



GHANA WHOLESALE ELECTRICITY MARKET BULLETIN

MARKET WATCH

Monthly Market Data Analysis

ISSUE NO. 78

1st June 2022 to 30th June 2022

This Bulletin covers major developments in the Wholesale Electricity Market (WEM) of Ghana from 1st June 2022 to 30th June 2022. 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) Secretariat would very much appreciate and welcome comments from readers on the Bulletin.

HIGHLIGHTS OF THE MONTH

The System Peak Load for June 2022 of 3,309.3 MW was 2.4% higher than the 3,389 MW projected in the 2022 Electricity Supply Plan (ESP). This Load was made of 3,062.3 MW and 247 MW of domestic and export demand respectively. The Ghana Peak Load, which is Ghana's maximum demand (excluding export), for the same period was 3,062.3 MW. This was 0.5% lower than the Ghana Peak load of 3,079 MW projected for June 2022 in the 2022 ESP.

In June 2022, electricity supply averaged 60.3 GWh per day, which was lower than the 62 GWh per day projected in the 2022 ESP. A total of 1,808.6 GWh of electricity was supplied in June 2022, which was also 2.7% lower than the 1,858.6 GWh projected in the 2022 ESP. Domestic supply accounted for 99.9% of the total generation while inadvertent imports from CIE accounted for 0.1%. Electricity export in June 2022 totaled 164.56 GWh and this was 9.1% higher than the 150.8 GWh projected in the 2022 ESP.

The Regulated Market accounted for 78.1% of electricity purchased in the Ghana wholesale electricity market in June 2022. The De-regulated Market and Export Market accounted for 7.9% and 14% respectively.

The Akosombo Dam recorded reduced rate of drop in its water level in June 2022. This is attributable to the reduced electricity generation for the hydroelectric plants for June 2022. Electricity generation from the Akosombo hydroelectric power plant reduced from an average of 18.07 GWh/day in May 2022 to 15.73 GWh/day in June 2022. The Akosombo dam recorded a 44% reduction in its rate of drop from 0.036 feet per day in May 2022 to 0.02 in June 2022. On the other hand, the Bui dam witnessed an increase in its water level in June 2022. This is mainly attributed to reduced generation from the power plant. The plant's electricity generation reduced from an average

Table 1. Projected and Actual Outturn of Electricity Demand and Supply in June 2022 and May 2022.

	May-21		Jun-22	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	2,019.0	1,982.2	1,853.4	1,808.6
Source by Power Plants (GWh)				
AKOSOMBO	482.1	560.2	422.9	471.9
KPONG	83.6	88.1	81.1	84.2
BUI	57.0	82.5	51.0	42.3
BUI Solar	5.4	9.0	5.4	5.9
Kaleo	1.5	2.8	1.5	2.2
Simon Asogli	239.3	160.1	181.4	235.3
TAPCO	195.2	157.7	189.5	208.1
TICO	195.2	210.6	188.9	221.2
TTiPP	-	13.9	57.6	74.7
CENIT	63.2	43.6	61.2	72.0
TT&PP	9.5	16.7	9.2	14.1
Twin City	120.2	115.3	116.3	110.4
KARPOWER	284.6	172.4	275.4	85.1
AMERI	-	-	-	-
KTPP	63.2	70.3	-	50.9
CENPOWER	209.5	259.7	202.8	115.6
AKSA	9.5	15.6	9.2	11.0
Bridge Power	-	-	-	-
Total Domestic Supply (GWh)	2,019.0	1,978.2	1,853.4	1,804.9
Imports (GWh)	-	4.0	-	3.7
Total Supply (GWh)	2,019.0	1,982.2	1,853.4	1,808.6
Ghana Coincident Peak Load (MW)	3,167.0	3,068.0	3,059.0	3,062.3
System Coincident Peak Load (MW)	3,497.0	3,378.0	3,389.0	3,309.3

HIGHLIGHTS OF THE MONTH

of 2.75GWh/ day in May 2022 to 1.41 GWh/ day in June 2022. Also, the Bui dam witnessed some inflow in June 2022. Contrarily, it recorded a net inflow of 0.26 feet in June 2022.

Natural gas continued to be 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 was 98.9% in June 2022, This was higher than the 98.1% recorded in May 2022.

