



PUBLIC UTILITIES REGULATORY COMMISSION

TEMPLATE FOR FILING OF TARIFF PROPOSALS

FOR

REVIEW OF ELECTRICITY GENERATION AGGREGATE REVENUE REQUIREMENT AND TARIFF

BY

VOLTA RIVER AUTHORITY

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This template is intended to capture in much detail both qualitative and quantitative data with respect to VRA's electricity generation operations. The data provided is to enable PURC undertake a comprehensive review and analysis of VRA's electricity generation operations as part PURC's 5-Year Multi-Year Tariff Review covering 2025-2030. VRA is expected to provide a detailed write-up on each of the following. Data presented in this write-up should be in consonance with the results presented in the attached excel spreadsheet.

1 Introduction

In accordance with the Public Utilities Regulatory Commission (PURC) Act, 1997 (Act 538) (Sections 16, 17 and 18) and the PURC Electricity Rate Setting Guidelines (Section 4.0), this tariff proposal seeks to request the PURC to approve power tariffs for Electricity Distribution Companies (DISCOs).

1.1 Brief Background of VRA's Electricity Generation Operations

The Volta River Authority (VRA) was established under the Volta River Development Act, 1961 (Act 46), as a body corporate with the mandate to operate mainly as a power generation and transmission utility. In 2005, following the promulgation of the Volta River Development (Amendment) Act, 2005 (Act 692) in the context of the Ghana Government Power Sector Reforms, the VRA's mandate has now been largely restricted to the generation of electricity to both domestic and foreign customers.

The domestic customers include both bulk customers and distribution companies who are licensed to distribute and sell electricity without discrimination to customers in an area or zone designated by the Board of the Energy Commission (EC).

The VRA currently operates a total installed electricity generation capacity of 2554MW. This is made up of two hydroelectric generating stations, i.e. the Akosombo and Kpong Generating Stations with installed capacities of 1,020MW and 160MW respectively. The hydro generation is complemented by 330MW Combined Cycle Thermal Plant (Takoradi 1) and 340MW Takoradi International Company (Takoradi 2), which is a joint venture between VRA and TAQA from Abu Dhabi all at Takoradi. Additionally, VRA has developed a number of thermal plants at Tema, including 110MW Tema Thermal 1 Power Station (Tema 1), 87MW Thermal 2 Power Station (Tema 2), and 220MW Kpone Thermal Power Plant (KTPS). The Authority has successfully relocated the 250MW (phase 1 & 2) Ameri Power plant to Anwomaso, where it is now officially known as Anwomaso Thermal Power Station (ATPS). A further 2.5MW, 6.5MW, 13.0MW and 15.0MW Solar Power Plants has also been installed at Navrongo, Lawra, Kaleo (phase 1) and Kaleo (phase 2) respectively.

1.2 Rationale/Objectives Underpinning Tariff Submission

The major objectives underpinning this tariff proposal are:

1. To recover the cost of power supply to the DISCOs and ensure the sustainability of VRA.
2. To recover the cost of transmission losses.
4. To recover the cost of ancillary services to the National Interconnected Transmission System.

5. To recover any additional cost borne by VRA to ensure grid stability and uninterrupted power supply in the nation.

1.3 Legislative Provision(s) in support of Tariff Application

In accordance with Sections 17 of the Public Utilities Regulatory Commission, 1997 Act 538, the VRA hereby requests the PURC to approve power tariffs to be charged by the VRA to Electricity Company of Ghana (ECG), Northern Electricity Distribution Company (NEDCo) and Enclave Power Company Limited (EPCL).

1.4 Highlights of Major Issues Underpinning Tariff Submission

- **Cost recovery tariffs on electricity supply to DISCOs:**
In line with the PURC Rate Setting Guidelines, VRA used the Revenue Requirement Approach to determine the cost recovery tariffs. This is based on the required revenue that allows VRA to recover the cost of operation and at the same time earn a return on Average Net Fixed Assets.
- **Reactive Power Compensation:**
Institute a framework for compensation/reimbursement for provision of ancillary services provided in line with regulations.
- **Allocation of Hydro Generation to Electricity Consumers:**
Projected hydro generation of 7,450 GWh has been allocated to DISCOs, VALCO, GWCL, Bulk Customers and Export Customers.
- **Composite Gas Price:**
The WACOG of US\$7.8368/MMBtu was used in the computation cost of supply from our thermal power plants.

2 Initiatives Undertaken since September 2022 Tariff Review

Since 2022, VRA has undertaken a number of initiatives and projects aimed at enhancing reliability and affordability while ensuring the sustainability of the company.

2.1 Projects Executed

PROJECTS	Cost
	USD million
Sea Water Reverse Osmosis Project at TTPS, Aboadze	9.79
Rehabilitation, Modernization and Life Extension Project – T1	27.36
AMERI Relocation 150MW (Phase 1)	28.22
AGS Automation and SCADA Upgrade Project	4.21
Repair of Foundation Rocks of Akosombo Dam Spillway No.2	19.74
Power Connection to VGIF	1.9

Rehabilitation of Akosombo and Kpong Hydro Electric Dam Phase 3	15.14
Supply and installation of Enhanced Security System for AGS and KGS	11.59
TOTAL	117.95

	Euro million
Aboadze and Tema Gas Interconnection Upgrade	1.50

2.2 Compliance with Directives of the Commission

VRA has been complying with all the directives of the PURC. Tariffs charged to ECG, NEDCo and EPCL are based on the approved tariffs by the PURC. Also, in compliance with the directives of the PURC, the following quarterly reports are submitted as scheduled:

