monitoring of prepayment meters to prevent energy theft and also to identify faulty meters to ensure prompt replacement.

The company is currently introducing smart meters with advance technology that will enable ECG to remotely monitor these meters (e.g. AMR Technology). In recent times, ECG has had to grapple with surveying and mapping out of new development areas to capture new customers on the ECG system. This has created a backlog of prospective customers waiting for long periods to be captured onto the ECG billing system. To overcome this challenge, ECG is embarking on GIS mapping of all installations and assets. This will facilitate the quick and smooth migration of new and prospective customers onto ECG's billing system.

5.2 Energy Audit

ECG has put in place measures to adequately account for all the energy that we purchase from our suppliers. Hitherto, we had no means of identifying particular areas where energy theft was rampant. With the introduction of secondary transformer metering, ECG can properly account

for energy sold through each secondary substation and hence, be able to indentify particular areas where energy theft occurs and take remedial actions.

At present, public lighting is another area where the company losses a lot of energy purchases and revenue for that matter. ECG has therefore taken proactive measures to account for all public lighting installations and where appropriate, install meters to monitor their energy consumption.

5.3 Theft of Power, Cables and Equipment

ECG has suffered cases of energy theft as well as cables and equipment over the years. A number of theft cases associated with overhead conductors, earthing leads, stealing of fuses from distribution feeder pillars and energy meters have prevailed for some time now. Additionally, incidence of transformer oil siphoning has been one of the main causes of the failure of transformers installed on the network.

An initial remedy adopted was to weld the drain taps on the transformers but this was not effective as thieves managed to cut through using hack saws. One key strategy indentified is mass public education for the general public to report suspicious acts of energy theft. With the establishment of the utility court, ECG hopes that the prosecution of such cases would serve as a deterrent to such thievery acts.

5.4 Loss Control-Technical and Commercial

The company has high levels of distribution system losses. This has prevented ECG from achieving the revenue levels expected in the tariff. Currently, several system loss reduction projects are being undertaken in order to minimize the system losses across its operational areas. The objective of these projects is to replace and upgrade all sub-standard LV networks; to replace all meters with new split type smart prepayment meters installed in enclosures and introduce distribution transformer metering for energy accounting.

Additionally, ECG will continue with the activities of the Loss Control Unit (LCU) to minimize losses attributable to customers who indulge in energy theft activities.

5.5 Availability/Reliability of Supply- Quality of Service

As mentioned earlier, overloaded networks, third party damages and theft have been the major factors hindering the availability and reliability of electricity supply to our customers. Vegetation overgrowth has also played key role in the quality of electricity supply. In the face of the proposed measures outlined earlier, the company believes that it can achieve the proposed improvements/targets in Table 4.1 above.

ECG however anticipates that generation shortfall and transmission failures are two main external factors beyond the company's control likely to impact heavily on the availability and reliability of power supply in 2013.

5.6 Suppressed Demand

Demand suppression on the distribution network continues to be a major challenge to ECG. Studies have shown that suppressed demand cannot be completely eliminated but minimised through network investments especially by way of installing more transformers and lines as well as providing redundancies on the network.

To address the issue of suppressed demand, a study must be done to review ECG's initial estimate of 3% of total energy sales in the year 2000. The conclusion of the study will allow ECG to begin an extensive network expansion exercise which will aim at providing enough redundancies on the distribution grid. Currently, the ongoing capacity expansion interventions are gradually providing relief to some overloaded networks especially in the urban communities. The prepayment metering project in Accra West Region and Teshie for example,

would procure and install additional transformers and interconnecting lines to provide relief to overloaded networks.

Since the costs involved in such major projects are huge, ECG is unable to immediately replicate these projects across all of its operational areas. Hence, large areas on the network will continue to experience suppressed demand in the year 2013. ECG's roadmap is to first review its master plan in the year 2013; assess the impact of ongoing projects on the network and validate the proposed projects over a 5-year period.

5.7 Management Information System Including E-Payment

It is acknowledged that ECG is required to collect more than 95% of total billed electricity units. To achieve this objective, a lot of interventions are ongoing to ensure that all revenues accrued to the company are retrieved on time. These interventions have imposed a lot of costs on ECG commercial operations and therefore, limited the company's ability to expand such initiatives.

At present, the company has introduced the Electronic Payment System (E-Payment) which is an arrangement between the telecommunication companies, the banks and ECG. The E-Payment System allows customers to make payment of electricity bills through their mobile service providers. An arrangement is further established with the financial institutions to ensure that once such payments are made, it reflects in real time on ECG's bank account.

5.8 Billing and Collection

Over the years billing, revenue collection and debt management has been a source of challenge to ECG. In an attempt to introduce accuracy and timeliness in billing, ECG has introduced the data loggers for NSTL meter reading on a pilot basis and the AMR for SLT customer billing[1]. The

[1] Sections 2.2.2 and 2.2.3 discusses the use of data loggers and AMR Systems for customer billing.

company aims at rigorously addressing billing challenges through the massive deployment of the two systems to cover all customer groups within a time frame of one year.

Additionally, a 24-hour vending service under the prepayment metering scheme is seriously under consideration. The project will require a detailed cost-benefit analysis to assess the impact on corporate revenues. Another major concern is the security implication of introducing the 24-hour vending service. In some jurisdiction, it will be easy to use technology to address security concerns but this must be explored with other stakeholder institutions to identify the viability of the project.

Revenue collection has also greatly challenged ECG. The issue to table is our ability to recover revenue from one major customer, GoG, which is required to regularly honour its payment obligations through a Cross Debt Clearing House (CDCH) arrangement. To date, payment under CDCH is in arrears and GoG is responsible for about 64.74% of ECG's total debt stock[2].

