



GHANA WHOLESALE ELECTRICITY MARKET BULLETIN

MARKET WATCH

Monthly Market Data Analysis

ISSUE NO. 76

1st April 2022 to 30th April 2022

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

HIGHLIGHTS OF THE MONTH

In April 2022, the System Peak Load recorded was 3,415.5 MW, this occurred on 5th April 2022. However, this load was marginally lower than the 3,456 MW that was projected in the 2022 Electricity Supply Plan (ESP). A domestic load of 3,133.5 MW and an export of 282 MW made up the System Peak Load recorded in April 2022. The Ghana Peak Load recorded in April 2022 was 3,149 MW and this was marginally higher than the 3,126 MW projected in the 2022 ESP.

The supply of electricity averaged 62.79 GWh per day in April 2022. This was 4.4% lower than the 67.9 GWh per day projected in the 2022 ESP. The total electricity supplied in April 2022 was 1,946.42 GWh and this was lower than the 2,036 GWh projected in the 2022 ESP. Electricity supplied by the domestic power plants constituted 0.98% and inadvertent electricity import from CIE constituted 0.2% of the total electricity supplied in April 2022. Electricity export in April 2022, totalled 186.72 GWh and was 9.3% higher than the 170.8 GWh projected in the 2022 ESP.

The Akosombo and Bui dam witnessed a reduction in the rate of drop in the water level by 23% and 63.8% in April 2022. The water level for the Akosombo dam dropped at a rate of 0.045 feet per day and that of the Bui dam at a rate of 0.084 feet per day.

The share of the natural gas used for power generation increased to 95.6% in April 2022, from the 93.2% recorded in March 2022. As a result of this increase, the share of the liquid fuel used for power generation reduced to 4.4% in April 2022, from the 6.8% recorded in March 2022.

Table 1. Projected and Actual Outturn of Electricity Demand and Supply in March 2022 and April 2022.

	Mar-21		Apr-22	
	Projected	Actual	Projected	Actual
Total Supply (GWh)	2,052.5	1,851.3	2,036.3	1,946.4
Source by Power Plants (GWh)				
AKOSOMBO	486.5	421.1	467.7	517.6
KPONG	83.5	74.7	81.0	87.5
BUI	92.0	42.0	56.0	56.4
BUI Solar	5.4	-	5.4	6.1
Kaleo	2.2	-	1.8	1.7
Sunon Asogli	185.4	353.6	314.3	207.6
TAPCO	195.2	128.3	189.5	194.4
TICO	195.2	225.1	188.9	175.8
TT1PP	-	50.0	57.6	77.2
CENT	63.2	56.2	61.2	30.8
TT2PP	9.5	12.0	9.2	11.9
Twin City	120.2	23.7	116.3	137.4
KARPOWER	284.6	286.9	275.4	172.7
AMERI	-	-	-	-
RTPP	63.2	34.3	-	14.6
CENPOWER	209.5	117.1	202.8	242.7
AKSA	56.9	21.5	9.2	8.8
Bridge Power	-	-	-	-
Total Domestic Supply (GWh)	2,052.5	1,846.6	2,036.3	1,943.3
Imports (GWh)	-	4.8	-	3.1
Total Supply (GWh)	2,052.5	1,851.3	2,036.3	1,946.4
Ghana Coincident Peak Load (MW)	3,101.0	2,903.0	3,126.0	3,149.0
System Coincident Peak Load (MW)	3,431.0	3,172.0	3,456.0	3,415.5

HIGHLIGHTS OF THE MONTH

ELECTRICITY TRADING

Electricity Demand

The 3,415.5 MW of System Peak Load recorded in April 2022 represented a reduction of 1.6% on the 3,469.4 MW recorded in March 2022. Similarly, electricity export to CIE, CEB and SONABEL reduced to 282 MW in April 2022, from the 303 MW recorded in March 2022. The load served by thermal power plants accounted for 58.5% of the System Peak Load recorded in April 2022. The remaining load of 41.6% of the System Peak Load recorded in April 2022 was served by the hydroelectric power plants.

The Ghana Peak Load in April 2022, also witnessed a reduction of 1.5% to 3,149 MW, from 3,197.7 MW recorded in March 2022. Similarly, the average electricity demand reduced by 3.4% to 2,703.4 MW in April 2022 and this was lower than the 2,797.59 MW recorded in March 2022. Again, the System Load Factor recorded for April 2022 was 79.2% and this was lower than the 80.6% recorded in March 2022.

