GHANA GRID COMPANY LIMITED

SUBMISSION OF TRANSMISSION AND ANCILLARY SERVICES TARIFF TO THE PURC

May 2013

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1 Introduction

1.1 Brief Background

The Ghana Grid Company Limited (GRIDCo), a wholly owned Government of Ghana entity is the independent transmission utility. Its core functions are to "acquire by purchase or otherwise construct, establish, manage, maintain all transmission facilities, works, buildings and other systems necessary to transmit energy".

1.2 Rational/ Objectives Underpinning Tariff Submission

The last major review of the Transmission tariff was done in June 2010. Since then, a great deal of factors that underpinned the 2010 review have significantly changed whiles new challenges have also emerged.

Significant among the factors that have changed are the extent and capacity of the transmission network and its associated O&M costs. GRIDCo has consistently over the last three years embarked on a major capital investment programme to develop, modernize and strengthen the National Interconnected Transmission System (NITS) to improve efficiency and reliability. This major investment has helped to create some level of redundancy for the efficient operation of the NITS. Unfortunately, this increase in asset and workload has not been matched with the transmission tariff.

Secondly, the changing regulatory environment makes and will continue to make demands on GRIDCo such as penalties for non-performance, licensing issues and more stringent performance and reporting regimes among others calls for structural, operational and systems changes that will reduce downtime and improve efficiency in our operations. All these require the injection of substantial funds which our existing tariff cannot support and does not allow us to have the capacity to source external funds.

The need to involve private participation in the electricity sector is yet another rationale for this tariff submission. We intend through this submission, to initiate the process of sending signals to both public and private entities with the capability of providing ancillary services, of our willingness to procure reserves and reactive energy for the efficient transmission of electricity. This proposal seeks to introduce an indicative, fair and attractive tariff for ancillary services.

1.3 Legislative Provision(s) in Support of Tariff Application

The Ghana Grid Company Limited (GRIDCo), which has been operating independently over the last four years, is the independent transmission utility in Ghana. GRIDCo derives its legal authority from the Energy Commission Act, 1997 (Act 541) and the Volta River Development (Amendment) Act, 2005 Act 692. It is charged with the

responsibility of developing, owning and operating the National Interconnected Transmission System (NITS) in an efficient and sustainable manner.

1.4 Highlights of Major issues which describes Structure of Tariff Submission

We are fully aware of the changing regulatory environment and the demands it is making on us such as licensing issues, more stringent performance and reporting standards and penalties for non-performance among others. This, together with technological and communication advancement, development of the Wholesale Electricity Market, and most importantly increased awareness and demand for quality service by our customers have become the main drivers of change in our business.

These call for structural, operational and systems changes that will increase our responsiveness, improve efficiency and reduce downtime and in our operations. However these significant improvements require injection of substantial capital which our existing tariff cannot support and does not allow us to have the capacity to source external funds.

2 Initiatives Undertaken

Reactive Power Injection

Over the last two years a total of 351 MVar of reactive power has been injected across the NITS to improve network voltages. Capacitor banks of various sizes have been injected at Achimota, Cape Coast, Ho, Bogoso, Sunyani, Kpandu, Smelter Substation, Winneba, Takoradi, Ayanfuri, Buipe and Accra 3rd Bulk Supply Point.

Transmission losses

GRIDCo is constructing new 330 KV lines to become the backbone of the transmission system. These include the Aboadze-Takoradi, Prestea-Kumasi and Kumasi - Bolgatanga, lines. In future, some existing 161 KV lines will be upgraded to 330 KV to help reduce transmission losses.

All old meters within the NITS have been replaced with digital and more accurate ones. These have the capability of storing information and therefore meters are read synchronously to eliminate discrepancies.

2.1 Projects Undertaken

GRIDCo commenced a major infrastructure rehabilitation, reinforcement, replacement and expansion to revamp the over-aged and weak transmission infrastructure in the NITS. The objective is to expand the NITS, improve voltage levels, reliability and overall quality of service.

GRIDCo has initiated over 29 projects within the 2010-2012 tariff period under review. Due to the long maturation period for transmission projects, various projects are at different levels of completion for which benefits have started accruing to the system. A

total of 11 projects have been completed, 13 projects are on-going whiles 5 are planned to be initiated between 2013 and 2015. A detailed breakdown of GRIDCo's Capital Investment Plan is attached as ***CIP Sheet*** in the Microsoft Excel File: ***GRIDCo Tariff Filling Forms - Filled***

2.2 Compliance with Directives of the Commission

GRIDCo has been compliant with directives of the PURC.

3 Key Policy Issues for Tariff Consideration

3.1 Introduction of Reserve Capacity tariff

The effort to attract private participation and thereby enhance competition in the energy generation sector has yielded some result although slow. However, to enhance the development of the Wholesale Electricity Market, having adequate generation is a prerequisite. GRIDCo therefore has decided to take the initiative in collaboration with the PURC to introduce a reserve capacity tariff.

3.2 Payment for Reactive Energy (Ancillary Service)

With the advent of multiple generators within the NITS and possibly varying sources of reactive energy, the billing and receipt of Power Factor Surcharge should be revisited. This is particularly so when all generators who are called upon to produce extra Vars beyond their capability or owners of capacitor banks will have to be compensated.