5.9 Organisational Reform & Restructuring

In line with the company's mission to provide quality, reliable and safe electricity services to support the economic growth and development of Ghana and following a report by Messrs Kwame Asante & Associates, Management Consultants, who were engaged to assist with the restructuring of the company, a new organizational structure was put in place in 2011. It created new directorates out of the existing nine (9). The new directorates included Premises and Estates, Information and Communication Technology, Network Projects and Procurement.

The main thrust of the organisational reform is to improve operational capability and commercial viability. It is intended to create a decision making structure which is compatible with Management autonomy and efficiency. The focus is to create functional groupings that

[2] Table 5.5 under Section 5.12 details the components of ECG's total debt stock

can support commercial operations in an essentially effective engineering/technological operation.

In the medium term, it is expected that the company would aim at constituting commercially viable "Cost Centres" for the distribution services with clearly defined relationships to the Head Office of the Electricity Company of Ghana Limited. These would be centres that will ensure improved profitability by expanding new customer base to utilize capacity, reduce system losses and have the potential to attract private capital investment.

5.10 Customer Complaints & Dispute Resolution

ECG's strategic objective is to provide safe and reliable electricity services to its cherished customers. In order to achieve the above objective, ECG has established customer call centres in all its operational areas to attend swiftly to customer complaints to ensure that such complaints are resolved timely and amicably. Daily reports are prepared and forwarded to the appropriate operational managers for their necessary action whilst monthly reports are forwarded for prompt action.

ECG's Customer Complaints Report captures all complaints reported by customers under four broad headings; Applications, Technical, Commercial and other complaints. For instance in 2012, about 103,100 customers put in applications for new meters. However, ECG was able to supply only 80,020 meters representing 78% of the applications received. Technical complaints reported included: 9,440 complaints about power outages, 25,720 complaints on faulty/obsolete meters, 1,180 meters reported burnt, 140 stolen meters, 5,340 complaints about low voltage and 320 damages to property due to high voltage.

Commercial complaints relates to billing, request for change for in tariff class among other complaints. About 31,000 customers requested for their statements which was printed at no cost to them. 30,980 customers complained of their payments not reflecting in their bills whiles

740 customers requested for their debt to be a rescheduled. Approximately 6000 customers disputed their bills whereas 1,820 customers requested for a change in tariff class. Table 5.1 below highlights the various complaints report in 2012.

Table 5.1: Number of Technical Complaints

Complaint	Number
Damages caused by high voltage	320
Complaints about low voltages	5,340
Stolen meter declaration	140
Burnt meter declaration	1,180
Complaints about faulty meters	25,720
Complaint about power cut off or outage	9,440
Total	**42,140**

Table 5.2: Number of Commercial Complaints

Complaint	Number
Request for account statement	30,820
Irregular meter reading	2,700
Non delivery of bill	4,620
Disputed bill	5,960
Request for change of tariff class	1,820
Previous payment not reflecting	30,980
Disputed disconnection	3,100
Request for debt rescheduling	740
Total	**80,740**

Table 5.3: Other Complaints

Complaint	Number
Estimated bills	29,880
Reading adjustments	13,820
Pending adjustment	11,340
Payments into wrong accounts	3,260
Change of name	6,600
Accounts reconnected on CBIS	11,200
Uncredited payment	340
Request for Temporary supply	380
Change of address	80
Total	**76,900**

Table 5.4: Customer Visits

Purpose of Visit	TOTAL
Number of applications brought forward	62,740

Number of applications received for the Year	103,100
Number of applications processed and connected	80,020
Number of applications not connected	42,240

5.11 Resolution of Court Cases

Previously, the non-prosecution of individuals associated with electricity theft cases posed a great challenge to the operations of ECG. In that, there existed no form of deterrent actions for such behaviours. ECG in consultation with the Chief Justice established and instituted a utility court in 2011 purposely to prosecute cases involving electricity theft and other associated cases. ECG was granted the authority to prosecute cases at the utility courts. Training sessions were organized for ECG Prosecutors and Judges of the Utility Courts to handle cases that come before them. With the establishment of the Utility Court, the company prosecuted about 24 different cases in 2012. The company hopes to follow this vigorously to deter people who intend to engage in such nefarious activities.

Considering the success already being chalked by the established Utility Court in Accra, ECG plans to do same in other districts in consultation with the Chief Justice.

5.12 Government and Public Sector Debts

At present, a significant portion of ECG's debt consists of arrears accrued from government and other public sector agencies. The accumulated government debt (MMDAs) constitutes about 64.74% of the total ECG debt stock. The table below shows the composition of ECG's total debt stock as at December 2012.

Table 5.5: Composition of ECG's Total Debt Stock

Source of Debt	Amount (GHS Million)	% of ECG's Total Debt Stock
Cross Debt Clearing House		
MDAs	177.59	
GWCL	91.84	
Life Line Subsidy	45.86	

Sub Total for CDCH	**315.29**	**37.96%**
Other GoG Debt:		
Public Light Shortfall	109.59	
TOR Electricity Debt	2.84	
Tariff Deficit	110.02	
Sub Total for other GoG Debt	**222.45**	**26.78%**
Total GoG Debt	537.74	64.74%
Private Debt	292.86	
Sub Total for Private Debt	**292.86**	**35.26%**
TOTAL DEBT (as at Dec. 2012)	**830.60**	**100.00%**

From the Table 5.5 above, 38% of the total debt stock is attributed to GoG obligations under the CDCH arrangement. The other GoG debt, which is about 27%, is attributed to the various shortfalls in electricity tariff from the period 2010 as well as the shortfall in public lighting. This makes the total GoG debt to ECG about 65% of the company's total debt stock. The other component of the debt stock is the private debt. This is about 35% of ECG's total debt and represents bills owed by customers and bad debt. It must be emphasised that at the preparation of this document, about 30% of this amount was not due for payment.

