GHANA WHOLESALE ELECTRICITY MARKET BULLETIN

MARKET WATCH

Monthly Market Data Analysis

ISSUE NO. 81 1st January 2023 to 31st January 2023

This Bulletin covers major developments in the Wholesale Electricity Market (WEM) of Ghana from 1st January to 31st January 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

The System Peak Load for January 2023 was 3,557.38 MW which was higher than the 3,474.0 MW projected in the 2023 Electricity supply Plan (ESP). The System Peak Load recorded was made up of 3,161.38MW of domestic demand and 396MW of Export demand. The Ghana Peak Load which is Ghana's system demand (excluding export) for January 2023 was 3,161.38MW which was higher than the 3,124MW projected in the 2023 Electricity Supply Plan.

In January 2023, the electricity supply averaged 65.29GWh per day. This value was marginally lower than the 63.98 GWh per day projected in the 2023 ESP. A total of 2,024.27 GWh of electricity was supplied in January, 2023 which was 2.01% higher than the 1,983.5MW projected in the 2023 ESP. Electricity export for the month totaled 203.92 GWh and this was higher than 188.9GWh projected in the 2023 Electricity supply Plan.

The Regulated Market accounted for 78.9% of electricity purchased in the Ghana wholesale electricity market in January 2023. The De-regulated Market accounted for 6.6% in January 2023 whilst the Export Market accounted for the rest.

The Akosombo Dam water level started decline in November 2022 leading to an end month water level of 272.58 feet. Therefore, we began the year 2023 with Akosombo dam water level at 272.58 feet, just 5.42 feet below the maximum operating level. The water level decreased to 270.95 feet at the end of the month at a rate of 0.053 feet per day in January 2023.

The water level for the Bui dam begun the

Table 1. Projected and Actual Outturn of Electricity Demand and Supply in December 2022 and January 2023.

	Dec-22		Jan-23	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	2,098.2	1,929.9	1,983.5	2,024.3
Source by Power Plants (GWh)				
AKOSOMBO	470.7	489.0	489.0	543.1
KPONG	84.3	79.0	88.5	88.1
BUI	111.0	149.9	130.5	156.5
BUI Solar	10.4	6.9	12.3	6.4
Kaleo	1.9	1.5	1.5	5.4
Sunon Asogli	181.8	380.5	271.8	257.2
TAPCO	135.7	218.3	214.3	194.4
TICO	195.2	217.4	222.6	232.7
TT1PP	59.5	67.0	63.2	3.8
CENIT	63.2	4.9	28.2	7.0
TT2PP	9.5	7.6	6.3	2.2
Twin City	120.2	131.5	120.2	143.8
KARPOWER	284.6	53.6	126.5	114.6
AMERI	145.5	-	-	-
KTPP	-	5.7	-	65.4
CENPOWER	209.5	93.4	177.7	179.6
AKSA	9.5	21.6	25.4	22.7
Bridge Power	-	-	-	-
Total Domestic Supply (GWh)	2,092.5	1,927.8	1,978.0	2,023.0
Imports (GWh)		2.2	-	1.2
Total Supply (GWh)	2,092.5	1,929.9	1,978.0	2,024.3
Ghana Coincedent Peak Load (MW)	3,245.3	3,049.8	3,124.0	3,161.4
System Coincident Peak Load (MW)	3,545.3	3,370.8	3,474.0	3,557.4

year at 588.75 ft which was 11.81 feet below the maximum operating level. The water level decrease at a rate of 0.24 feet per day to end the month of January 2023 at a water level of 581.14 feet.

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 plants was 60.60%. This underscore the continuous need for stable natural gas supply which would enable adequate and stable supply of electricity in Ghana power market.

ELECTRICITY TRADING

Electricity Demand

The system peak load for January 2023 was 3,557.38MW as compared to 3,370.80MW in December 2022 which was 5.54% higher than what was recorded in December 2022. This increase is attributable to an increase in the domestic load. The domestic peak load accounted for 64.9% of the growth in the System Peak Load.

