



# GHANA WHOLESALE ELECTRICITY MARKET BULLETIN

## MARKET WATCH

### Monthly Market Data Analysis

ISSUE NO. 89

1<sup>st</sup> September 2023 to 30<sup>th</sup> September 2023

This Bulletin covers major developments in the Wholesale Electricity Market (WEM) of Ghana from 1<sup>st</sup> September, 2023 to 30<sup>th</sup> September, 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.

Despite taking reasonable precautions to guarantee the accuracy of the information in this Bulletin at the time of publishing, we sincerely apologize for any mistakes, omissions, or inaccuracies that may have occurred. The Electricity Market Oversight Panel Secretariat (EMOPS) would be delighted to hear reader feedback on the Bulletin.

#### HIGHLIGHTS OF THE MONTH

The System Peak Load for September, 2023 was 3,175.06 MW which was lower than the 3,333MW projected in the 2023 Electricity Supply Plan (ESP). The System Peak Load recorded is made up of 2,829.06MW of the domestic demand and 346MW of export for September, 2023. The Ghana Peak Load which is Ghana's System demand excluding export for September, 2023 was 2,931.38MW which was marginally lower than 2,983MW projected in the 2023 Electricity Supply Plan.

The electricity supply averaged 56.7GWh per day in September, 2023 and this value was lower than the 61.9GWh per day projected in the 2023 ESP. A total of 1,701.53GWh was supplied in September, 2023 which was lower than the 1,858.4GWh projected in the 2023 ESP. Export to our neighboring countries for the month totaled 176.17GWh and it was lower than the 184.3GWh projected in the 2023 Electricity Supply Plan.

The regulated Market accounted for 77.8% of electricity purchased in the Ghana Wholesale Electricity Market in September, 2023. The de-regulated market accounted for 7.56% whilst the export market accounted for 14.64%.

The Akosombo Dam water level increased in September, 2023. The water level increased to 275.40 feet at the end of September, 2023 from 269.60feet at the end of August, 2023 at a rate of 0.19ft per day.

Bui dam's water level at the beginning of the month was 557.74 feet which decreased at a rate of 0.70ft per day at the end of September, 2023 at a water level of 578.87feet.

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

	August, 2023		September, 2023	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	1,877.7	1,828.1	1,858.4	1,701.5
Source by Power Plants (GWh)				
AKOSOMBO	513.4	518.0	444.8	587.1
KPONG	83.6	91.0	81.0	90.9
BUI	75.9	76.0	147.5	150.3
BUI Solar	12.8	-	12.8	2.9
Kaleo	1.9	1.4	1.9	1.6
Sumon Asogli	375.0	245.9	362.9	226.0
TAPCO	214.3	160.6	82.9	54.6
TICO	100.1	238.9	140.3	203.9
TT1PP	-	-	61.2	20.8
CENIT	-	3.3	-	-
TT2PP	6.3	-	6.3	-
Twin City	120.2	134.8	116.3	125.4
KARPOWER	55.1	197.3	152.8	74.8
AMERI	-	-	-	-
KTPP	63.2	76.0	-	40.7
CENPOWER	241.1	49.8	233.3	150.8
AKSA	6.8	20.2	6.5	33.7
Bridge Power	-	6.4	-	4.1
Total Domestic Supply (GWh)	1,869.7	1,819.6	1,850.5	1,767.5
Imports (GWh)	-	8.5	-	9.0
Total Supply (GWh)	1,869.7	1,828.1	1,850.5	1,776.5
Ghana Coincident Peak Load (MW)	2,930.0	2,761.1	2,983.0	2,931.4
System Coincident Peak Load (MW)	3,250.0	3,181.5	3,333.0	3,175.1

## HIGHLIGHTS OF THE MONTH

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 power plant was 81.9%

### ELECTRICITY TRADING

#### Electricity Demand

The System Peak Load for September, 2023 was 3,175.06MW as compared to 3,181.49MW in August, 2023. This was 0.2 % lower than what was recorded in August, 2023. This decrease is attributable to the decrease in export demand at the Peak Load.

The Ghana Peak Load increased in September, 2023 compared to August, 2023. The Ghana Peak load increased by 6.17% from 2,761.10MW in August, 2023 to 2,931.38MW in September, 2023. The load factor for September, 2023 was 74.43%.