3.3 Depreciation of Cedi and its impact on GRIDCo's financial obligations

The transmission tariff has not seen a major review since June 2010 albeit there have been some minor adjustments. The face value of the TSC was relatively stable since the last gazette Automatic Adjustment Formula application in December 2011. However, in US Dollar terms, the TSC has lost 15% of its value as at December 2012. This has diminished GRIDCo's ability to meet financial obligations and import spares and other critical equipment. The Automatic Adjustment Formula should be reintroduced and enforced.

3.4 Treatment of Transmission Losses and Composition of TSC

The allowable transmission loss threshold of 3.5% which was fixed in 2010 was primarily based on the network configuration, geographical distribution of generation vis a vis load centers and system demand all of which are relevant determinants of the level of losses. Any transmission loss over and above the threshold of 3.5% is deemed as inefficiency on the part of GRIDCo and GRIDCo is required to pay the cost of the excess to the generators. Whereas some of these factors are within the control of GRIDCo and should appropriately be planned, geographical dispatch of generation is outside

GRIDCo's control. Therefore if losses exceed the threshold as a result of this particular factor, GRIDCo should not be wholly penalized for the extra losses.

It is anticipated that with the completion of the planned system reinforcement, the impact of geographical location of generation will be minimized.

The price set for transmission losses per kilowatt in the transmission tariff has a direct impact on the transmission revenue that accrues to GRIDCo. We are therefore mindful of the proportion of the price of transmission loss within the TSC. The proportion of Regulation Levy, Losses and Transmission revenue the existing tariff is represented in Appendix D2.

4 Proposed Service Delivery and Efficiency Improvement During Tariff Period

4.1 Service Delivery & Efficiency Targets

Below are some availability data for the various categories of transmission lines with the National interconnected Transmission System (NITS).

System Availability	-	98.67
69 kV availability	-	99.32
161 kV availability	-	98.75
225 kV availability	-	98.88
330 kV availability	-	97.33

4.2 Technical /Operating Performance Indicator / Indices

4.3 Financial Performance Indicators/ Indices

DESCRIPTION	2011 ACTUAL	2012 EXPECTED	2013 PROJECTED	2014 PROJECTED	2015 PROJECTED
Average Revenue/kWh Wheeled:	11,082,444,135	12,269,774,010	13,398,035,857	15,327,403,790	17,150,071,370
Gh Cedis Revenue	242,321,353.07	287,966,919.31	339,497,524.56	418,434,734.15	487,953,278.12
GH Cedi/kWh	0.02265	0.0227	0.0232	0.0244	0.0252
US cents/kWh	1.49842	1.20220	1.07554	1.12940	1.16927
Direct Operating Cost (GH¢)	85,965,352.55	125,604,726.30	132,879,381.73	150,542,051.56	160,451,556.02
Total cost of transmitting plus depreciation and interest:	138,550,900.78	184,284,673.60	212,272,588.62	236,594,893.13	252,294,432.43
Gh Cedis/kWh	0.012501836	0.015019402	0.01584356	0.015436071	0.014710984
US cents/kWh					
Total cost of transmitting without depreciation and interest:	108,623,900.78	149,045,086.10	163,249,491.39	182,491,492.26	195,679,908.98
Gh Cedis/kWh	0.009801439	0.012147338	0.012184584	0.011906223	0.01140986
US cents/kWh					
Operating Income/(Loss) (GH¢)	156,356,000.52	162,362,193.01	206,618,142.83	267,892,682.59	327,501,722.10
Net Income / (Loss) (GH¢)	103,770,452.29	103,682,245.72	127,224,935.94	181,839,841.02	235,658,845.69
Operating Ratio (%)	64.52%	56.38%	60.86%	64.02%	67.12%
Debt Service Coverage (Times)	34.10	4.59	2.46	3.36	3.61
Sales Debtors (Months)	3	5	2	2	2
Return on Average Net Fixed Assets(%)					
Current Ratio (Ratio)	6.96	7.32	10.43	12.55	15.85
Gearing Ratio (Ratio)	30%	18%	38%	51%	55%
Net Fixed Assets(GH¢Million)	463.21	1,420.16	1,787.34	1,856.66	1,890.05
TSC GH¢/kWh	0.009	1.009	2.009	3.009	4.009
Uscents/kWh					
Long Term Liabilities	246,183.71	272,447.91	778,142.38	1,410,330.67	1,839,385.01
Current Assets	175,204.73	227,038.53	231,095.75	286,751.83	399,071.46
Current Liabilities	25,182.44	31,023.28	22,155.20	22,851.12	25,172.38
Total Capitalisation	820,774.64	1,498,223.48	2,065,786.46	2,790,481.48	3,326,061.62
Average Exchange Rate (GH¢/US$1)	1.5118	1.8843	2.1593	2.1593	2.1593

5 Key Challenges Likely to Impact Service Delivery

- Increasing receivables

  Sales receivables continue to mount primarily due to default by our major customer ECG. Presently ECG owes in excess of GH¢104 million (77% of total debt) with receivable collection period over 6 months. This is not sustainable.

- Existing generation and transmission constraints

  Generation constraints are making it impossible to meet the load, have reserves and obtain optimal dispatch with the existing transmission system configuration.

- Higher than expected transmission losses
- Funding of Capital Investment Projects since GRIDCo borrows on the strength of its Balance Sheet.