- Quality of Service
- Key Performance Indices

3 Key Policy Issues for Tariff Consideration

3.1 Foreign Exchange Losses Resulting from Tariff

Reference to contractual agreements between fuel suppliers and power plant partners, VRA is required to honour its obligations, particularly payment for natural gas and operational spares in foreign currency while the receivables from the regulated market are paid in local currency (Ghana Cedis). The average actual exchange rate for 2022 was GHS 8.3202/USD while the PURC FX rate was GHS 7.5165/USD. The exchange rate for approved by PURC, effective October 1, 2024, was GHS 15.3855/USD. Nonetheless, effective July 1, 2025, the exchange rate approved by PURC was GHS 10.3052/USD. The table below indicate VRA's Exchange Losses for the period 2020 to 2024.

	2020	2021	2022	2023	2024
Exchange Losses on Transactions (GHS'000)	300,439.00	338,707.00	252,165.00	395,097.00	506,250.00
Exchange Losses on Loans (GHS'000)	169,248.00	42,072.00	63,041.00	196,334.00	230,241.00

3.2 Payment for Power Supply by Discos

Payment for power bills by ECG and NEDCo continues to be a challenge. Despite the operationalization of the cash waterfall mechanism, the absence of a balancing fund to cater for unpaid portion of power bills poses a challenge to the sustainability of VRA's operations.

3.3 Generation on Liquid Fuel

Occasionally, VRA has been called upon by the grid operator, over the past years, to generate power from liquid fuel to prevent disruptions in power supply and contribute to grid stability. The PURC-approved tariff does not cater for such instances since the tariff has been solely based on generation from natural gas. Over the past years, the Kpone Thermal Power Station (KTPS) has operated under emergency circumstances to support the grid whenever there is a shortfall. The shortfalls as usually as a result of inadequate gas supplies due to forced and planned outages from the suppliers, i.e. natural gas supply interruptions. The following table highlights the amount of liquid fuel used and the corresponding energy generated over the period:

	KTPS		TICO		
Year	DFO (m³)	MWh	DFO (m³)	LCO (m³)	MWh From Liquid Fuel
2022	8,976.02	26,535.67	-	-	-
2023	17,598.20	51,236.63	-	-	-
2024	31,072.62	90,929.78	-	-	-
Total	57,642.84	168,702.08	-	-	-

For the period 2022-2024, VRA used 57,642.84 cubic meters of DFO to generate 168.70GWh.

Operating on liquid fuel results in lower efficiency for the turbines. As compared to a heat rate of 11,895 Btu/kWh, the KTPS heat rates increases to as high as 12,689 Btu/kWh on peaking mode, representing a 6% increase in heat rate.

Lastly, VRA also keeps strategic fuel stock as well as maintain a service contract for the Single Point Mooring (SPM) facility in Aboadze. The SPM which facilitates the safe receiving and transfer of LCO from vessels to the tanks in the plants is currently being dry-docked at the Ghana Naval Base, Takoradi. Significant investments estimated at approximately \$10.4 million is required to rehabilitate while an estimated amount of \$22.3 million is required for a replacement.

In order for VRA to continue providing this vital service to the power sector, we propose that the tariff structure should account for the chosen option of rehabilitating the Single Point Mooring (SPM). This rehabilitation is estimated to **cost \$10.4 million** and is essential for ensuring a reliable power supply to the nation, especially in situations where the supply of natural gas is limited or curtailed.

3.4 Ancillary Services

VRA provides additional services to ensure grid stability and continuity of supply which results to increasing the overall cost of power. These services include black start, provision of reactive power, spinning reserve and voltage/frequency regulation. VRA currently makes provision from its existing power plants as reserve margin; in this respect it will be imperative to define a tariff for the reserve margin. At present, there is no clear framework or provision for reimbursement or payment for the ancillary services provided.

3.5 Mini-Grid Maintenance

VRA is currently responsible for operation and maintenance of mini grids installed on 5 island communities. Furthermore, 3 installations are in the offering as the Ministry of Energy and VRA are discussing terms for the operation and maintenance before handing-over is finalised. Additional mini-grids are being constructed which are at different stages of completion and they will be handed-over to VRA as and when commissioned by the Ministry of Energy & Partners. PURC will need to develop a tariff purposely for the maintenance and operation of the mini – grid plants.

4 Proposed Service Delivery and Efficiency Improvements during Tariff Period

4.1 Service Delivery and Efficiency Targets

Refer to Section 4.2

4.2 Technical / Operating Performance Indicators/Indices

Plant	Availability (%)	Capacity Utilization (%)
Akosombo GS	94	60
Kpong GS	94	60
TAPCO (T1)	85	80
TT1PP	90	46.7
KTPS	90	40
ATPS (Phase 1)	90	85
VRA Solar Plant	90	18

NB: These availability factors are based on assumption that there are no major projects that will require extended outages outside of the normal outages taken to carry out planned maintenance works.

4.3 Financial Performance Indicators/Indices

With the objective of improving financial performance and business sustainability, VRA intends to achieve an annual equity return of 11.96%.