Electricity export at the System Peak Load to CIE, CEB and SONABEL was 346MW in September, 2023 compared to 487MW in August, 2023. This was made up of 48MW, 130MW and 168MW for CIE, CEB and SONABEL respectively. The dwindle in the export for September, 2023 is attributable to the decrease in export demand to CIE.

The average electricity demand for September 2023 was 2,376.89MW compared to an average electricity demand in August, 2023 of 2,335.33MW. The average electricity demand therefore increased in September, 2023.

The average electricity demand for regulated market in September, 2023 was 1,849.07MW which is higher than 1,799.7MW recorded in August, 2023.

For the regulated markets, ECG accounted for 87.3% of the average demand whilst NEDCO and enclave power accounted for an average of 11.13% and 1.57% respectively.

The average demand for the de-regulated market was 179.66MW for September, 2023. The mines accounted for 92.44% whilst bulk customers accounted for 7.56% of the de-regulated market demand. Average demand in the export market was 348.16MW. Demand from neighboring countries accounted for 73.05% of demand whilst VALCO accounted for the rest

#### Electricity supply

A total of 1,701.53GWh of electricity was supplied in September, 2023 which was lower than the 1,828.06GWh supplied in August, 2023. Electricity supply averaged 56.72GWh per day in September, 2023 and was lower than the 58.96GWh supplied in August, 2023. In addition, domestic supply accounted for 99.49% of the total generation supplied while inadvertent imports from CIE accounted for 0.51%.

Electricity supplied by thermal plants in September, 2023 constituted 52.66% of the total electricity supplied. The contribution of electricity supplied from the solar power plant was 0.16% whilst hydro accounted for 46.66%. Hence, renewable energy accounted for 46.82% of the total supply in September, 2023. Thermal plants had a larger share of 52.66% in the electricity mix.

A total of 1,331.32GWh of electricity was supplied to the Regulated Market in September, 2023 whilst de-regulated market and export were supplied with 129.34GWh and 250.66GWh respectively.

A total of 190.04GWh of electricity was supplied to the export market in our neighboring countries in September, 2023. Electricity export to CIE was 11.56GWh which was lower than the 15.02GWh recorded in August, 2023. Export to CEB in September, 2023 was 67.54GWh which was also lower than the 89.81GWh recorded in August, 2023. Less than the 112.56GWh reported in August 2023, SONABEL's proportion of exporting electricity was 110.94GWh.

### HYDRO DAM LEVELS

#### Akosombo Dam increased in September, 2023

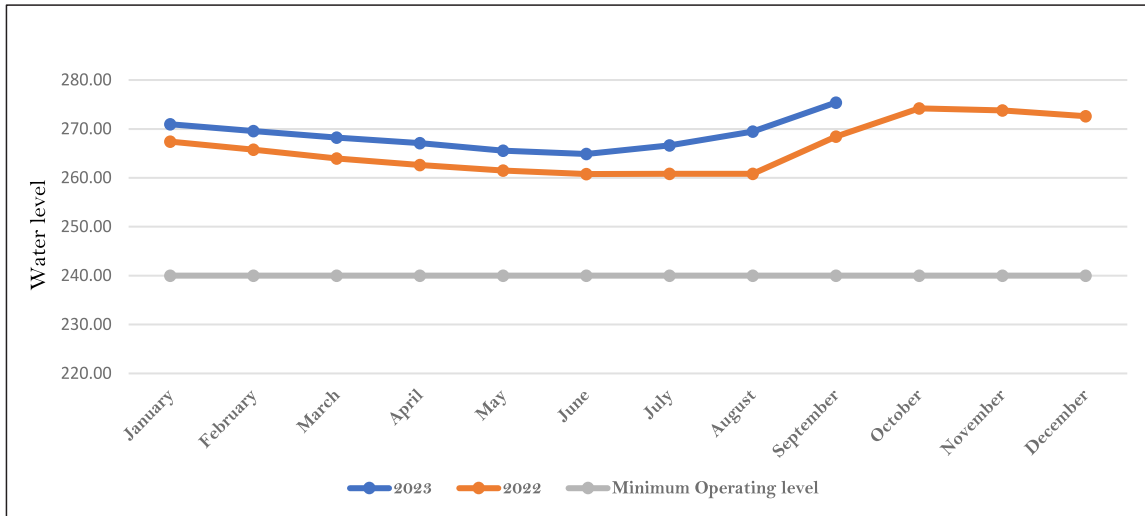
The Akosombo Dam water level increased by 0.19ft per day in September, 2023 from 0.09 ft per day in August, 2023. In the 3rd quarter of 2023, the Akosombo dam GS change in water level in August increased to 2.84 ft from July, 2023 whilst September 2023 recorded 5.8 ft increase in water level from August, 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.