5.1 Transmission Losses (Technical and Commercial)

An average transmission loss for 2011 and 2012 was 4.28 and 4.23 % respectively as compared to the projected figure of 3.8% for the two periods. Transmission losses have been higher than predicted due a combination of factors such as non-optimal generation scheduling, poor customer end power factors and lack of reactive power compensation at bulk supply centers and long distances between generation points and load centers. Currently, system analyses have established that operating four (4) or more units in Aboadze provides the minimum system losses

5.2 Transmission Constraints

- Poor power factors at load centers
- Inadequate generation

5.3 Inter-Regional Transmission (Imports/ Exports of Power)

The inter connection of the transmission network between Ghana Togo/Benin and La Cote d'Ivoire continues to be beneficial to the three countries. The table below shows import and export for 2011 and 2012

	2011	**2012**
Import (GWh)	15.2	177
Export (GWh)	76.8	71.7

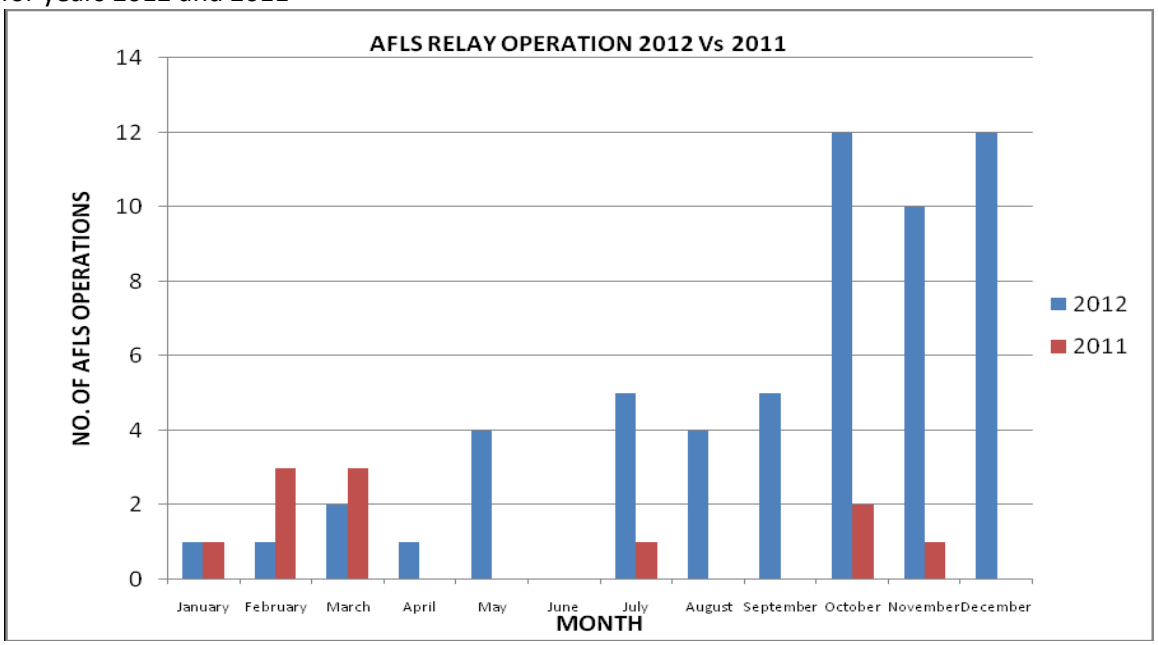
5.4 Automatic Load Frequency Operation and Load Curtailment

The number of AFLS operations increased significantly from 11 in year 2011 to 57 in year 2012. This was due the incidents of low gas pressure that occurred in the first, second and third quarters of 2012 which resulted in the reduction in power generation from both VRA and Sunon Asogli power plants.

Load curtailment increased during the third quarter of 2012 following the damage in the WAGP pipeline which resulted in shortage of gas supply and therefore insufficient generation.

All of this culminated in the high AFLS operation necessary to balance generation and demand and avoid system instability.

AFLS for years 2012 and 2011



5.5 System Availability / Reliability of Supply (Quality of Service)

Transmission lines recorded an average availability of 99.28 % and 98.78 % for 2011 and 2012 respectively which were above the required PURC performance target. The decline in performance is due to numerous network upgrades and expansion projects which required outages to provide safe working environment.

	%
System Availability	98.67
69 kV availability	99.32
161 kV availability	98.75
225 kV availability	98.88
330 kV availability	97.33
Index of transmission reliability	99.60

5.6 System Improvement / Expansion

Between 2010 and 2012, the transmission network has seen some major expansion. Five (5) new substations have been commissioned i.e. Buipe, Anyanfuri, Takoradi T3, A3BSP and Zebilla. Also at different stages of completion are others such as Smelter II, Kintampo, Ahomaso, New Abirem and some 34 KV stations in the north being

upgraded to 161 KV. In addition, over 200 km of High Voltage transmission lines have been commissioned.

Transformer capacity within the NITS has also seen a similar increase from 2,195 MVA at the end of 2011 to 3,403.60 MVA by the end of 2012. This represents a 55% increase in transformer capacity. This is as a result of the massive investment in transformer and Substation Upgrade Programmes undertaken within the last three years. These increases in assets imply increased operations and maintenance cost for GRIDCo.

5.7 Status of Transmission Projects

Details of status of project can be found in the report "Status of Major Capital Works"

5.8 Reactive Power Compensation

Over 532.8 MVar of shunt capacitor banks of various sizes is installed but Reactive Power Compensation continues to be in a deficit in the NITS. This quantum is supplemented with Vars production from generating units. Consistently generating units particularly Akosombo Generating Station have been producing Vars above the plant capability limit. A total of 102.6 MVar of capacitor banks were installed at various Bulk Supply Points for reactive power compensation in 2012.