The Ghana Peak Load increased in the 4th quarter by an average of 2.58% per month. Compared to December 2022, the Ghana Peak Load increased by 3.6% and reach 3,161.38MW in January, 2023. The Load Factor for January 2023 was 76.48%.

Electricity export at the System Peak Load to CIE, CEB and SONABEL was 396MW in January 2023. This was made up of 93MW, 152MW, 151MW for CIE, CEB and SONABEL respectively. The growth in export demand from December 2022 to January 2023 is attributable to the increase in export demand to CEB.

The average electricity demand has continued its growth trend recorded in the 4th quarter of 2022. In the 4th quarter of 2022, the average electricity demand has gradually increased from 2,470.78 MW in October to 2,567.86 MW in November, 2022 and 2,587.77 MW in December 2022. Average electricity demand increased to 2,681.6 in January 2023.

The average electricity demand for regulated market increased from 2,064.86MW in December 2022 to 2,035.3MW. ECG continue to dominate the Regulated Market with a market share of 88.6% of whilst NEDCO and Enclave power accounted for an average of 10.0% and 1.4% respectively.

The average demand for the de-regulated market was 170.3MW for January, 2023. The mines accounted for 91.7% whilst bulk customers accounted for 8.3% of the De-regulated Market demand.

Export markets recorded an average demand of 372.92MW for January, 2023. Export to neighboring countries accounted for 75.6% of our export demand whilst VALCO accounted for 24.4%.

Electricity supply

A total of 2,024.27GWh of electricity was supplied in January, 2023 which was higher than the 1,983.5GWh projected in the 2022 ESP. Electricity supply averaged to 65.3GWh per day which was 2% higher than the 63.9GWh per day projected in the 2022 supply plan. In addition, domestic supply accounted for 99.6% of the total generation while inadvertent imports from CIE accounted for 0.06%. Electricity export for the month of January, 2023 totaled 203.92GWh and this was higher than 188.9GWh projected in the 2022 ESP.

Electricity supplied by thermal plants in January, 2023 constituted 60.6% of the total electricity supplied. The contribution of electricity supplied from the solar power plant was 0.32% whilst hydro accounted for 39.02%. Hence, renewable energy accounted for 39.3% of total supply in January, 2023. Thermal plants have a greater share in the electricity mix.

A total of 1,514.28GWh of electricity was supplied to the Regulated Market in January, 2023, whilst de-regulated market and export were supplied with 126.67GWh and 277.45 GWh respectively.

A total of 209.63Gwh of electricity was supplied to the export market in our neighboring countries in January, 2023. Electricity export to CIE was 43.98GWh which was higher than the 36.77GWh recorded in December, 2022. Export to CEB in January 2023 was 73.02 GWh which was also higher than what was recorded in December, 2022. SONABEL'S share of the total electricity exported of 92.63GWh was lower than the 103.73GWh recorded in December, 2022.