5.13 Bad & Doubtful Debts

On the average, the company records about 5% of its sales revenue as irrecoverable and this has been the trend for the past five (5) years. This is brought about when especially; non-residential customers have their structures demolished by Metropolitan, Municipal and District Assemblies (MMDA's), making them untraceable.

5.14 Surcharge & Subsidies

Current policy penalises SLT Customers whose power factors fall below 0.9. Such funds are used in power factor improvement programmes. There are also life line subsidies for residential consumers below 50kWh and a further subsidy for customers consuming between 51 - 150kWh which is serviced by the Ministry of Finance and Economic Planning (MoFEP) on behalf of GoG.

5.15 Government Grants

The company receives subsidiary loans from GoG which after disbursement, are normally converted into equity. Even though these facilities come in as grants, ECG converts them into equity to increase the investment holdings of GoG. Examples of such grants are the French Credit, the Norwegian Credit, GEDAP, the ACGF and the IDA grant.

It must be noted that since 2008, ECG has not received such facilities from the GoG. ECG beyond this period (i.e. from 2008) has sourced a number of facilities on its own through bilateral negotiations with manufactures, suppliers, financial institutions and some intermediary agencies to finance critical investment projects. These facilities are in the form of medium to long terms loans.

The funds received prior to 2008 was used to partly finance the cost of the third bulk supply point in Accra; 12no. Switching stations located in Kasoa, Bogoso, Akuse Junction, Kuntunase, Adjisu, Dodowa, etc.; the interconnecting 33kV and 11kV lines, etc. These projects were financed partly by GoG budgetary allocation between the years 2006 to 2008 and ECG internal generated funds. Refer to the Appendices for a list of completed projects.

5.16 Access to Finance and Repayment of Financing Costs

Generally, the company has access to finance from banks and financial institutions. The challenge is our inability to attain a reasonable return on our investments thereby, preventing ECG from accessing funds from the financial institutions. The bank offers usually come with stringent financial terms which most often ECG'S cash flow and balance sheet are unable to support.

5.17 Tariff Structure and Rates Design

One major challenge with regards to the tariff structure is that BC's embedded within ECG distribution network are compelled to pay a higher rate than their counterparts who take

power directly from the transmission network. The company has had to negotiate lower electricity tariffs to retain high revenue-yielding customers; this translates into a huge revenue loss to ECG.

Secondly, the prevailing tariff structure posses a great challenge to compound households whose aggregate consumption is extremely high. Furthermore, administering the current tariff structure (four-part tariff) has also posed some challenges as it is difficult for low income family units to understand.

Thirdly, during peak load, there is a constraint on ECG to supply power to consumers. However, the current tariff structure does not adequately compensate for such costs.

5.18 Introduction of Wholesale Electricity Market

The Wholesale Electricity Market (WEM) which is yet to commence operation in Ghana is currently posing a number of challenges to ECG's operations. At present, ECG holds about 72% of total demand in Ghana. The structure of the impending market puts the obligation on IPPs to identify and sign a PPA with a credible off-taker. In most cases, ECG has been regarded as the main off-taker and therefore, it imposes a lot of pressure on the utility to engage prospective IPPs to sign such agreements.

The numerous requirements of lenders for various prospective IPPs sometimes make it difficult and almost impossible to conclude PPA negotiations with investors. A case in point is the need to raise Letters of Credit (LC) as a guarantee to the payment of power purchased and the requirement for GoG to backstop the sale of power under such agreements. In some cases, ECG is required to raise LC's in excess of USD90 Million as a guarantee to payments under the project.

This poses a lot of challenge on ECG since it is unable to afford LC's of such magnitude. Although Ghana requires more generation capacity, it is barely impossible for ECG to regularly establish LC's with very high face values for all potential IPPs. In the process, most investors are unable to continue with their plans to enter the power generation market. This is a major deterrent to Ghana's aim to increase generation capacity to about 5000MW by 2015.

ECG wishes to propose that the regulators together with the Ministry of Energy & Petroleum (MoEP) fashion out a structure which will support the attainment of the proposed 5000MW generation capacity. In other parts of the world, numerous models and procurement arrangements are under implementation. These include the single buyer-single seller model, the use of World Bank partial risk guarantee and a policy framework which supports the provision of government support for power generation, etc.

5.19 Wholesale Market Bulk Customers Embedded in Distribution Network

Bulk Customers embedded in ECG's distribution network under the existing pricing regime are made to subsidise consumers in other categories of customer classification in the electricity market. Under this arrangement, the energy consumption of these BC's are included in the total energy consumption of ECG's customers. The regulator therefore includes the total energy consumption of these customers in computing the revenue requirement of ECG.

It is proposed that the energy consumption of the BC's is excluded in the computation of ECG's revenue requirement. The other alternative is to spread the cross subsidy to cover all participants in the electricity market. The total projected demand, energy and estimated revenue for all the BC's are tabulated below.

Table 5.6: Bulk Customer Data

Item Description	2013	2014	2015
Demand (kW)	1,176,081.90	1,234,886.00	1,296,630.29
Energy (kWh)	667,256,692.68	720,637,228.09	778,288,206.34
Estimated Revenue (GH¢)	52,754,168.21	62,671,951.84	74,454,278.78

5.20 Embedded Generators and Interconnection

As a strategy to provide reliable electricity services to customers, particularly, large industrial establishments, ECG is commencing discussions with IPPs to implement the concept of distributed power generation which simply means, injecting power generation directly to the distribution grid. The company is using this approach to ensure that challenges in power generation and transmission do not affect its priority customers.