ELECTRICITY TRADING

Electricity Demand

The System Peak Load dropped by 2.1% in June 2022 from 3,378 MW in May 2022. The System Peak Load has gradually reduced by an average of 0.9% from a peak of 3,426 MW in March 2022 to 3,309.3MW in June 2022. This could be attributed to the cold weather condition experienced in the country.

The Ghana Peak Load continued to gradually reduce by an average of 1.1% over the period from 3,197.7MW in March 2022 to 3,062.3MW in June 2022. The Ghana peak load also reduced by 0.2% in June 2022 from 3,068MW in May 2022.

Likewise, the average electricity demand reduced from 2,753.1MW in May 2022 to 2,512MW in June 2022. The System Load Factor for June 2022 reduced to 76.1% from 78.9% in May 2022.

Average electricity demand for the Regulated Market was 1,950.3MW in June 2022. The average demand for the De-regulated and Export Markets was 197.6MW and 349.8MW respectively. Export to the neighboring countries accounted for 70.6% of the average export demand. Industrial customers accounted for 8.2% of the demand for the De-regulated market with the mines accounting for 91.8%.

Electricity supply

Electricity supply decreased by 5.5% in June 2022 from an average 60.3GWh per day to 60.4GWh per day in May 2022. Similarly, the electricity supply reduced from 1,982.22 GWh in May 2022 to 1,808.6GWh in June 2022. The electricity supplied by the thermal power plants in June 2022 constituted 66.3% of the total electricity supplied which is higher than the 62.4% recorded in May 2022. On the contrary, the share of electricity supply by the hydroelectric power plants decreased to 33.1% in June from 36.9% recorded in May 2022. The contribution of the electricity supplied from the solar power plants decreased from 0.5% in May 2022 to 0.3% in June 2022. Renewable energy therefore accounted for 33.4% of the total electricity supplied in June 2022.

Electricity export to our neighboring countries decrease by 11.9% from 186.7GWh in May 2022 to 164.6GWh in June 2022. The decrease in electricity export was due to reduced export to CIE and CEB. Electricity export to CIE and CEB decreased from 16.7 GWh and 62.9 GWh in May 2022 to 16.2 GWh and 46.4 GWh in June 2022 respectively. Electricity export to SONABEL on the other hand increased by 2.9% in June 2022 from 99.2 GWh recorded in May 2022.

A total of 1,404.2 GWh of electricity was supplied to the Regulated Market in June 2022 with the Electricity Company of Ghana (ECG) accounting for 87.6% of the total electricity supplied. Northern Electricity Company (NEDCo) and Enclave Power Company (EPC) accounted for 12.4%.

The De-regulated Market made up of the Mines and Industrial customers were supplied 142.3 GWh of electricity in June 2022. The Mines accounted for 91.8% of the total supply to the market whilst industrial customers accounted for the rest. A total of 251.9GWh of electricity was supplied to the export market in June 2022.

Table 1 shows a comparison of the Projected and Actual Electricity Demand and Supply for June 2022 and May 2022.

HYDRO DAM LEVELS

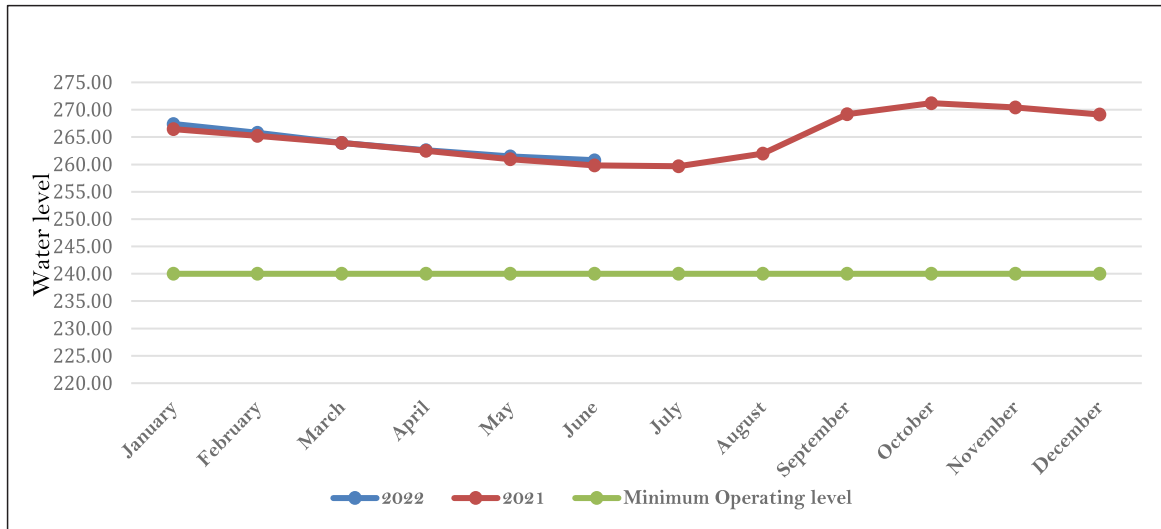
The rate of drop in the Akosombo dam water level reduced in June 2022