5 Key Challenges Likely to Impact Service Delivery

5.1 Generation Plant Availability

Grid Induced Challenges:

Grid disturbances result in tripping of various power plants which consequently reduce plant performance. The trips result in more simple cycle run, numerous starts and stops, more part-loading and higher heat rates. These disturbances also pose risks of failure to the machines and increases the frequency of maintenance with resultant increased maintenance cost. GRIDCo's liquidity challenges affect prompt preventive and corrective maintenance of the generation switchyards reducing reliability and safe operation of VRA generation units

Switchyard Challenges:

Snapping of cables at the switchyard and breaker failures renders turbines unavailable for longer hours. In some instances, breaker failures resulted in the motoring of generator rotors causing failures, longer outage durations and unbudgeted cost.

Dispatch Challenges:

Dispatch challenges such as part loading and non-contractual fuel allocation by the grid operator results in inefficiencies and unutilized capacity of VRA thermal plants. Additionally, the grid operator has on several occasions curtailed supply to VRA export customers to meet internal demand (ECG additional load). Any adjustment to VRA tariff to recognize oversupply to the ECG should factor the real opportunity cost of this situation.

5.2 Fuel Availability

VRA has gas sales agreements with Ghana National Gas Company (GNGC), Ghana National Petroleum Company (GNPC) and N-Gas Limited (through West Africa Gas Pipeline Company (WAPCo).

There have been instances of supply challenges and quality of gas supplied which require pre-heating of the natural gas before it can be used by the gas turbine.

VRA also procures Light Crude Oil (LCO) and Distillate Fuel Oil (DFO) from the spot market as and when required to cater for gas supply disruptions or during emergencies.

5.3 Fuel Price

The price of N-Gas is determined by the contractual arrangements in place while the price of local gas is determined by the PURC. The PURC-determined WACOG is expected to reflect the composite gas price from the various supply sources, but this has not been achieved. WACOG determination should reflect actual quantities delivered by N-Gas in Tema and not some estimated quantity which is mostly far lower than actual quantities delivered.

5.4 Expansion of Generation Capacity

Over the next five (5) years, VRA has plans of expanding its generation asset base and also undertaking a number of generation efficiency projects to increase its power supply capacity and supply reliability.

The planned generation projects are:

T1 Life Extension Project: The Takoradi Thermal Power Plant (T1), at the Aboadze enclave has been in operation for over 25 years (since 1997) and it is at the end of its planned economic life of 25 years. The comprehensive Rehabilitation, Modernization and Life Extension Project (RMLEP) has commenced with sections of the phase 1 project activities completed. The project is primarily aimed at extending the economic life of the plant, while increasing the dependable capacity by a minimum 12MW and reducing the plant heat rate to a minimum of 8000 BTU/kWh for a minimum of 15 years. The procurement of the phase 1 equipment estimated at \$27.36 million of the total estimated project cost of \$55 Million have been done with sections installed on the steam turbine.

Due to the current generation constraints, the opportunity for an extensive outage duration to execute the project has not been attainable, thus we propose the strategy of repowering T3 to substitute capacity of 150 MW of T1 for a minimum of 1 year each, for the completion of the outlined modernization projects, which include the replacement of the following key equipment: 2No. HRSGs, and accessories 2No. gas turbine air inlet filter housings, 1No. steam turbine condenser, Medium and Low Voltage switchgears, 2No. Power and unit auxiliary transformers, 3No. Generator circuit breakers. The phase 2 is expected to commence in 2028 and completed by 2029

KTPS Conversion to Combined Cycle: We also intend to convert the existing 220 MW simple cycle KTPS power plant into a 315 MW combined cycle power plant. This project will improve the efficiency of the power plant, increase generation output and reduce cost of power generation from the power plant. The project is currently at developmental stage. The target is to have the project completed by 2025. The estimated cost of the project is US\$ 220 Million.

T3 Retrofit Project: The 132 MW T3 Power plant is currently out of service primarily because of damage of the 4No. OGT25000 aero-derivative gas turbines. The approach to replace the defective 4No. OGT25000 aero-derivative gas turbines with 4No. MS50001 PA General Electric Heavy-duty gas turbines is being explored. The new turbines are currently being manufactured, and the project, estimated to cost US\$ 100 Million is expected to be completed by 2028.

5.5 Reactive Power Generation and Compensation Issues

VRA provides additional services to ensure grid stability and continuity of supply which results in increasing the overall cost of power. These services include black start, provision of reactive power, spinning reserve and voltage/frequency regulation. VRA currently makes provision from its existing power plants as reserve margin; in this respect it will be imperative to define a tariff for the reserve margin. At present the tariff does not explicitly or indirectly make provision for reimbursement or payment of the ancillary services provided. VRA

estimates that cost of providing spinning reserve, standby reserve and other ancillary services from the Akosombo Generating Station is about USD 32.61 Million per year.

5.6 Auxiliary Energy Consumption

Apart from VRA's hydro power plants (Akosombo G.S. and Kpong G.S), all other power plants in Ghana currently consume energy from the grid at some point or the other. Both Akosombo GS & Kpong GS have black start capability.

5.7 Recovery of Transmission losses

In 2023, PURC directed that GRIDCo bill for and receive TSC 2 (transmission losses) payments from the customers. The Commission further directed that VRA works with GRIDCo to develop an agreeable payment mechanism through which the former will commit to settle the VRA portion of all TSC2 funds collected. Unfortunately, GRIDCo has not shown any commitment to the Payment Mechanism as developed and agreed. Thus, GRIDCo's total indebtedness to VRA with regards to TSC2 as at December 31, 2024 is GHS1.2 billion.

