GHANA WHOLESALE ELECTRICITY MARKET BULLETIN

MARKET WATCH

Monthly Market Data Analysis

ISSUE NO. 90 **1st October, 2023 to 31st December, 2023**

This Bulletin covers major developments in the Wholesale Electricity Market (WEM) of Ghana from 1st October 2023 to 31st December 2023. It analyses the performance of the key WEM indicators against their benchmarks and examines the likely implications of any discernable trends in the market.

Reasonable care has been taken to ensure the information contained in this Bulletin is accurate at the time of publication, nevertheless, any errors, omissions, or inaccuracies therein are regretted. The Electricity Market Oversight Panel (EMOP) would very much appreciate and welcome comments from readers on the Bulletin.

HIGHLIGHTS OF THE MONTH

In the 4th quarter of 2022, the System Peak load was 3,203.40MW, 3,256.10MW and 3,370.80MW which increased to 3,166.70MW, 3,528.30MW and 3,617.60MW for October, November and December 2023 respectively. The average demand growth was 4.9% for the 4th quarter of 2023.

The System Peak Load recorded in the 4th quarter of 2023 was made up of averagely 87.3% of domestic demand and 12.7% of export demand.

The Ghana Peak Load which is Ghana's System demand excluding export for October, November and December 2023 was 2, 834.70MW, 3,076.30MW and 3,119.60MW respectively which was higher than 2,910MW, 2928.40MW and 3,049.80MW recorded in 2022.

Average supply increased from 56.7GWh per day in September, 2023 to 68.09GWh per day in the 4th quarter of 2023 representing a 20% increase.

In October, the actual electricity supply was 62.45GWh compared to October 2022 which was 59.36GWh. In November and December 2023, the actual supply was 69.08GWh and 68.37GWh respectively which was lower than the 61.63GWh and 62.23GWh recorded in November and December, 2022.

The regulated Market accounted for 77% to 78.6% of electricity purchased in the Ghana Wholesale Electricity Market from October to December 2023. The de-regulated market accounted for 6.6% to 7.2% whilst the export market accounted for maximum of 15.2%.

The Akosombo Dam water level at the end of the month in October 2023 had increased to 276.98ft from 275.48ft at the beginning of the month. The Akosombo dam began to drop in November 2023. The water decreased at a rate of 0.02ft per day in November 2023 and 0.038 ft per day in December 2023. The end-year water level for 2023 was 272.58ft which was 1.63ft higher than 270.95ft recorded at the beginning of the year.

The Bui dam water level continued to increase in October 2023 by 0.31ft per day. The water level however began to drop in November 2023. The water level reduced at a rate of 0.14 ft per day. It continued to decrease at a rate of 0.33ft per day in December, 2023. The end year water level for 2023 for Bui Dam was 588.58ft which was 7.44ft higher than the 581.14ft recorded at the beginning of the year.

Natural gas remains the primary fossil fuel for the generation of electricity in the Ghana wholesale electricity market. The share of the natural gas used to generate electricity by thermal plants was over 97.0%.

ELECTRICITY TRADING

Electricity Demand

The System Peak Load in November 2023 increased by 11.42% from what was recorded in October, 2023. In December, 2023 the System Peak Load increased by 2.5% from the3,528.30MW recorded in November, 2023. The System Peak Load in October, November and December was 3,166.70MW, 3,528.30MW and 3,617.60MW respectively.

The System Peak Load for 2023 was 3,617.6MW which occurred in December, 2023

The Ghana Peak Load continued to increase gradually in October, November and December, 2023 from 2834.70MW to 3076.30MW and 3119.60MW respectively. The Ghana peak load increased in November, 2023 by 8.5% from October 2023, then increased in December, 2023 by 1.4% from the 3076.30MW recorded in November, 2023

The load factor for October 2023 was 84.91% whilst November and December's Load factors were 81.58% to 81.37% respectively.

Electricity export at the System Peak Load to CIE, CEB and SONABEL was 60MW, 147MW and 156MW for October, 2023 whilst November for CEB and SONABEL was 263MW and 189MW. December, 2023 recorded the System Peak Load to CIE, CEB and SONABEL as 168MW, 180MW and 150MW

The average electricity demand for October, November and December 2023 was 2,508.01MW, 2,749.66MW and 2,733.02MW respectively. The average demand increased from October to November, 2023 but decreased in December, 2023

The average electricity demand for the regulated market was 1,975MW, 2,119.84MW and 2,134.77MW in October, November, and December, 2023. Comparatively, the 3rd quarter average electricity demand for regulated market was lower than what was recorded in the 4th quarter. For regulated markets, ECG accounted for an average of 87.30% on the average for October, November and December, 2023 while NEDCO accounted for an average of 11.5% and Enclave Power accounted for the rest

The average demand for the deregulated market for October, November and December, 2023 was 163.3MW, 185.93MW and 181.66MW respectively. The average demand for Mines and Bulk customers was 87.81% and 12.44% respectively.

In addition, export market accounted for 369.69MW, 443.87MW and 416.59MW for October, November and December, 2023 respectively. Export accounted for 74.14% and VALCO accounted for the rest.

Electricity supply

A total of 1,936.05GWh of electricity was supplied in October 2023 which was higher than the 1,840.20GWh recorded in October 2022. Domestic supply accounted for 99.5% of the total generation supplied while inadvertent imports from CIE accounted for 0.5%. Electricity export in October, 2023 totaled 196.06GWh and higher than the 187.10GWh recorded the same period in 2022.

A total of 2,072.46GWh of electricity was supplied in November, 2023 which was higher than the 1,848.93GWh supplied in November, 2022. Electricity averaged 69.08GWh per day which was 12.09% higher than 61.63GWh per day supplied in November, 2022. In addition, domestic supply accounted for 99.74% of the total generation while inadvertent imports from CIE accounted for the rest.

Electricity export totaled 243.99GWh in November 2023 as it grew from the 187.10GWh recorded the previous year in November.

The domestic supply for December, 2023 accounted for 99.73% of the total generation while inadvertent imports from CIE accounted for 0.27%. Furthermore, electricity export totaled 232.02GWh which was higher than the 181.59GWh recorded in December, 2022. A total of 2,119.38GWh was supplied in December 2023 at an average of 68.37GWh per day which was lower than the 62.23GWh per day in December, 2022.

The electricity supplied by thermal plants in October 2023 constituted 53.4% of the total electricity supplied. In addition, November and December, 2023 electricity supplied by thermal plants constituted 58.55% and 56.73% respectively.

The contribution of electricity supplied from solar power plants were 0.4%, 0.47% and 0.45% in October, November and December, 2023 respectively.

Renewable energy (Solar and hydro-electric power Plants) in this case accounted for 46.1%, 41.19% and 43% for October, November and December, 2023 respectively.

A total of 1,469.41GWh, 1,526.29GWh, 1,588.26GWh of electricity was supplied to the Regulated Market in October, November and December, 2023 respectively with the Electricity company of Ghana (ECG) accounting for an average of 89.06% of the total electricity supplied. Northern Electricity company (NEDCO) and Enclave power company (EPC) accounted for an average of 11.18% and 1.62%.

The De-regulated Market made up of mines and Bulk Customers were supplied 121.5GWh, 133.88GWh, and 135.1GWh for October, November and December, 2023 respectively. The mines accounted for an average of 87.80% whilst industrial customers accounted for the rest.

A total of 203.91GWh, 250.49GWh and 238.91GWh of electricity was supplied to the export market in October, November and December, 2023 respectively. Electricity export to CIE for October, November and December, 2023 was 10.59GWh, 20.45GWh and 24.80GWh respectively. In October, export to CEB was 77.82GWh, this increased to 109.12GWh in November, 2023 and dropped to 94.76GWh in December, 2023. In October 2023, SONABEL recorded export of electricity as 115.50GWh. The export of electricity increased to 120.92GWh in November, 2023 from 115.50GWh in October, 2023 but dropped to 119.35GWh in December, 2023

Table 1. Projected and Actual Outturn of Electricity Demand and Supply in September, 2023 and October, 2023

	September ,2023		October, 2023	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	1,858.4	1,701.5	2,006.3	1,936.1
Source by Power Plants (GWh)				
AKOSOMBO	444.8	587.1	589.7	630.9
KPONG	81.0	90.9	78.5	65.5
BUI	147.5	150.3	167.7	188.1
BUI Solar	12.8	2.9	25.5	6.2
Kaleo	1.9	1.6	2.0	1.6
Sunon Asogli	362.9	226.0	315.0	260.6
TAPCO	82.9	54.6	-	26.2
TICO	140.3	203.9	222.6	186.5
TT1PP	61.2	21.3	-	62.5
CENIT	-	-	-	40.4
TT2PP	6.3	-	6.3	9.1
Twin City	116.3	125.4	120.2	137.5
KARPOWER	152.8	74.8	62.5	161.3
AMERI	-	-	87.3	-
KTPP	-	40.7	63.2	2.5
CENPOWER	233.3	150.8	241.1	84.3
AKSA	6.5	33.7	16.3	62.0
Bridge Power	-	4.1	-	0.2
Total Domestic Supply (GWh)	1,850.5	1,768.0	1,997.9	1,925.5
Imports (GWh)	-	9.0	-	10.5
Total Supply (GWh)	1,850.5	1,777.1	1,997.9	1,936.0
Ghana Coincedent Peak Load (MW	2,983.0	2,931.4	3,248.0	2,834.7
System Coincident Peak Load (MW	3,333.0	3,175.1	3,578.0	3,166.7

Table 2. Projected and Actual Outturn of Electricity Demand and Supply in October 2023 and November, 2023