Electricity supply

The average electricity of 62.69 GWh per day supplied in April 2022 was 6.5% lower than the 67.18 GWh per day recorded in March 2022. Consequently, the total electricity supplied in April 2022 reduced from 2,082.63 GWh recorded in March 2022 to 1,946.42 GWh. The electricity supplied by the thermal power plants in April 2022 accounted for 65.5% of the total supply and this was higher than the 62% recorded in March 2022. Subsequently, the share of the electricity supplied by the hydroelectric power plants reduced to 34% in April 2022, from 37.5% recorded in March 2022. The share of the electricity supplied by the solar power plants remained at 0.4% in April 2022.

The export of electricity in April 2022 reduced marginally by 0.7% to 186.72 GWh, from 187.97 GWh recorded in March 2022. This reduction was due to a decrease of 4.4% and 8.9% in the electricity export to CEB and CIE in April 2022. The electricity supplied to CEB and CIE was 68.55 GWh and 22.35 GWh in April 2022, from 71.68 GWh and 24.54 GWh recorded in March 2022. The supply to SONABEL increased by 4.4% to 95.82 GWh in April 2022, from 91.76 GWh recorded in March 2022.

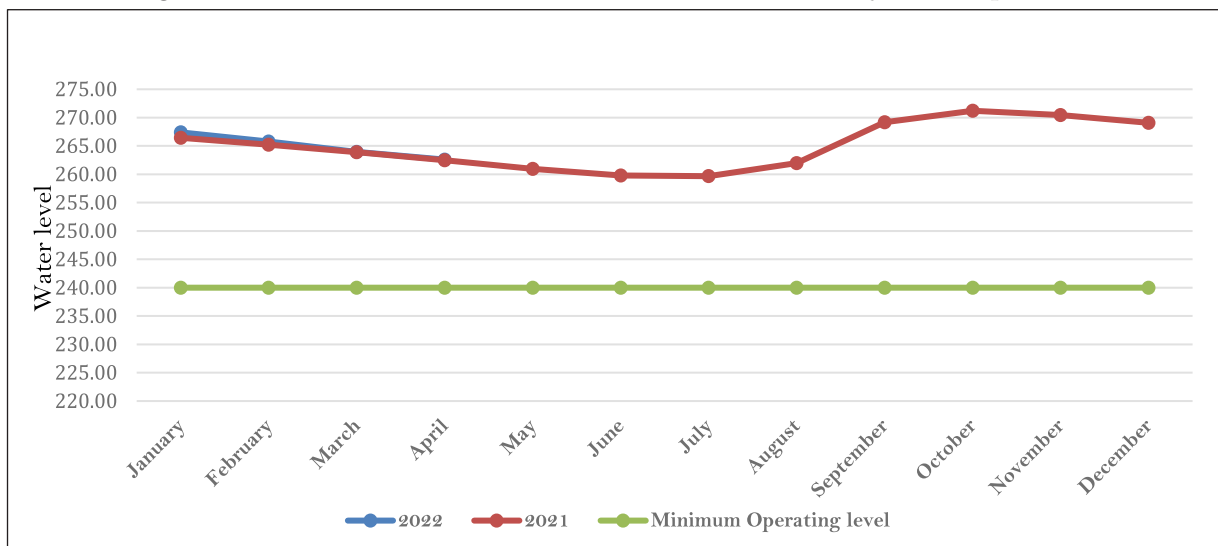
HYDRO DAM LEVELS

Akosombo dam water level continued to drop in April 2022

The Akosombo dam continued to record a reduction in the water level in April 2022 at a rate of 0.045 feet per day and this was 23% lower than the 0.059 feet per day recorded in March 2022. Consequently, the water level of the dam dropped by 1.36 feet at the end of April 2022 to a water level of 262.6 feet, from the 263.96 feet recorded at the beginning of the month. The water level recorded at the end of the month was 0.1 feet above the water level recorded for the same period in 2021 and was 22.54 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 April 2022