By this Tariff Proposal, VRA requests PURC to allow VRA to bill for and receive TSC 2 (transmission losses) payments from the customers. GRIDCo should also take the necessary steps to settle its TSC2 indebtedness to VRA within the shortest possible time.

6 Strategies to Address Key Challenges

6.1 Gas Fuel Price:

It is recommended that PURC should review the WACOG price methodology to strictly use actual consumption of N-Gas as opposed to some arbitrary quantities being used to determine the WACOG.

6.2 Generation & Plant Availability

Aboadze Switchyard Upgrade Project: One major problem affecting generation and availabilities is unstable frequency and equipment failures such as cable snapping, breaker hydraulic oil leakages and mechanism failure. To help reduce the impact of these failures on the generating stations, VRA will pre-finance the replacement of all hydraulic-operated breakers at Aboadze switchyard with Spring-Operated type. In addition, the existing relays, cables and communication network will be upgraded to improve reliability and service delivery. The replacement will make the tie breakers more reliable and dependable.

Procurement and installation of synchronizing Breakers: As a measure to reduce the impact of Switch yard related failures (e.g generator motoring), VRA has initiated processes to procure and install synchronizing breakers at the LV side of the transformer. This mitigates the possibility of generators motoring due to failure of tie breakers to open.

Fuel Redundancy Provision:

To ensure high-capacity utilization, VRA continues to invest in getting back-up fuel for all dual-fuel units to be used for generation. LCO and DFO are stored in readiness for usage during gas supply cuts. Additionally, arrangements are being made with N-Gas to supply interruptible gas quantities to augment current firm supply.

7

AKOSOMBO HYDRO GENERATION

7.1 Projected Generation Data

Table-1 Summary of Generating Station Data 2025-2030

Parameter	2025	2026	2027	2028	2029	2030
Gross Generation Capacity	1020	1020	1020	1020	1020	1020
Name Plate Power Factor	0.95	0.95	0.95	0.95	0.95	0.95
Net Effective / Dependable Generation Capacity	900	900	900	900	900	900
Projected Energy Generated	6450	5513	5072	4690	4690	4690
Target Availability of Power Plant	94	94	94	94	94	94

7.2 Capital Expenditure

For purposes of tariff application, the Generating Company must provide generation augmentation plan based on Load Growth Forecast during the tariff review period, which in this case is 2025-2030. The same is required for computation of Revenue Requirement (RR), indicating projected amount of electricity to be generated taking into consideration, estimated growth plan of its customers and any plans of new generation facilities.

The capital investment plan to be submitted by the generating company must contain details of ongoing projects as well as new projects beyond the tariff period.

The generating company must submit Renovation and Modernisation (R&M) **plans** for purposes of extension of asset life beyond its useful life. Detailed project reports indicating scope, justification, cost– benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure and schedule of completion.

With respect to Annual Performance Review, the generating company must submit capital expenditure incurred and capitalisation during the year under review alongside Annual Performance Review.

Outline of the Capital Investment Plan must include but not limited to the following:

- Purpose of Capital Investment Plan
- Replacement of existing assets with a view to meeting load growth, transformation losses, reactive power generation, improvement in quality and reliability of supply
- Capital Structure
- Capitalisation Schedule
- Financing Plan
- Cost – benefit analysis
- Performance improvement envisaged during tariff period

Table- 2 Capital Investment Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Cost	406.32	6.65	6.99	7.34	7.70	8.09
Initial Spares	6.34	6.65	6.99	7.34	7.70	8.09
Additional Capitalisation	98.63	-	-	-	-	-
Renovation & Modernisation (R&M)	301.36	-	-	-	-	-
Rehabilitation & Resettlement (R & R)	-	-	-	-	-	-

7.3 Capital Expenditure Financing Plan

Table-3 Capital Expenditure Financing Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Accumulated Depreciation	8,178.22	8,532.25	8,891.63	9,256.44	9,626.78	10,002.72
Net Asset Value	18,272.17	18,319.00	18,366.80	18,415.58	18,465.37	18,516.20
Retained Earnings	453.03	413.22	(18.44)	(910.30)	(1,815.84)	(2,782.06)
Commercial Borrowings:						
Domestic	-	-	-	-	-	-
Foreign	406.32	6.65	6.99	7.34	7.70	8.09
Additional Equity Contribution By Shareholder(s)	-	-	-	-	-	-
Grants:						
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-
Tariff Revenue (Revenue from Projected Capacity Charge)	-	-	-	-	-	-

7.4 Operation & Maintenance Costs

Table-4 Operation and Maintenance Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	123.57	131.34	143.16	149.99	162.74	173.20
Variable O & M Cost	21.81	23.18	25.26	26.47	28.72	30.56

7.5 Administration & General Costs

Table-5 Administration and General Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed A & G Costs	193.22	209.90	232.59	248.50	274.83	297.94
Variable A & G Cost	5.98	6.49	7.19	7.69	8.50	9.21

7.6 Human Resource Costs (Employee Costs)

Table-6 Human Resource Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed HR Costs	429.48	463.75	516.10	548.46	607.58	656.53
Variable HR Cost	86.93	91.80	100.06	103.96	112.79	119.31

7.7 Public Education

Table-7 Summary of Public Education Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Stakeholder Communication & Sensitisation (Public Education)	1.40	1.46	1.59	1.63	1.76	1.84

