



GHANA GRID COMPANY LTD. (GRIDCo)

2022- 2027 TARIFF PROPOSAL

TO

PUBLIC UTILITIES REGULATORY COMMISSION

APRIL 2022

TABLE OF CONTENTS

TABLE OF CONTENTS	ii
LIST OF TABLES	iv
1 Introduction.....	1
1.1 Brief Background of GRIDCo’s Power Transmission Operations.....	1
1.2 Rationale /Objective Underpinning Tariff Submission	1
1.3 Legislative Provision(s) in Support of Tariff Application	2
1.4 Highlights of Major Issues which Describe Structure of Tariff Submission	2
2 Initiatives Undertaken Since July 2019 Tariff Review.....	4
2.1 Projects Undertaken	4
2.2 Performance Improvement	7
2.3 Enterprise Resource Planning.....	8
2.4 Compliance with Directives of the Commission.....	8
3 Key Policy Issues for Tariff Consideration.....	8
3.1 Ancillary Services	8
3.2 Stranded Assets Resulting from Embedded Generation	8
3.3 Operation and Maintenance of Transmission Assets owned by IPPs	8
4 Proposed Service Delivery and Efficiency Improvements During Tariff Period.....	9
4.1 Increase Transmission Transfer Capacity.....	9
4.2 Increase Reliability and Stability of the NITS	9
4.3 Meet Increasing Demand.....	9
4.4 Reduction of Transmission System Losses.....	9
4.5 Service Delivery & Efficiency Targets.....	10
4.6 Technical/Operating Performance Indicators/Indices.....	10
4.7 Financial Performance Indicators/Indices	11
5 Key Challenges Likely to Impact Service Delivery.....	11
5.1 Delays in Project execution	11
5.2 Major Transmission Constraints	11
5.3 Inter – Regional Transmission (Imports / Exports of Power).....	12
5.4 System Availability /Reliability of Supply (Quality of Service)	12
5.5 System Improvement / Expansion.....	12
5.6 Reactive Power Compensation.....	12
5.7 Embedded Generators & Interconnection	12
5.8 Customer Complaints and Dispute Resolution.....	13

5.9	Legal Issues Including Resolution of Court Cases	13
5.10	Introduction of Wholesale Electricity Market	13
5.11	Wholesale Bulk Customers.....	14
6	Strategies to Address Key Challenges	14
6.1	Transmission Loss Reduction Strategy	14
7	Projected Generation.....	15
8	Capital Expenditure.....	19
8.1	Capital Expenditure Financing Plan	19
9	Operation & Maintenance Costs	19
10	Administration and General Costs.....	19
11	Human Resource Costs (Employee Costs)	20
12	Financing and Interest Costs.....	20
13	Conclusion.....	20
14	Appendices.....	21

LIST OF TABLES

Table 1: Key Operational Assumptions	3
Table 2: Proposed Tariff for 2022 – 2027	3
Table 3: Completed Projects Since the last tariff.	4
Table 4: Medium Term Projects.....	6
Table-5 Summary of Projected Electricity Generation 2021-2027	15
Table-6 Summary of Akosombo Generating Station Data 2021-2026	16
Table- 7 Summary of Kpong Generating Station Data 2021-2026	16
Table- 8 Summary of TAPCo Data 2021-2026	16
Table-9 Summary of TICo Data 2021-2026.....	17
Table-10 Summary of TTIPP Data 2021-2026	17
Table-11 Summary of TT2PP Data 2021-2026.....	18
Table 12: Summary of Capital Expenditure Financing Plan (Million GHS) 2021 - 2027.....	19
Table 13: Summary of Operation and Maintenance Costs (Million GHS) 2021-2027.....	19
Table 14: Summary of Administration and General Costs (Million GHS) 2021-2027.....	19
Table 15: Summary of Human and Resource Cost (Million GHS) 2021 - 2027.....	20
Table 16: Summary of Financing and Interest Costs (Million GHS) 2021-2027	20

1 Introduction

Ghana Grid Company Limited (GRIDCo), is responsible for developing, managing and operating the National Interconnected Transmission System (NITS) in a reliable, efficient and sustainable manner. GRIDCo has been operating independently since 2008, facilitating wholesale electricity trading and the provision of ancillary services on the NITS.

GRIDCo's mission is to provide reliable grid for the development of Ghana and the Sub-region at large rests on the sustainability and financial viability of GRIDCo.

1.1 Brief Background of GRIDCo's Power Transmission Operations

GRIDCo was established in 2006 and operationalized in 2008 as part of Government of Ghana's (GoG) Power Sector Reforms to (i) address power supply reliability and quality of supply, (ii) attract private investments in generation, (iii) increase competition in generation supply and (iv) enhance efficiency in electricity delivery systems for economic growth.

GRIDCo as the Electricity Transmission Utility (ETU) is also responsible for the implementation and operation of the Ghana Wholesale Electricity Market (GWEM) to ensure fair, transparent, and non-discriminatory procurement and dispatch of electricity from Wholesale Suppliers to Bulk Customers and Distribution Companies.