A PPA was signed in 2012 with Messrs Genser Power (GP) at a price of Ghp22.81/kWh to generate 3MW of electricity using LPG for customers in Tema. The recent fuel price adjustments increased the LPG price, which is the main source of fuel to the power plant, by about 50%. Therefore, in 2013 the price for GP is expected to increase to Ghp34.2/kWh. It is projected that in 2013 Genser will generate a total energy of 23.65GWh.

Discussions are also ongoing for GP to commence power generation in the Western Region (i.e. Chirano). It is the company's belief that this intervention will help uplift service delivery to ECG's BC's.

5.21 Power Procurement from Independent Power Producers and Renewable Energy Generators

Given the current power generation challenge prevailing in the country, there was the need for ECG to contract IPPs as a strategy to mitigate the impact of the generation shortage on ECG's service delivery. To this end, the company has contracted seven (7) IPP's to augment ongoing power generation efforts in Ghana. The introduction of these IPPs into the generation mix would undoubtedly contribute to electricity supply in recent times.

ECG has however had to battle critical challenges with these IPPs mainly in the area of tariff negotiation. The argument has been the currency to be used in setting tariff and billing for that

matter. Over the years, negotiated tariffs with dollar denomination mostly translate into huge revenue losses for the company due to the consistent depreciation of the cedi. A case in point is where the company had to bear a cost element of SAPP due to depreciation in the cedi which was not accommodated in the tariff adjustment by the regulator.

5.22 Human Resource - Skilled Manpower

ECG has a manpower capacity of over 6,000 employees. These employees have different levels of competence and knowledge. The challenge the company face is the ability for our staff to cope with emerging technology in the running of modern utility. To overcome this challenge, ECG periodically organizes refresher training programmes at our training school. The process for identifying staff training requirements is driven by annual staff appraisals and the introduction of a new technology/process into our operations.

6 Strategies to Address Key Challenges

A number of strategies have already been discussed under each key challenge above. These strategies have been employed to combat the above enumerated challenges ECG is facing. Generally, the adoption of these strategies and a favourable adjustment in the DSC would translate into an improvement in ECG's fiscal stance.

7 Total Distribution Utility System Load at Peak

Over the years, an average growth of about 8% has been observed in ECG's system load at peak. In 2011 a maximum system load of 1152.99MW was recorded whiles that for 2012 was 1258.2MW. This represents a growth of 9.1%. Undoubtedly, the Accra region recorded the highest growth in demand 546MW and the lowest of 42.98MW was recorded in the Volta region. Between 2011 and 2012, the demand in Accra only grew by 12.4%. This is very significant to ECG and it represents the fact that the sub-transmission and distribution grid in Accra require greater investments than all other ECG regions. The area with low demand (i.e. Volta Region) recorded a growth 8.2% between 2011 and 2012.

It is therefore important to underscore the need for large investment on the distribution network since even areas with minimum demand on the ECG network are showing a growth in excess of 8%.

With a projected growth rate of 8%, a further 3% provision for suppressed demand, and a 30% provision for economic loading, it is anticipated that by 2015, the peak load will be about 2,122.7MW. Considering the present total installed sub-transmission transformer capacity of 1,858MW, it is expected that global distribution network capacity be increased by about 264MW in order to meet peak load projections (demand projections) for 2015.

8 Regulated Market-Non-Special Load Tariff Customers

Generally, there two broad category of customers under the NSLT group; that is (i) Residential, (ii) Non-Residential. Residential customers pay electricity tariff based on energy consumed. Currently ECG in consultation with the regulator (PURC) has grouped residential customers into three classes (lifeline, medium and high consumers) based on their level of consumption.

Customers who use electricity for commercial and non-domestic activities and whose consumption level is equal to or less than 100 kilovolt Ampere at a service voltage of 415 Volts are termed Non-Residential Customers. The customers under this category pay electricity tariff based on energy consumed. Reference can be made to Section 13.1

9 Regulated Market-Energy Commission Licensed Bulk Customers Embedded in Disco Network

Lately, a number of companies with high electricity consuming rates have obtained bulk customer status (license) from the Energy Commission mainly to enjoy benefits associated with this class of customers. At present, 11 companies, mainly steel and mining companies, embedded on ECG's distribution have obtained bulk customer status and negotiated new tariff rates with

ECG mainly because of the claim that they are being charged more to subsidise residential customers.

Below is a list of all ECG's Bulk Customers classified under mining companies, steel companies and others.

Mining Companies:

- Abosso Goldfields
- Chirano Goldmines
- Anglogold Iduapriem
- Noble Gold Bibiani Limited
- Goldfields Ghana Limited

Steel Companies:

- M/S Special Steel
- M/S Tema Steel
- Tema Steel Company
- Western Steel/ Forgings

Other Companies include:

- GHACEM Ghana Limited
- Ferro Fabric Manufacturing

In year 2012, total energy consumed by ECG's bulk customers totalled 617.83GWh. A detailed computation of the projected consumption of all BCs, their respective wheeling charge and the estimated revenue from each BC for the period 2013-2015 have been provided in the Appendices.

10 Base Load

Within the scope of electricity distribution, ECG has a limited role in identifying base and peak loads. However, the company has engaged a number of IPPs who are expected to run their plants continuously as base load for ECG. The plants scheduled to commence operation within

the tariff period (2013 – 2015) include SAPP, BUI Hydro Power Plant, CENIT Energy, Jacobsen Elektro, Cenpower Generation Co. Ltd, Siginik Ltd. and Genser Power. The actual situation will well be predicted by GRIDCo.