The rate of drop in the water level for the Akosombo GS reduced in June 2022, from 0.036 feet per day recorded in May 2022 to 0.02 feet per day, representing a 44% reduction in the rate of drop. As a result, the water level of 261.47 feet recorded at the beginning of the month dropped by 0.7 feet to 260.77 feet at the end of the month. The month-end water level of the Akosombo dam was 0.97 feet above the water level recorded for the same period in 2021 and is 20.77 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 2021 to June 2022

HIGHLIGHTS OF THE MONTH

Figure 1: Month-End Water Level for Akosombo Dam from January 2021 to June 2022.

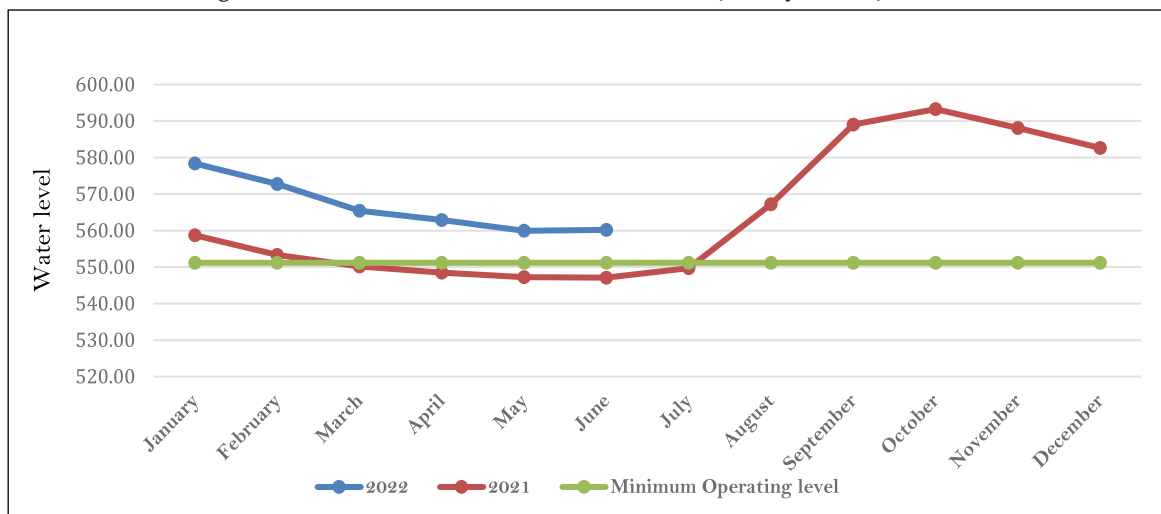


The Bui dam begins to rise in June 2022

The Bui GS began to rise in June 2022 at an average rate of 0.0087 feet per day. This is attributable to the reduced generation from the plant as well as inflows into the dam. The plant generated 48% lower in June 2022 compared to May 2022. It generated 1.4 GWh per day in June 2022, compared to 2.7 GWh per day in May 2022. Consequently, month-end the water level of 560.2 feet was 0.26 feet higher than the water level at the beginning of the month. The month-end water level was 13.09 feet above the water level recorded for the same period in 2021 and was 9.02 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 2021 to June 2022.

Figure 2: Month-End Water Level for Bui Dam from January 2021 to June 2022.