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



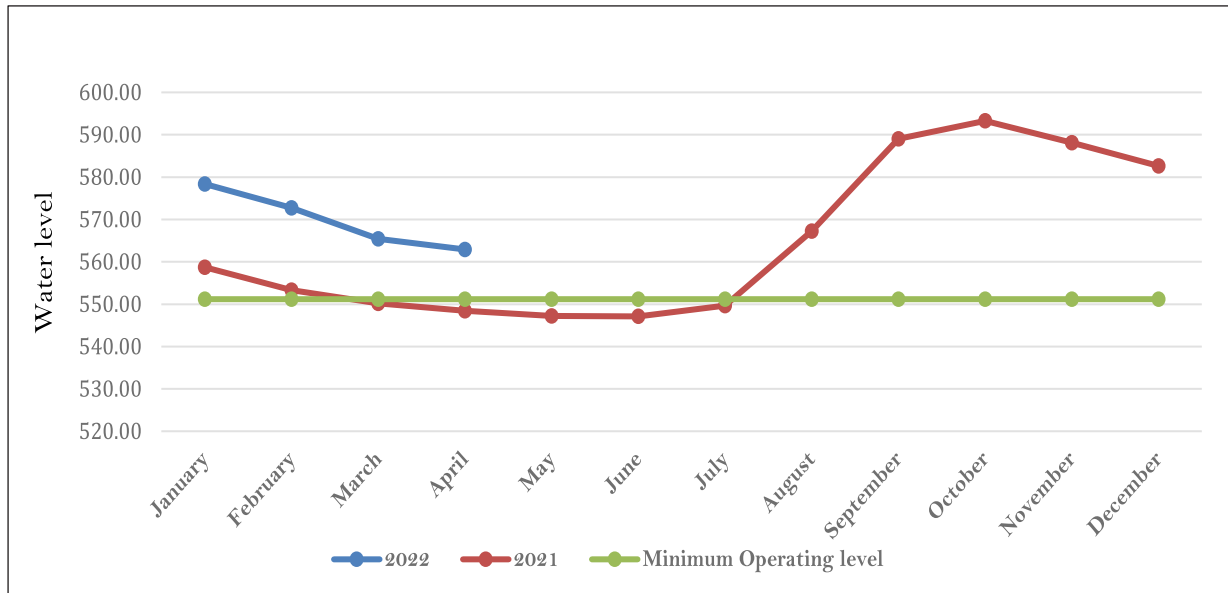
HIGHLIGHTS OF THE MONTH

Bui dam water level continued to drop in April 2022

The rate of drop in the water level for the Bui dam reduced significantly in April 2022 by 63.8% and this was due to a reduction in the electricity supplied by the plant. As a result, the water level of the dam dropped at a rate of 0.085 feet per day in April 2022, from the 0.235 feet per day recorded in March 2022. The water level of 565.45 feet recorded at the beginning of the month dropped by 2.53 feet to a month-end water level of 562.93 feet. The water level of the dam at the end of the month was 10.81 feet above the minimum operating level of the dam but was above the water level recorded for the same period in 2021 by 14.47 feet.

Figure 2 shows the comparative end-of-month trajectory of the level of water in the Bui dam from January 2021 to April 2022.

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



FUEL SUPPLY FOR POWER GENERATION

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

Natural gas supply through the West African gas pipeline from Nigeria averaged 47.28 MMSCFD in April 2022, decreased by 22.7% from the 59.19 MMSCFD recorded in March 2022. The total natural gas supplied reduced to 1,418.4 MMSCF in April 2022, from the 1,835.02 MMSCF recorded in March 2022. The share of the imported natural gas in the total natural gas consumed reduced to 15.45 in April 2022, from the 19.8% recorded in March 2022. Similarly, the share of the imported natural gas in the total fuel mix reduced to 14.7% in April 2022, from the 18.4% recorded in March 2022.

Natural gas supply from domestic sources increased in April 2022

The natural gas supplied from the domestic gas fields increased by an average of 10% in April 2022 to 259.02 MMSCFD, from the 235.41 MMSCFD recorded in March 2022. Thus, the total natural gas supplied increased to 7,770.52 MMSCF in April 2022 and this was higher than the 7,297.65 MMSCF recorded in March 2022. The natural gas supplied from the domestic gas fields accounted for 84.6% of the total natural gas consumed in April 2022 and was higher than the 80.2% recorded in March 2022. Similarly, the share of the domestic natural gas in the total fuel mix increased to 80.9% in April 2022, from 74.8% in March 2022.