1.2 Rationale /Objective Underpinning Tariff Submission

The objective underpinning this Tariff Proposal is to obtain a cost-reflective tariff that will enable GRIDCo improve the service levels and quality thresholds, and importantly enhance the company's sustainability. It has become increasingly expensive to maintain the legacy assets and upgrade the transmission infrastructure to reduce congestions within the NITS.

A cost-reflective transmission tariff will ensure a reliable and stable NITS which will restore confidence in Ghana's power system for sustainable economic development. The current tariff of 0.060398GHS/kWh does not adequately reflect the cost of GRIDCo's operational activities.

The tariff granted by PURC since July 2019 has depreciated in US Dollar terms from 1.0915 US Cents/kWh in 2019 to 0.8492 US Cent/kwh in March 2022 notwithstanding increases in Regulatory Asset Base over the years (See Figure 1 below).

1.2.1 Increasing Cost of Maintenance

The reliability of the NITS is dependent largely on GRIDCo's ability to maintain the assets as required and our promptness to resolve intermittent disruptions. Most of the over 6,400circuit km of the transmission lines are in densely forested vegetation. The cost of clearing undergrowth along these lines keeps rising. Aside the thickets posing a threat to the transmission lines, GRIDCo is confronted by a high incidence of corrosion

on the coastal transmission lines, illegal mining activities (galamsey) and other forms of encroachments to grapple with. The coastal and western transmission line corridors are critical to the stability of the power system since it is the main corridor for evacuating over 1600MW of power generated from the Western Region.

Additionally, increased transformer capacity at most substations to improve operational flexibility and reliability, have also increased maintenance expenditure on substation equipment.

However, GRIDCo's weakened liquidity position does not allow reasonable coverage of all these maintenance obligations comprehensively. These factors among others are detrimental to the optimal performance of the transmission assets. GRIDCo therefore requires a cost reflective tariff to be able to maintain the various assets in the short to medium term to enhance efficiency.

1.2.2 Increasing cost of transmission financing

The absence of a cost reflective tariff has hampered GRIDCo's capacity to secure direct loans for medium to long term investments in the NITS to meet the growing demand. GRIDCo's funding sources has therefore been limited to mainly grants. The non-cost reflective tariff also makes the required return on most planned investments lower than the cost of financing, thereby warding off potential financiers.

1.3 Legislative Provision(s) in Support of Tariff Application

GRIDCo derives its legal authority from the Energy Commission Act, 1997 (Act 541) and the Volta River Development (Amendment) Act, 2005 Act 692. GRIDCo's operations are guided by the Electricity Standards and Performance, LI 1934, and Electricity Regulations, LI 1937. This tariff proposal is in compliance with the PURC Act 1997 (Act 538). Further, LI 1937 mandates the Electricity Transmission Utility (ETU) to establish and implement the Ghana Wholesale Electricity Market (GWEM), governed by Electricity Market Rules.

1.4 Highlights of Major Issues which Describe Structure of Tariff Submission

The Revenue Requirement Methodology prescribed by the PURC was employed in the calculation of GRIDCo's transmission tariff proposal for the 2022-2027 Major Tariff Review. Key Operational Assumptions include the following:

Table 1: Key Operational Assumptions

Description	Unit	2022	2023	2024	2025	2026	2027
Projected Energy Transmission	GWh	23,578.51	25,983.05	27,763.55	29,325.35	31,349.97	34,920.18
Projected Peak Demand	MW	3,545.27	3,986.96	4,255.74	4,491.42	4,793.36	5,172.30
Projected Transmission Losses	%	4.49	4.21	4.23	4.30	3.90	3.80
Average Exchange Rate	GHS	8.57	9.20	9.70	9.88	10.06	9.41
Expected Rate of Return on Net Fixed Assets	%	20.0	21.0	25.0	25.0	25.0	25.0
Network Usage	GWh	11.07	12.08	12.90	13.62	14.52	16.15

Using the assumptions and the proposed methodology outlined by the PURC in the Tariff Methodology, GRIDCo proposes the following Transmission Service Charges excluding all levies as shown in table 2 for the 5-year tariff period.

Table 2: Proposed Tariff for 2022 – 2027

Appendix A: Transmission Service Charge (TSC) Computation

	Unit	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast
		2022	2023	2024	2025	2026	2027
Total Energy Sales GWh	GWh	22,520	24,889	26,590	28,065	29,921	31,716
Operating Cost							
Staff Costs	Ghc'M	256.33	280.61	320.30	366.16	390.87	450.77
Administrative Costs	Ghc'M	79.48	84.83	92.45	100.53	109.91	117.33
Materials and Spares	Ghc'M	18.48	25.51	28.72	31.67	36.34	38.11
Maintenance Costs	Ghc'M	93.83	115.43	134.53	156.05	190.20	215.62
Operating Cost	Ghc'M	448.12	506.38	576.01	654.40	727.33	821.83
Depreciation	Ghc'M	200.45	213.31	227.18	244.91	250.82	259.91
Regulated Fixed Asset Base ¹	Ghc'M	5,169	5,546	5,746	5,884	6,208	6,563
Rate of Return on Fixed Asset Base ²	%	20%	21%	25%	25%	25%	25%
Return on regulated fixed asset base	Ghc'M	1,033.74	1,164.58	1,436.42	1,470.92	1,551.97	1,640.75
Working Capital	Ghc'M	1,530.03	1,579.53	1,702.18	1,820.60	1,940.02	1,930.05
Cost of Working Capital	Ghc'M	306.01	331.70	425.54	455.15	485.00	482.51
Corporate Tax		20.03	34.25	12.31	39.68	109.07	67.16
Annual Revenue Requirement	Ghc'M	2,008.35	2,250.22	2,677.46	2,865.06	3,124.20	3,272.16
Projected TSC³	GHS/kWh	0.089181	0.090411	0.100696	0.102087	0.104415	0.103170
	% increase (GHS)	48%	1%	11%	1%	2%	-1%

