



**GHANA GRID COMPANY LTD. (GRIDCo)**

**2022- 2027 TARIFF PROPOSAL  
(Abridged Version)**

**APRIL 2022**

## **1 Introduction**

GRIDCo was established in 2006 under the Energy Commission Act, 1997 (Act 541) and the Volta River Development (Amendment) Act, 2005 Act 692. It was operationalized in 2008 as part of Government of Ghana's (GoG) Power Sector Reforms aimed at addressing power supply reliability and quality of supply, attracting private investments in generation, increasing competition in generation supply and enhancing efficiency in bulk electricity delivery systems for economic growth.

GRIDCo as the Electricity Transmission Utility (ETU) has the mandate to carry out transmission of electricity from generators to bulk customers, operate the Wholesale Electricity Market and provide telecommunication services.

This document highlights the key inputs into the 2022-2027 Transmission Service Tariff Proposal submitted to the Public Utilities Regulatory Commission (PURC) for this Major Tariff Review Period.

### **1.1 Rationale Underpinning Tariff Submission**

GRIDCo makes this Tariff Proposal in compliance with the PURC Act 1997 (Act 538) to obtain a cost-reflective transmission tariff that will ensure a reliable and stable National Interconnected Transmission System (NITS) to meet the increasing energy growth 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.

#### **1.1.1 Increasing Cost of Maintenance**

The reliability of the NITS is largely dependent on GRIDCo's ability to maintain the assets as required and its promptness to resolve intermittent disruptions. GRIDCo is confronted by a high incidence of corrosion on the coastal transmission lines, illegal mining (galamsey) and other forms of encroachment. The coastal and western transmission line corridors are critical to the stability of the power system since they are the main corridors for evacuating over 1600MW of power, approximately 50% of National requirement, from the Aboadze enclave in the Western Region. These corridors therefore require frequent maintenance to attain operational reliability.

The transmission network has seen significant expansion due to the commissioning of new substations and transmission lines over the past three (3) years. These expansions and coverage have resulted in increased operation and maintenance costs.

However, GRIDCo's weakened liquidity position has significantly impaired the Company's ability to effectively undertake the required maintenance on the transmission infrastructure.

### 1.1.2 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 electricity demand. The non-cost reflective tariff also makes the required return on most planned investments lower than the cost of financing, thereby making it unattractive to investors.

## 1.2 Key Tariff Assumptions

The Revenue Requirement Methodology prescribed by the PURC was employed in the development of GRIDCo's 2022-2027 Transmission Tariff Proposal. Key Operational Assumptions underlying the proposal 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      |

Using the methodology outlined by the PURC, GRIDCo proposes the following 5-Year Transmission Service Charges (TSC), excluding all levies as indicated in **Table 2** below. The tariff proposal considers operating and maintenance costs, depreciation for the asset usage and return on regulatory assets base.

**Table 2: Proposed Tariff for 2022 – 2027**

|                                      | Unit           | Forecast        | Forecast        | Forecast        | Forecast        | Forecast        | Forecast        |
|--------------------------------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                      |                | 2022            | 2023            | 2024            | 2025            | 2026            | 2027            |
| Total Energy Sales                   | GWh            | 22,520          | 24,889          | 26,590          | 28,065          | 29,921          | 31,716          |
| 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          |
| 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        |
| 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           |
| <b>Annual Revenue Requirement</b>    | <b>Ghc'M</b>   | <b>2,008.35</b> | <b>2,250.22</b> | <b>2,677.46</b> | <b>2,865.06</b> | <b>3,124.20</b> | <b>3,272.16</b> |
| <b>Projected TSC<sup>3</sup></b>     | <b>GHS/kWh</b> | <b>0.089181</b> | <b>0.090411</b> | <b>0.100696</b> | <b>0.102087</b> | <b>0.104415</b> | <b>0.103170</b> |

## 2 Initiatives Undertaken Since July 2019 Tariff Review

### 2.1 Projects Undertaken

Projects completed by GRIDCo since the last tariff review in July 2019 are listed in **Table 3** below:

**Table 3: Completed Projects Since the Last Tariff Review**

| 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"> <li>• Anwomaso-Kintampo Line</li> <li>• Kintampo – Adubuliyili Line</li> <li>• Adubuliyili – Nayagnia Line</li> <li>• Adubuliyili Substation</li> <li>• Kintampo and Anwomaso Substations</li> <li>• Nayagnia Substation</li> </ul> Tamale and Bolgatanga 161kV substation upgrade | 2021<br>2019<br>2019<br>2019<br>2019<br>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              |
|      | <b>Total</b>  |  | <b>327.72</b>      |

Completion of these projects has significantly increased GRIDCo’s Regulatory Asset Base as depicted below:

- Transformer capacity increased from 8,064.2MVA in 2019 to 9,642MVA in 2021.
- Transmission line length increased from 5,965.83Km in 2019 to 6,472.23Km in 2021.

### **Ongoing Projects Required for Grid Reliability and Expansion**

The on-going 161kV Achimota–Mallam Transmission Line Upgrade Project is expected to be completed by the end of 2022.

### **Medium-Term Projects considered in Proposed Tariff for 2022 – 2027**

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

deliver power reliably, minimise system interruptions, lower transmission losses and 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"> <li>• Aboadze - Takoradi</li> <li>• Takoradi -Tarkwa</li> <li>• Tarkwa - New Tarkwa</li> <li>• New Tarkwa - Prestea</li> <li>• Bogoso - Dunkwa</li> <li>• New Obuasi- Dunkwa</li> <li>• Dunkwa - Ayanfuri</li> <li>• Ayanfuri-Asawinso</li> </ul> | 2025                     | 224.00      |
| 5    | Construction and upgrade of 161kV middle corridor transmission lines <ul style="list-style-type: none"> <li>• Akosombo- Tafo</li> <li>• Tafo- Nkawkaw</li> <li>• Nkawkaw-Konongo</li> <li>• Konongo-Kumasi</li> </ul>   | 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 <sup>nd</sup> 330kV Kumasi to Bolgatanga Transmission Line  | 2027 | 120           |
|    | <b>TOTAL</b>  |      | <b>990.53</b> |

### 3 Proposed Service Delivery and Efficiency Improvements During Tariff Period

#### 3.1 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.

### **3.2 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.

### **3.3 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 (growing at rate of 8-10% per annum) driven by economic growth.

### **3.4 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 beyond) as well as optimising generation dispatch will also enhance the transmission loss reduction to improve efficiency.

## **4 Key Challenges Likely to Impact Service Delivery**

### **4.1 Major Transmission Constraints**

The NITS is currently challenged with the following major constraints:

- Congestion on transmission lines:
  - 161kV Western Corridor Transmission Lines.
  - 161kV Coastal Corridor Transmission Lines
  - 161kV Middle Corridor Transmission Lines
- Transformer overloads at substations including, Kumasi, Tamale, Sunyani and Techiman substations.
- Single transformer substations including Esiama, Yendi, Akosombo, and Akyempim.
- Radial transmission lines on the NITS.
  - 161kV 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)

#### **4.2 Transmission Loss Reduction Strategy**

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

#### **5 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.