Furthermore, the water level of 269.60 ft was recorded at the beginning of the month and 275.40 ft at the end of the month. The water level at the end of September, 2023 was 6.5ft above water level recorded for the same period in 2022 and 35.4ft above the minimum operating level of the dam.

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

## HIGHLIGHTS OF THE MONTH

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



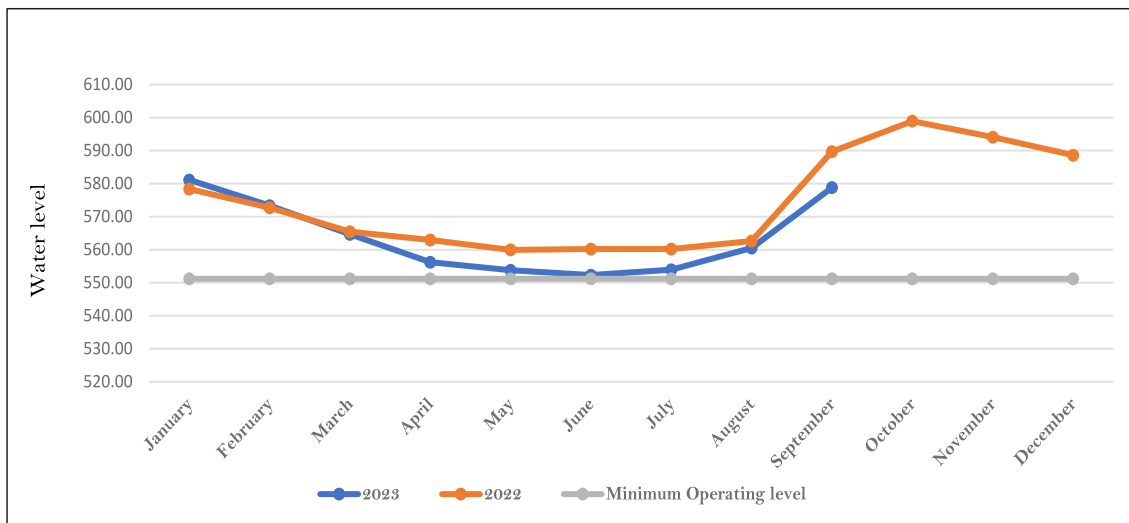
### Bui dam water level continued to increase

Bui dam water level increased in September, 2023. There was an increase in the water level from 557.74 ft at the beginning of the month to 578.87 ft at a rate of 0.70 ft at the end of the month resulting in 21.13ft increase in the water level at the end of September, 2023.

In September, 2023, the month end water level recorded was 10.8 6ft lower than what was recorded as the same period in 2022. The water level for the Bui dam was 27.69 ft above the minimum operating level of the power plant.

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

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



## FUEL SUPPLY FOR POWER GENERATION

### Natural gas imports decreased in September, 2023

The supply of natural gas from Nigeria through the West African gas pipeline decreased to 49.46MMscfd in September, 2023 from 49.56MMscfd in August, 2023. This represents a 0.2% decrease in natural gas import. Natural gas imports accounted for 20.7% in the total fuel mix and 25.3% in the natural gas supply mix.

### Natural gas supply from domestic sources decreased in September, 2023

The average natural gas supply for September 2023 from domestic sources was 141.68MMscfd which was lower than the gas supply of 235.90MMscfd in August, 2023. On the average natural gas from domestic sources accounted for 61.2% in the total fuel mix and 74.7% in the gas supply mix

### Consumption of liquid was recorded in September, 2023

In September, 273,547.48bbbls made up of 234,714.84bbbls LCO, 8,558.79bbbls DFO and 30,273.86bbbls HFO was used. On the average, liquid fuel accounted for an average of 17.4% in the total fuel mix. LCO accounted for 84.4% of the total liquid mix while DFO and HFO accounted for 3.1 and 12.5% respectively. The plants responsible for the consumption of the liquid fuels, LCO and DFO and HFO in September 2023 was SAPP, KTPP, AKSA and Cenpower