5.9 Auxiliary Energy Consumption

Energy consumption at the various substations and other auxiliary equipment in the NITs amounts to approximately 5 GWh per annum.

5.10 Embedded Generators & Interconnection

Currently the NITS is interconnected with the CIE (Cote d'Ivoire) and CEB (Togo/Benin) system and there are no embedded generators.

5.11 Power Procurement from Independent Power Producers and Renewable Energy Generators

Presently, GRIDCo does not procure any power from Independent Power Producers and Renewable Energy Generators. However, effective mid-2015 our plan is to commence some procurement of energy for the reserve capacity market. The cost of the reserve capacity will be ultimately borne by all bulk customers who will be the beneficiaries of this reserve capacity.

5.12 Management Information System Including E-Payment System

GRIDCo is in the process of procuring a telemetering system to enhance meter reading and speed up billing for transmission service.

GRIDCo is also planning to rely on information technology in substation monitoring, a prototype of which has been implemented.

5.13 Metering and Accounting

All meters installed at customers end within the NITS are electronic and have an accuracy of +0.2. All the meters are bi-directional Landis & Gyr ZMD series meters with the capability of registering data on Power Factor, KVA, KW, KWh and KVArH.

5.14 Billing and Collection

Transmission billing is post-paid based on a regulated postage stamp rate. Presently all bills are completed and delivered to bulk customers by the fifth working day of the month on average and customer pay as per terms of the Transmission Services Agreement which is usually 30 days.

GRIDCo expects to reduce the bill preparation period after the completion of an in-house developed multi-user billing software.

5.15 Organizational Reform and Restructuring

Our quest to deliver efficient and reliable service to our customers has become more challenging due to the rapid increase in the capacity and size of the NITS.

Consequently, GRIDCo decided to restructure its operations in an effort to speed up response and reduce turnaround time by decentralizing authority and materials supplies. In that direction, the operations and maintenance of the NITS was separated in Northern and Southern Networks each under separate directorates. Warehouses are also being constructed at strategic points all across the country.

5.16 Customer Complaints and Dispute Resolution

A major customer compliant received within 2012 was from Diamond Cement Limited after fire gutted the Aflao Substation in April, 2012 which resulted in the curtailment of power for 3 weeks. The substation was refurbished and power restored.

5.17 Legal Issues Including Resolution of Court Cases

Negotiations and signing of Transmission Service Agreements and Connection Agreements between GRIDCo and Market Participants are at various levels of completion. All legal disputes between GRIDCo and Bulk Customers will be resolved as per the dictates of the Agreement between the parties.

5.18 Government and Public Sector Debts

ECG and NEDCo debt in relation to transmission service charges is GH¢104 million and GH¢12 million respectively. These represent about 85 % of total receivables.

5.19 Bad and Doubtful Debts

Debt owed by Prestea Township continues to be doubtful.

5.20 Surcharge and Subsidies

Presently, GRIDCo does not surcharge for any service.

5.21 Government Grants

GRIDCo has not benefitted from government grant.

5.22 Access to Finance and Repayment of Financing Costs

GRIDCo borrows on the strength of its Balance Sheet from the capital market to finance projects.

5.23 Tariff Structure and Rates Design

The transmission tariff is a single postage stamp value based on kWh. This arrangement exposes GRIDCo financially in the event energy generation declines in which case it becomes difficult for GRIDCo to repay the loans it has contracted to expand its capacity and also increase reliability. GRIDCo in consultation with the PURC will progressively pursue a programme to decouple its revenue from sales of kilowatt hours of electricity transmitted.

5.24 Introduction of Wholesale Electricity Market

The first phase of the Wholesale Electricity Market (Dispatch Data Exchange Phase) purpose of which was to develop the culture of routine data exchange between the ETU and Market Participants commenced in July 2012.

The next phase is the introduction of Capacity Market scheduled for year 2013. GRIDCo will develop guidelines for Bulk Customers to procure capacity for their present and future needs. GRIDCo will be calling for bids to develop reserve capacity for the market. A precursor to this phase is our request in this proposal for a tariff for reserve capacity as an ancillary service.

GRIDCo continues to build capacity of its staff in readiness for full operationalization of the Wholesale Electricity Market.

5.25 Wholesale Bulk Customers

Presently the number of Wholesale Bulk Customers is 27. They are classified as per the table below:

Category	Number
Electricity Distributors	3
Mines	12
Manufacturing Entities	9
Foreign Customers	3
TOTAL	27

5.26 Human Resource

The staff strength of GRIDCo as at January 2013 is 782.