7.8 Financing and Interest Costs:

Table-8 Financing and Interest Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Interest on Foreign Loans	31.31	31.81	32.34	32.89	33.37	57.71
Interest on Domestic Loans	-	-	-	-	-	-
Interest on Working Capital Loan	7.50	7.13	6.75	6.38	12.80	12.85

7.9 Return on Equity

Table-9 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Rate of Return	11.96	11.96	11.96	11.96	11.96	11.96

7.10 Depreciation

Table-10 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Depreciation	348.76	354.03	359.38	364.81	370.34	375.94

7.11 Projected Electricity Generation Revenue Requirement:

**Table- 11 Summary of Akosombo Hydro Generating Station Revenue Requirement (Million GHS)
 2025-2030**

Item	2025	2026	2027	2028	2029	2030
Capital Recovery Component (CRC)	1,960.37	1,969.76	1,979.33	1,989.07	1,998.98	2,009.07
Fixed O & M Component (FOMC)	747.68	806.45	893.45	948.58	1,046.91	1,129.51
Non-Fuel Variable Operating Component (NFVOC)	114.71	121.47	132.52	138.11	150.01	159.09
Fuel Cost Recovery Component (FCRC)	-	-	-	-	-	-
Reactive Power Compensation Component (RPCC)	386.30	493.17	515.74	488.52	390.27	431.02

8

KPONG HYDRO GENERATION

8.1 Projected Generation Data

Table-12 Summary of Generating Station Data 2025-2030

Parameter	2025	2026	2027	2028	2029	2030
Gross Generation Capacity	160	160	160	160	160	160
Name Plate Power Factor	0.90	0.90	0.90	0.90	0.90	0.90
Net Effective / Dependable Generation Capacity	140	140	140	140	140	140
Projected Energy Generated	1000	987	928	910	910	910
Target Availability of Power Plant	94	94	94	94	94	94

8.2 Capital Expenditure

Table-13 Capital Investment Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Cost	79.12	2.66	2.79	2.93	3.08	3.23
Initial Spares	2.53	2.66	2.79	2.93	3.08	3.23
Additional Capitalisation	46.88	-	-	-	-	-
Renovation & Modernisation (R&M)	29.71	-	-	-	-	-
Rehabilitation & Resettlement (R & R)	-	-	-	-	-	-

8.3 Capital Expenditure Financing Plan

Table-12 Capital Expenditure Financing Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Accumulated Depreciation	2,400.66	2,621.99	2,846.64	3,074.66	3,306.11	3,541.04
Net Asset Value	9,588.29	9,548.30	9,507.82	9,466.85	9,425.39	9,383.45
Retained Earnings	71.06	64.82	(2.89)	(142.79)	(284.84)	(436.40)
Commercial Borrowings:	-	-	-	-	-	-

Domestic	-	-	-	-	-	-
Foreign	79.12	2.66	2.79	2.93	3.08	3.23
Additional Equity Contribution By Shareholder(s)	-	-	-	-	-	-
Grants:						
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-
Tariff Revenue (Revenue from Projected Capacity Charge)	-	-	-	-	-	-

8.4 Operation & Maintenance Costs

Table- 13 Operation and Maintenance Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	16.86	17.84	19.44	20.24	21.96	23.27
Variable O & M Cost	2.98	3.15	3.43	3.57	3.87	4.11

8.5 Administration & General Costs

Table-14 Administration and General Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	75.26	78.41	85.47	87.28	94.71	98.77
Variable O & M Cost	2.33	2.42	2.64	2.70	2.93	3.05

8.6 Human Resource Costs (Employee Costs)

Table-15 Human Resource Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	67.37	72.74	80.96	86.03	95.31	102.98
Variable O & M Cost	13.64	14.40	15.70	16.31	17.69	18.72

8.7 Public Education

Table-16 Summary of Public Education Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Stakeholder Communication & Sensitisation (Public Education)	0.22	0.23	0.25	0.26	0.28	0.29

8.8 Financing and Interest Costs:

Table-17 Financing and Interest Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Interest on Foreign Loans	8.66	8.86	9.07	9.29	9.46	25.48
Interest on Domestic Loans	-	-	-	-	-	-
Interest on Working Capital Loan	1.18	1.12	1.06	1.00	2.01	2.02

8.9 Return on Equity

Table-18 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Rate of Return	11.96	11.96	11.96	11.96	11.96	11.96

8.10 Depreciation

Table-19 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Depreciation	218.05	221.33	224.65	228.03	231.45	234.93

8.11 Projected Electricity Generation Revenue Requirement:

Table-20 Summary of Kpong Hydro Generating Station Revenue Requirement (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Recovery Component (CRC)	1,063.74	1,063.49	1,063.24	1,063.00	1,062.77	1,062.55
Fixed O & M Component (FOMC)	159.72	169.22	186.11	193.81	212.25	225.31
Non-Fuel Variable Operating Component (NFVOC)	18.94	19.97	21.77	22.58	24.50	25.88
Fuel Cost Recovery Component (FCRC)	-	-	-	-	-	-
Reactive Power Compensation Component (RPCC)	0.58	0.61	0.54	0.48	0.52	0.56

9

TAPCo THERMAL GENERATION

9.1 Projected Generation Data

Table-21 Summary of Generating Station Data 2025-2030

Parameter	2025	2026	2027	2028	2029	2030
Gross Generation Capacity	330	330	330	330	330	330
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85	0.85
Net Effective / Dependable Generation Capacity	300	300	300	300	300	300
Projected Energy Generated	2222	2234	2234	2234	2234	2234
Target Availability of Power Plant	80	80	85	85	85	85