11 Forecast of Energy to be Purchased

In total, ECG plans to purchase from VRA and from seven (7) other IPP's. The forecasted energy purchases for the year 2013, 2014 and 2015 are 8,457GWh, 9,133GWh and 9,864GWh respectively.

Table 11.1: Electricity Demand Forecast (2012 to 2015)

Scenarios	Categories	Units	2012	2013	2014	2015
Low	**Total Sales**	MWh	6,186,184	6,557,355	7,020,304	7,518,932
	Total Purchases	MWh	7,830,613	8,300,450	8,798,477	9,326,385
	System Losses	MWh	1,644,429	1,743,094	1,778,172	1,807,453
	System Loses	%	21.0%	21.0%	20.2%	19.4%
	Peak Load	MWh	1,086	1,152	1,233	1,321
Base	**Total Sales**	MWh	6,186,184	6,681,079	7,284,067	7,952,612
	Total Purchases	MWh	7,830,613	8,457,062	9,133,627	9,864,317
	System Loses	MWh	1,644,429	1,775,983	1,849,559	1,911,705
	System Loses	%	21.0%	21.0%	20.3%	19.38%
	Peak Load	MWh	1,086	1,173	1,279	1,397
High	**Total Sales**	MWh	6,186,184	6,804,803	7,560,136	8,402,656
	Total Purchases	MWh	7,830,613	8,613,674	9,475,041	10,422,546
	System Loses	MWh	1,644,429	1,808,872	1,914,906	2,019,889
	System Loses	%	21.0%	21.0%	20.2%	19.4%
	Peak Load	MWh	1,086	1,195	1,328	1,476

**Base case purchases were used in the tariff computation.

11.1 Volta River Authority

It has been forecasted that 6,395GWh of energy would be purchased from VRA in 2013 at a projected cost of Ghp21.01/kWh. The price was projected based on a 90.7% increase in the current price of Ghp11.02/kWh. The volume of energy to be purchased is also the difference between forecasted total energy purchases and all ECG's engagements by way of PPA's.

11.2 Independent Power Producers

Currently, ECG has contracted eight (8) IPP's of which seven (7) of them would be operational during the tariff review period. The seven (7) IPP's are namely Sunon Asogli Power Company Ltd. (SAPP), CENIT Energy Ltd. (CENIT), Bui Power Authority (BPA), Genser Power Ltd. (GPL), Cenpower Generation Company Ltd., Jacobsen Elektro and Siginik. Below is a detailed description of the respective purchases to be made and from each IPP.

11.2.1 Sunon Asogli Power Plant

Since fourth quarter 2012, SAPP has not been in production due to the damaged gas pipe line. Discussions with SAPP officials projects that by April 2013, supply of natural gas would be restored and therefore the plant will commence power production. Considering the three (3) months break in production, ECG has estimated to purchase about 807.75GWh of energy from SAPP at a projected cost of Ghp30.99/kWh. The price was determined assuming an increase of 30% on the current price of USCents12.48/kWh. The increase we project would be attributed to adverse macroeconomic indicators.

ECG is also drawing attention to the fact that power purchases from SAPP although is already determined in the PPA in US dollar terms, a corresponding rate should be set in Ghana cedi for the tenor of the tariff. This would ensure that ECG does not make revenue losses through exchange rate conversion. This challenge has greatly affected ECG's revenue position because the exchange rate used in the ATAF is usually lower than the market rate which is always demanded by SAPP.

11.2.2 CENIT

Tema CENIT Energy Ltd. started energy production and delivery to ECG on 1st November, 2012 and continues to generate power for ECG although discussions on the PPA have not yet been concluded. The contracted annual energy in the PPA is 867GWh. The capacity under discussion is USCents4.42/kWh. ECG projects that this rate will grow by 30% in 2013 to USCents5.75/kWh. Additionally, the energy charge under discussion is USCents23/kWh. This is also projected by 30%. The total cost of power generation for CENIT Energy therefore is about Ghp68.08/kWh.

ECG's concern on the engagement with CENIT Power is the fuel cost. It is perceived that the fuel cost is extremely high and therefore if passed through the tariff, may drive prices very high. The company is therefore proposing that GoG procures and supply the fuel to CENIT Power. This would minimise the cost of generation from the 110MW simple cycle power plant.

11.2.3 BUI POWER AUTHORITY

Electricity generation from the Bui Power Plant is expected to commence in April 2013 where half of the total capacity would be available for generation. The planned production for the year 2013 is 363.38GWh and the projected price is Ghp22.73/kWh. This is the indicative price given by PURC and contracted in the amended PPA with ECG.

It must be noted that at the commercial operations date, this price will be renegotiated to reflect the true cost of the power plant.

11.2.4 GENSER POWER

It is projected that Genser Power would contribute a total of 23.65GWh to the total power generation mix in 2013. The PPA contracted a price of Ghp22.80/kWh has been increased to Ghp34.2/kWh due to the recent 50% increase in the price of LPG.

11.2.5 CENPOWER GENERATION COMPANY LIMITED

In 2015, Cenpower Generation Company is expected to commence commercial production of power for ECG. The projected cost of the 340MW Combined Cycle, Natural Gas/LCO fired plant is Ghp52.8/kWh. ECG further intends to purchase 2,680 GWh when they begin commercial operations. Details of the above are provided in the Appendices.