FUEL SUPPLY FOR POWER GENERATION

The Natural gas imported through the West Africa Gas Pipeline Company (WAPCo) increased in June 2022

The supply of natural gas from Nigeria through the West African gas pipeline averaged 72.2 MMSCFD in June 2022. This represented an increase of 2.7% on the 70.3 MMSCFD recorded in May 2022. Similarly, total natural gas supplied from WAPCo in June 2022 was 2,165.8 MMSCF. Consequent to this increase, the share of the imported natural gas in the total fuel mix increased from 14.6% in May 2022 to 23% in June 2022. Also, its share in the total natural gas used for power generation increased to 23% in June 2022, from 14.8% recorded in April 2022.

Natural gas supply from domestic sources decreased in June 2022

Natural gas supply from domestic sources from 236.8 MMSCFD in May 2022 reduced to 234 MMSCFD in June 2022. The total natural gas supplied in June 2022 was 7,103.3 MMSCF. The share of the domestic natural gas in the total fuel mix, decreased from 83.6% recorded in May 2022 to 76.8% in June 2022. With the total natural gas used for power generation, the share of domestic natural gas decreased from 85.2% in May 2022 to 77% in June 2022.

The liquid fuel used for power generation decreased in June 2022

There was a decrease in the use of liquid fuel for power generation in June 2022. Liquid fuel consumption decreased from 1.9% in May 2022 to 0.2% in June 2022. This was due to the decrease in consumption of DFO by KTPP from 22,906 bbls in May 2022 to 4,144 bbls in June 2022. There was no HFO consumption by AKSA as a plant operated on only natural gas. In June, 2021 DFO consumption constituted 0.2% of the total fuel mix. Also, there was no LCO consumption in June 2022.