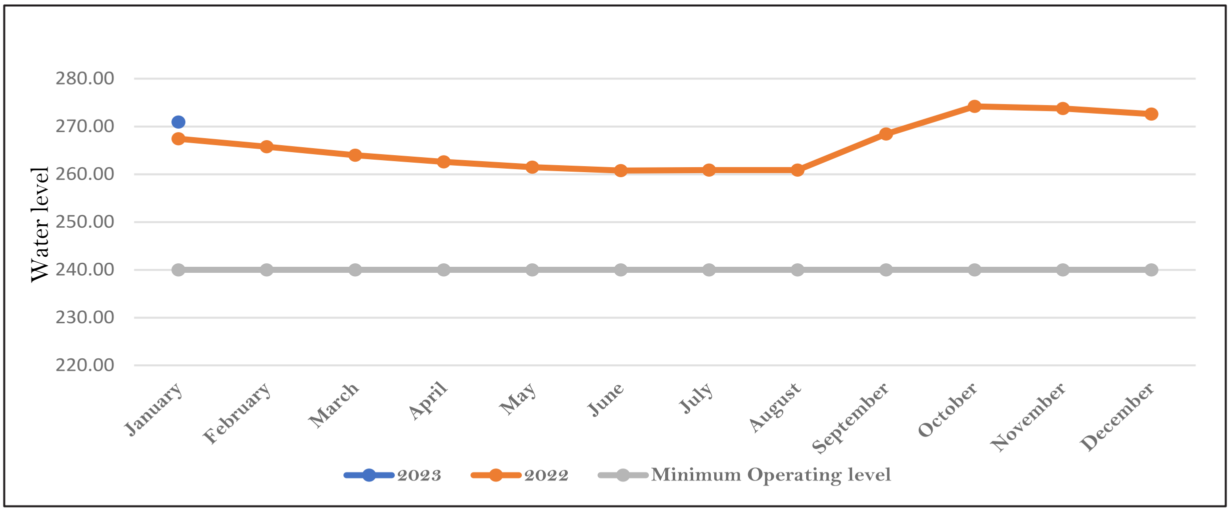
HYDRO DAM LEVELS

Rate of drop of the Akosombo Dam increased in January 2023

The rate of drop in the water level for the Akosombo GS increased in January 2023. It increased from 0.038 feet per day in December 2022 to 0.052 feet per day in January, 2023 representing a 36.84% increase in the rate of drop from December, 2022. As a result, the water level of 272.58 feet recorded at the beginning of the month dropped by 1.63 feet to 270.95 feet at the end of the month. The month-end water level of the Akosombo dam was 3.55feet above the water level recorded for the same period in 2022 and was 34.2 feet 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 January 2023

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

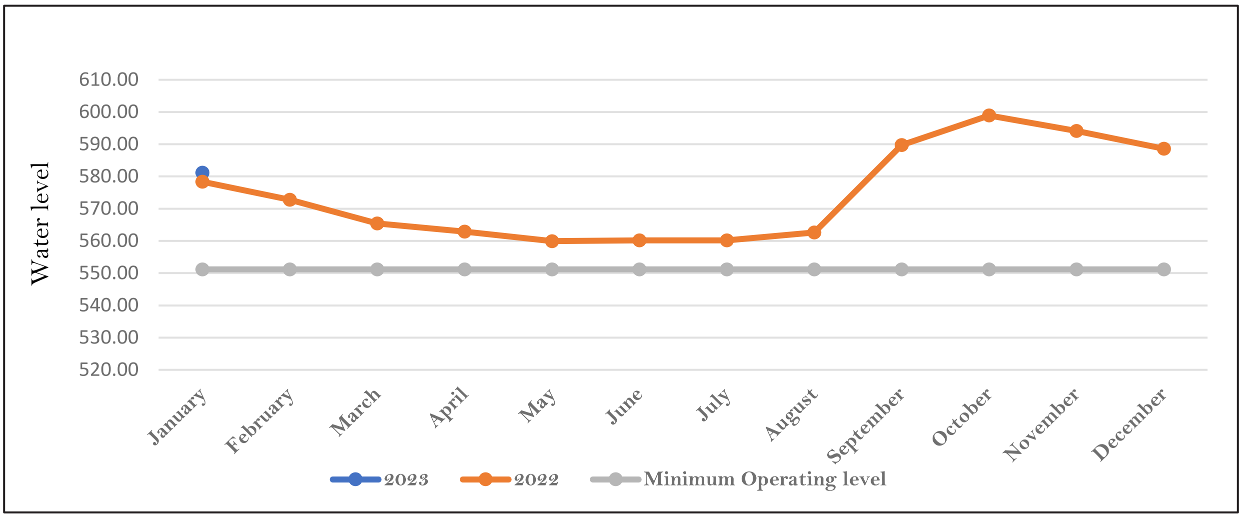


Bui dam water level continued to drop in January 2023

The water level for the Bui GS continued to drop but at a reduced rate of 0.24 feet per day in January 2023 from 0.33 feet per day in December 2022. By the end of the month, the water level for the dam had dropped by 7.44 feet from 588.58 feet at the beginning of the month to 581.14 feet. The month-end water level of the dam was 2.76 feet above the water level recorded for the same period in 2022 and was 29.96 feet above the minimum operating level of the dam.