# OPERATIONAL FACT SHEET

## Monthly Market Data Analysis

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

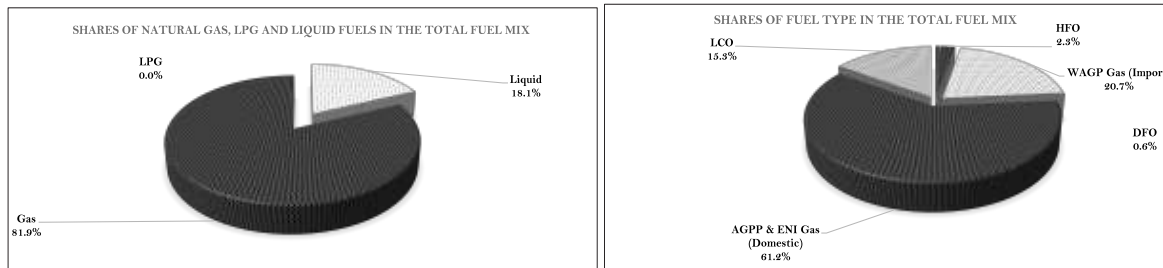


Figure 4a: Contribution of Natural Gas Supply by sources

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

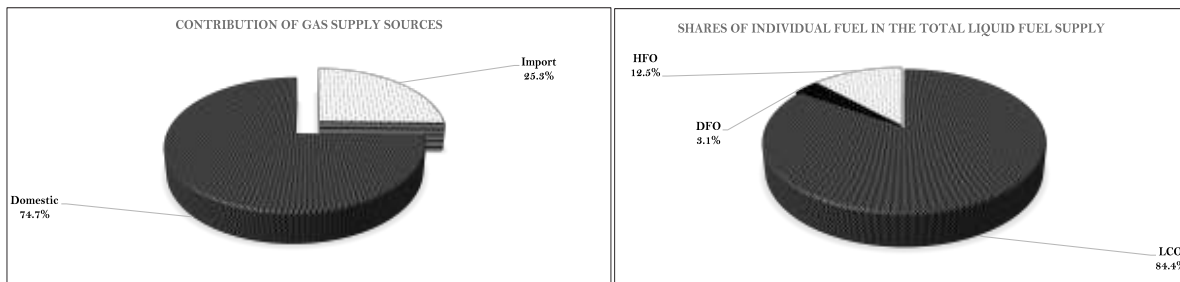
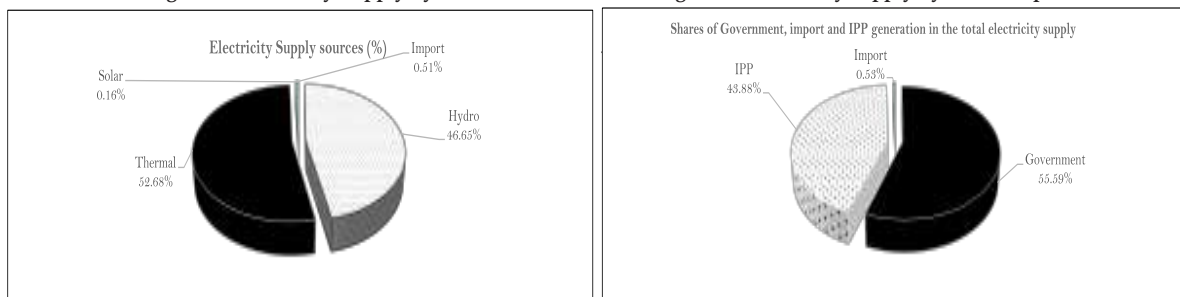


Figure 5a: Electricity Supply by sources

Figure 5b: Electricity supply by ownership



Peak Electricity Supply for September 2023

Source of Supply	Generation at System Peak Load (MW)	Generation at Ghana Peak Load (MW)
AKOSOMBO	890.30	879.85
KPONG	101.05	122.70
BUI	341.91	303.17
BUI Solar	-	-
SEAP	350.70	481.30
TAPCO	209.35	-
TICO	335.65	342.86
TT1PP	-	-
CENIT	-	-
TT2PP	-	-
TWIN CITY	197.70	195.00
KARPOWER	378.50	18.30
AMERI	-	-
KTPP	-	105.00
Trojan Power	-	-
CENPOWER	182.00	361.30
AKSA	187.90	184.90
Bridge Power	-	30.00
IMPORT	-	138.00
Export to CIE at peak	48.00	-
Export to CEB at peak	130.00	79.00
Export to Sonabel	168.00	152.00
<b>System Coincident Peak Load</b>	<b>3,175.06</b>	
<b>Ghana Coincedent Peak Load</b>		<b>2,931.38</b>