The liquid fuel used for power generation decreased in April 2022

The use of liquid fuel for power generation reduced by 32.3% in April 2022 to 89,023 barrels, from 131,576 barrels recorded in March 2022. The reduced use of liquid fuel in April 2022 was due to the commissioning of the AKSA power plant on natural gas. The CenPower plant continued to operate partially on LCO and so was KTPP on DFO in April 2022. The LCO used for power generation accounted for 66.6% of the total liquid fuel used in April 2022 and this was higher than the 20.1% recorded in March 2022. Similarly, the share of the LCO used increased in the total fuel mix to 2.9% in April 2022, from 1.4% recorded in March 2022. The share of the DFO used in the total liquid fuel mix increased in April 2022 to 33.4%, from 27.4% recorded in March 2022. On the contrary, the share of the DFO used in the total fuel mix reduced to 1.5% in April 2022, from 1.9% in March 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

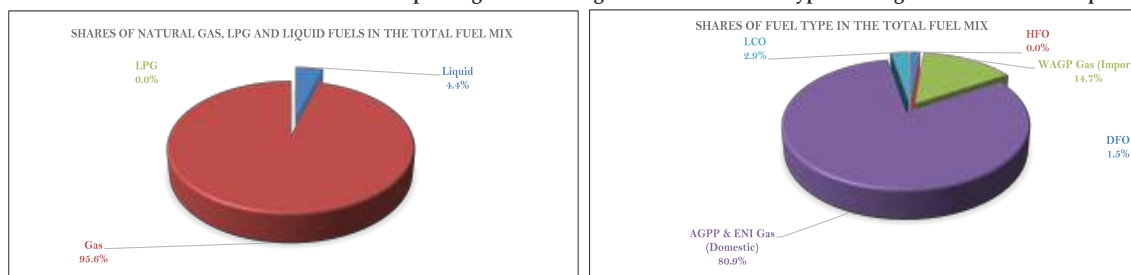


Figure 4a: Contribution of Natural Gas Supply by sources

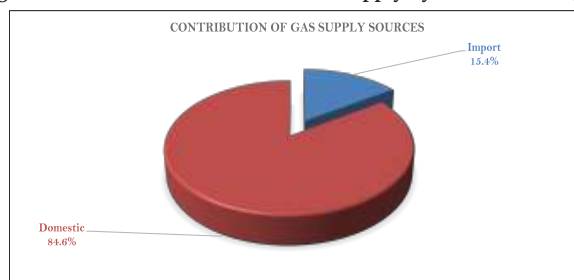


Figure 4b: Contribution of individual fuel in the liquid fuel supply

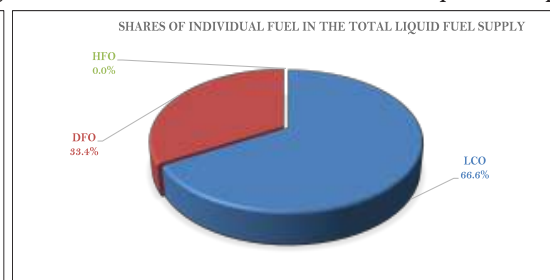


Figure 5a: Electricity Supply by sources

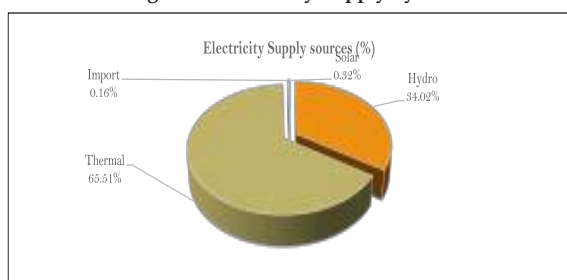
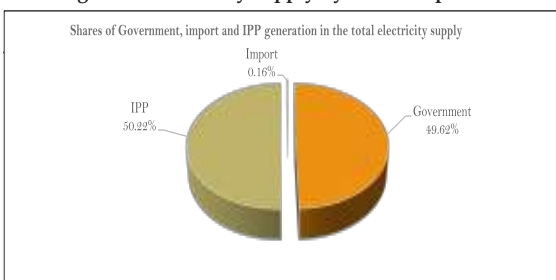