The tariff proposal considers operating and maintenance costs, depreciation for the asset usage, return on regulatory assets base and corporate income tax.

2 Initiatives Undertaken Since July 2019 Tariff Review

2.1 Projects Undertaken

Since the last major tariff review, GRIDCo has embarked on numerous projects aimed at improving reliability of the NITS to enhance customer satisfaction. The projects and initiatives completed are listed in **Table 3** below:

Table 3: Completed Projects Since the last tariff.

Item	Project Name	Completion Date	Cost (USD Million)
1	330kV Aboadze – Prestea Transmission Line	2019	29.69
2	330kV Kumasi-Bolgatanga Transmission Project. <ul style="list-style-type: none"> • Anwomaso-Kintampo Line • Kintampo – Adubuliyili Line • Adubuliyili – Nayagnia Line • Adubuliyili Substation • Kintampo and Anwomaso Substations • Nayagnia Substation Tamale and Bolgatanga 161kV substation upgrade	2021 2019 2019 2019 2019 2019	158.9
3	161kV Volta – Achimota Transmission Line Upgrade Project	2021	11.27
4	161kV Kasoa Substation (Grant)	2022	42.8
5	330kV Accra Fourth Bulk Supply Point, Pokuase (Grant)	2021	45.3
6	330kV Karpowership - Aboadze Transmission Line Project	2019	7.8
7	330kV Aboadze Substation Expansion	2019	31.96
	Total		327.72

The addition of these assets has significantly increased GRIDCo's Regulatory Asset Base as depicted in **Figure 1** below:

Figure 1

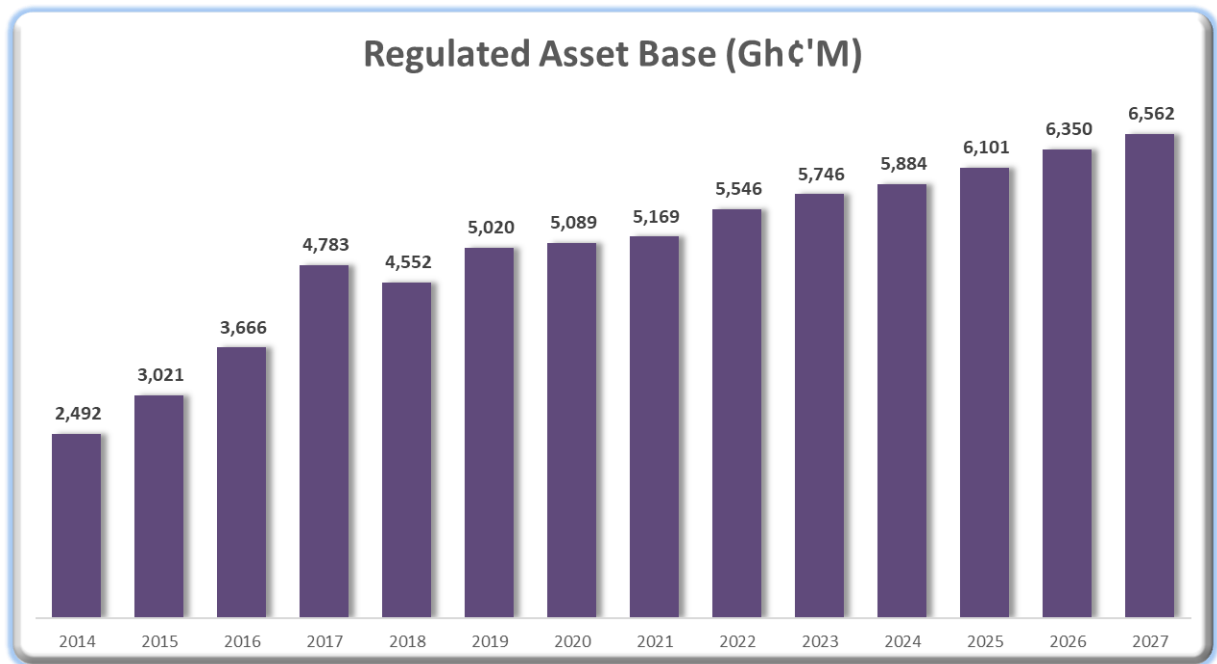


Figure 1: GRIDCo's Regulated Asset Base 2014 – 2027

The Regulated Asset Base includes Capital Works in Progress (CWIP). The inclusion of CWIP in this Tariff Proposal is to make the necessary provision for assets to be capitalised during the 5-year regulatory period (2022 – 2027), since there will be no major tariff reviews during the 5-year period, it is reasonable to consider assets currently being funded and most likely to be available for use during the period under regulatory consideration.