6 Strategies to Address Key Challenges

- Continue installation of reactive power compensation devices
- Continue system reinforcement projects including pursuance higher voltage (330kV) backbone transmission network.
- Work with PURC to introduce a tariff regime which will incorporate an incentive to customers to self-correct poor power factors.
- There is the need to address ECG and Prestea Township indebtedness with all stakeholders.
- Develop Energy Reserve Market to create required reserve capacity

6.1 Transmission Loss Reduction Strategy

- Continue installation of reactive power compensation devices
- Continue system reinforcement projects including higher voltage (330kV) transmission lines
- PURC should introduce tariff regime to address poor factors at load centres

7 Projected Generation

Table-1 Summary of projected Electricity Generation 2011-2015

Generating Station/Plant	Gross Generation Capacity	Name Plate Power	Capacity Factor	Net Effective Dependable Generation Capacity	Projected Energy Generated
Hydro:					
Akosombo	1,023.15	0.95		900.00	
Kpong	159.98	0.90		140.00	
Bui	400.00	0.90		345.00	
Sub Total	**1,583.13**	**2.75**		**1,385.00**	
Thermal:					
TAPCO	364.40	0.85		300.00	
TICO	240.89	0.85		200.00	
TT1PP	123.50	0.80		110.00	
TT2PP	45.00	0.80		40.00	
MRP	80.00	0.85		35.00	
T3	132.00	0.80		120.00	
SAPP	200.00	0.80		170.00	
CENIT	123.50	0.80		110.00	
Sub Total	**1,309.29**	**6.55**		**1,085.00**	
TOTAL	**2,892.42**	**9.30**		**2,470.00**	

Table-2 Summary of Akosombo Generating Station Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	1,023.15	1,023.15	1,023.15	1,023.15	1,023.15
Name Plate Power Factor	0.95	0.95	0.95	0.95	0.95
Net Effective/Dependable Generation Capacity	900	900	900	900	900
Projected Energy Generated	6494.1	6949.6	5808.3	5300	5300
Target Availability of Power Plant	97.23	99.13	94	94	94

Table-3 Summary of Kpong Generating Station Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	159.98	159.98	159.98	159.98	159.98
Name Plate Power Factor	0.90	0.90	0.90	0.90	0.90
Net Effective/Dependable Generation Capacity	140.00	140.00	140.00	140.00	140.00
Projected Energy Generated	1,066.70	1,121.10	991.70	950.00	950.00
Target Availability of Power Plant	91.60	94.45	90.00	90.00	90.00

Table-4 Summary of TAPCO Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	364.40	364.40	364.40	364.40	364.40
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85
Net Effective/Dependable Generation Capacity	300.00	300.00	300.00	300.00	300.00
Projected Energy Generated	1,138.10	1,061.00	1,531.00	1,200.00	1,200.00
Target Availability of Power Plant	90.30	59.67	85.00	85.00	85.00

Table-5 Summary of TICO Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	240.8	240.8	240.8	240.8	364.3
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85
Net Effective/Dependable Generation Capacity	200	200	200	200	300
Projected Energy Generated	656.6	1,168	1193	1000	1400
Target Availability of Power Plant	57.54	91.67	85	85	85

Table-6 Summary of TT1PP Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	123.5	123.5	123.5	123.5	123.5
Name Plate Power Factor	0.8	0.8	0.8	0.8	0.8
Net Effective/Dependable Generation Capacity	110	110	100	100	100
Projected Energy Generated	557.7	622.2	745	650	650
Target Availability of Power Plant	85.8	93.47	85	85	85

Table-7 Summary of TT2PP Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	49.5	49.5	49.5	49.5	49.5
Name Plate Power Factor	0.8	0.8	0.8	0.8	0.8
Net Effective/Dependable Generation Capacity	45	45	45	45	45
Projected Energy Generated	49.1	261	250	250	250
Target Availability of Power Plant	76.9	69.86	85	85	85

Table-8 Summary of MRP Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	80	80	80	80	80
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85
Net Effective/Dependable Generation Capacity	35	35	35	70	70
Projected Energy Generated	49.1	261	250	250	250
Target Availability of Power Plant	33.1	56.6	75	75	75

Table-9 Summary of SAPP Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity	200	200	200	200	200
Name Plate Power Factor	0.8	0.8	0.8	0.8	0.8
Net Effective/Dependable Generation Capacity	170	170	170	170	170
Projected Energy Generated	1224.2	847.8	1225	1200	1200
Target Availability of Power Plant					

Table-10 Summary of CENIT Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Gross Generation Capacity		123.5	123.5	123.5	123.5
Name Plate Power Factor		0.8	0.8	0.8	0.8
Net Effective/Dependable Generation Capacity		110	110	100	100
Projected Energy Generated			745	700	700
Target Availability of Power Plant					

Table-11 Summary of ETU Operational Data 2011-2015

Parameter	2011	2012	2013	2014	2015
Total System Load @ Peak (MW)	1,664.00	1,728.90	2,016.20	2,396.10	2,764.20
*Total Domestic Load @ Peak (MW)	1,519.00	1,657.00	1,830.00	2,037.60	2,301.50
Regulated Market (ECG & NED) (MW)		1,263.7 & 128.9	1,472.8 & 158.9		
Energy Commission Licensed Bulk Customers	27	27	27		
Projected Base load	1,657.83	1,817.39	1,937.5	2,303.9	2,657.85

Table-12 Summary of ETU Projected Energy (GWh) 2011-2015

Generating Station/Plant	2011	2012	2013	2014	2015
Hydro:					
Akosombo Generating Station	6494.1	6949.6	5808.3	5300	5300
Kpong Generating Station	1066.7	1121.1	991.7	950	950
Bui Hydro					
Sub Total	**7,560.80**	**8,070.70**	**6,800.00**	**6,250.00**	**6,250.00**
Thermal:					
TAPCO	1138.1	1061	1531	1200	1200
TICO	656.6	1168	1193	1000	1400
TT1PP	557.7	622.2	745	650	650
TT2PP	49.1	261	250	250	250
MRP	49.1	261	250	250	250
T3					
SAPP	1224.2	847.8	1225	1200	1200
CENIT	0	0	745	700	700
Sub Total	**3,674.80**	**4,221.00**	**5,939.00**	**5,250.00**	**5,650.00**
TOTAL	**11,235.60**	**12,291.70**	**12,739.**	**7,150.00**	**7,550.00**

8 Energy Transmitted (Dispatch and Scheduling)

Energy transmitted for 2012 was 12,158.97 GWh and it is projected that 13,398 GWh will be transmitted in 2013.