9.2 Capital Expenditure

Table-22 Capital Investment Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Cost	168.51	-	-	-	-	-
Initial Spares						
Additional Capitalisation	38.01	-	-	-	-	-
Renovation & Modernisation (R&M)	-	-	-	-	-	-
Rehabilitation & Resettlement (R & R)	130.50	-	-	-	-	-

9.3 Capital Expenditure Financing Plan

Table-23 Capital Expenditure Financing Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Accumulated Depreciation	4,982.00	4,992.69	5,003.53	5,014.54	5,025.72	5,037.06
Net Asset Value	1,808.40	1,898.89	1,990.72	2,083.93	2,178.52	2,274.52
Retained Earnings	146.57	133.69	(5.96)	(294.51)	(587.48)	(900.08)
Commercial Borrowings:						
Domestic	-	-	-	-	-	-
Foreign	168.51	-	-	-	-	-

Additional Equity Contribution By Shareholder(s)	-	-	-	-	-	-
Grants:						
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-
Tariff Revenue (Revenue from Projected Capacity Charge)	-	-	-	-	-	-

9.4 Operation & Maintenance Costs

Table-24 Operation and Maintenance Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	76.52	85.01	92.66	94.66	102.70	109.02
Variable O & M Cost	13.50	15.00	16.35	16.70	18.12	19.24

9.5 Administration & General Costs

Table-25 Administration and General Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	105.14	121.38	135.50	141.93	158.26	170.89
Variable O & M Cost	3.25	3.75	4.19	4.39	4.89	5.29

9.6 Human Resource Costs (Employee Costs)

Table-26 Human Resource Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	170.51	196.47	218.65	215.67	238.92	244.74
Variable O & M Cost	25.31	28.99	31.59	31.01	33.64	34.15

9.7 Public Education

Table-27 Summary of Public Education Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Stakeholder Communication & Sensitisation (Public Education)	0.42	0.49	0.53	0.53	0.58	0.60

9.8 Financing and Interest Costs:

Table-28 Financing and Interest Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Interest on Foreign Loans	13.52	13.52	13.52	13.52	13.58	0.89
Interest on Domestic Loans	-	-	-	-	-	-
Interest on Working Capital Loan	2.43	2.31	2.18	2.06	4.14	4.16

9.9 Return on Equity

Table-29 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Rate of Return	11.96	11.96	11.96	11.96	11.96	11.96

9.10 Depreciation

Table-30 Equity Financing Costs 2025-2030

Item	2025	2026	2027	2028	2029	2030
Depreciation	10.53	10.69	10.85	11.01	11.17	11.34

9.11 Projected Electricity Generation Revenue Requirement:

Table-31 Summary of TAPCo Revenue Requirement (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Recovery Component (CRC)	170.03	178.17	186.43	194.81	203.32	211.95
Fixed O & M Component (FOMC)	352.59	403.35	447.34	452.79	500.47	525.25
Non-Fuel Variable Operating Component (NFVOC)	42.07	47.74	52.14	52.10	56.66	58.68
Fuel Cost Recovery Component (FCRC)	1,831.52	1,932.47	2,029.82	2,054.49	2,156.72	2,264.56
Reactive Power Compensation Component (RPCC)	-	-	-	-	-	-

10

TT1PP THERMAL GENERATION

10.1 Projected Generation Data

Table-32 Summary of Generating Station Data 2025-2030

Parameter	2025	2026	2027	2028	2029	2030
Gross Generation Capacity	126	126	126	126	126	126
Name Plate Power Factor	0.8	0.8	0.8	0.8	0.8	0.8
Net Effective / Dependable Generation Capacity	105	105	105	105	105	105
Projected Energy Generated	383	482	482	482	482	482
Target Availability of Power Plant	90	90	80	90	90	90

10.2 Capital Expenditure

Table-33 Capital Investment Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Cost	-	-	-	-	-	-
Initial Spares	-	-	-	-	-	-
Additional Capitalisation	-	-	-	-	-	-
Renovation & Modernisation (R&M)	-	-	-	-	-	-
Rehabilitation & Resettlement (R & R)						

10.3 Capital Expenditure Financing Plan

Table-34 Capital Expenditure Financing Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Accumulated Depreciation	1,032.37	1,062.14	1,092.34	1,123.00	1,154.11	1,185.68
Net Asset Value	1,242.42	1,246.55	1,250.74	1,255.00	1,259.32	1,263.70
Retained Earnings	48.86	44.56	(1.99)	(98.17)	(195.83)	(300.03)
Commercial Borrowings:						
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-

Additional Equity Contribution By Shareholder(s)	-	-	-	-	-	-
Grants:						
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-
Tariff Revenue (Revenue from Projected Capacity Charge)	-	-	-	-	-	-

10.4 Operation and Maintenance Costs

Table-35 Operation and Maintenance Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	25.51	28.34	30.89	31.55	34.23	36.34
Variable O & M Cost	4.50	5.00	5.45	5.57	6.04	6.41

10.5 Administration and General Costs

Table-36 Administration and General Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	35.05	40.46	45.17	47.31	52.75	56.96
Variable O & M Cost	1.08	1.25	1.40	1.46	1.63	1.76

10.6 Human Resource Costs (Employee Costs)

Table-37 Human Resource Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	56.84	65.49	72.88	71.89	79.64	81.58
Variable O & M Cost	8.44	9.66	10.53	10.34	11.21	11.38