Ongoing Projects Required for Grid Reliability and Expansion

As shown in Table 1, demand for energy is projected to grow at an average rate of 9% per annum to meet this demand. GRIDCo seeks to continue to invest in the transmission infrastructure to enable reliable evacuation of power from all generating stations to the load centres, in a safe and secure manner.

The on-going 161kV Achimota – Mallam Transmission Line Upgrade Project is expected to be completed by the end of 2022. The funding for this project is covered under the 330kV Kumasi-Bolgatanga Transmission Line Project.

The upgrade of the 161 kV Achimota-Mallam Transmission Line which serves the highest load centre in Ghana will significantly improve supply reliability to the national capital.

Medium-Term Projects

The medium-term projects to be completed within the 5-year tariff period as listed below in Table 4 are expected to build a robust transmission system that enable to deliver

power reliably, minimise system interruptions, lower transmission losses and be able to meet increasing demand.

Table 4: Medium Term Projects

ITEM	PROJECT NAME	EXPECTED COMPLETION YEAR	COST (MUSD)
1	50MVAR SVC in Kumasi	2023	133.93
2	330kV Dunkwa Substation Project	2026	
3	3rd Kumasi Bulk Supply Point (BSP)	2025	
4	Upgrade of 161kV Western Corridor Transmission Lines <ul style="list-style-type: none"> • Aboadze - Takoradi • Takoradi -Tarkwa • Tarkwa - New Tarkwa • New Tarkwa - Prestea • Bogoso - Dunkwa • Dunkwa - New Obuasi • Dunkwa - Ayanfuri • Ayanfuri-Asawinso 	2025	224.00
5	Construction and upgrade of 161kV middle corridor transmission lines <ul style="list-style-type: none"> • Akosombo- Tafo • Tafo- Nkawkaw • Nkawkaw-Konongo • Konongo-Kumasi 	2025	140.00
6	161kV Mallam to Pokuase (A4BSP) Transmission Line	2024	42.00
7	330kV Pokuase – Nkawkaw - Anwomaso Project (Transmission Line and Substation)	2025	154.00
8	Wholesale Electricity Market Systems	2023	25.00
9	Wide Area Monitoring Systems (Phasor Measurement Units)	2026	2.50

10	Upgrade of SCADA and Corporate Telecommunications Network	2023	8.50
11	Supply of Two (2No.) 330/225/34.5kV, 250MVA Autotransformers at Nayagnia Substation	2023	6.00
12	Supply Of 6 No. 120/145MVA Power Transformers	2022	10.50
13	Prestea-Bogoso Transmission Reinforcement Project - Termination of the 2nd Prestea – Bogosu Transmission Line	2022	4.00
14	225/161kV Prestea Substation Improvement Project (Including 50MVar SVC)	2023	19.10
15	Live Transmission Line Maintenance Equipment	2022	3.00
16	Akwatia – New Abirem Loop Closure	2023	16.00
17	Supply and Installation of Variable Reactors including 50MVar SVC at Nayagnia	2023	11.00
18	161kV Obotan – New Obuasi Loop Closure	2023	6.00
19	Tafo Substation Break – In Project	2023	6.00
20	Break-in of 225kV Transmission Line at Elubo and looping back to Esiana	2023	4.00
21	161kV Aboadze-Cape Coast-Winneba-Mallam Coastal Transmission Line Upgrade	2026	55
22	2 nd 330kV Kumasi to Bolgatanga Transmission Line	2027	120
	TOTAL		990.53

2.2 Performance Improvement

Technological improvement and sustainability are key to utility operations. GRIDCo therefore, has put in place a new Performance Management System which allows the Company to define, describe, clarify, and communicate its strategy.

A key strength of this new Performance Management System enables planning at all levels (corporate, departmental and employee) to be results-oriented. The results are clear, measurable and motivational. This has enhanced operational efficiency.

2.3 Enterprise Resource Planning

GRIDCo has embarked on some initiatives including the Enterprise Resource Planning (ERP) to enhance operational effectiveness, access to reliable company information, compliance to best practice, improvement in operations and financial efficiency.

The ERP system integrates data and processes across multiple departments and locations making information available for decision making at all levels.

The system streamlines business operations by integrating the data and refining the processes required to operate as an organization. It also enhances data sharing among departments and related organisations to enable quick decision making.

2.4 Compliance with Directives of the Commission

Historically, GRIDCo has displayed support for the Commission's work and remains committed to working with the Commission to ensure enhanced service reliability to our cherished customers.

3 Key Policy Issues for Tariff Consideration

3.1 Ancillary Services

GRIDCo as the System Operator requires reactive energy and other ancillary services to maintain system stability and voltage support, in line with the Grid Code. There is therefore the need for an approved per unit tariff to formalise the arrangement for procurement of the various ancillary services for all participants in accordance with the Grid Code.