8.1 Total Transmission Utility System Load at Peak

Annual Ghana Peak Demand (MW): 2009 – 2012

Year	Ghana Peak Demand
**2015 Projection	2,396.05
**2014 Projection	2,016.35
**2013 Projection	1,890.09
*2012	1,728.90
2011	1,664.60
2010	1,505.90
2009	1,423.00

* The highest instantaneous demand achieved within the year which occurred at 20:15 hours on 18th December, 2012.

** Projections are based on GRIDCo's 2013 Electricity Supply Plan

8.2 Transmission System Losses at Various Voltage Levels

Not Available

9 Capital Expenditure

The massive program to improve GRIDCo's over-aged and weak transmission infrastructure through rehabilitation, reinforcement, replacement and expansion is continuing earnestly with the sole purpose of improving reliability and quality of service.

The Company anticipates a continuation of this investment drive to retrofit the grid. A table showing the status of projects is outlined in Appendix C attached.

Table 13A : Summary of Capital Expenditure Plan (Million GHS) 2011 - 2015						
Item	Unit	**2011**	**2012**	**2013**	**2014**	**2015**
Capital Cost	GHS	107,723,365	77,448,527	268,659,607	281,674,645	167,657,810
Initial Spares	GHS					
Additional Capitalization	GHS					
Renovation & Modernization (R&M)	GHS					

Rehabilitation & Resettlement (R&R)	GHS					

Reference: MS Excel Template: File name (GRIDCo Tariff Filing Forms revised) – Sheet name (Project Cashflow)

Table 13 B: Details of Capital expenditure

No.	Project	Purpose	Capital Structure ($)	Financing Plan	Status
1	Accra 3rd Bulk Supply Point	Improve quality of service & supply extension to existing consumers	13,000,000	100% Debt	Completed
2	4th Circuit to Achimota	Essential for continued operations, regulatory compliance	5,000,000	100% IGF	Completed
3	Mallam Substation Upgrade	Improve quality of service & supply extension to existing consumers	7,000,000	85% Debt/ 15% IGF	Completed
4	Substation Upgrade Projects B&C	Improve quality of service & supply extension to existing consumers	6,000,000	100% IGF	Completed
5	Capacity Bank Installations	Improve quality of service & supply extension to existing consumers	10,000,000	100% IGF	Completed
6	Maintenance Facilities and Special Equipment	General improvement for building or expanding the business	10,000,000	100% Debt	Completed
7	Volta - New Tema Upgrade	Essential for continued operations, regulatory compliance	1,000,000	100% IGF	Completed
8	Development of Warehouses	General improvement for building or expanding the business	7,000,000	100% Debt	Completed
9	Expansion of National Control Centre	Essential for continued operations, regulatory compliance	3,000,000	100% Debt	Completed
10	Supply of Power Transformers - 2009	Improve quality of service & supply extension to existing consumers	10,000,000	100% Debt	Delivered
11	Supply of	Improve quality of service & supply extension to	24,990,000	100% Debt	Delivered

	Transformers 2010	existing consumers			
12	WAPP - Coastal Trans. Backbone (CTB) - WB	Carryover project, already in progress, requires additional funding	73,313,772	100% Debt	On-going
13	Smelter II Substation	Essential for continued operations, regulatory compliance	22,000,000	86% Debt/ 14% IGF	On-going
14	Substation Rehabilitation Enhancement Project	Essential for continued operations, regulatory compliance	45,000,000	85% Debt/ 15% IGF	On-going
15	Switchgear Upgrade (Rep of Medium Voltage Equip)	Essential for continued operations, regulatory compliance	17,000,000	100% Debt	On-going
16	Power System Reinforcement (Zebilla Bawku)	Essential for continued operations, regulatory compliance	50,000,000	100% Debt	On-going
17	Prestea-Bogoso Transmission Reinforcement	Essential for continued operations, regulatory compliance	8,500,000	85% Debt /15% IGF	On-going
18	Prestea-Kumasi 330kV Trans. Project	Essential for continued operations, regulatory compliance	100,000,000	78% Debt /22% IGF	On-going
19	Tumu-Han-Wa 161kV Transmission Project	Essential for continued operations, regulatory compliance	73,000,000	85% Debt /15% IGF	On-going
20	Ghana Burkina Interconnection Project(WB Fin)	Essential for continued operations, regulatory compliance	27,200,000	95.59% Debt /4.41% IGF	On-going
21	Kumasi Kintampo-Tamale-Bolga 330KV TL	Essential for continued operations, regulatory compliance	182,500,000	99.21% Debt /0.79 IGF	On-going
22	Supply Improvement to Western Region	Essential for continued operations, regulatory compliance	65,000,000	100% Debt	On-going
23	Substations Upgrade Project Phase 1	Improve quality of service & supply extension to existing consumers	8,000,000	100% IGF	On-going
24	Kumasi 2nd Bulk Supply Point	Carryover project, already in progress, requires additional funding	15,000,000	100% Debt	On-going
25	Kumasi Atebubu 161KV Transmission Line	Essential for continued operations, regulatory compliance	40,000,000	100% Debt	Future Project