10.7 Public Education

Table 38 Summary of Public Education Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Stakeholder Communication & Sensitisation (Public Education)	0.14	0.16	0.18	0.18	0.19	0.20

10.8 Financing and Interest Costs:

Table-39 Financing and Interest Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Interest on Foreign Loans	0.89	0.89	0.89	0.89	0.89	0.89
Interest on Domestic Loans	-	-	-	-	-	-
Interest on Working Capital Loan	0.81	0.77	0.73	0.69	1.38	1.39

10.9 Return on Equity

Table-40 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Rate of Return	11.96	11.96	11.96	11.96	11.96	11.96

10.10 Depreciation

Table-41 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Depreciation	29.32	29.76	30.21	30.66	31.11	31.58

10.11 Projected Electricity Generation Revenue Requirement:

Table-42 Summary of TT1PP Revenue Requirement (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Recovery Component (CRC)	138.91	139.71	140.52	141.35	142.18	143.03
Fixed O & M Component (FOMC)	117.53	134.45	149.11	150.93	166.82	175.08
Non-Fuel Variable Operating Component (NFVOC)	14.02	15.91	17.38	17.37	18.89	19.56
Fuel Cost Recovery Component (FCRC)	970.20	1,018.45	1,069.75	1,123.35	751.30	788.86
Reactive Power Compensation Component (RPCC)	-	-	-	-	-	-

11.1 Projected Generation Data

Table-43 Summary of Generating Station Data 2025-2030

Parameter	2025	2026	2027	2028	2029	2030
Gross Generation Capacity	220	220	220	220	220	220
Name Plate Power Factor	0.85	0.85	0.85	0.85	0.85	0.85
Net Effective / Dependable Generation Capacity	205	205	205	205	205	205
Projected Energy Generated	481	460	460	460	460	1526
Target Availability of Power Plant	80	80	90	90	80	80

11.2 Capital Expenditure

Table-44 Capital Investment Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Cost	356.15	-	-	-	-	-
Initial Spares						
Additional Capitalisation	356.15	-	-	-	-	-
Renovation & Modernisation (R&M)	-	-	-	-	-	-
Rehabilitation & Resettlement (R & R)	-	-	-	-	-	-

11.3 Capital Expenditure Financing Plan

Table-45 Capital Expenditure Financing Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Accumulated Depreciation	4,417.28	4,435.82	4,454.63	4,473.72	4,493.10	4,512.77
Net Asset Value	9,793.21	9,986.41	10,182.49	10,381.49	10,583.46	10,788.43
Retained Earnings	97.71	89.13	(3.98)	(196.34)	(391.65)	(900.08)
Commercial Borrowings:						
Domestic	-	-	-	-	-	-
Foreign	356.15	-	-	-	-	-

Additional Equity Contribution By Shareholder(s)	-	-	-	-	-	-
Grants:						
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-
Tariff Revenue (Revenue from Projected Capacity Charge)	-	-	-	-	-	-

11.4 Operation & Maintenance Costs

Table-46 Operation and Maintenance Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	51.01	56.67	61.77	63.11	68.47	109.02
Variable O & M Cost	9.00	10.00	10.90	11.14	12.08	19.24

11.5 Administration and General Costs

Table-47 Administration and General Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	70.09	80.92	90.33	94.62	105.51	170.89
Variable O & M Cost	2.17	2.50	2.79	2.93	3.26	5.29

11.6 Human Resource Costs (Employee Costs)

Table-48 Human Resource Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	113.68	130.98	145.76	143.78	159.28	244.74
Variable O & M Cost	16.88	19.32	21.06	20.67	22.43	34.15

11.7 Public Education

Table- 49 Summary of Public Education Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Stakeholder Communication & Sensitisation (Public Education)	0.28	0.33	0.36	0.36	0.39	0.60

11.8 Financing and Interest Costs:

Table-50 Financing and Interest Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Interest on Foreign Loans	85.99	85.99	85.99	85.99	86.10	59.28
Interest on Domestic Loans	-	-	-	-	-	-
Interest on Working Capital Loan	1.62	1.54	1.46	1.38	2.76	2.77

11.9 Return on Equity

Table-51 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Rate of Return	11.96	11.96	11.96	11.96	11.96	11.96

11.10 Depreciation

Table-52 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Depreciation	18.26	18.54	18.81	19.09	19.38	19.67

11.11 Projected Electricity Generation Revenue Requirement:

Table-53 Summary of KTPS Revenue Requirement (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Recovery Component (CRC)	882.03	899.34	916.91	934.74	952.84	971.21
Fixed O & M Component (FOMC)	235.06	268.90	298.22	301.86	333.64	525.25
Non-Fuel Variable Operating Component (NFVOC)	28.05	31.83	34.76	34.73	37.77	58.68
Fuel Cost Recovery Component (FCRC)	1,750.80	1,837.86	1,930.44	2,028.80	2,129.76	2,129.76
Reactive Power Compensation Component (RPCC)	n/a	n/a	n/a	n/a	n/a	n/a

12.1 Projected Generation Data

Table-54 Summary of Generating Station Data 2025-2030

Parameter	2025	2026	2027	2028	2029	2030
Gross Generation Capacity	150	150	150	150	150	150
Name Plate Power Factor						
Net Effective / Dependable Generation Capacity	138	138	138	138	138	138
Projected Energy Generated	1034	1034	1034	1034	1034	1034
Target Availability of Power Plant	90	90	90	90	90	90