3.2 Stranded Assets Resulting from Embedded Generation

Bulk Customers connected to the NITS are increasingly engaging embedded power generators for direct power supply. This will result in under-utilization of transmission capacity which results in high transmission cost burden on other regulated transmission customers. There is therefore the need for a policy direction to guide the deployment of embedded generation. Challenges with Embedded Generation are further discussed in Chapter 5.

3.3 Operation and Maintenance of Transmission Assets owned by IPPs

GRIDCo operates the NITS regardless of ownership and maintains third party owned transmission assets including that of Bui Power Authority and the Karpowership Ghana Company. These assets are used for transmission service delivery to all customers connected to the NITS. This proposal includes the operation and maintenance (O & M) costs of these assets. However, the capital cost recovery of these non-GRIDCo owned assets is not included in this Tariff Proposal. GRIDCo proposes that the capital recovery

cost of these assets should be excluded from GRIDCo's assets based. We recommend that Stakeholders are engaged to implement a policy for efficient recovery for such third parties.

4 Proposed Service Delivery and Efficiency Improvements During Tariff Period

4.1 Increase Transmission Transfer Capacity

The upgrade of existing low-capacity infrastructure during the tariff period will improve power transfer capability of the NITS to eliminate congestion within transmission corridors as well as overloads at BSPs. This will enable GRIDCo efficiently and effectively evacuate power to the major load centers. Adequate redundancy will also be created to reliably meet the projected demand such that outage of an element on the NITS would not result in customer outage.

4.2 Increase Reliability and Stability of the NITS

The installation of SVC and variable reactors at critical substations will continue to improve and maintain system voltages within the requirements of the National Electricity Grid Code as well as provide sufficient reactive power within the NITS. This will improve the quality of power supply to customers.

4.3 Meet Increasing Demand

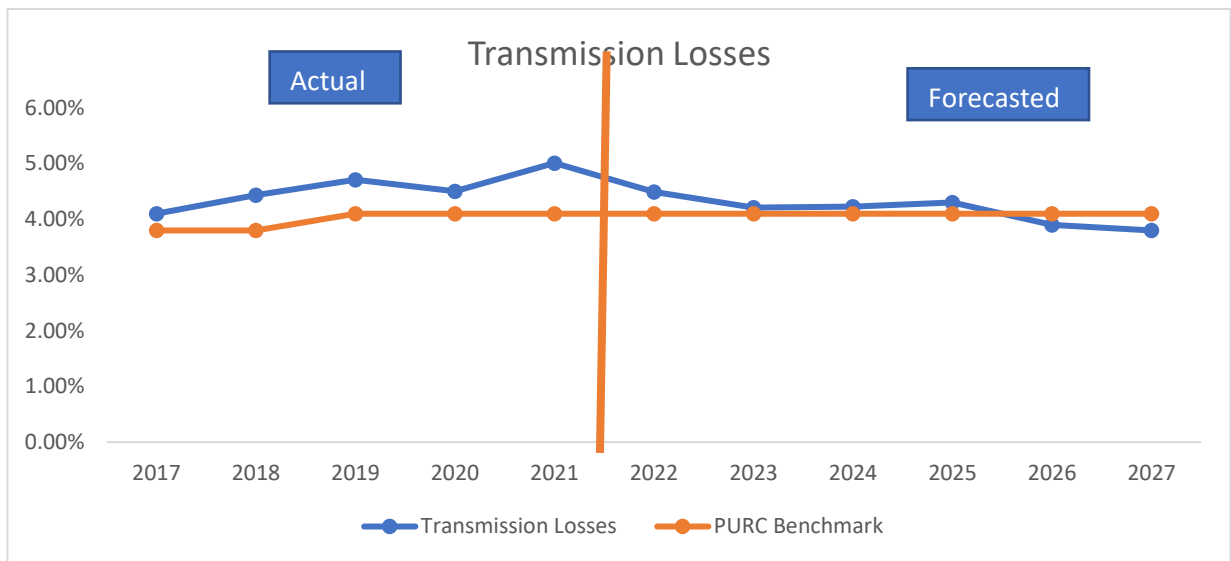
The construction of new lines, provision of higher capacity transformers to existing substations and development of new substations will enable GRIDCo meet increasing demand at a rate of 8-10% per annum driven by economic growth.

4.4 Reduction of Transmission System Losses

The implementation of these medium-term projects, siting generation facilities on the NITS close to load centres (especially Kumasi and the North) as well as optimising generation dispatch will also enhance the transmission loss reduction to improve efficiency.

4.5 Service Delivery & Efficiency Targets

Figure 2: System Transmission Losses 2019 – 2027



4.6 Technical/Operating Performance Indicators/Indices

TRANSMISSION SYSTEM INTERRUPTION DURATION INDEX (TSAIDI)