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

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



FUEL SUPPLY FOR POWER GENERATION

Natural gas imports increased in January 2023

The supply of natural gas from Nigeria through the West African gas pipeline increased to 55.4MMSCFD in January 2023 from an average of 44.4MMSCFD in the 4th quarter of 2022. This represents an increase of 24.8%. On the average, gas imports accounted for 18.7% in the total fuel mix and 18.9% in the gas supply mix.

Natural gas supply from domestic sources increased in January 2023

The average natural gas supply for January 2023 was 242.2MMSCFD which was higher than the average gas supply of 231.5MMSCFD in the 4th quarter. On the average natural gas from domestic sources accounted for 80% in the total fuel mix and 81.1% in the gas supply mix

Consumption of liquid fuel increased in 2023

There was no liquid fuel consumption in the 4th quarter of 2022. Contrary to happenings in the 4th quarter, there was liquid fuel consumption in January 2023 made up of 26,411 bbls made up 12,370 bbls LCO and 14,041 bbls DFO. On the average, liquid fuel accounted for 1.4% in the total fuel mix. LCO accounted for 46.5% of the total liquid used whilst DFO accounted for the rest. The plants responsible for the consumption of liquid fuels, LCO and DFO, in January, 2023 were Cenpower and KTPP respectively. LCO and DFO were used mainly because of natural gas supply challenges.