## OPERATIONAL FACT SHEET

September, 2023 Average Monthly Natural Gas Flowrate (MMSCFD)	
Location	Monthly Average
ENI	81.19
Takoradi Consumption	123.40
Etoki	66.13
Tema WAGPCo	87.86
Ghana Gas	73.96
Reverse Flow	23.55

Hydro Dam Water level for September, 2023			
	Beginning month (ft)	End month (ft)	Change in water level
Akosombo	269.60	275.40	5.80
Bui	557.74	578.87	21.13

Month Average fuel prices					
	Gazetted Natural Gas Price	LCO	HFO	DFO	LPG
US\$/MMBtu	8.1221	17.24	15.05	34.38	17.96

Monthly Average Electricity Prices in the WEM				
		Sep-23	Aug-22	Change
Average Market Price (AMP)	US\$/MWh	123.12	103.95	19.16
System Marginal Cost (SMC)	US\$/MWh	139.85	96.33	43.52
System Marginal Price (SMP)	US\$/MWh	161.80	115.22	46.58

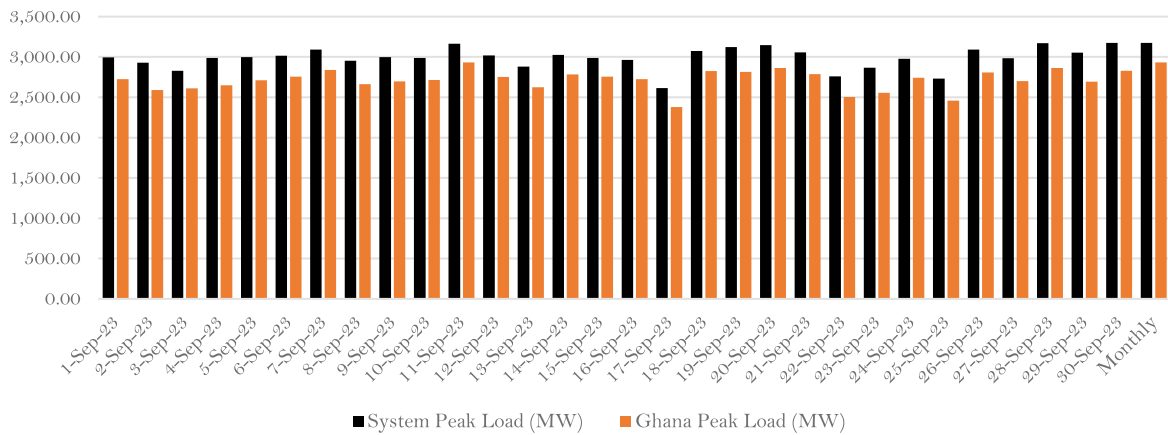
Power Plants	Average fuel price (US\$/MMBtu)
TAPCO	8.12
TICO	8.12
SAPP	10.51
TT2PP	0.00
TT1PP	8.12
CENIT	0.00
KARPOWERSHIP	8.12
AMERI PLANT	0.00
KPONE THERMAL	10.10
CENPOWER	11.17
AKSA ENERGY	10.79
Twin City	8.12
Bridgepower	8.12