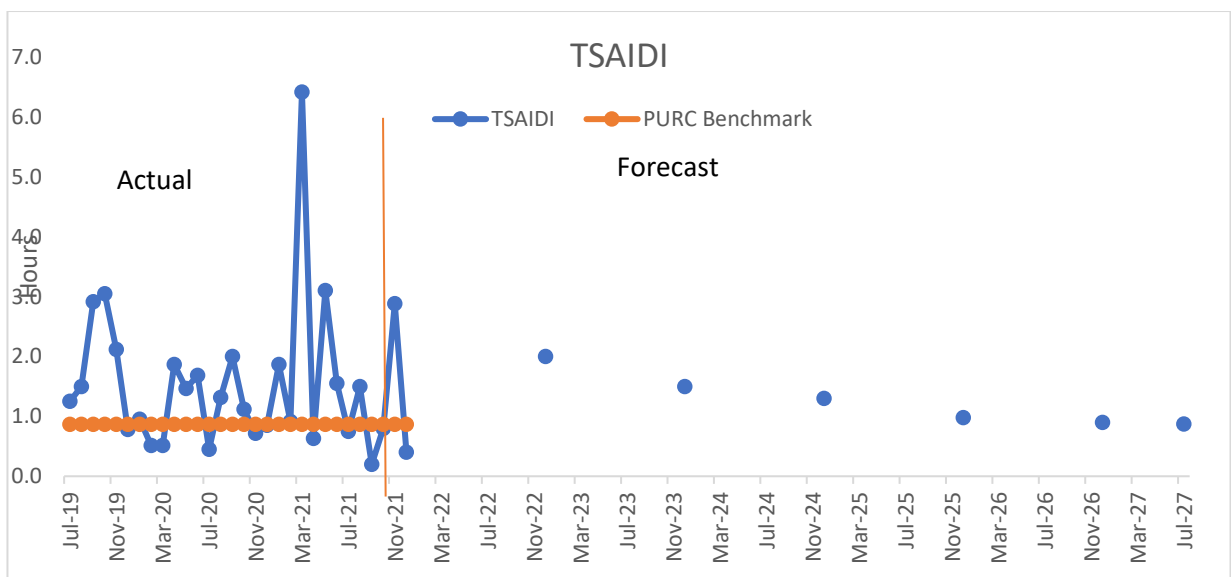


Figure 3: Transmission System Interruption Duration Index (TSAIDI) Jul 2019 -Jul 2027

4.7 Financial Performance Indicators/Indices

Table 5: Projected Financial Indicators

		2022	2023	2024	2025	2026	2027
Net Indebtedness to EBITDA	≤ 4.50	2.14	2.58	2.39	2.76	3.36	4.44
Leverage Ratio (Debt/Debt+Equity)	≤ 0.65	0.40	0.41	0.40	0.38	0.42	0.43
Debt Service Coverage Ratio (DSCR)	≥ 1.40	1.95	0.75	3.00	1.66	2.57	1.93

GRIDCo has not been able to satisfy key financial covenants on loans contracted for its projects. Within this tariff proposal, GRIDCo has projected the levels of tariff that will progressively help attain an appreciable level of financial performance that will bring comfort to both current and prospective financiers.

In determining the expected tariff for the regulatory period 2022 – 2027, GRIDCo took into consideration, the ongoing interventions in the sector which are aimed at addressing the levels of inter-utility debts and invariably low liquidity. Hence the working capital assumptions for 2022 onwards, excludes the debts prior to the implementation of the Cash Waterfall Mechanism.

5 Key Challenges Likely to Impact Service Delivery

5.1 Delays in Project execution

The proposed medium-term projects (Section 2) must be executed to meet the system demand, minimise system interruptions and increase system reliability. Any delays in the project schedules will therefore have adverse impact on service delivery.

5.2 Major Transmission Constraints

The NITS is currently challenged with the following major constraints:

- Congestion on some critical lines:
 - 161kV Western Corridor Transmission Lines.
 - 161kV Coastal Corridor Transmission Lines
 - 161kV Middle Corridor Transmission Lines
- Transformer overloads at Tamale, Sunyani and Techiman Substations.
- Single transformer substations including Esiama, Yendi, Akosombo, and Akyempim.
- Radial transmission network on the NITS.
 - 161 kV Tamale-Yendi Line
 - 69kV Asiekpe-Kadjebi Line
 - 161kV Ayanfuri-Obotan Line
 - 69kV Asiekpe-Sogakope Line
 - 161kV Sunyani-Berekum Line
 - 161kV Nkawkaw-New Abirem Line
 - 161kV Takoradi-Esiama Line

- Low voltages on the eastern corridor due to low network capacity (Ho, Kpeve and Sogakope)

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

Power transfer to Burkina has increased drastically from about 65 MW to an average of 100 MW and it is expected to increase to 150MW.

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

The system currently has been experiencing voltage challenges due to overloads on the 161kV Western and Middle Corridor Lines. This challenge has direct impact on transmission losses and makes the system prone to outages.

5.5 System Improvement / Expansion

To address the challenges discussed, GRIDCo has undertaken key projects to improve transmission services on the NITS as listed in Section 2 above.

5.6 Reactive Power Compensation

Reactive Power Compensation on the NITS could be achieved through either or a combination of:

- Installation of Capacitor banks
- Installation of SVCs
- Procurement from power generation plants

GRIDCo has installed 796MVar Capacitor Banks. We note that capacitor banks are more effective when installed within the Distribution Network as well as the networks of Bulk Customers which are the sources of reactive power demand.

Currently a 40MVar SVC is in service at Tamale. A new 50MVar SVC has been installed and commissioned as part of the Kasoa BSP project. As indicated above, GRIDCo is also working at installing a 50MVar SVC in Kumasi.