Figure 5b: Electricity supply by ownership



Peak Electricity Supply for April 2022		
Source of Supply	Generation at System Peak Load (MW)	Generation at Ghana Peak Load (MW)
AKOSOMBO	955.50	933.40
KPONG	136.60	129.00
BUI	326.90	345.70
BUI Solar	-	-
SEAP	347.10	348.30
TAPCO	303.10	305.00
TICO	162.60	163.00
TT1PP	105.00	108.00
CENIT	107.00	107.00
TT2PP	16.90	16.60
TWIN CITY	191.10	196.60
KARPOWER	385.60	220.00
AMERI	-	-
KTPP	-	95.00
Trojan Power	-	-
CENPOWER	363.60	366.00
AKSA	14.50	15.40
Bridge Power	-	-
IMPORT	-	55.00
Export to CIE at peak	13.00	-
Export to CEB at peak	115.00	125.00
Export to Sonabel	154.00	130.00
System Coincident Peak Load	3,415.50	
Ghana Coincident Peak Load		3,149.00

OPERATIONAL FACT SHEET

April 2021 Average Monthly Natural Gas Flowrate (MMSCFD)	
Location	Monthly Average
Etoki	53.05
Tema WAGPCo	0.00
Aboadze WAGPCo	0.00
Aboadze GNGC	99.19
Reverse Flow	85.19

Hydro Dam Water level for April 2022			
	Beginning month (ft)	End month (ft)	Change in water level
Hydro Dam			(feet)
Akosombo	263.96	262.60	-1.36
Bui	565.45	562.93	-2.53

	Weekly Electricity Supply (GWh)				
	Week 1	Week 2	Week 3	Week 4	Total
AKOSOMBO	120.81	119.72	114.45	162.66	517.64
KPONG	20.15	19.80	19.78	27.82	87.54
BUI Hydro	14.73	14.75	12.22	14.68	56.38
Bui Solar	1.52	1.47	1.17	1.99	6.15
VRA Kaleo	0.36	0.45	0.37	0.52	1.70
SAPP	73.29	62.57	34.49	37.30	207.65
TAPCO	51.30	45.11	44.65	53.34	194.41
TICO	25.27	25.80	53.70	71.05	175.82
TT1PP	17.99	18.08	17.88	23.27	77.22
CENIT	17.51	13.26	0.00	0.00	30.76
TT2PP	2.60	2.74	2.84	3.71	11.90
Twin City	32.32	32.59	30.36	42.12	137.40
KARPOWER	29.75	30.66	42.30	69.94	172.65
AMERI	0.00	0.00	0.00	0.00	0.00
KTPP	5.78	4.21	1.68	2.96	14.63
Cenpower	54.23	55.75	59.35	73.34	242.66
AKSA	2.14	1.50	2.26	2.94	8.83
Bridge Power	0.00	0.00	0.00	0.00	0.00
Import	0.54	1.02	0.96	0.55	3.08
Total	470.28	449.49	438.46	588.18	1,946.42