Monthly Market Data Analysis

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

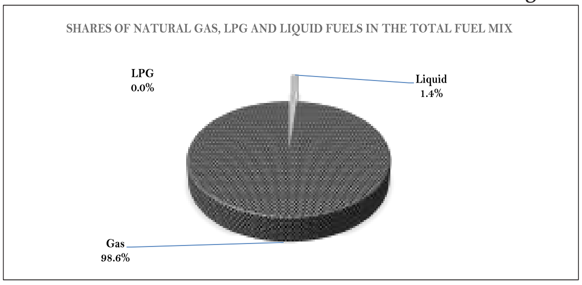


Figure 3b: Shares of fuel types in the generation fuel mix of power generation

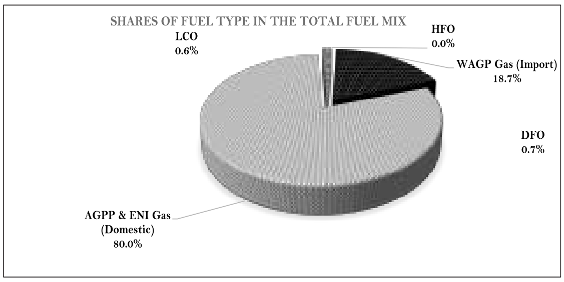


Figure 4a: Contribution of Natural Gas Supply by sources

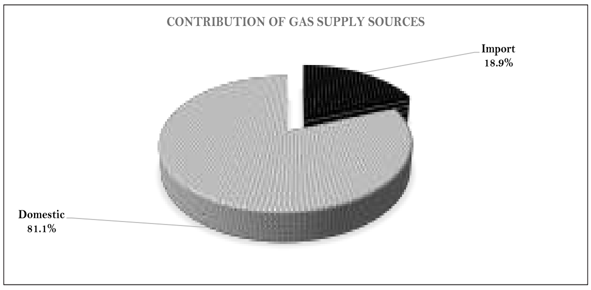


Figure 4b: Contribution of individual fuel in the liquid fuel supply

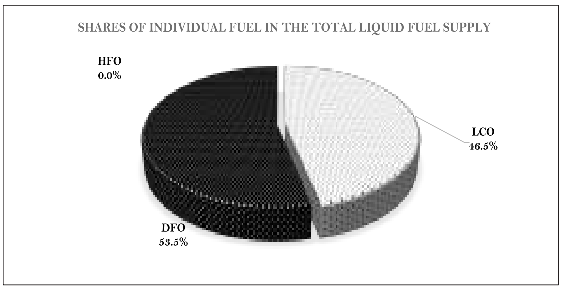


Figure 5a: Electricity Supply by sources

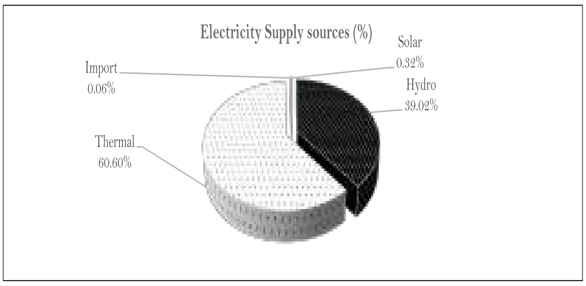
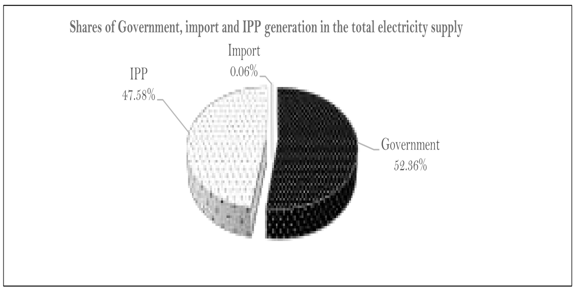


Figure 5b: Electricity supply by ownership



Peak Electricity Supply for January 2023		
Source of Supply	**Generation at System Peak Load (MW)**	**Generation at Ghana Peak Load (MW)**
AKOSOMBO	953.46	953.46
KPONG	129.84	129.84
BUI	371.71	371.71
BUI Solar	-	-
SEAP	352.00	352.00
TAPCO	299.97	299.97
TICO	333.70	333.70
TT1PP	-	-
CENIT	107.00	107.00
TT2PP	10.00	10.00
TWIN CITY	201.70	201.70
KARPOWER	313.10	313.10
AMERI	-	-
KTPP	102.00	102.00
Trojan Power	-	-
CENPOWER	368.00	368.00
AKSA	14.90	14.90
Bridge Power	-	-
IMPORT	-	-
Export to CIE at peak	93.00	93.00
Export to CEB at peak	152.00	152.00
Export to Sonabel	151.00	151.00
System Coincident Peak Load	**3,557.38**	
Ghana Coincedent Peak Load		**3,161.38**

OPERATIONAL FACT SHEET

(MMSCFD)	
Location	**Monthly Average**
Etoki	**56.14**
Tema WAGPCo	**129.78**
Aboadze WAGPCo	**163.22**
ENI	**190.62**
Aboadze AGPP	**97.41**
Reverse Flow	**74.32**

Hydro Dam Water level for January 2023			
	Beginning month (ft)	**End month (ft)**	**Change in water level**
Hydro Dam			**(feet)**
Akosombo	272.58	270.95	-1.63
Bui	588.58	581.14	-7.44