	October, 2023		November, 2023	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	2,006.3	1,936.1	2,060.9	2,072.5
Source by Power Plants (GWh)				
AKOSOMBO	589.7	630.9	549.3	599.3
KPONG	78.5	65.5	81.6	101.5
BUI	167.7	188.1	89.9	143.1
BUI Solar	25.5	6.2	24.6	7.4
Kaleo	2.0	1.6	2.0	2.2
Sunon Asogli	315.0	260.6	362.9	234.7
TAPCO	-	26.2	-	-
TICO	222.6	186.5	215.4	226.7
TT1PP	-	62.5	61.2	26.3
CENIT	-	40.4	-	23.4
TT2PP	6.3	9.1	6.3	-
Twin City	120.2	137.5	116.3	125.0
KARPOWER	62.5	161.3	218.7	264.1
AMERI	87.3	-	84.5	-
KTPP	63.2	2.5	61.2	42.0
CENPOWER	241.1	84.3	233.3	215.3
AKSA	16.3	62.0	7.1	46.3
Bridge Power	-	0.2	-	9.6
Total Domestic Supply (GWh)	1,997.9	1,925.5	1,774.1	2,066.8
Imports (GWh)	-	10.5	-	5.6
Total Supply (GWh)	1,997.9	1,936.0	1,774.1	2,072.5
Ghana Coincedent Peak Load (MW	3,248.0	2,834.7	3,292.0	3,076.3
System Coincident Peak Load (MW	3,578.0	3,166.7	3,647.0	3,528.3

Table 3. Projected and Actual Outturn of Electricity Demand and Supply in November 2023 and December, 2023

	November ,2023		December, 2023	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	2,060.9	2,072.5	2,138.9	2,119.4
Source by Power Plants (GWh)				
AKOSOMBO	549.3	599.3	480	640.2
KPONG	81.6	101.5	79.4	107.7
BUI	89.9	143.1	93.3	153.8
BUI Solar	24.6	7.4	24.1	7.3
Kaleo	2.0	2.2	1.7	2.2
Sunon Asogli	362.9	234.7	350.0	144.8
TAPCO	-	-	130.8	-
TICO	215.4	226.7	222.6	196.4
TT1PP	61.2	26.3	-	43.1
CENIT	-	23.4	-	19.4
TT2PP	6.3	-	6.3	-
Twin City	116.3	125.0	120.2	136.6
KARPOWER	218.7	264.1	198.1	285.9
AMERI	84.5	-	87.3	-
KTPP	61.2	42.0	63.2	36.4
CENPOWER	233.3	215.3	241.1	218.9
AKSA	7.1	46.3	33.2	55.8
Bridge Power	-	9.6	-	65.1
Total Domestic Supply (GWh)	1,774.1	2,066.8	1,842.8	2,113.6
Imports (GWh)	-	5.6	-	5.7
Total Supply (GWh)	1,774.1	2,072.5	1,842.8	2,119.4
Ghana Coincedent Peak Load (MW	3,292.0	3,076.3	3,333.0	3,119.6
System Coincident Peak Load (MW	3,647.0	3,528.3	3,673.0	3,617.6

HYDRO DAM LEVELS

Akosombo dam water level began to decline in November, 2023

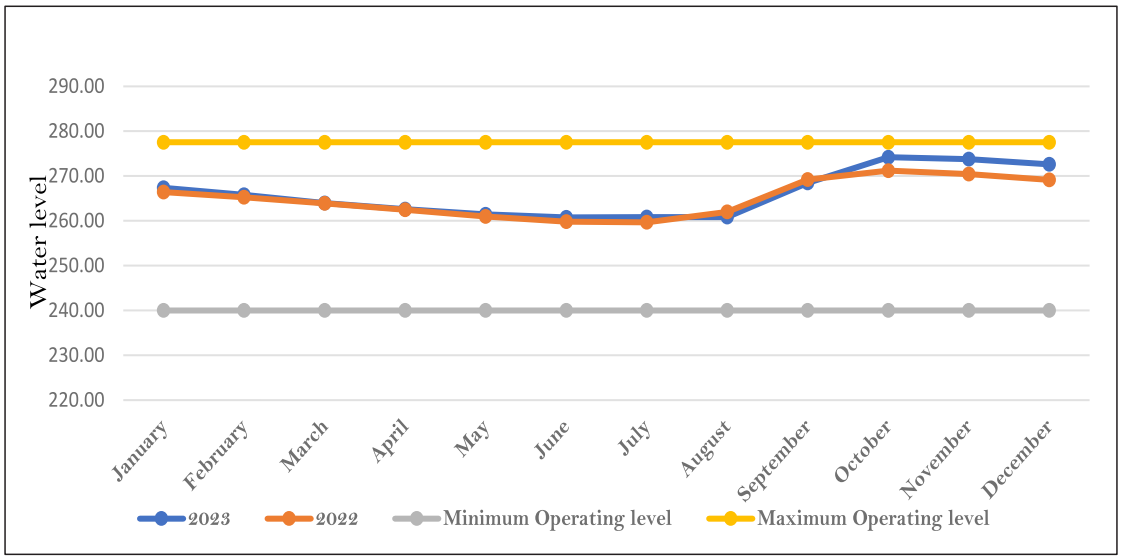
The Akosombo Dam water level increased by 0.048ft per day in October, 2023 to 1.5ft from September, 2023. The notable rise in precipitation has caused water levels to surpass the dam's maximum operational capacity. Aware of the possibility of a dam breach, the spillage exercise started on September 15, 2023 at a discharge rate of 183,000 cubic feet per second (cfs/day). Because of the water level's continuous rise, the discharge rate was increased on October 9, 2023.

As a result of the increase in the spillage of Akosombo dam in October, 2023, The Akosombo water level began to decline in November, 2023 at a rate of 0.028ft per day. The water level decreased by 0.86ft in November, 2023 from 276.98ft at the beginning of the month to 276.12ft at the end of the month.

The water level continued to decline in December, 2023 at an average of 0.039ft. Comparatively, the end months water level for October, November and December, 2023 was 2.99ft, 3.34ft and 3.47ft above the water level in the same periods as 2022. The end year water level for 2023 was 272.58ft which was 5.18ft higher than the 267.40ft recorded at the beginning of the year

Figure 1. shows the comparative end-of-month trajectory of the level of water in the Akosombo Dam from January 2022 to December 2023

Figure 1: Month-End Water Level for Akosombo Dam from January 2022 to December 2023.



The Bui Dam water level began to drop in November, 2023

Bui dam's water level increased in October, 2023 from September, 2023 but reduced from November, 2023 to the end of the year. The beginning month water level for October, 2023 was 579.53ft at a rate of 0.32 feet to 589.37ft at the end month resulting in a 9.84ft increase.

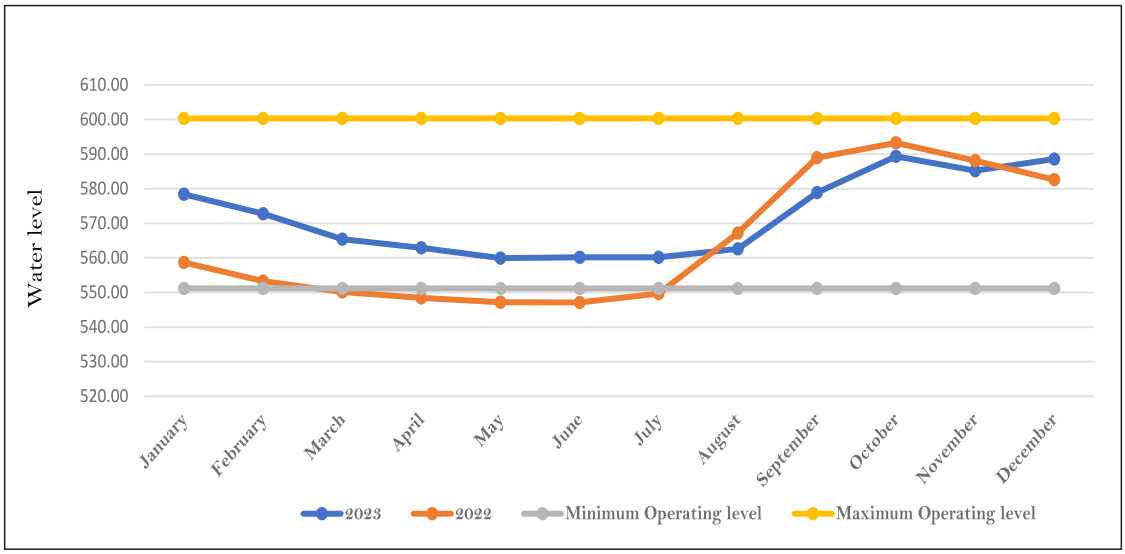
The water level then declined in the months of November and December, 2023.The Bui GS witnessed an average decrease of 0.14ft per day in November, 2023. At the end of November, 2023, the end month water level stood at 585.24ft lower than the 594.09ft recorded in 2022 but higher than the minimum operating level. In November, 2023 the dam operated 15.1ft below the maximum operating level.

The rate of drop increased in December 2023, from 0.14ft per day in November 2023 to 0.33feet per day. The water level reduced from 589.92ft to 588.58ft at the end of December, 2023. This meant that, the water level at the end of December, 2023 was 37.4ft higher than the minimum operating level of 551.18ft.

Comparatively, the end year water level for the year 2023 was 10.2ft higher than the 578.38ft recorded at the beginning of the year.