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

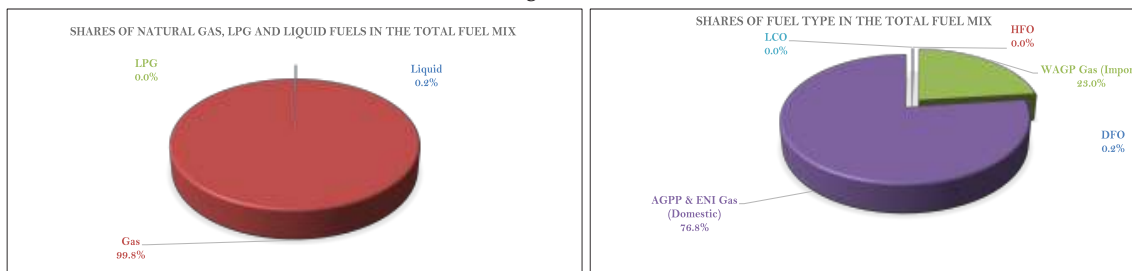


Figure 4a: Contribution of Natural Gas Supply by sources

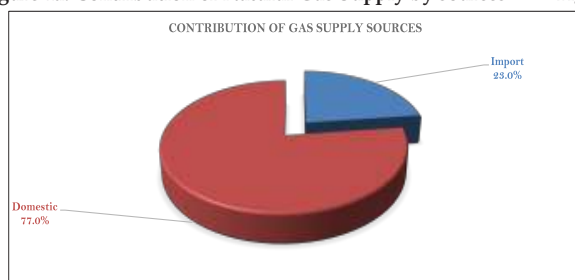


Figure 4b: Contribution of individual fuel in the liquid fuel supply

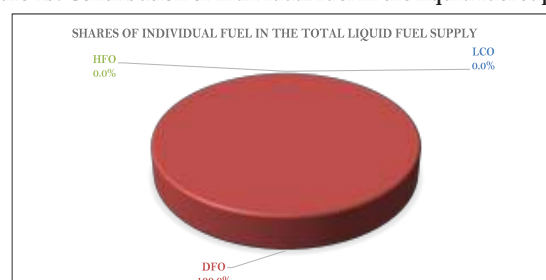


Figure 5a: Electricity Supply by sources

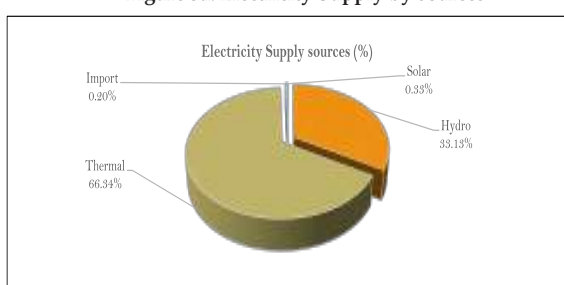
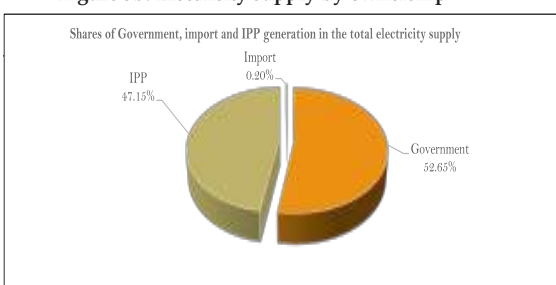


Figure 5b: Electricity supply by ownership



Peak Electricity Supply for June 2022		
Source of Supply	Generation at System Peak Load (MW)	Generation at Ghana Peak Load (MW)
AKOSOMBO	958.50	958.50
KPONG	132.30	132.30
BUI	215.50	215.50
BUI Solar	-	-
SEAP	347.70	347.70
TAPCO	311.80	311.80
TICO	357.10	357.10
TT1PP	-	-
CENIT	108.00	108.00
TT2PP	20.60	20.60
TWIN CITY	198.50	198.50
KARPOWER	183.50	183.50
AMERI	-	-
KTPP	102.00	102.00
Trojan Power	-	-
CENPOWER	360.00	360.00
AKSA	13.80	13.80
Bridge Power	-	-
IMPORT	-	-
Export to CIE at peak	4.00	4.00
Export to CEB at peak	96.00	96.00
Export to Sonabel	147.00	147.00
System Coincident Peak Load	3,309.30	
Ghana Coincedent Peak Load		3,062.30

OPERATIONAL FACT SHEET

June 2022 Average Monthly Natural Gas Flowrate (MMSCFD)	
Location	Monthly Average
Etoki	65.42
Tema WAGPCo	156.12
Aboadze WAGPCo	0.00
Aboadze GNGC	107.88
Reverse Flow	98.61

Hydro Dam Water level for June 2022			
	Beginning month (ft)	End month (ft)	Change in water level
Hydro Dam			(feet)
Akosombo	261.47	260.77	-0.70
Bui	559.94	560.20	0.26