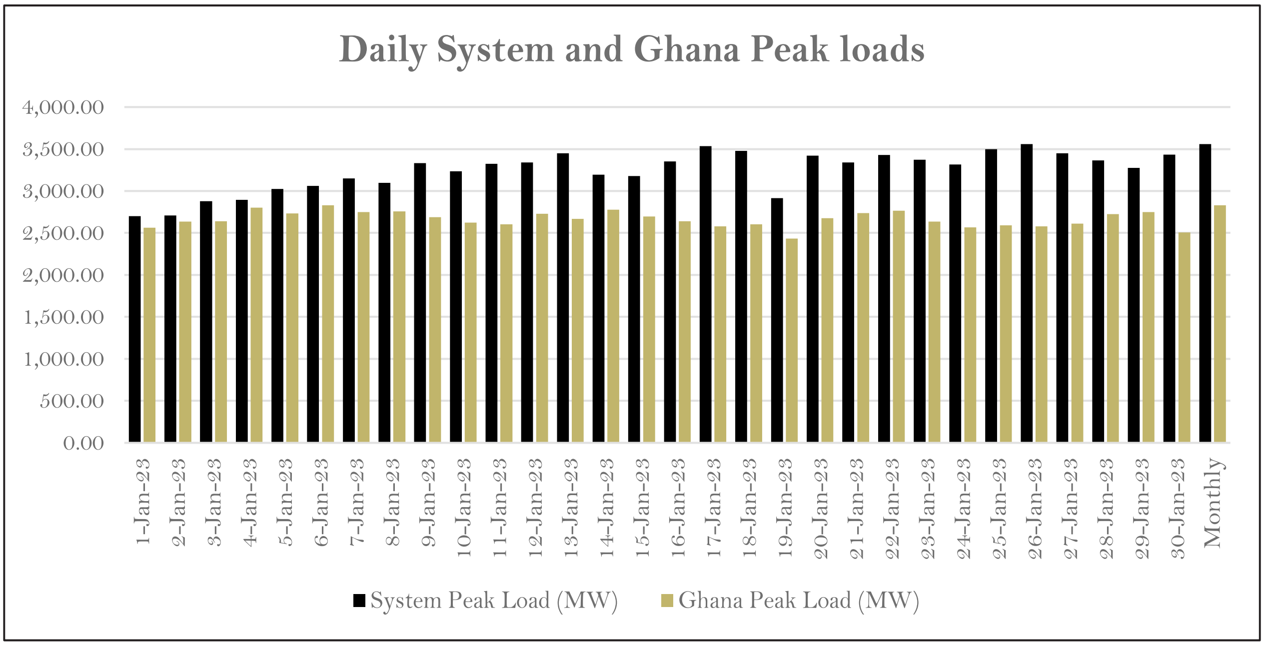
	Weekly Electricity Supply (GWh)				
	Week 1	**Week 2**	**Week 3**	**Week 4**	**Total**
AKOSOMBO	99.59	131.58	132.63	179.30	543.09
KPONG	16.48	20.95	21.24	29.40	88.07
BUI Hydro	23.07	40.24	39.63	53.59	156.53
Bui Solar	1.51	1.34	1.65	1.92	6.42
VRA Kaleo	4.02	0.31	0.52	0.53	5.38
SAPP	82.46	56.90	39.09	78.79	257.24
TAPCO	38.09	43.93	43.90	68.45	194.37
TICO	51.75	49.78	53.54	77.63	232.70
TT1PP	3.80	0.00	0.00	0.00	3.80
CENIT	0.00	6.96	2.56	6.96	16.47
TT2PP	0.00	0.51	0.34	1.31	2.16
Twin City	30.80	32.04	34.63	46.37	143.84
KARPOWER	3.52	37.43	54.04	19.64	114.63
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	12.96	15.63	11.67	25.19	65.45
Cenpower	28.93	27.35	41.09	82.28	179.65
AKSA	3.65	7.35	3.11	8.64	22.75
Bridge Power	0.00	0.00	0.00	0.00	0.00
Import	0.44	0.42	0.21	0.18	1.25
Total	**401.07**	**472.71**	**479.85**	**680.16**	**2,033.78**