Figure 2 shows the comparative end-of-month trajectory of the level of water in the Bui dam from January 2022 to December 2023

Figure 2: Month-End Water Level for Bui Dam from January 2022 to December 2023



FUEL SUPPLY FOR POWER GENERATION

Natural gas imports reduced in the 4th quarter of 2023

The supply of natural gas from Nigeria through the West African gas pipeline reduced from 51.11MMscfd in the 3rd quarter of 2024 to 44.47MMscfd in the 4th quarter of 2024. This represents a 14.9% decrease in natural gas import. Natural gas imports accounted for 17.1% in the total fuel mix and 18.5% in the natural gas supply mix.

Natural gas supply from domestic sources increased in the 4th quarter of 2023

The average natural gas supply for October, November and December 2023 was 236.48MMscfd which was higher than the average gas supply of 204.64MMscfd in the 3rd quarter, On the average, natural gas supply from domestic sources accounted for 75.6% in the total fuel mix and 81.5% in the gas supply mix.

Consumption in liquid fuel increased in November, 2023

In October 2023, 88,731bbls made up of 21,987bbls LCO, 289bbls DFO and 66,454bbls was used. Furthermore, November 2023 recorded fuel consumption of 136,585bbls which was more than what recorded in October, 2023 and consisted 104,623bbls LCO, 551bbls DFO, and 31,411bbls HFO. December's fuel consumption dwindled to 43, 247bbls made up of 5,733 DFO and 37,513bbls HFO. On the average, liquid fuel accounted for an average of 7.3% in the total fuel mix in the 4th quarter of 2023

The table below shows the shares of the various liquid fuel consumed in the 4th quarter of 2023.

2023	LCO	DFO	HFO
October	36.5%	0.5%	63%
November	74.1%	0.4%	25.5%
December	-	11.9%	88.1%

The plants responsible for the consumption of the liquid fuels, LCO and DFO and HFO in 4th quarter was Cenpower, AKSA, Karpower and KTPP.

Monthly Market Data Analysis for October, 2023

Figure 3a: Shares of sources of fuel in the total fuel mix for power generation

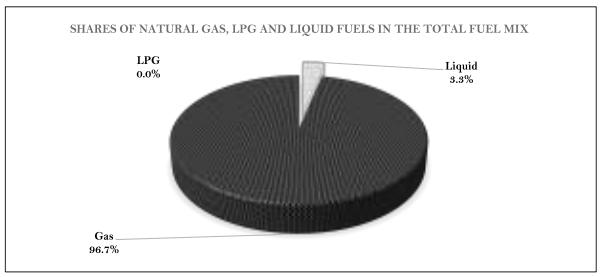


Figure 3b: Shares of fuel types in the generation fuel mix of power generation

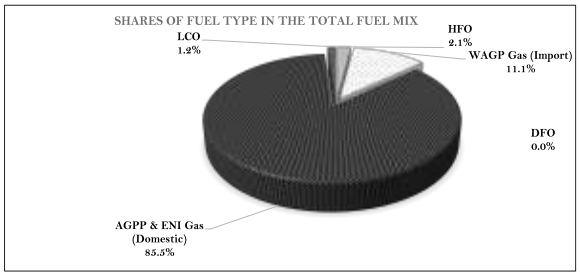


Figure 4a: Contribution of Natural Gas Supply by sources

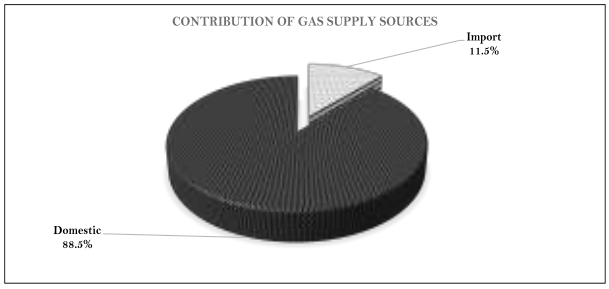


Figure 4b: Contribution of individual fuel in the liquid fuel supply

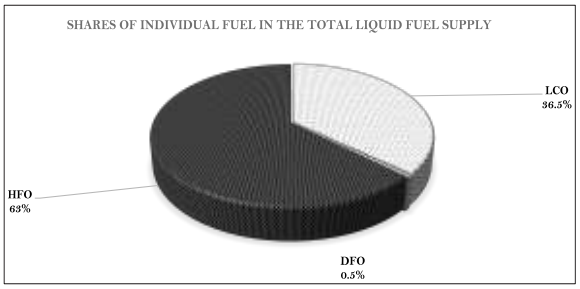


Figure 5a: Electricity Supply by sources

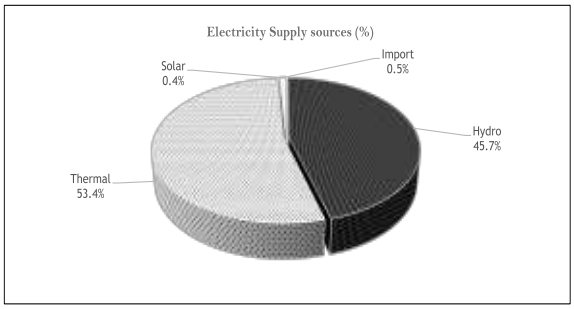
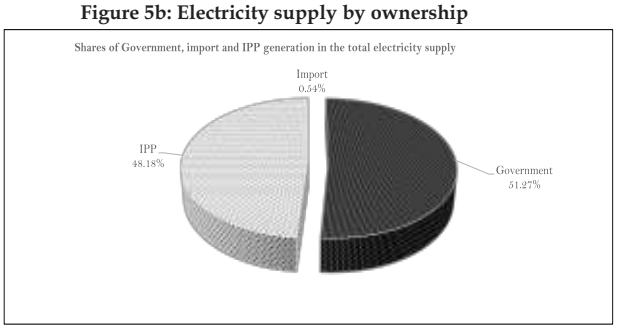


Figure 5b: Electricity supply by ownership



Peak Electricity Supply for October 2023		
Source of Supply	Generation at System Peak Load (MW)	Generation at Ghana Peak Load (MW)
AKOSOMBO	967.90	935.30
KPONG	109.20	136.00
BUI	363.50	363.50
BUI Solar	-	-
SEAP	461.70	359.20
TAPCO	105.50	-
TICO	349.00	219.00
TT1PP	-	-
CENIT	-	-
TT2PP	-	-
TWIN CITY	198.40	196.20
KARPOWER	439.60	451.60
AMERI	-	-
KTPP	-	-
Trojan Power	-	-
CENPOWER	-	230.00
AKSA	171.90	212.90
Bridge Power	-	-
IMPORT	-	17.00
Export to CIE at peak	60.00	-
Export to CEB at peak	147.00	117.00
Export to Sonabel	156.00	169.00
System Coincident Peak Load	**3,166.70**	
Ghana Coincedent Peak Load		**2,834.70**

October 2023 Average Monthly Natural Gas Flowrate (MMSCFD)	
Location	Monthly Average
Etoki	44.52
Tema WAGPCo	130.32
Aboadze WAGPCo	127.47
Eni	187.93
Ghana Gas	92.03
Reverse Flow	79.98

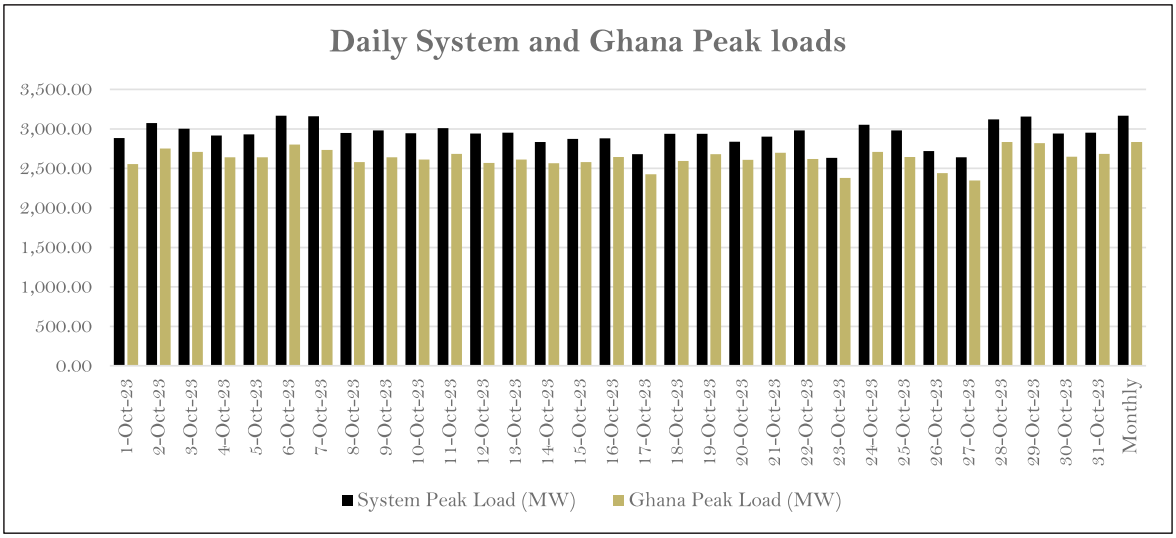
Monthly Average Electricity Prices in the WEM				
		Oct-23	Aug-23	Change
Average Market Price (AMP)	US$/MWh	107.77	103.95	3.82
System Marginal Cost (SMC)	US$/MWh	117.89	96.33	21.56
System Marginal Price (SMP)	US$/MWh	134.47	115.22	19.24