26	Supply Improvement to Berekum	Improve quality of service & supply extension to existing consumers	28,000,000	100% Debt	Future Project
27	Achimota-Mallam Line Upgrade	Essential for continued operations, regulatory compliance	5,000,000	100% IGF	Future Project
28	Akwatia-New Abirem line Project	Improve quality of service & supply extension to existing consumers	9,900,000	100% Debt	Future Project
29	Kumasi 3rd Bulk Supply Point	Improve quality of service & supply extension to existing consumers	30,000,000	85% Debt /15% IGF	Future Project

- *Debt refers to percentage of total project cost financed externally or borrowed (Short term/Long term concessionary loans)*
- *IGF refers to percentage of total project cost financed by Internally Generated Funds*
- *Breakdown of project cost into local and foreign: Refer to MS Excel File name: GRIDCo Tariff Filing Forms – Revised; Sheet name: Project Cashflow – Debt*

9.1 Capital Expenditure Financing Plan

Table 14: Summary of Capital Expenditure Financing Plan (Million GHS) 2011 - 2015						
Item	Unit	**2011**	**2012**	**2013**	**2014**	**2015**
Accumulated Depreciation	GHS					
Retained Earnings	GHS					
Commercial Borrowings:	GHS					
Domestic	GHS					
Foreign	GHS	140,981,714	123,457,286	515,555,543	622,939,224	410,322,997
Additional Equity Contribution By Shareholder(s)	GHS	18,999,872	11,392,216	64,583,645	57,736,280	12,370,329
Grants:	GHS					
Domestic	GHS					
Foreign	GHS					
Tariff Revenue	GHS					
Total	GHS					

9.2 New Projects

9.3 CAPEX for O & M Related projects

9.4 CAPEX for Telecom Related Projects

9.5 CAPEX for Information Technology Related Projects

Not available

9.6 CAPEX for Transmission Related Projects & Construction

Included in Table 13 B

9.7 CAPEX for Civil Works

		2012	2013	2014	2015
ITEM	**DESCRIPTION**	**GRIDCo**	**GRIDCo**	**GRIDCo**	**GRIDCo**
1	Bolga Housing Project	-	1,500,000	810,000	
2	Protection Review Study		1,000,000	1,000,000	
3	Techiman Office			-	1,500,000
4	GRIDco Head Office	-	3,000,000	3,000,000	12,000,000
5	Wa Housing Project	-	1,000,000	1,310,000	
6	Buipe Housing Project			1,300,000	810,000
7	Prestea Office Project	710,000	865,000		
8	Takoradi Office Project			1,000,000	1,625,000
9	Construction of bridge over River Suhyen on P3AB Line at Prestea	100,000	410,000		
10	Construction of culverts on selected streams on the P3AB Line	-	310,000	200,000	
11	Installation of Fire Alarm System	-	700,000	1,000,000	
12	Permanent Office Building for Tafo Lines Crew				
13	Northern Services Office for Kumasi Area				
14	Yendi Housing Project				
15	New Offices for Dunkwa Lines Crew			150,000	
16	Construction of garages at Tamale Substation				

17	Installation of approximately 80Km OPGW Elubo-Prestea		600,000	1,680,000	
18	Provision of communication network for telemetry system				
19	Introduction of Wimax etc to improve communication coverage	409,075			
20	Car Park and road at GRIDCo Head Office				
21	Acquisition of 12.5 Acre Land (50 Plots)			350,000	
22	Introduction of CCTV to improve security in GRIDCo in Volta and Takoradi Areas				
23	Project Building	-	918,000		
24	Achimota Substation Office Project	250,000		300,000	592,500
25	Conversion / Modification of Residential Accomodation Facilities at Community 3, Tema		300,000	159,000	
26	Construction of Washing Bay				50,000
27	11kV/415kV Distribution System for Tema Enclave	-	600,000	420,000	
28	Upgrade of Meeting Shed in Akosombo	150,000	500,000		
29	Fencing Of Kumasi Substation	-		300,000	382,500
30	Remodelling of Kumasi Management Guesthouse	-	120,000	247,500	
31	Procurement of Minor Civil Works Equipment for Operational Areas	70,000			
32	Rehabilitation of Prestea Roads	-	700,000	218,000	
33	Rehabilitation of Winneba Guesthouse	-		262,500	
34	Drainage Improvement and Fencing of Various Substations	200,000	500,000	500,000	
35	Rust Control at Aboadze and Smelter Substations	-	300,000		
36	Landscaping at Tema Enclave	-	100,000	50,000	
37	GRIDCo - KNUST Collaboration	100,000	200,000		
38	Acquisition of plot of land near Kumasi substation	705,000			
39	Standby Generator 800kVA - Provision of alternate power supply to Volta Area	-	200,000		
40	Emergency Restoration Towers	-			
41	Outside Plant for Akuse Townships				
42	Refurbishment of Radio Workshop				
43	Aboadze Fire station	200,000			
44	2No. 3 Bedroom houses for operators - Elubo				