# OPERATIONAL FACT SHEET

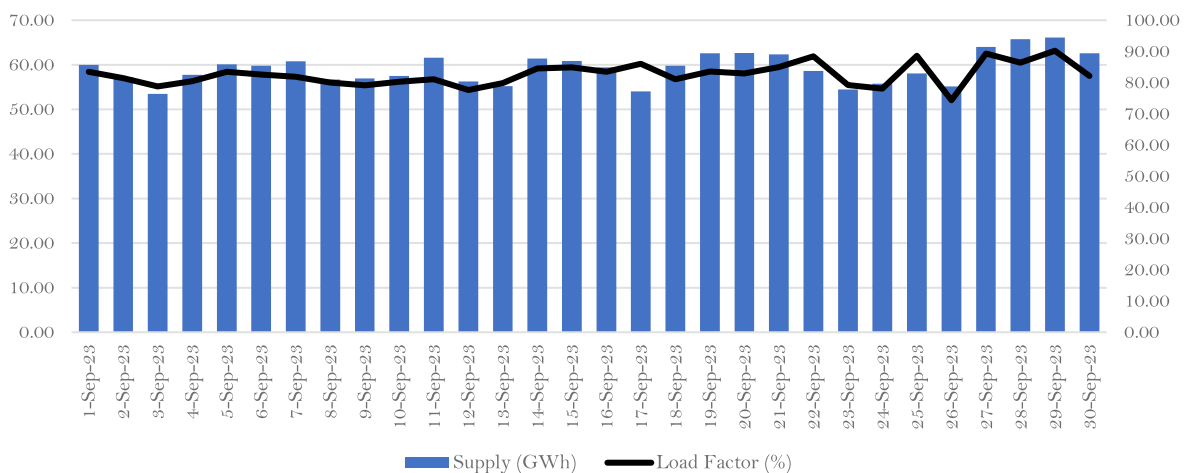
	Weekly Electricity Supply (GWh)				
	Week 1	Week 2	Week 3	Week 4	Total
AKOSOMBO	123.67	133.70	144.09	185.64	587.10
KPONG	21.95	23.07	22.32	23.54	90.88
BUI Hydro	25.57	30.51	37.01	57.19	150.28
Bui Solar	0.00	0.15	0.99	1.74	2.88
VRA Kaleo	0.33	0.23	0.29	0.46	1.31
SAPP	48.17	60.24	51.52	66.03	225.95
TAPCO	31.42	0.00	0.00	23.16	54.58
TICO	52.82	45.14	53.61	52.38	203.95
TT1PP	0.00	0.00	13.17	8.15	21.32
CENIT	0.00	0.00	0.00	0.00	0.00
TT2PP	0.00	0.00	0.00	0.00	0.00
Twin City	27.77	26.11	31.19	40.31	125.37
KARPOWER	29.58	3.89	3.08	38.30	74.84
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	17.31	19.00	3.14	1.25	40.70
Cenpower	25.74	51.91	48.15	25.01	150.81
AKSA	3.33	7.83	9.07	13.43	33.66
Bridge Power	0.00	0.96	1.43	1.73	4.12
Import	1.31	2.83	2.66	2.25	9.05
<b>Total</b>	<b>408.98</b>	<b>405.55</b>	<b>421.71</b>	<b>540.55</b>	<b>1,776.80</b>

	Fuel Consumption (MMBtu)				
	Heat rate (Btu/kWh)	Natural gas	LCO	HFO	DFO
TAPCO	11,623.47	634,409.03	-	-	-
TICO	8,037.48	1,639,239.01	-	-	-
SAPP	10,694.58	1,784,412.59	632,029.31	-	-
TT2PP	-	-	-	-	-
TT1PP	12,770.89	272,249.74	-	-	-
CENIT	-	-	-	-	-
KARPOWERSHIP	9,137.83	683,916.00	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	12,544.78	472,040.65	-	-	38,510.56
CENPOWER	12,523.05	1,271,528.96	609,612.19	-	7,466.77
AKSA ENERGY	14,149.39	292,899.51	-	183,308.19	-
Twin City	8,027.15	1,006,399.43	-	-	-
Bridgepower	15,070.85	62,158.21	-	-	-