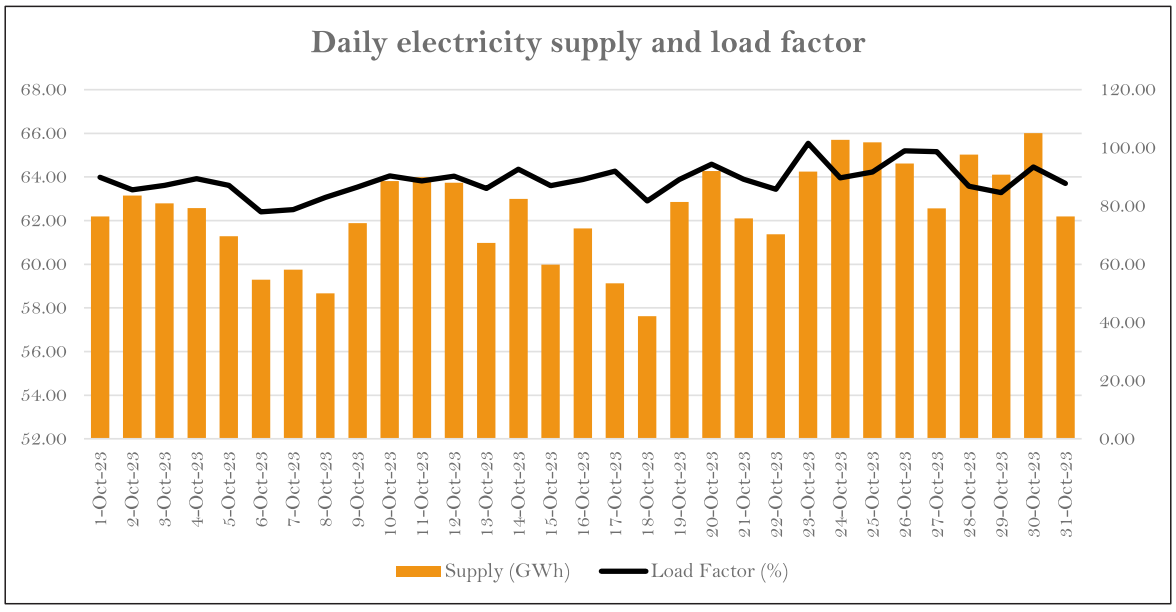
	Month Average fuel prices				
	Gazetted Natural Gas Price	Weighted average natural gas price	LCO	HFO	DFO
US$/MMBtu	8.1221	7.05	17.24	15.05	34.38

Power Plants	Average fuel price (US$/MMBtu)	
TAPCO	8.12	
TICO	8.12	
SAPP	8.12	
TT2PP	0.00	
TT1PP	8.12	
CENIT	8.12	
KARPOWERSHIP	8.12	
AMERI PLANT	0.00	
KPONE THERMAL	8.12	
CENPOWER	9.67	
AKSA ENERGY	10.69	
Twin City	8.12	
Bridgepower	8.12	

	Weekly Electricity Supply (GWh)				
	Week 1	Week 2	Week 3	Week 4	Total
AKOSOMBO	140.50	143.28	139.75	207.40	630.92
KPONG	17.88	12.04	10.05	25.56	65.52
BUI Hydro	50.81	40.97	36.38	59.96	188.12
Bui Solar	1.00	1.44	1.41	2.38	6.23
VRA Kaleo	0.31	0.36	0.38	0.58	1.62
SAPP	55.65	55.33	60.31	89.30	260.58
TAPCO	26.23	0.00	0.00	0.00	26.23
TICO	33.59	54.73	46.76	51.43	186.51
TT1PP	6.60	15.31	17.02	23.53	62.46
CENIT	0.00	15.32	12.31	10.32	37.95
TT2PP	0.00	0.00	9.08	0.00	9.08
Twin City	31.51	32.02	29.26	44.72	137.51
KARPOWER	29.24	25.71	29.64	76.69	161.28
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	2.49	0.00	0.00	0.00	2.49
Cenpower	21.84	26.76	15.47	20.22	84.30
AKSA	11.76	11.64	14.88	23.76	62.03
Bridge Power	0.24	0.00	0.00	0.00	0.24
Import	1.39	1.14	2.43	5.55	10.52
Total	431.04	436.05	425.13	641.39	1,933.60

		Fuel Consumption (MMBtu)			
	Heat rate (Btu/kWh)	Natural gas	LCO	HFO	DFO
TAPCO	14,226.30	373,155.80	-	-	-
TICO	9,087.09	1,694,835.62	-	-	-
SAPP	8,448.08	2,201,427.98	-	-	-
TT2PP	-	-	-	-	-
TT1PP	18,409.46	1,149,875.42	-	-	-
CENIT	12,821.94	486,572.11	-	-	-
KARPOWERSHIP	8,266.15	1,333,165.94	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	11,493.65	28,646.79	-	-	-
CENPOWER	8,100.53	566,539.91	116,314.43	-	-
AKSA ENERGY	8,738.27	340,885.43	-	201,190.40	-
Twin City	7,941.43	1,092,012.96	-	-	-
Bridgepower	13,552.53	3,306.82	-	-	-


Daily System and Ghana Peak loads
3,500.00
3,000.00
2,500.00
2,000.00
1,500.00
1,000.00
500.00
0.00
1-Oct-23
2-Oct-23
3-Oct-23
4-Oct-23
5-Oct-23
6-Oct-23
7-Oct-23
8-Oct-23
9-Oct-23
10-Oct-23
11-Oct-23
12-Oct-23
13-Oct-23
14-Oct-23
15-Oct-23
16-Oct-23
17-Oct-23
18-Oct-23
19-Oct-23
20-Oct-23
21-Oct-23
22-Oct-23
23-Oct-23
24-Oct-23
25-Oct-23
26-Oct-23
27-Oct-23
28-Oct-23
29-Oct-23
30-Oct-23
31-Oct-23
Monthly
System Peak Load (MW)
Ghana Peak Load (MW)


Daily electricity supply and load factor
68.00
66.00
64.00
62.00
60.00
58.00
56.00
54.00
52.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1-Oct-23
2-Oct-23
3-Oct-23
4-Oct-23
5-Oct-23
6-Oct-23
7-Oct-23
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24-Oct-23
25-Oct-23
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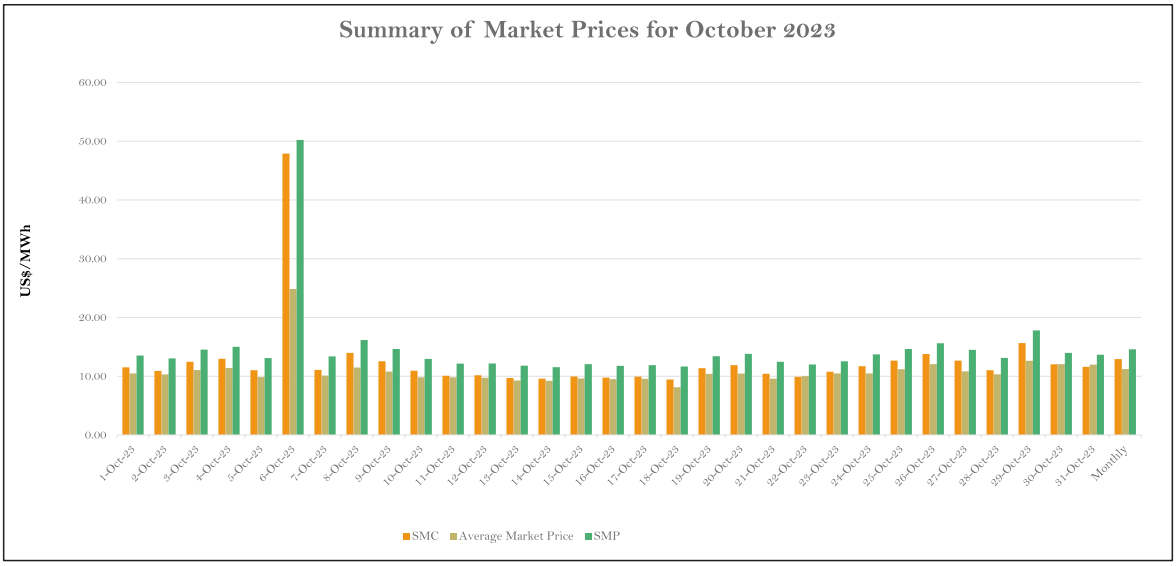
30-Oct-23
31-Oct-23
Supply (GWh)
Load Factor (%)


Summary of Market Prices for October 2023
US$/MWh
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1-Oct-23
2-Oct-23
3-Oct-23
4-Oct-23
5-Oct-23
6-Oct-23
7-Oct-23
8-Oct-23
9-Oct-23
10-Oct-23
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22-Oct-23
23-Oct-23
24-Oct-23
25-Oct-23
26-Oct-23
27-Oct-23
28-Oct-23
29-Oct-23
30-Oct-23
31-Oct-23
Monthly
SMC
Average Market Price
SMP