45	Installation of Prestea -Elubo Communication line	-	-		
46	Smelter Substation 13.8kV Disconnect Swithces Replacement	780,000			
47	Rehabilitation of Rusted Towers (Coastal Lines)		400,000	365,000	
48	Construction of Club House, Gym and Tennis Court facilities at Community 3, Tema			500,000	520,000
49	Expansion of Tamale Substation Control Building and Fencing				
50	Corporate Social Responsibilities			100,000	100,000
	TOTAL B: PROJECTS ON TENDER	**3,674,075**	**14,223,000**	**15,222,000**	**17,580,000**
	MINOR CAPITAL PROJECTS -USD@	**2,110,143**	**6,586,601**	**6,299,112**	**6,972,962**

Reference: MS Excel Template: File name (GRIDCo Tariff Filing Forms revised) – Sheet name (CAPEX for Civil Works)

9.8 Operation & Maintenance Costs

Table 15: Summary of Operating & Maintenance Costs (Million GHS) 2011 - 2015						
Item	Unit	**2011**	**2012**	**2013**	**1014**	**1015**
Fixed O & M costs	GHS	7,969,994	9,756,531	6,842,713	7,184,849	7,328,546
Variable O & M costs	GHS	2,523,585	5,774,694	4,050,064	4,252,567	4,337,619
Total	GHS	10,493,578	15,531,225	10,892,777	11,437,417	11,666,165

Refer to MS Excel File name: GRIDCo Tariff Filing Forms – Revised; Sheet name: Transmission O&MainExpData Sheet

10 Administration and General Costs

Table 16: Summary of Administration and General Costs (Million GHS) 2011 - 2015						
Item	Unit	**2011**	**2012**	**2013**	**2014**	**2015**
Fixed O & M costs	GHS	8,952,124	13,023,505	11,155,009	11,087,656	11,305,856
Variable O & M costs	GHS	2,986,017	1,711,368	1,830,870	1,922,414	1,960,862
Total	GHS	11,938,141	14,734,874	12,985,879	13,010,070	13,266,719

Refer to MS Excel File name: GRIDCo Tariff Filing Forms – Revised; Sheet name: TransmissionWorkingCapReqData

11 Human Resources Cost (Employee Costs)

Table 17: Summary of Human Resource Costs (Million GHS) 2011 - 2015						
Item	Unit	**2011**	**2012**	**2013**	**2014**	**2015**
Fixed O & M costs	GHS	43,157,455	40,161,621	66,487,235	72,892,453	86,550,472
Variable O & M costs	GHS	3,474,209	7,758,598	7,758,598	8,146,529	8,309,460
Total	GHS	46,631,664	47,920,219	74,245,834	81,038,982	94,859,931

Refer to MS Excel File name: GRIDCo Tariff Filing Forms – Revised; Sheet name: TransHumanResourceExpData

12 Public Education

Has been Included "transmission Administration & General Expenses" Section E.

13 Financing and Interest Costs

Table 17: Summary of Financing and Interest Costs (Million GHS) 2011 - 2015						
Item	Unit	**2011**	**2012**	**2013**	**2014**	**2015**
Interest on Foreign Loans	GHS	523,082.8	2,868,721.13	13,593,055.59	19,306,311.51	27,326,894.78
Interest on Domestic Loans	GHS					
Interest on Working Capital Loans						
Total	GHS	**523,082.8**	**2,868,721.13**	**13,593,055.59**	**19,306,311.51**	**27,326,894.78**

Refer to MS Excel File name: GRIDCo Tariff Filing Forms – Revised; Sheet name: Loan Interest Payment

14 Return on Equity

The return on equity used in this proposal is 12%.

15 Projected Electricity Transmission Revenue Requirement

16 Proposed Tariff & Rates Structure

This Proposal in summary seeks an upward adjustment of the transmission tariff and introduction of new Ancillary Services as follows:

Tariff	Current	New	Implementation Date
Transmission Service Charge	2.26 GHp/kWh	3.19 GHp/kWh	Immediate
Reserve Capacity Charge		0.5132GHp/kWh	Mid 2015
Reactive Power Charge		0.0419GHp/kWh	Immediate

16.1 Total Revenue Requirements Apportionment

TABLE 25

Bulk Customer	Monthly Maximum Demand (MW) Year 2012	Month of Maximum Demand	Capacity Utilisation Ratio	Allotted MW for Capacity Utilisation	% Allocation for sharing ARR	Annual Sharing of ARR
Mines						
Prestea Township	3.64	Mar				
New Century Mines	6.46	Mar				
Sankofa Gold Ltd	0.88	Jun				
Owere Mines	0.21	Sep-Dec				
Ghana Cons. Diamond	2.27	Jul				
Golden Star Bogoso	47.70	May				
Golden Star WASSA	10.00	Nov				
Goldfields Mining Co. Ltd	45.40	June				
Anglogold Obuasi	12.00	Jan- Dec				
Anglogold New Obuasi	44.33	Feb				
Newmont Gold	32.00	May				
Adamus	4.87	Dec				
Perseus Mining	20.44	May				
Others						
Akosombo Textiles Ltd	3.5	Jan				
Diamond Cement	7.23	Mar				
Savana Diamond Cement	3.52	Feb				
Aluworks	2.83	Oct				
VRA Township	4.66	Nov				
VALCO	76.9	Jan				
Ghana Free Zones Board	2.19	Oct				
Electricity Distributors						
NEDCo	142.48	Nov				
Enclave Power Company	2.19	Dec				
ECG	1424.28	Dec				
FOREIGN						
SONABEL	2.46	Dec				
SONABEL Youga Mines	5.81	Dec				
CEB	139	Oct				

PURC support is required in completion of this form.