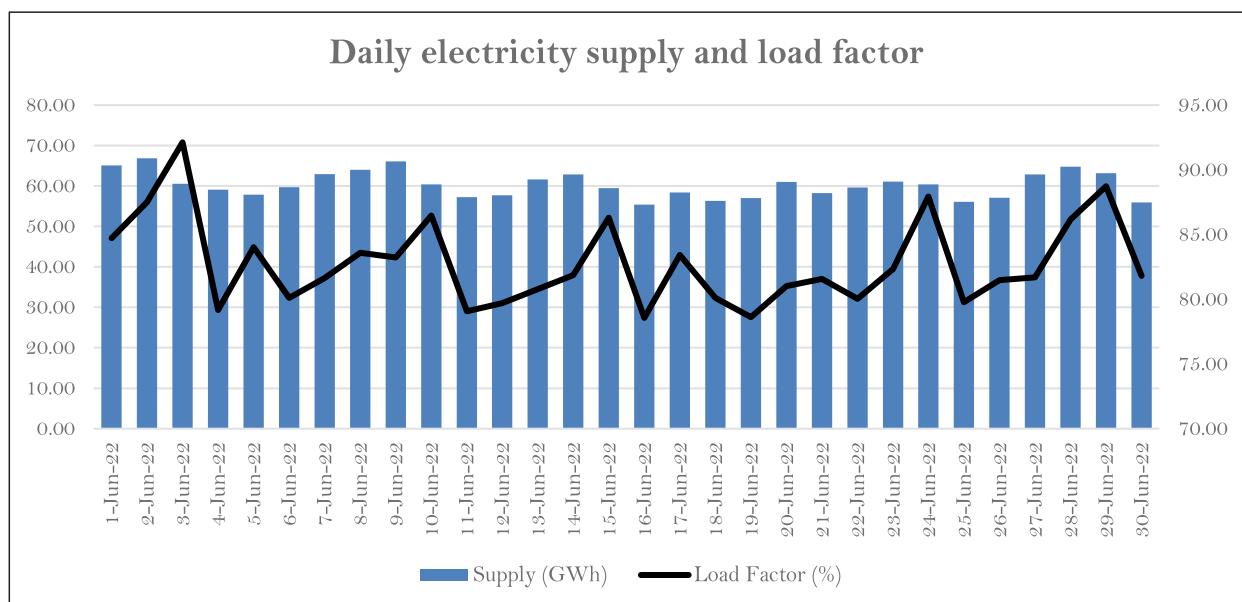
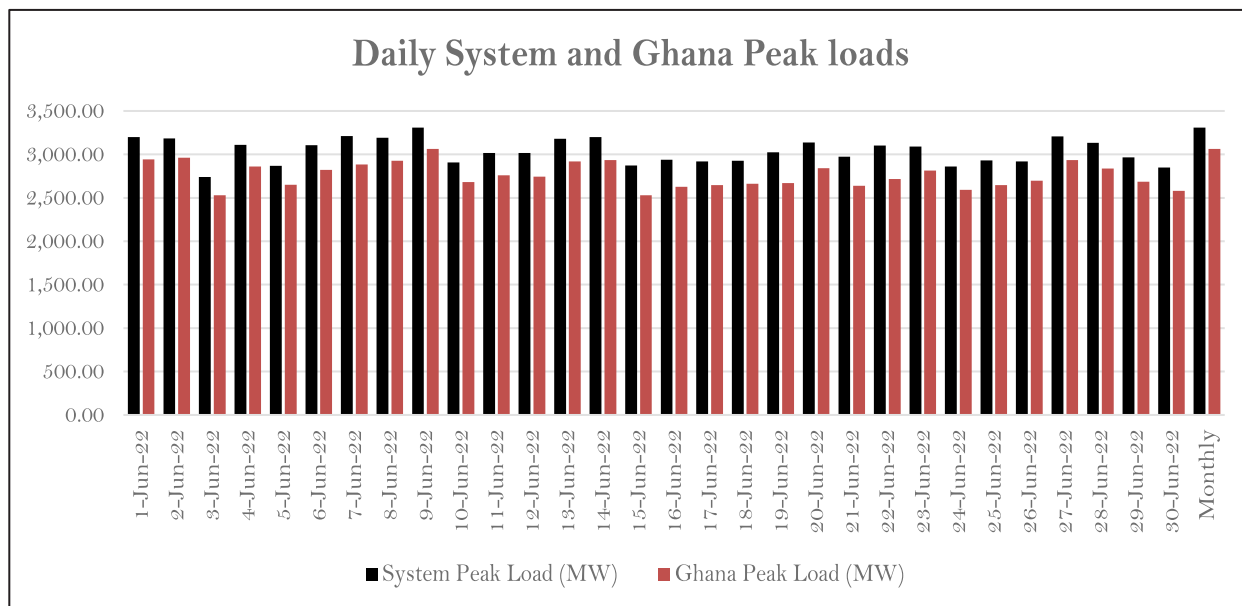
	Weekly Electricity Supply (GWh)				
	Week 1	Week 2	Week 3	Week 4	Total
AKOSOMBO	118.78	103.76	109.96	139.37	471.87
KPONG	20.70	18.74	19.57	25.24	84.25
BUI Hydro	13.77	9.45	6.29	12.82	42.33
Bui Solar	1.46	1.32	1.30	1.83	5.90
VRA Kaleo	0.44	0.39	0.86	0.49	2.18
SAPP	50.74	46.58	58.52	79.46	235.29
TAPCO	39.55	50.75	48.99	68.81	208.09
TICO	40.86	55.72	52.55	72.11	221.24
TT1PP	18.21	15.36	17.95	23.19	74.71
CENIT	16.26	14.89	17.84	22.98	71.96
TT2PP	4.10	3.57	1.89	4.58	14.14
Twin City	30.49	32.27	25.16	22.48	110.40
KARPOWER	13.74	6.10	25.35	39.94	85.14
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	3.22	9.25	15.53	22.87	50.87
Cenpower	56.79	58.78	0.00	0.00	115.56
AKSA	2.42	2.42	2.55	3.58	10.97
Bridge Power	0.00	0.00	0.00	0.00	0.00
Import	0.54	0.58	1.48	1.09	3.69
Total	432.08	429.91	405.78	540.84	1,808.61