5.7 Embedded Generators & Interconnection

Over the last tariff review, GRIDCo has lost revenue in excess of GHS 26.7Million due to embedded generation. Some Bulk Customers connected to the NITS have procured generation at their sites while others have indicated their intention to follow the same path. As more customers embrace Embedded Generation (EG), the demand for service from the grid reduces significantly, leading to under-utilisation of transmission capacity. A case in point is the location of EG at Winneba and Tarkwa. A high penetration of EG will result in stranded assets for GRIDCo, leading to low returns on investments on such assets. Further, in instances where EG becomes unavailable due to technical reasons, the immediate upsurge in demand may create instability on the NITS. GRIDCo recommends that EG must be adequately regulated to prevent such adverse impact on the NITS.

5.8 Customer Complaints and Dispute Resolution

Some bulk customers in the mining areas have complained of voltage dips at their facilities. GRIDCo has taken the necessary steps to ensure speedy completion of projects to improve quality of supply.

5.9 Legal Issues Including Resolution of Court Cases

GRIDCo continues to face enormous legal challenges with respect to claims for the payment of compensation to Project Affected Persons (PAPs). Cash flow issues related to the availability of funds to cover all aspects of project execution remains a major hurdle for project execution. In this regard, when payment to PAPs is unavailable or inadequate, PAPs impacted by substation and transmission line projects across the country make substantial financial claims in courts and before statutory bodies such as the Commission for Human Rights & Administrative Justice (CHRAJ) for resolution of matters related to compensation payments.

Currently GRIDCo is facing several court cases which could involve in the payment of about GHS106,810,500.00. These claims have at times led to delays in the execution of projects across the country thereby affecting the ability of GRIDCo to meet its statutory objectives.

5.10 Introduction of Wholesale Electricity Market

GRIDCo as the ETU is responsible for the implementation and operation of the Ghana Wholesale Electricity Market (GWEM) to ensure fair, transparent, and non-discriminatory procurement and dispatch of electricity. The GWEM seeks to attract private investments in the electricity sector and improve transparency, efficiency and provide pricing signals based on actual cost of generation, transmission, and distribution of electricity. This will lead to fair and optimum pricing that reflect the actual competitive cost of electricity.

The GWEM Design has been completed and approved by the Energy Commission. Market Participants and Regulators were engaged in 2020 on the Market Design and Draft Market Rules to educate and inform participants and solicit their comments. These comments have been incorporated to finalize the draft Rules. The Draft Final Rules have been submitted to the Energy Commission for approval. Subsequently, GRIDCo together with the Market Consultant will carry out Gap Analysis to identify gaps in Ghana's current electricity market relative to the Final Market Rules. GRIDCo will engage Stakeholders to address the gaps for the implementation of the GWEM.

Currently, challenges in the implementation of the data exchange phase in preparation towards the GWEM include the timely submission of availability and demand declaration schedules by Market Participants. GRIDCo has engaged Market Participants to submit their generation availability declaration and demand data to the System Operator (SO) daily. However, only a few Market Participants are committed to the submissions, which has an adverse effect on dispatch scheduling.

5.11 Wholesale Bulk Customers

GRIDCo currently has 30 Bulk Customer and 3 Distribution Companies.

6 Strategies to Address Key Challenges

6.1 Transmission Loss Reduction Strategy

All efforts are being made to ensure timely completion of the projects to improve system stability and reduce losses. Additionally, GRIDCo encourages the siting of more generation in the central section of the NITS such as the relocation of AMERI plant to Kumasi. This is expected to contribute to the reduction of system losses.

7 Projected Generation

Table-5 Summary of Projected Electricity Generation 2021-2027

Generating Station/Plant	Gross Generation Capacity	Name Plate Power / Capacity Factor	Net Effective / Dependable Generation Capacity	Projected Energy Generated
Hydro:				
Akosombo Generating Station	1023.15		900	22,075
Kpong Generating Station	183.6		140	4,425
BUI Generating Station	400		360	3,500
Sub Total	1,606.75		1400	30,000
Thermal:				
TAPCo	364.4		300	7,067.49
TICo	364.4		320	10,512.00
TT1PP	113.4		100	
TT2PP	86.2		70	
MRP				
T3	132		130	2,903.94
KTPP	220.1		200	
AMERI	250		230	7,177.73
SAPP I	180		170	5,212.20
SAPP II	360		350	13,030.50
CENIT	113.4		100	3,285.00
KARPOWERSHIP	450		450	16,753.50
AKSA	370		330	
CENPOWER	360		325	11,388.00
AMANDI	202		190	7,073.70
Early Power	400		390	10,900.94

Sub Total				90,133.11
TOTAL	5,187.65		4,679.00	120,133.11

Table-6 Summary of Akosombo Generating Station Data 2021-2026

Parameter	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
Gross Generation Capacity	1023.15	1023.15	1023.15	1023.15	1023.15
Name Plate Power Factor					
Net Effective / Dependable Generation Capacity	900	900	900	900	900
Projected Energy Generated	4,415	4,415	4,415	4,415	4,415
Target Availability of Power Plant					