Monthly Market Data Analysis for November, 2023

Figure 3a: Shares of sources of fuel in the total fuel mix for power generation

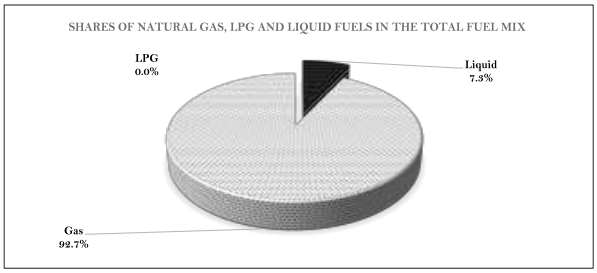


Figure 3b: Shares of fuel types in the generation fuel mix of power generation

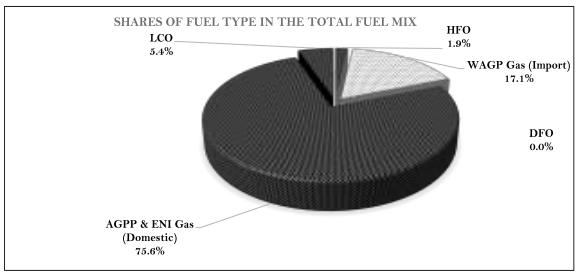


Figure 4a: Contribution of Natural Gas Supply by sources

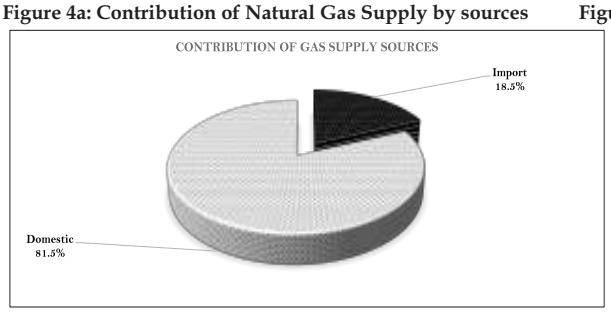


Figure 4b: Contribution of individual fuel in the liquid fuel supply

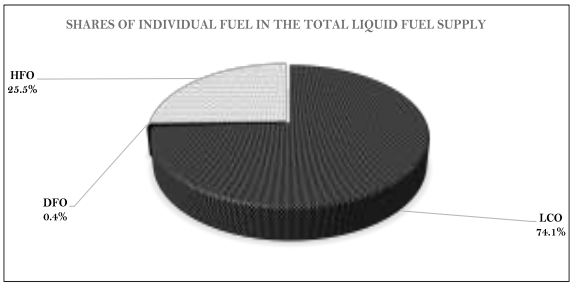


Figure 5a: Electricity Supply by sources

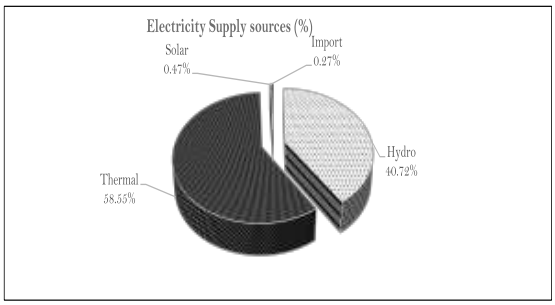
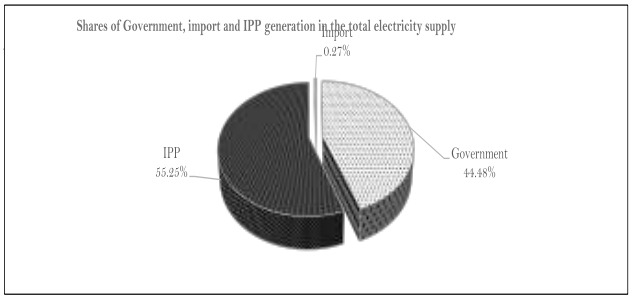


Figure 5b: Electricity supply by ownership



Peak Electricity Supply for November 2023		
Source of Supply	Generation at System Peak Load (MW)	Generation at Ghana Peak Load (MW)
AKOSOMBO	817.00	817.00
KPONG	148.00	148.00
BUI	357.40	357.40
BUI Solar	-	-
SEAP	363.20	363.20
TAPCO	-	-
TICO	337.00	337.00
TT1PP	-	-
CENIT	-	-
TT2PP	-	-
TWIN CITY	196.20	196.20
KARPOWER	454.70	454.70
AMERI	-	-
KTPP	103.00	103.00
Trojan Power	-	-
CENPOWER	366.00	366.00
AKSA	258.20	258.20
Bridge Power	63.60	63.60
IMPORT	64.00	64.00
Export to CIE at peak	-	-
Export to CEB at peak	263.00	263.00
Export to Sonabel	189.00	189.00
System Coincident Peak Load	**3,528.30**	
Ghana Coincedent Peak Load		**3,076.30**

November, 2023 Average Monthly Natural Gas Flowrate (MMSCFD)	
Location	Monthly Average
ENI	204.13
Etoki	55.50
Tema WAGPCo	136.43
Aboadze WAGPCo	148.58
Ghana Gas	86.20
Reverse Flow	78.58

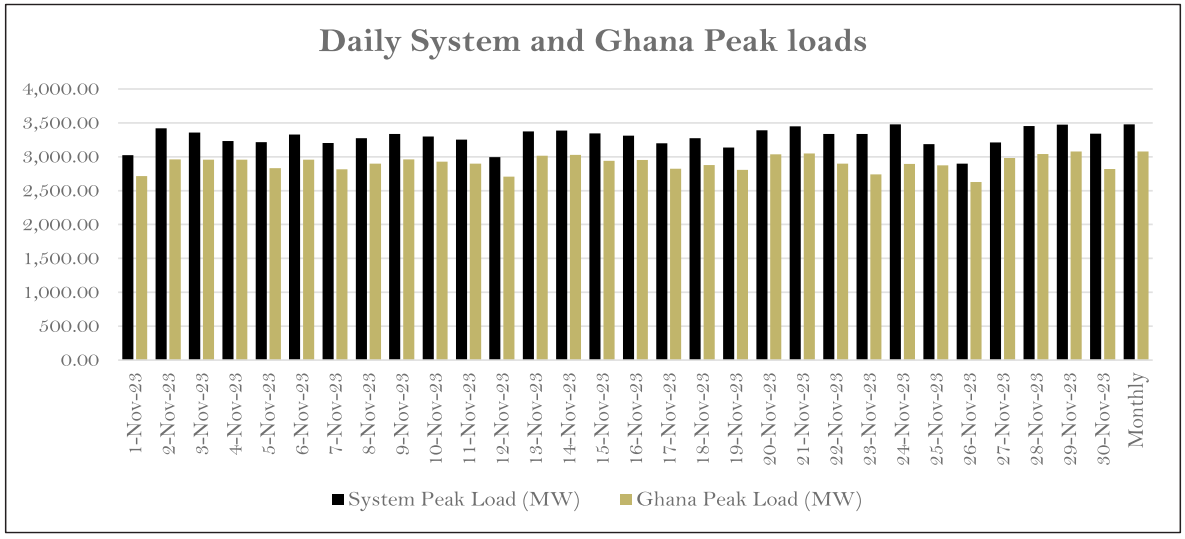
Monthly Average Electricity Prices in the WEM				
		Nov-23	Oct-23	Change
Average Market Price (AMP)	US$/MWh	110.29	107.77	2.52
System Marginal Cost (SMC)	US$/MWh	116.82	117.89	-1.07
System Marginal Price (SMP)	US$/MWh	140.01	134.47	5.54

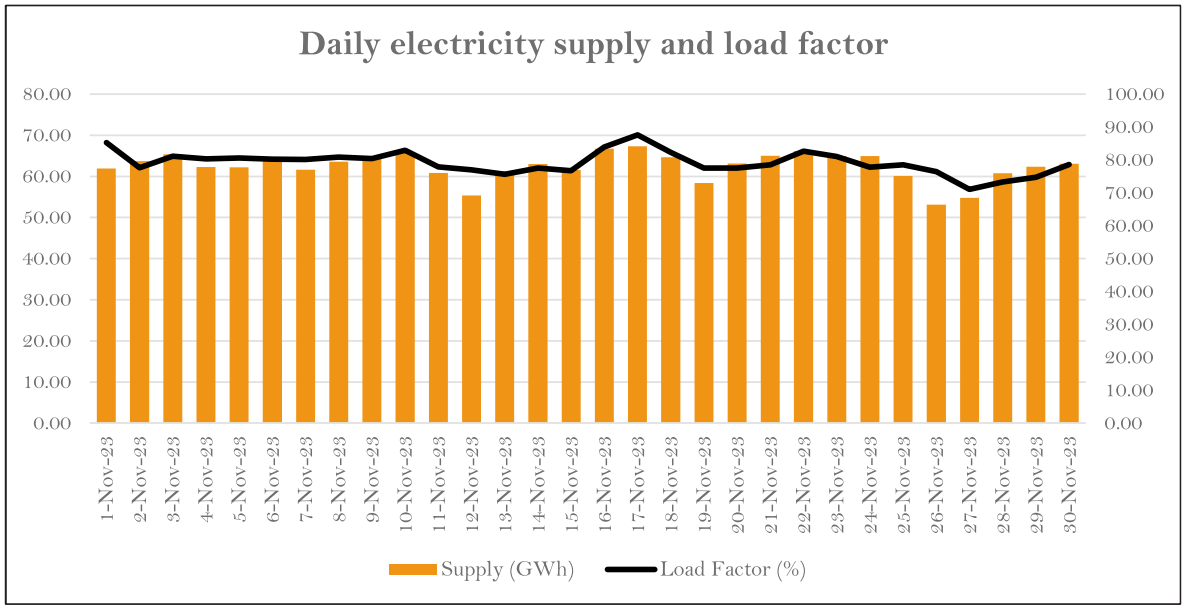
	Month Average fuel prices					
	Gazetted Natural Gas Price	Weighted average natural gas price	LCO	HFO	DFO	LPG
US$/MMBtu	6.08	6.69	22.37	18.37	38.48	17.96