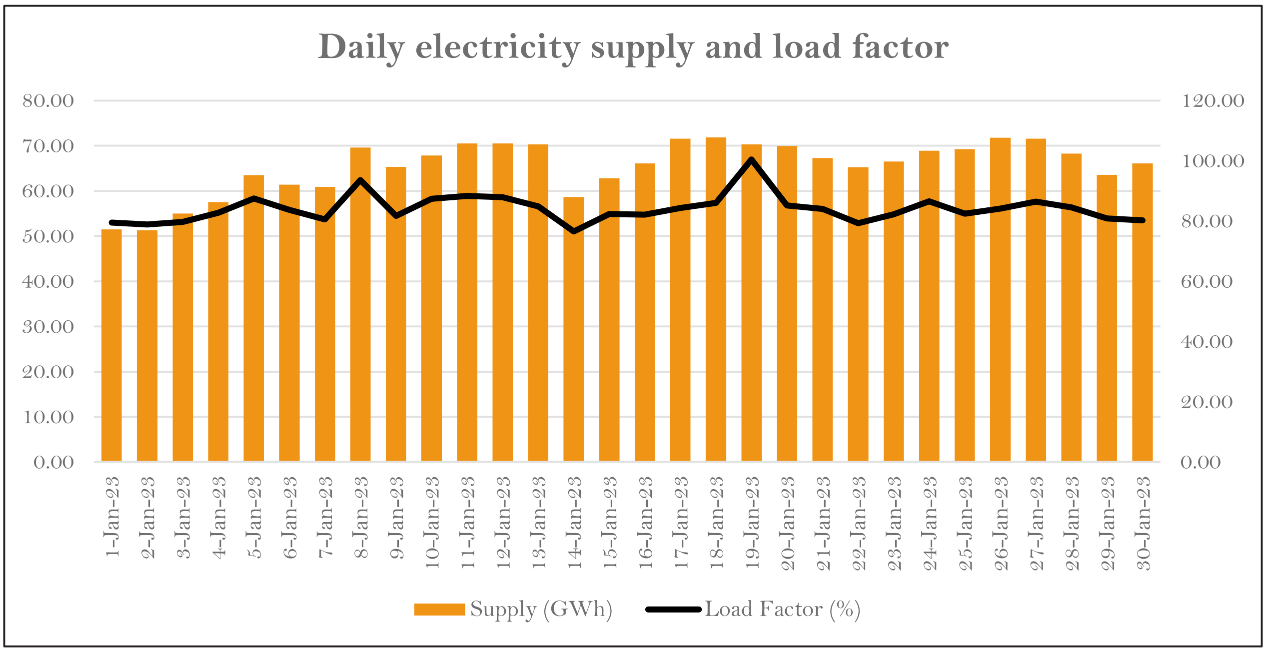
		Fuel Consumption (MMBtu)			
	Heat rate (Btu/kWh)	**Natural gas**	**LCO**	**HFO**	**DFO**
TAPCO	8,629.97	1,677,398.60	-	-	-
TICO	7,535.30	1,753,437.22	-	-	-
SAPP	7,871.77	2,024,894.83	-	-	-
TT2PP	11,060.67	23,835.74	-	-	-
TT1PP	12,211.68	46,404.38	-	-	-
CENIT	1,991.15	32,798.04	-	-	-
KARPOWERSHIP	8,239.47	944,474.28	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	12,089.31	716,357.69	-	-	74,850.17
CENPOWER	6,894.68	1,238,622.13	-	-	-
AKSA ENERGY	5,013.93	114,056.79	-	-	-
Twin City	7,712.96	1,109,416.47	-	-	-
Bridgepower	-	-	-	-	-

Monthly Average Electricity Prices in the WEM				
		Jan-23	**Dec-22**	**Change**
Average Market Price (AMP)	US$/MWh	105.92	88.15	17.77
System Marginal Cost (SMC)	US$/MWh	139.91	87.77	52.14
System Marginal Price (SMP)	US$/MWh	161.46	109.59	51.87