Table- 7 Summary of Kpong Generating Station Data 2021-2026

Parameter	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
Gross Generation Capacity	183.6	183.6	183.6	183.6	183.6
Name Plate Power Factor	0.9	0.9	0.9	0.9	0.9
Net Effective / Dependable Generation Capacity	140	140	140	140	140
Projected Energy Generated	885	885	885	885	885
Target Availability of Power Plant					

Table- 8 Summary of TAPCo Data 2021-2026

Parameter	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
------------------	------------------	------------------	------------------	------------------	------------------

Gross Generation Capacity	364	364	364	364	364
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85
Net Effective / Dependable Generation Capacity	300	150	150	300	300
Projected Energy Generated	1,577	788	788	1,971	1,971
Target Availability of Power Plant	0.6	0.6	0.6	0.6	0.6

Table-9 Summary of TCo Data 2021-2026

Parameter	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
Gross Generation Capacity	364	364	364	364	364
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85
Net Effective / Dependable Generation Capacity	320	320.00	320.00	320.00	320.00
Projected Energy Generated	2,102	2,102	2,102	2,102	2,102
Target Availability of Power Plant	0.75	0.75	0.75	0.75	0.75

Table-10 Summary of TTIPP Data 2021-2026

Parameter	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
Gross Generation Capacity	113.4	113.4	113.4	113.4	113.4
Name Plate Power Factor	0.8	0.8	0.8	0.8	0.8
Net Effective / Dependable Generation Capacity	100	100.00	100.00	100.00	100.00

Projected Energy Generated	613	613	613	613	613
Target Availability of Power Plant					

Table-11 Summary of TT2PP Data 2021-2026

Parameter	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
Gross Generation Capacity	86.2	86.2	86.2	86.2	86.2
Name Plate Power Factor	0.8	0.8	0.8	0.8	0.8
Net Effective / Dependable Generation Capacity	70	70.00	70.00	70.00	70.00
Projected Energy Generated	429	429	429	429	429
Target Availability of Power Plant					

8 Capital Expenditure

8.1 Capital Expenditure Financing Plan

Table 12: Summary of Capital Expenditure Financing Plan (Million GHS) 2021 - 2027

Item	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/27
Accumulated Depreciation	155.95	193.49	199.32	204.88	217.15	222.11
Retained Earnings	654.89	636.16	844.46	1,198.37	1,692.54	2190.00
Commercial Borrowings:						
Domestic	0	0	0	0	0	
Foreign	688.43	157.65	157.33	-	207.20	
Additional Equity Contribution by Shareholder(s)	0	0	0	0	0	
Grants:						
Domestic	0	0	0	0	0	
Foreign	0	0	0	0	0	
Tariff Revenue (Revenue from Projected Capacity Charge)	1,094.06	1,108.96	1,249.88	1,443.39	1,547.66	1764.24

9 Operation & Maintenance Costs

Table 13: Summary of Operation and Maintenance Costs (Million GHS) 2021-2027

Item	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/27
Fixed O & M Costs (GHS 'M)	93.83	115.43	134.53	156.05	190.20	215.62
Variable O & M Cost						

10 Administration and General Costs

Table 14: Summary of Administration and General Costs (Million GHS) 2021-2027

Item	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/27
Fixed O & M Costs	79.48	84.83	92.45	100.53	109.91	109.91
Variable O & M Cost						

11 Human Resource Costs (Employee Costs)

Table 15: Summary of Human and Resource Cost (Million GHS) 2021 - 2027

Item	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/27	
Fixed O & M Costs (GHS 'M)	234.67	256.33	280.61	320.30	366.16	366.16	
Variable O & M Cost							

12 Financing and Interest Costs

Table 16: Summary of Financing and Interest Costs (Million GHS) 2021-2027

Item	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026	2026/27	
Interest on Foreign Loans	49.88	53.04	57.67	65.32	83.91		
Interest on Domestic Loans	37.61	28.49	19.37	13.86			
Interest on Working Capital Loan	384.30	330.08	324.62	330.71	342.47	384.30	

13 Conclusion

GRIDCo is committed to deliver on its mandate to provide to fair and non-discriminatory access to power transmission to support economic development. This request therefore seeks a cost reflective tariff to sustain GRIDCo's operation of the NITS.

14 Appendices

F-1T - Transmission Lines Data

F-2T - Transmission Substations Data

F-3T - Transmission Fixed Assets Schedule

F-4T - Transmission Fixed Assets Depreciation Schedule

F-5T - Transmission System Project Cost Data

F-6T - Transmission Project Cost Data (Foreign Costs)

F-7T - Transmission Project Cost Data (Local Costs)

F-8T - Capital Expenditure Funding/Financing Plan

F-9T - Transmission Operation and Maintenance Cost Data

F-10T - Transmission Administration and General Cost Data

F-11T - Transmission Human Resource Cost Data

F-12T - Working Capital Requirement Data

F-13T - Summary of Transmission Costs

F-14T - Relevant Documentation in Respect of Transmission Tariff Proposal

F-15T - Summary of Qualitative and Quantitative Data Contained in Forms F-1T-F14T
in Respect of Tariff Application