Power Plants	Average fuel price (US$/MMBtu)
TAPCO	0.00
TICO	6.08
SAPP	6.08
TT2PP	0.00
TT1PP	6.08
CENIT	6.08
KARPOWERSHIP	6.08
AMERI PLANT	0.00
KPONE THERMAL	6.17
CENPOWER	11.11
AKSA ENERGY	11.80
Twin City	6.08
Bridgepower	6.08

	Weekly Electricity Supply (GWh)				
	Week 1	Week 2	Week 3	Week 4	Total
AKOSOMBO	139.58	143.71	147.83	186.46	617.57
KPONG	23.37	24.28	24.55	32.28	104.48
BUI Hydro	31.02	37.77	30.02	49.57	148.39
Bui Solar	1.74	1.86	1.79	2.29	7.69
VRA Kaleo	0.38	0.39	0.61	0.96	2.35
SAPP	58.86	52.35	53.31	77.85	242.37
TAPCO	0.00	0.00	0.00	0.00	0.00
TICO	16.54	9.74	0.00	0.00	26.28
TT1PP	16.54	9.74	0.00	0.00	26.28
CENIT	0.70	4.65	16.84	1.19	23.38
TT2PP	0.00	0.00	0.00	0.00	0.00
Twin City	26.39	26.23	31.90	44.63	129.14
KARPOWER	57.24	61.95	58.71	95.30	273.21
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	0.00	5.80	14.79	23.62	44.21
Cenpower	56.00	35.96	55.20	76.17	223.33
AKSA	11.11	18.43	7.10	10.47	47.10
Bridge Power	0.24	0.30	3.24	7.10	10.88
Import	1.40	0.88	0.85	2.62	5.75
Total	441.10	434.03	446.76	610.51	1,932.41

		Fuel Consumption (MMBtu)			
	Heat rate (Btu/kWh)	Natural gas	LCO	HFO	DFO
TAPCO	-	-	-	-	-
TICO	68,447.47	1,798,799.42	-	-	-
SAPP	8,605.36	2,085,705.18	-	-	-
TT2PP	-	-	-	-	-
TT1PP	13,339.29	350,556.48	-	-	-
CENIT	12,101.18	282,868.32	-	-	-
KARPOWERSHIP	8,099.57	2,212,845.52	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	11,426.37	503,719.88	-	-	1,463.95
CENPOWER	8,070.20	1,247,377.82	553,457.32	-	1,496.72
AKSA ENERGY	8,839.22	222,694.23	-	193,666.77	-
Twin City	7,843.86	1,012,992.29	-	-	-
Bridgepower	9,187.59	99,997.73	-	-	-


Daily System and Ghana Peak loads
4,000.00
3,500.00
3,000.00
2,500.00
2,000.00
1,500.00
1,000.00
500.00
0.00
1-Nov-23
2-Nov-23
3-Nov-23
4-Nov-23
5-Nov-23
6-Nov-23
7-Nov-23
8-Nov-23
9-Nov-23
10-Nov-23
11-Nov-23
12-Nov-23
13-Nov-23
14-Nov-23
15-Nov-23
16-Nov-23
17-Nov-23
18-Nov-23
19-Nov-23
20-Nov-23
21-Nov-23
22-Nov-23
23-Nov-23
24-Nov-23
25-Nov-23
26-Nov-23
27-Nov-23
28-Nov-23
29-Nov-23
30-Nov-23
Monthly
System Peak Load (MW)
Ghana Peak Load (MW)


Daily electricity supply and load factor
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1-Nov-23
2-Nov-23
3-Nov-23
4-Nov-23
5-Nov-23
6-Nov-23
7-Nov-23
8-Nov-23
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10-Nov-23
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22-Nov-23
23-Nov-23
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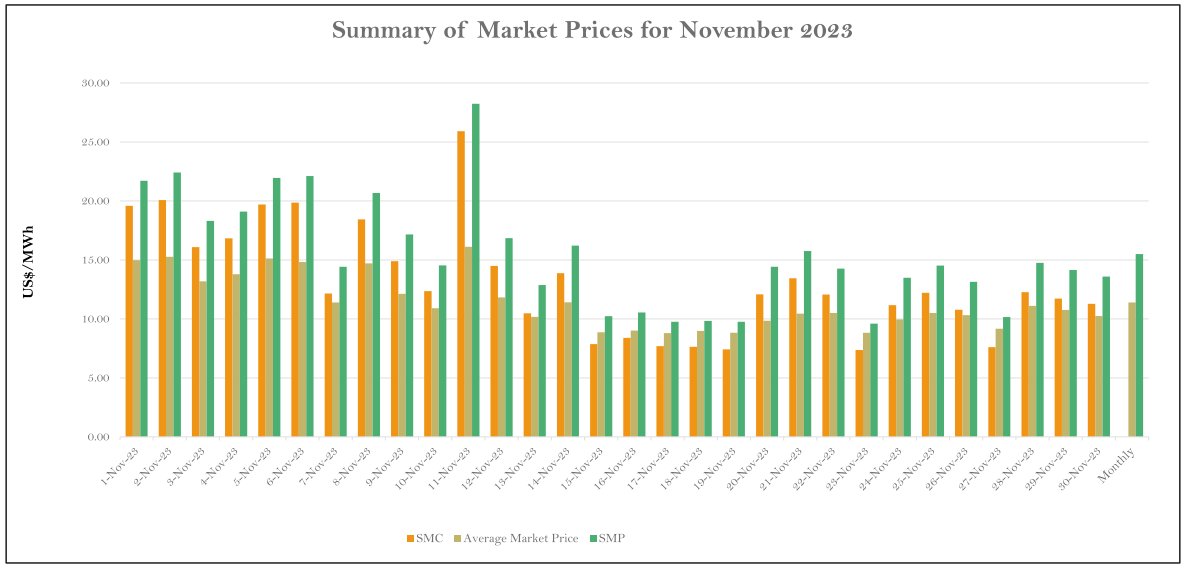
28-Nov-23
29-Nov-23
30-Nov-23
Supply (GWh)
Load Factor (%)


Summary of Market Prices for November 2023
US$/MWh
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1-Nov-23
2-Nov-23
3-Nov-23
4-Nov-23
5-Nov-23
6-Nov-23
7-Nov-23
8-Nov-23
9-Nov-23
10-Nov-23
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18-Nov-23
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20-Nov-23
21-Nov-23
22-Nov-23
23-Nov-23
24-Nov-23
25-Nov-23
26-Nov-23
27-Nov-23
28-Nov-23
29-Nov-23
30-Nov-23
Monthly
SMC
Average Market Price
SMP

Monthly Market Data Analysis for December, 2023

Figure 3a: Shares of sources of fuel in the total fuel mix for power generation

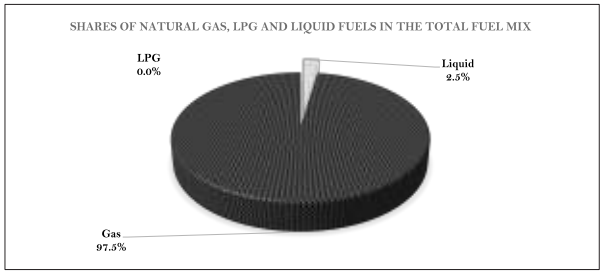


Figure 3b: Shares of fuel types in the generation fuel mix of power generation

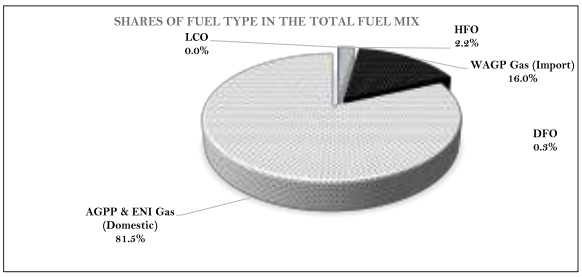


Figure 4a: Contribution of Natural Gas Supply by sources

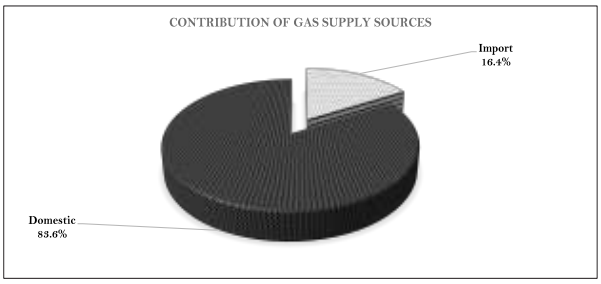


Figure 4b: Contribution of individual fuel in the liquid fuel supply

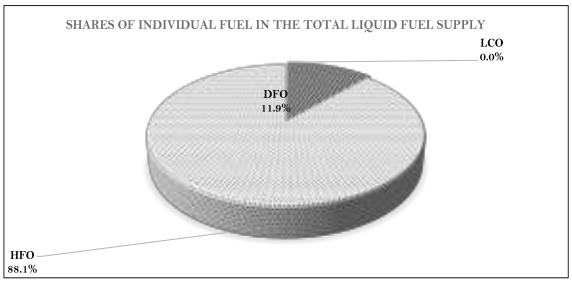


Figure 5a: Electricity Supply by sources

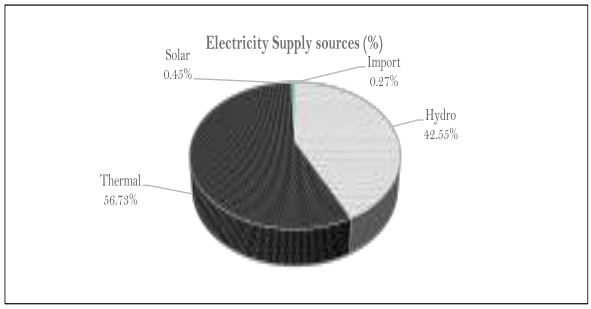
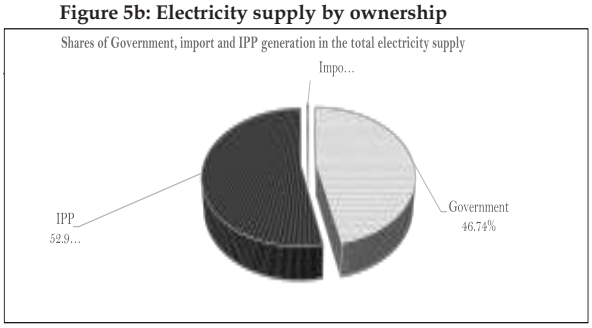