11.2.6 JACOBSEN ELEKTRO AS

Jacobsen Elektro As will also complete the construction of a 360MW Combined Cycle, natural gas/LCO fired power plant in Aboadze Takoradi by 2015. ECG projects to purchase 2,838 GWh of energy at an agreed price of Ghp37.39/kWh from Jacobsen in 2015. A detailed computation of ECG's projection is provided in Appendix .....

11.2.7 Others

The above seven (7) mentioned IPPs are the confirmed sources of power generation, to ECG, for the years 2013 to 2015. The Commission will be duly informed of any new commitment or discussions that will lead to the establishment of any new power plant in the country.

11.3 Non-Conventional Energy-Renewable Energy

Following GoG's strong commitment to promote power generation from greener fuels, ECG is restructuring its operations to embrace the introduction of power generation from renewable energy sources. Currently, the company has signed a PPA for a 50MW Solar Power Generation with Messrs Siginik Energy Limited. The details are provided in Section 11.3.5 below.

11.3.1 Hydro<100MW

N/A

11.3.2 Waste to Energy

N/A

11.3.3 Biomass

N/A

11.3.4 Wind

N/A

11.3.5 Solar

As stated earlier, ECG has signed a PPA with Messrs Siginik Energy to off-take an annual energy of 175.2 GWh at a negotiated rate of US cent 29.5/kWh. The plant is expected to be commissioned in 2015 and hence COD is also expected in the same year.

12 Distribution System Losses at Various Voltage Levels

Currently, ECG's total distribution system losses is estimated at 21.25% made up of 10.97% technical losses and a commercial loss component of 10.28%. Reference to the table below illustrates that the commercial loss component is marginally lower than that of the technical loss. It is worthy of note that this was a result of stringent measures the company employed in reducing commercial losses. Much investment is needed to pursue key system loss reduction projects in an effort to reduce technical losses within ECG's distribution network. Details of the distribution system loss rates across the various voltage levels have been provided in the table below.

Table 12.1: Distribution System Losses at Various Voltage Levels

Description	Technical Losses	Commercial Losses	Total
Sub-transmission system	3.44%	1.47%	4.91%
Primary distribution system	4.01%	1.79%	5.80%
LV distribution System	3.52%	7.02%	10.54%
TOTAL	**10.97%**	**10.28%**	**21.25%**

Source: National Technical and Commercial Loss Study, Ghana-2012[3]

[3] Information is extrapolated from report prepared by Global Energy Consulting Engineers Private Ltd. (GECE of India)

12.1.1 34.5kV-11.5kV

ECG currently does not operate 34.5kV and 11.5kV networks.

12.1.2 33kV-11kV

From the table above, total system losses within the 33kV and 11kV network is about 10.71%. This is made up of a technical loss component of 7.45% a commercial loss component of 3.26%.

12.1.3 415V-240V

Reference to the above table shows total system losses of 10.54% within the 415V – 240V network. Its components are 3.52% technical losses and 7.02% commercial losses.

13 Customer Population by Classification and Characteristics

As at December 2012, ECG had a total customer population of 2.5 Million. Out this population, 71% are active customers made up mainly NSLT of 1.78Million representing 99.91% of the total customer population and SLT comprising 1,605 customers.

About 16.94% of NSLT customers use electricity for commercial activities (non-residential customers) whilst 83.06% of the NSLT customers basically use electricity for residential and non productive activities as at December 2012. Of the total NSLT customer population, 43.60% (776,294 customers) use prepayment meters. The average NSLT growth for the last five years is approximately 7.9%. In the short to medium term, ECG projects a 10% NSLT growth for 2013 and an 8% growth for 2014 to 2016. The projected growths are based on the ongoing SHEP, REP and other network expansion and committed generating plants envisaged in the medium term.

Seventy six percent of SLT customers are classified as Low Voltage (LV), whilst 21% and 3% are categorised as Medium Voltage (MV) and High Voltage (HV) respectively. Over the years, the SLT population has dwindled due to the liberalisation of the electricity market which allows some BC's with licenses to buy directly from VRA.

13.1 Regulated Market- Non-Special Load Tariff Customers

The criteria used in allocating cost to NSLT customers embedded within ECG's network is based on the cost of providing services to each customer group and also designed in such a way as to effectively manage demand by sending signals to customers who consume above 600kwh.

However, some NSLT customers (i.e. life line customers- customers whose consumption is less than or equal to 50kwh per month) are subsidised by the GoG even though the latter often default in remitting ECG of such revenues. NSLT customers embedded within the distribution network represent about 99% of ECG's active customer population as at December 2012.

About 17% of NSLT customers embedded within the distribution network operate as commercial whilst 83% (301,345) are categorised as residential. The tariff rate and structure differs for both residential and non-residential customers under the NSLT category entrenched in the distribution network.

13.1.1 Residential Customers

Customers, who use electricity for non-commercial activities, maintain a consumption level equal to or less than 100 kilovolt Ampere at a nominal service voltage of 415 Volts for 3 phase and/or 240 Volts for single phase are classified as Residential Customers. About 83% of ECG's NSLT customers fall under this category. In designing a tariff for residential customers, ECG takes into consideration Economic as well as non-economic factors. Life lines consumers enjoy a subsidy from the government.

13.1.2 Non-Residential Customers

Non-Residential Customers are regulated customers who use electricity for commercial and non-domestic activities and whose consumption level is equal to or less than 100 kilovolt Ampere at a service voltage of 415 Volts and/or 240 Volts. As at December 2012, about 17%

(301,345) of NSLT customers embedded within the distribution network operate as Non-Residential customers.