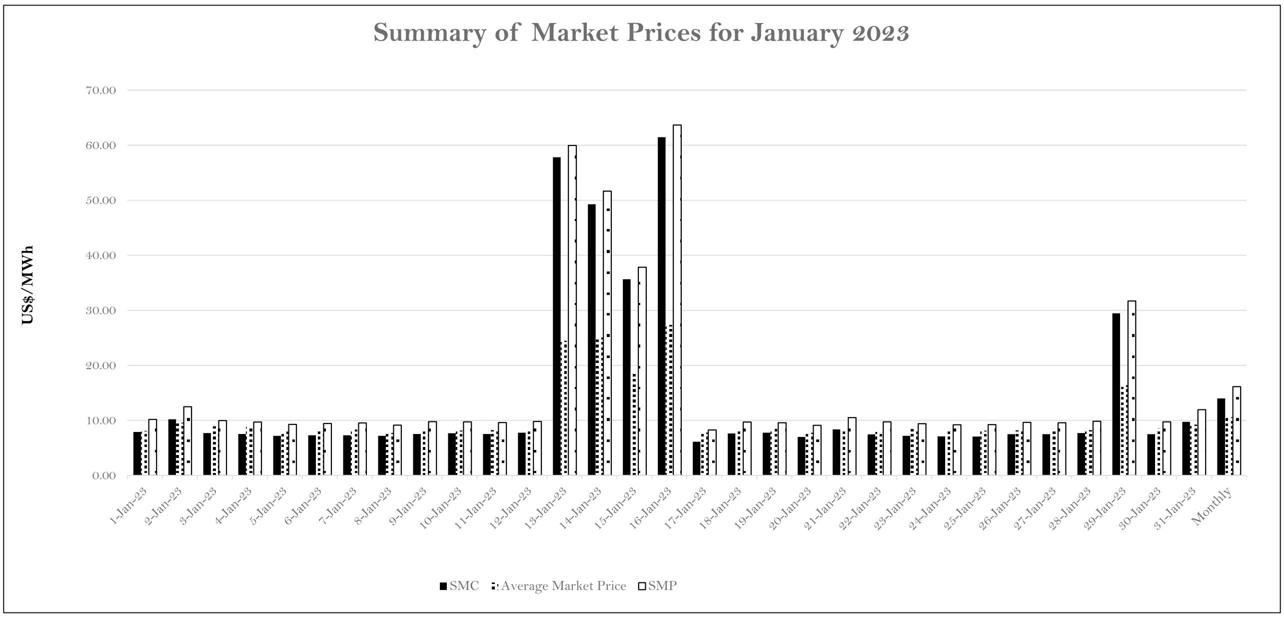
OPERATIONAL FACT SHEET

Power Plants	Average fuel price (US$/MMBtu)
TAPCO	6.08
TICO	6.08
SAPP	6.08
TT2PP	6.08
TT1PP	6.08
CENIT	6.08
KARPOWERSHIP	6.08
AMERI PLANT	0.00
KPONE THERMAL	9.14
CENPOWER	6.08
AKSA ENERGY	6.08
Twin City	6.08
Bridgepower	0.00





ECONOMIC FACT SHEET



EMOP SECRETARIAT

EMOP Administrator
Energy Commission, Accra
Tel: +233 (0) 302 908 193
Website: www.energycom.gov.gh/emop
Location: Airways Avenue GA-037-3212

...Watch out for 2020 to 2022 edition!

Acronyms

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
LCO = Light Crude Oil
LTA = Long Term Average
MMscf = Million Standard Cubic Feet
NITS = National Interconnected Transmission System
SAPP = Sunon Asogli Power Plant
SNEP = Strategic National Energy Plan
TT1PP = Tema Thermal 1 Power Plant
VRA = Volta River Authority
WAGP = West African Gas Pipeline
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
LI = Legislative Instrument
MW = Megawatt
MWh = Mega-watt hours
PV = Photovoltaic
SMP = System Marginal Price
TEN = Tweneboa, Enyenra, Ntomme
TT2PP = Tema Thermal 2 Power Plant
WAGPCo – West African Gas Pipeline Company
WEM = Wholesale Electricity Market

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