### Daily System and Ghana Peak loads

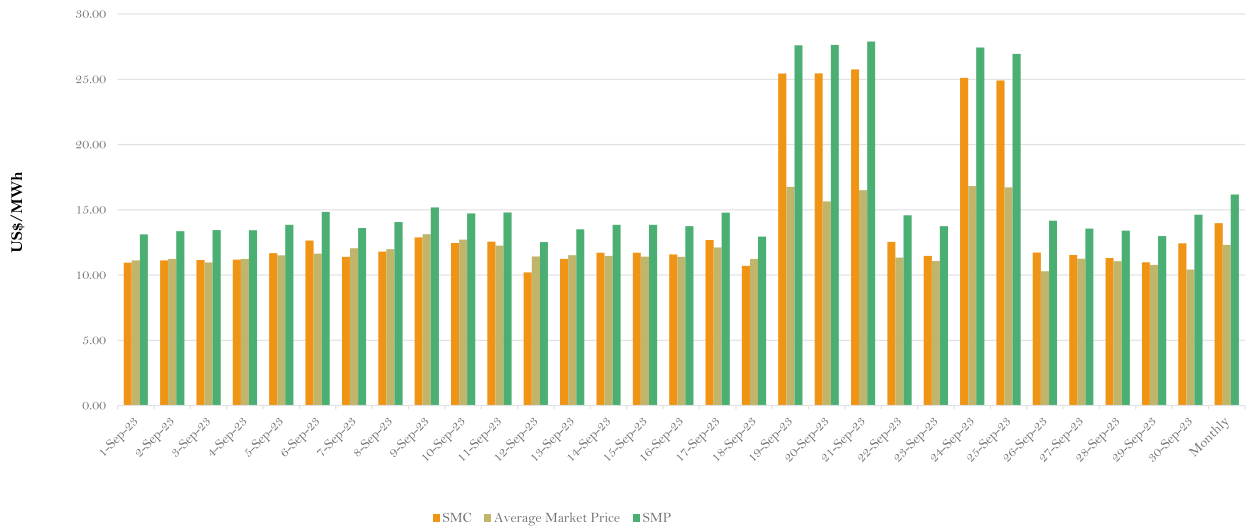


### Daily electricity supply and load factor



# ECONOMIC FACT SHEET

Summary of Market Prices for September 2023



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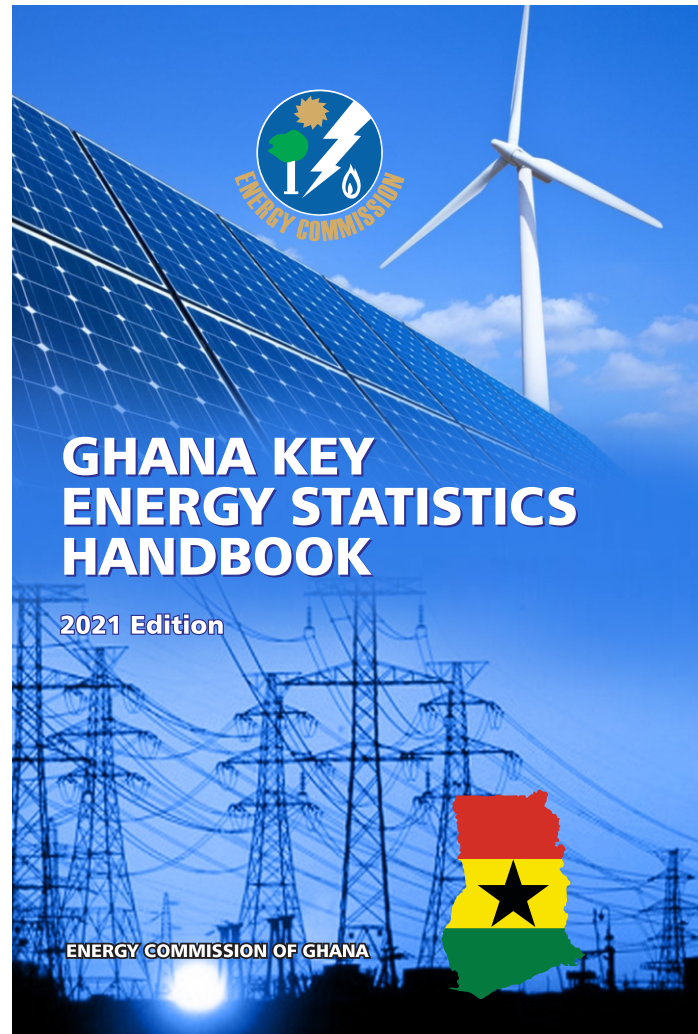
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*AGPP = Atuabu Gas Processing Plant  
CBGC = Composite Bulk Generation Charge  
DFO = Distillate Fuel Oil  
ECG = Electricity Company of Ghana  
ESP – Electricity Supply Plan  
GHp = Ghana Pesewa  
GWh = Giga-watt Hours  
KTPP = Kpone Thermal Power Plant  
MRP = Mine Reserve Plant*

*Btu = British Thermal Units  
CUF = Capacity Utilization Factor  
EC = Energy Commission  
EMOP = Electricity Market Oversight Panel  
FPSO = Floating Production, Storage and Offloading  
GNGC = Ghana National Gas Company  
HFO = Heavy Fuel Oil  
kWh = Kilo-watt hours  
LEAP = Long-range Energy Alternative Planning*

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