12.2 Capital Expenditure

Table-77 Capital Investment Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Cost	-	-	-	-	-	-
Initial Spares	-	-	-	-	-	-
Additional Capitalisation	-	-	-	-	-	-
Renovation & Modernisation (R&M)	-	-	-	-	-	-
Rehabilitation & Resettlement (R & R)	-	-	-	-	-	-

12.3 Capital Expenditure Financing Plan

Table-55 Capital Expenditure Financing Plan (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Accumulated Depreciation	684.76	759.93	836.23	913.66	992.25	1,072.00
Net Asset Value	3,836.08	3,828.27	3,820.34	3,812.29	3,804.12	3,795.83
Retained Earnings	66.62	60.77	(2.71)	(133.87)	(267.04)	(409.13)
Commercial Borrowings:						
Domestic	-	-	-	-	-	-

Foreign	164.20	-	-	-	-	-
Additional Equity Contribution By Shareholder(s)	-	-	-	-	-	-
Grants:	-	-	-	-	-	-
Domestic	-	-	-	-	-	-
Foreign	-	-	-	-	-	-
Tariff Revenue (Revenue from Projected Capacity Charge)	-	-	-	-	-	-

12.4 Operation & Maintenance Costs

Table-56 Operation and Maintenance Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	43.29	47.91	52.22	52.41	56.86	59.49
Variable O & M Cost	7.64	8.45	9.22	9.25	10.03	10.50

12.5 Administration & General Costs

Table- 57 Administration and General Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	53.59	61.50	68.48	70.91	78.89	84.46
Variable O & M Cost	1.66	1.90	2.12	2.19	2.44	2.61

12.6 Human Resource Costs (Employee Costs)

Table-58 Human Resource Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Fixed O & M Costs	94.27	107.95	120.14	117.71	130.40	132.95
Variable O & M Cost	15.71	17.76	19.35	18.73	20.32	20.43

12.7 Public Education

Table-59 Summary of Public Education Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Stakeholder Communication & Sensitisation (Public Education)	0.20	0.23	0.25	0.25	0.27	0.28

12.8 Financing and Interest Costs:

Table-60 Financing and Interest Costs (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Interest on Foreign Loans	-	-	-	-	-	-
Interest on Domestic Loans	-	-	-	-	-	-
Interest on Working Capital Loan	-	-	-	-	-	-

12.9 Return on Equity

Table-61 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Rate of Return	11.96	11.96	11.96	11.96	11.96	11.96

12.10 Depreciation

Table-62 Equity Financing Costs (%) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Depreciation	74.07	75.18	76.30	77.43	78.59	79.76

12.11 Projected Electricity Generation Revenue Requirement:

Table- 63 Summary of ATPS Revenue Requirement (Million GHS) 2025-2030

Item	2025	2026	2027	2028	2029	2030
Capital Recovery Component (CRC)	412.41	412.83	413.25	413.68	414.11	414.55
Fixed O & M Component (FOMC)	191.34	217.59	241.10	241.29	266.42	277.18
Non-Fuel Variable Operating Component (NFVOC)	25.01	28.11	30.69	30.17	32.80	33.54
Fuel Cost Recovery Component (FCRC)	1,542.60	1,933.48	2,030.88	2,132.65	2,238.77	2,238.77
Reactive Power Compensation Component (RPCC)	-	-	-	-	-	-

13 **Summary of Projected Energy Generation By Power Plant**

Table-64 Projected Electricity Generation 2025-2030

Generating Station/Plant	Gross Generation Capacity	Name Plate Power / Capacity Factor	Net Effective / Dependable Generation Capacity	Projected Energy Generated
Hydro:				
Akosombo Generating Station	1020	0.95	900	31,219
Kpong Generating Station	160	0.9	140	5,674
Sub-Total	1180		1040	36893
Thermal:				
TAPCo	330	0.85	300	13,574
TICo	n/a	n/a	n/a	n/a
TT1PP	126	0.8	105	2,792
TT2PP	n/a	n/a	n/a	n/a
KTPS	220	0.85	205	3,847
ATPS	150		138	10,585
Sub-Total	826		748	30798
Renewable:				
Navrongo	2.5MWp	n/a	n/a	20
Lawra	19.58MWp	n/a	n/a	53
Kaleo I	n/a	n/a	n/a	n/a
Kaleo II	n/a	n/a	n/a	n/a
Sub-Total	n/a	n/a	n/a	n/a
Grand Total		n/a		

14 **Reactive Power Parameters**

14.1 **Name Plate Information**

Table-110 Name Plate Information (Akosombo Generating Station)

Item	Total No of Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Generator Data							
Name Plate Capacity	6	179.5MVA	179.5MVA	179.5MVA	179.5MVA	179.5MVA	179.5MVA
Rated Power Factor	6	0.95	0.95	0.95	0.95	0.95	0.95
Exciter Data							
Name Plate Rating	6	0.915 MVA	0.915 MVA	0.915 MVA	0.915 MVA	0.915 MVA	0.915 MVA

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Reactive Power Parameters

15.1 Name Plate Information

Table-110 Name Plate Information (Kpong Generating Station)

Item	Total No of Units	Unit 1	Unit 2	Unit 3	Unit 4
Generator Data					
Name Plate Capacity	4	44.44MVA	44.44MVA	44.44MVA	44.44MVA
Rated Power Factor	4	0.90	0.90	0.90	0.90
Exciter Data					
Name Plate Rating	4	1 MVA	1 MVA	1 MVA	1 MVA