13.2 Regulated Market - Energy Commission Licensed Bulk Customers Embedded in Disco Network

As mentioned in Section 9 above, eleven (11) companies have been licensed by the Energy Commission as bulk customers and are currently embedded in ECG's distribution network. They are broadly classified under mining companies, steel companies and other companies. Please refer to Section 9 for a detailed list of all the Bulk Customers.

14 Energy Allocated to Public Lighting

ECG as part of its role provides energy to light public and street lights. In some cases (i.e. the 24 ceremonial streets of Accra), ECG is responsible for operating and maintain the street and public lights installed along those streets. In 2012, the total consumption of street lights on ECG's network was 184.4GWh which represents the consumption of about 483 street lights. Table 4.1 below summarizes projections made for streetlights.

Table 4.1: Projections for Street Lights

Projections	2013	2014	2015
Energy Consumption (GWh)	199.5	215.08	232.3
Number of Street Lights (No.)	531.4	584.4	642.9

In Section 5.2, ECG has discussed the issues which affect public and street lights. The levy is insufficient to pay for the energy consumption as well as the operation and maintenance cost of the light. In an attempt to provide enough lighting for communities and public places and therefore security to the citizenry, it has become prudent to recommend an upward adjustment in the rate of GHS0.0001/kWh or an appropriate intervention to ensure that revenues required to support the provision of public and street lights are capable of paying for the cost of providing the facility.

Our proposal has introduced a compensation of 3% of energy purchases in our revenue requirements to make up for revenue loss attributed to public lighting.

15 Distribution Company's System Load Data

Table-1: Disco System Load Data 2011-2015

Parameter	Unit	2011	2012	2013	2014	2015
Total System Load @ Peak	MW	1,152.99	1,258.2	1,819.51	1,965.07	2,122.27
Regulated Market (Non-SLT Customers)	MW	1,030.47	1,120.08	1,176.08	1,234.89	1,296.63
De-Regulated Market (Energy Commission Licensed Bulk Customers Embedded in Disco Network)	MW	122.52	138.12	643.43	730.18	825.65
Projected Base Load	MW	1,152.99	1,258.2	1,819.51	1,965.07	2,122.27

16 Capital Expenditure

Table-2: Summary of Capital Investment Plan (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Capital Cost	4,412.955	4,551.899	8,164.853	10,069.322	12,462.226
Initial Spares	-	-	-	-	-
Additional Capitalisation	437.785	624.291	823.316	883.572	940.889
Renovation & Modernisation (R&M)	-	-	-	-	-
Rehabilitation & Resettlement (R & R)	-	-	-	-	-

16.1 Capital Expenditure Financing Plan

Table-3: Summary of Capital Expenditure Financing Plan (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Accumulated Depreciation	1,888.823	1,471.870	2,719.704	3,285.752	3,977.944
Retained Earnings	287.881	506.088	1,328.569	2,088.547	2,991.042
Commercial Borrowings:	222.80	344.93	485.71	563.12	577.28
Domestic	35.42	58.93	63.85	14.73	0.28
Foreign	187.384	285.999	421.860	548.390	576.999
Additional Equity Contribution By Shareholder(s)	-	-	-	-	-
Grants:	243.60	225.97	215.80	206.09	196.81
Domestic	-	-	-	-	-

Foreign	243.60	225.97	215.80	206.09	196.81
Tariff Revenue (Revenue from Projected Capacity Charge)	863.67	956.50	2,005.97	2,559.63	3,107.32

ECG's proposal computes the average DSC for the period 2013 to 2015.

17 Operation and Maintenance Costs

Table-4 Operation and Maintenance Costs (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Fixed O & M Costs	36.583	57.687	278.790	448.150	549.422
Variable O & M Cost	9.146	10.180	61.197	85.362	89.441

18 Administration and General Costs

Table-5 Administration and General Costs (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Fixed O & M Costs	44.537	49.606	190.550	275.010	317.210
Variable O & M Cost	4.949	6.131	14.342	23.914	43.256

19 Human Resource Costs- Employee Costs

Table-6: Human Resource Costs (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Fixed O & M Costs	132.922	144.675	344.110	380.790	499.122
Variable O & M Cost	6.996	9.2346	21.965	28.662	37.568

20 Public Education

Table-7: Summary of Public Education Costs (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Stakeholder Communication & Sensitisation (Pubic Education)	846.954	1,483.653	3,200.000	3,840.000	4,608.000

21 Financing and Interest Costs:

Table-8: Financing and Interest Costs (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
Interest on Foreign Loans	5.123	10.132	13.848	25.899	30.182
Interest on Domestic Loans	1.32	7.802	8.343	2.941	1.351
Interest on Working Capital Loan	1.32	1.32	3.12	4.05	5.29

22 Return on Equity

Table-9: Equity Financing Costs (%) 2011-2015

Item	2011	2012	2013	2014	2015
Rate of Return	20.15	21.81	22.00	22.50	23.00

23 Depreciation

Table-10 Equity Financing Costs (%) 2011-2015

Item	2011	2012	2013	2014	2015
Rate of Return	-	-	-	-	-

24 Projected Electricity Distribution Revenue Requirement:

Table-11: Summary of Distribution Company's Revenue Requirement (Million GHS) 2011-2015

Item	2011	2012	2013	2014	2015
A. Capital Recovery Component (CRC)	161.35	175.27	192.79	294.08	363.62
B. Fixed O & M Component (FOMC)	214.04	251.97	813.45	1,103.95	1,365.75
C. Revenue from Energy Charge	-	-	-	-	-
D. Reactive Power Charge	-	-	-	-	-
E. Revenue from Open Access-Wheeling	-	-	52.75	62.67	74.45
F. Fixed Charges					
F1. Service Connection Charge	7.62	13.95	15.35	16.88	18.57
F2. Reconnection Charges	0.452	0.493	0.542	0.597	0.656
F3. Interconnection Charges	-	-	-	-	-
F4. Separate Metering Charges	0.650	0.763	0.839	0.923	1.02
F5. Penalties-Illegal Connection	0.063	0.074	0.081	0.090	0.098
F6.Revenue from Rural Electrification Levy		0.075	0.083	0.091	0.100

25 Proposed Tariff and Rates Structure

Based on the enumerated issues and discussions made, ECG has computed the DSC which will support its operations for the period 2013 to 2015. Below is a discussion on the method, assumptions and results.