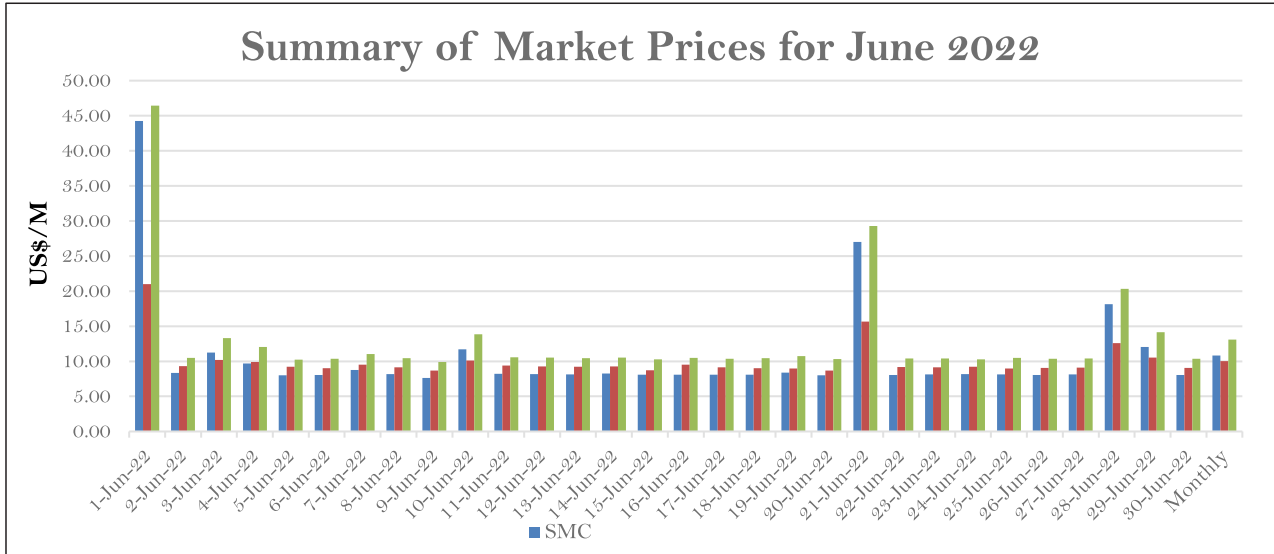
	Heat rate (Btu/kWh)	Fuel Consumption (MMBtu)			
		Natural gas	LCO	HFO	DFO
TAPCO	8,707.64	1,811,972.90	-	-	-
TICO	8,312.92	1,839,128.78	-	-	-
SAPP	7,740.21	1,821,202.11	-	-	-
TT2PP	11,376.54	160,902.18	-	-	-
TT1PP	12,806.38	956,764.32	-	-	-
CENIT	11,859.78	853,448.97	-	-	-
KARPOWERSHIP	8,249.72	702,367.90	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	11,939.61	585,143.84	-	-	22,251.55
CENPOWER	7,862.65	908,643.47	-	-	-
AKSA ENERGY	8,766.12	96,181.88	-	-	-
Twin City	8,927.74	985,662.07	-	-	-
Bridgepower	-	-	-	-	-

OPERATIONAL FACT SHEET

Month Average fuel prices					
Gazetted Natural Gas Price	Weighted average natural gas price	LCO	HFO	DFO	LPG
6.08	6.25	22.37	18.37	38.48	17.96

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	7.27
CENPOWER	6.08
AKSA ENERGY	6.08
Twin City	6.08
Bridgepower	0.00





Monthly Average Electricity Prices in the WEM				
		Jun-22	May-22	Change
Average Market Price (AMP)	US\$/MWh	100.29	109.37	-9.08
System Marginal Cost (SMC)	US\$/MWh	108.16	129.22	-21.07
System Marginal Price (SMP)	US\$/MWh	130.80	150.70	-19.89

Performance of the Wholesale Electricity Market (WEM) in 2021

Quality of supply

The Ghana Electricity Grid Code stipulate that in the normal state of the NITS, system frequency shall be maintained between 49.8 Hz and 50.2 Hz while the NITS voltage shall be kept with $\pm 5\%$ of the normal voltage at all times. In 2021, system frequency was in the normal range 79.7% of the time compared to 78.5% in 2020.