Figure 5b: Electricity supply by ownership



Peak Electricity Supply for December 2023		
Source of Supply	Generation at System Peak Load (MW)	Generation at Ghana Peak Load (MW)
AKOSOMBO	997.50	997.50
KPONG	148.00	148.00
BUI	339.00	339.00
BUI Solar	-	-
SEAP	235.60	235.60
TAPCO	-	-
TICO	336.00	336.00
TT1PP	-	-
CENIT	-	-
TT2PP	-	-
TWIN CITY	191.00	191.00
KARPOWER	458.20	458.20
AMERI	-	-
KTPP	101.00	101.00
Trojan Power	-	-
CENPOWER	327.00	327.00
AKSA	296.40	296.40
Bridge Power	187.90	187.90
IMPORT	-	-
Export to CIE at peak	168.00	168.00
Export to CEB at peak	180.00	180.00
Export to Sonabel	150.00	150.00
System Coincident Peak Load	**3,617.60**	
Ghana Coincedent Peak Load		**3,119.60**

December, 2023 Average Monthly Natural Gas Flowrate (MMSCFD)	
Location	Monthly Average
ENI	202.23
Etoki	54.91
Tema WAGPCo	152.29
Aboadze WAGPCo	156.64
Ghana Gas	78.64
Reverse Flow	80.48

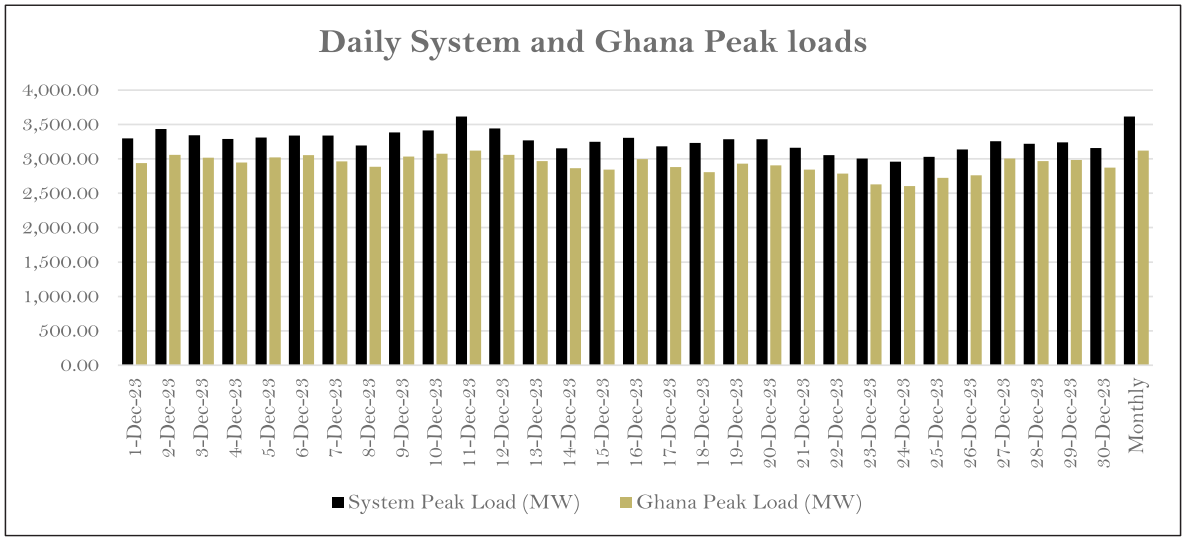
Monthly Average Electricity Prices in the WEM				
		Dec-23	Nov-23	Change
Average Market Price (AMP)	US$/MWh	119.39	110.29	9.10
System Marginal Cost (SMC)	US$/MWh	149.35	116.82	32.53
System Marginal Price (SMP)	US$/MWh	159.47	140.02	19.45

	Month Average fuel prices					
	Gazetted Natural Gas Price	Weighted average natural gas price	LCO	HFO	DFO	LPG
US$/MMBtu	5.97	6.43	22.37	18.37	38.48	17.96

Power Plants	Average fuel price (US$/MMBtu)
TAPCO	0.00
TICO	5.97
SAPP	5.97
TT2PP	0.00
TT1PP	5.97
CENIT	5.97
KARPOWERSHIP	5.97
AMERI PLANT	0.00
KPONE THERMAL	8.42
CENPOWER	5.97
AKSA ENERGY	11.42
Twin City	5.97
Bridgepower	5.97

	Weekly Electricity Supply (GWh)				
	Week 1	Week 2	Week 3	Week 4	Total
AKOSOMBO	143.13	144.48	147.97	204.66	640.23
KPONG	23.42	24.78	25.04	34.43	107.67
BUI Hydro	32.48	30.62	39.70	51.02	153.82
Bui Solar	1.80	1.73	1.70	2.11	7.34
VRA Kaleo	0.57	0.60	0.82	0.23	2.23
SAPP	57.04	40.42	36.95	10.39	144.80
TAPCO	0.00	0.00	0.00	0.00	0.00
TICO	56.25	50.55	36.02	53.62	196.44
TT1PP	0.00	1.45	17.17	24.44	43.06
CENIT	4.51	0.00	1.62	13.30	19.44
TT2PP	0.00	0.00	0.00	0.00	0.00
Twin City	30.27	31.30	30.74	44.30	136.61
KARPOWER	57.51	59.64	68.73	99.98	285.86
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	16.78	15.51	0.00	4.07	36.36
Cenpower	56.24	49.48	36.10	77.09	218.91
AKSA	3.60	7.66	19.01	25.54	55.81
Bridge Power	3.10	19.36	17.93	24.68	65.06
Import	0.49	1.42	1.86	1.97	5.74
Total	487.19	478.99	481.38	671.82	2,119.38

		Fuel Consumption (MMBtu)			
	Heat rate (Btu/kWh)	Natural gas	LCO	HFO	DFO
TAPCO	-	-	-	-	-
TICO	9,163.52	1,800,126.51	-	-	-
SAPP	8,404.86	1,217,020.11	-	-	-
TT2PP	-	-	-	-	-
TT1PP	13,023.46	560,790.15	-	-	-
CENIT	12,000.69	233,264.64	-	-	-
KARPOWERSHIP	8,036.38	2,297,262.85	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	11,233.63	377,639.20	-	-	30,788.79
CENPOWER	8,311.22	1,819,411.47	-	-	-
AKSA ENERGY	9,248.91	289,258.53	-	226,959.05	-
Twin City	7,867.18	1,074,739.73	-	-	-
Bridgepower	8,533.12	555,187.71	-	-	-


Daily System and Ghana Peak loads
4,000.00
3,500.00
3,000.00
2,500.00
2,000.00
1,500.00
1,000.00
500.00
0.00
1-Dec-23
2-Dec-23
3-Dec-23
4-Dec-23
5-Dec-23
6-Dec-23
7-Dec-23
8-Dec-23
9-Dec-23
10-Dec-23
11-Dec-23
12-Dec-23
13-Dec-23
14-Dec-23
15-Dec-23
16-Dec-23
17-Dec-23
18-Dec-23
19-Dec-23
20-Dec-23
21-Dec-23
22-Dec-23
23-Dec-23
24-Dec-23
25-Dec-23
26-Dec-23
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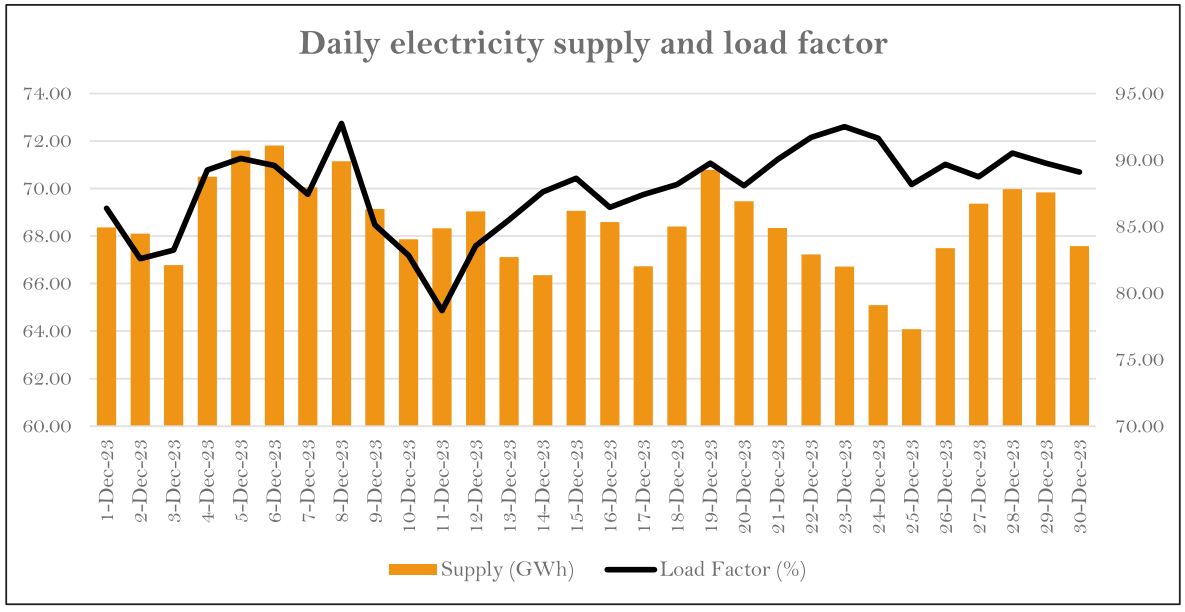
28-Dec-23
29-Dec-23
30-Dec-23
Monthly
System Peak Load (MW)
Ghana Peak Load (MW)