25.1 Methodology

For simplicity the company adopted the average cost pricing and rate of return approach used by the PURC in determining electricity rates. By this approach, ECG has identified all its costs and therefore the revenue requirements for the three (3) years. In 2013 for example, the projected total energy purchase of 8,457GWh was then used to divide the revenue requirements to arrive at the proposed average DSC. Below are the details of the revenue requirements for 2013 to 2015.

Table 25.1: ECG's Proposed Revenue Requirement

	2013	2014	2015
Item Description	**Amount (GH¢ Million)**		
Cash Operating Expenses less Direct Cost	910.95	1,241.89	1,536.02
Provision for 95% Collectibles	142.66	244.28	324.64
Provision for Depreciation (Less: GoG and Customer Contribution)	192.79	294.08	363.62
Provision for Company Tax (25%)	151.03	171.58	117.67
Return on Rate Base	658.13	670.08	482.69
Sub-Total (Value Added)	**2,067.78**	**2,496.56**	**2,675.72**
Compensation for System Losses	598.84	726.33	1,004.77
Public Lighting	85.55	103.76	143.54
Less: Projected Revenue from Customers in Deregulated Market	52.75	62.67	74.45
Total Revenue Requirement	**2,687.19**	**3,389.32**	**3,898.48**

From table 24.1 above, ECG's cash operating expenses was derived from the annual approved budget for the year 2013 (a copy attached to the proposal) and projections made for 2014 and 2015. The budget details all expenditures to be made by each operational directorate as well as its impact on the financial statement. Additionally, financial projections and associated statements have been prepared to support the 2014 and 2015 figures.

As provided by PURC, a 95% collection ratio provision was made as well as 21% system loss. These drivers were valued at a projected Bulk Generation Charge (BGC) and Transmission Service Charge (TSC) which are passed through costs to ECG. The Bulk Supply Tariff (BST) and the Rate of Return (RoR) on rate base are used to model scenarios for the applicable DSC.

The ECG approved 2013 budget also made provisions for capital investment captured in the financial statement as depreciation. The total value for depreciation is reduced by all expected GoG and customer contribution. It must be noted that for the year 2013, no budgetary allocation was made to support ECG's operations.

Furthermore, provision was made for company tax amounting to about GHS165.20 Million. ECG's regulatory asset base was estimated using the 2012 Asset Valuation Report prepared by Price Waterhouse Coopers (PWC), a published study on ECG's Weighted Average Cost of Capital (WACC). The table below provides details of ECG's estimation of the regulatory rate base.

Table 25.2: ECG's Rate Base – 2013 to 2015

Item Description	2013	2014	2015
	Amount (GHC Million)		
Plant in service	8,164.85	10,069.32	12,462.23
Construction work in progress	926.36	926.36	926.36
Plant held for future use	-	-	-
Materials & Supplies	78.14	98.12	116.58
Prepayments	130.80	159.58	186.20
Cash working capital (45/365*Cash OPEX)	112.31	153.11	189.37
Total additions to Rate Base	**9,412.45**	**11,406.49**	**13,880.73**
Accumulated depreciation	2,719.70	3,285.75	3,977.94
Customer deposits (deferred credits)	106.23	138.23	172.27
Accumulated deferred income taxes	856.72	1,331.22	2,068.53
Total deductions from rate base	**3,682.66**	**4,755.21**	**6,218.74**
Total Rate Base	**5,729.80**	**6,651.28**	**7,662.00**

A percentage of 11.2% was taken out of the total rate base as a return on ECG's investment (planned). According to the published study, ECG requires about 18% return on its investment (in Ghana Cedi terms) in order to be profitable. However, over the years, ECG has constantly made a negative return on its investment. Therefore the modest 11.2% is being proposed as a measure to help the company to attain the required level of return which will make the power distribution business profitable.

25.2 Key Assumptions

As mentioned earlier, ECG's assumptions for the various scenarios are based on the level of BST which affects system losses, the 95% collection ratio and the required RoR on rate base. The table below summarises the assumptions.

Table 25.3: Assumptions for DSC Computation

The proposal is based on the December 2011 gazetted tariffs. It was dependent on a number of primary and secondary data pertaining to the company's operations to arrive at the results. Key among them were the Asset Valuation Report of 2012 published by PWC, ECG Study and Publication on the Weighted Average Cost of Capital (2012), Third Quarter 2012 Management Accounts, ECG's Load Forecast Report, Cross Debt Clearing House Up-To-Date Report and ECG's Customer Service Database Report.

All expected sources of power generation have been used to arrive at a weighted average bulk generation tariff for the period 2013 to 2015. Additionally, transmission cost was assumed to increase by 75% in 2013, 20% in 2014 and 2015. On the part of ECG, it intends to move from a state of continuous demand suppression to a level where the network will be revamped, provided with enough capacity and redundancies to enable the efficient delivery of electricity distribution services. It was therefore projected that a massive infrastructure expansion drive shall be pursued within the years 2013 and 2014 to help achieve this objective.