The voltages at major Bulk Supply Points (BSP) at peak were largely within normal limits except Mallam and Kumasi stations. For the first half of 2021, voltages at the Mallam substation were below normal voltages 49.3% of the period. This is attributable to the period of upgrade works on the 161 kV Accra Central to Mallam and Achimota to Mallam transmission lines. Likewise, voltages in Kumasi was also below normal voltage 27.7% of the period in the first quarter of 2021. This is attributable to periods when Bui water levels was low and thereby had to be shut down during the off-peak period with only one unit available for some peak periods.

Transmission System Performance

The PURC benchmarked the average availability of feeders in the NITS at 95%. The NITS system in 2021 had a feeder availability of 99.8%, 4.8% higher than the PURC benchmark. On transmission line availability, transmission lines recorded an average availability of 98.9%. The 69kV line recorded the highest availability of 99.7% with the 225kV line recording the lowest of 96.3%. The 330 kV and 161 kV line had an average availability of 98.8% and 98.9% respectively.

There was an increase in transmission losses in 2021 compared to 2020. Average transmission losses in 2021 was 5% compared to 4.5% in 2020. On a monthly basis, there was a gradual decline in transmission losses from 5% in February 2021, 6.3% in April 2021 to 3.8% in October 2021 and 4.1% in December 2021. This is contrary to observations made in 2020. Transmission losses in 2020 increase gradually from 4.3% in January 2020 to 5.3% in December 2020.

The Ghana Power System in the year 2021 experienced several disturbances caused mostly by transmission line faults and gas supply related trips, leading to supply interruptions to various consumers on the power system. In all, there were 16 disturbances caused by transmission line faults and 8 fuel related disturbances. These disturbances underscore the need for increased investments in the transmission network and natural gas supply security as enumerated in the October 2021 edition of the bulletin.

Acronyms

<i>AGPP = Atuabu Gas Processing Plant</i>	<i>Btu = British Thermal Units</i>
<i>CBGC = Composite Bulk Generation Charge</i>	<i>CUF = Capacity Utilization Factor</i>
<i>DFO = Distillate Fuel Oil</i>	<i>EC = Energy Commission</i>
<i>ECG = Electricity Company of Ghana</i>	<i>EMOP = Electricity Market Oversight Panel</i>
<i>ESP = Electricity Supply Plan</i>	<i>FPSO = Floating Production, Storage and Offloading</i>
<i>GHp = Ghana Peseva</i>	<i>GNGC = Ghana National Gas Company</i>
<i>GWh = Giga-watt Hours</i>	<i>HFO = Heavy Fuel Oil</i>
<i>KTPP = Kpone Thermal Power Plant</i>	<i>kWh = Kilo-watt hours</i>
<i>MRP = Mine Reserve Plant</i>	<i>LEAP = Long-range Energy Alternative Planning</i>
<i>LCO = Light Crude Oil</i>	<i>LI = Legislative Instrument</i>
<i>LTA = Long Term Average</i>	<i>MW = Megawatt</i>
<i>MMScf = Million Standard Cubic Feet</i>	<i>MWh = Mega-watt hours</i>
<i>NITS = National Interconnected Transmission System</i>	<i>PV = Photovoltaic</i>
<i>SAPP = Sunon Asogli Power Plant</i>	<i>SMP = System Marginal Price</i>
<i>SNEP = Strategic National Energy Plan</i>	<i>TEN = Tweneboa, Enyenra, Ntomme</i>
<i>TT2PP = Tema Thermal 2 Power Plant</i>	<i>TT2PP = Tema Thermal 2 Power Plant</i>
<i>VRA = Volta River Authority</i>	<i>WAGPCo = West African Gas Pipeline Company</i>
<i>WAGP = West African Gas Pipeline</i>	<i>WEM = Wholesale Electricity Market</i>

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