Daily electricity supply and load factor
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72.00
70.00
68.00
66.00
64.00
62.00
60.00
95.00
90.00
85.00
80.00
75.00
70.00
1-Dec-23
2-Dec-23
3-Dec-23
4-Dec-23
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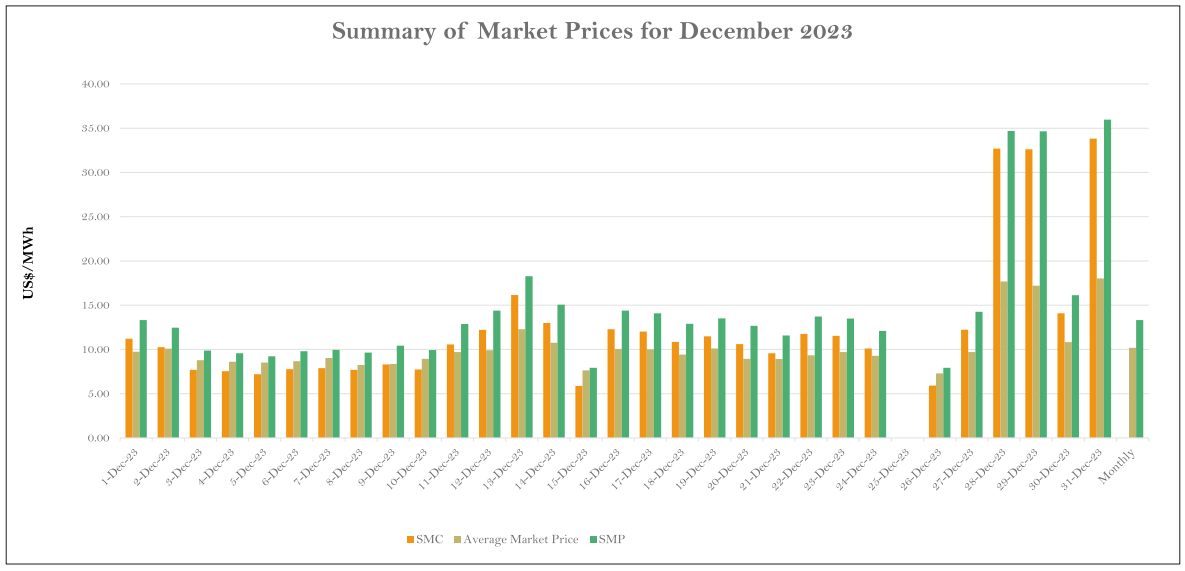
Supply (GWh)
Load Factor (%)


Summary of Market Prices for December 2023
US$/MWh
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1-Dec-23
2-Dec-23
3-Dec-23
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30-Dec-23
31-Dec-23
Monthly
SMC
Average Market Price
SMP

AKOSOMBO DAM SPILLAGE

The Akosombo Dam is a hydroelectric dam on the Volta River used to generate electricity and serves as the backbone for grid stability in Ghana and the sub-region especially Togo, Benin and Burkina Faso. The Akosombo Dam has a maximum operating capacity of 277.54 feet and a minimum operating capacity of 240 feet.

The dam witnessed an average decline of 0.05 feet per day from 272.58 feet at the beginning of 2023 to 264.79 feet on 27th June 2023 when the water level began to rise. The Akosombo spillway gates were opened to commence a control spilling operation to regulate the inflow into the reservoir on 15th September 2023, when the Headwater Level (HWL) was 272.50 feet following higher-than-expected inflows into the dam. The inflows into the dam increased from 0.05 feet per day in July 2023 to 0.09 feet per day in August 2023 and 0.20 feet per day in September 2023. In October 2023, the dam was receiving about 200% more water than the same period in 2022. Above-average inflows was obtained in 2023 culminating in a total net inflow for 2023 of 46.27 MAF (55.6 billion cubic meters). At the end of the spill which lasted for 46 days, a total of 8.42 MAF (10.4 billion cubic meters) of water was spilled.

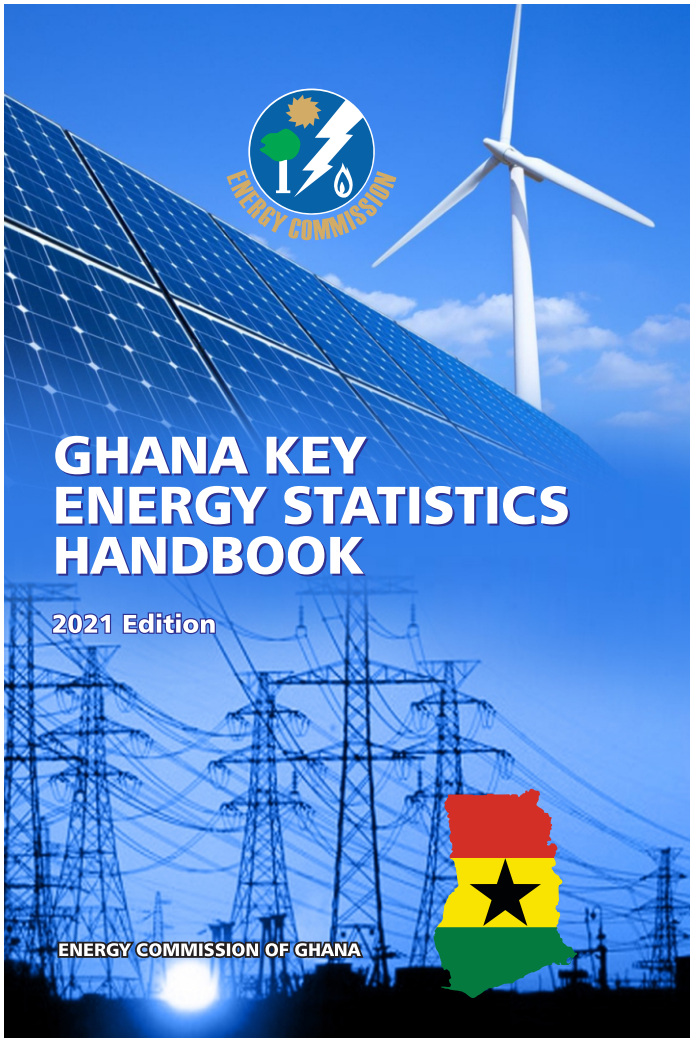
Before the commencement of the spillage, Volta River Authority (VRA), Managers of the Akosombo hydroelectric power plant released a press statement on 12th September 2023 notifying the public of the consistent rise in the water level and the need to commence spilling after it had undertaken several stakeholder engagements in May 2023 and triggered the Emergency Preparedness Protocol (EPP) in the beginning of September 2023. The spillage of the dam ended on 30th October 2023.

However, the controlled spilling operation, while necessary to prevent a potential disaster, resulted in adverse effects on downstream communities. Widespread flooding disrupted economic activities, leading to revenue loss and food shortages. Moreover, the spillage posed environmental and health risks, necessitating coordinated efforts for relief and rehabilitation.

The proactive approach adopted by the VRA, including stakeholder engagements, the activation of emergency protocols, and timely public communication, demonstrates a commitment to safeguarding both the dam's integrity and the well-being of affected communities. The allocation of funds in the 2024 budget to support flood-affected regions underscores the government's recognition of the need for comprehensive assistance and reconstruction efforts.

While the spillage undoubtedly caused hardships, it ultimately averted a potentially catastrophic scenario. The collapse of the dam would have had far-reaching consequences, impacting not only local communities but also regional infrastructure and power transmission networks.

In conclusion, the management of the Akosombo Dam situation reflects a delicate balance between ensuring energy security and mitigating the risks posed by natural variability. While challenges remain in addressing the aftermath of the spillage, commendation is due to the VRA for its proactive measures and to the government for its commitment to supporting affected communities. Moving forward, ongoing monitoring and adaptive management will be essential to enhance resilience and minimize the impact of future incidents.



AGPP = Atuabu Gas Processing Plant
Btu = British Thermal Units
CBGC = Composite Bulk Generation Charge
CUF = Capacity Utilization Factor
DFO = Distillate Fuel Oil
EC = Energy Commission
ECG = Electricity Company of Ghana
EMOP = Electricity Market Oversight Panel
ESP – Electricity Supply Plan
FPSO = Floating Production, Storage and Offloading
GHp = Ghana Pesewa
GNGC = Ghana National Gas Company
GWh = Giga-watt Hours
HFO = Heavy Fuel Oil
KTPP = Kpone Thermal Power Plant
kWh = Kilo-watt hours
MRP = Mine Reserve Plant
LEAP = Long-range Energy Alternative Planning

For any enquiries please contact the:
EMOP Secretariat, Energy Commission, Accra.
Tel: 0302 813756/7/9 **E-mail:** emop@energycom.gov.gh