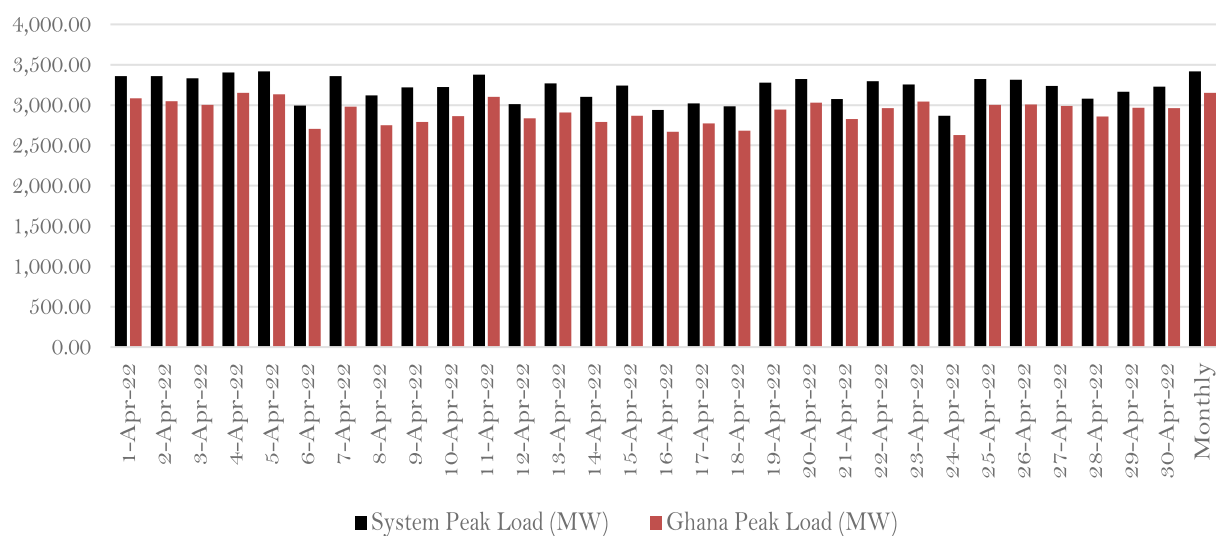
	Heat rate (Btu/kWh)	Fuel Consumption (MMBtu)			
		Natural gas	LCO	HFO	DFO
TAPCO	9,505.87	1,848,026.73	-	-	-
TICO	7,343.36	1,291,125.77	-	-	-
SAPP	7,820.70	1,623,938.87	-	-	-
TT2PP	12,182.96	145,018.71	-	-	-
TT1PP	12,509.54	965,986.65	-	-	-
CENIT	11,777.16	362,305.63	-	-	-
KARPOWERSHIP	7,859.99	1,357,045.84	-	-	-
AMERI PLANT	-	-	-	-	-
KPONE THERMAL	11,293.49	40,618.29	-	-	124,638.18
CENPOWER	7,931.81	1,576,033.01	315,239.69	-	33,484.14
AKSA ENERGY	9,003.63	79,501.18	-	-	-
Twin City	7,848.37	1,078,334.93	-	-	-
Bridgepower	-	-	-	-	-

	Month Average fuel prices					
	Gazetted Natural Gas Price	Weighted average natural gas price	LCO	HFO	DFO	LPG
US\$/MMBtu	6.08	6.21	22.16	18.26	37.39	18.47

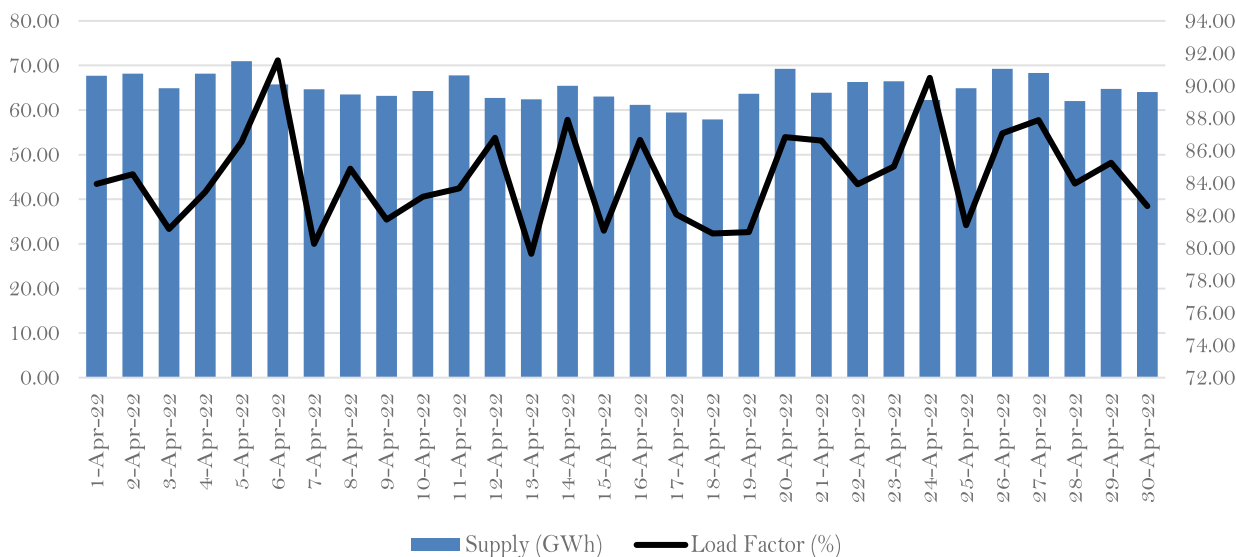
OPERATIONAL FACT SHEET

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	29.69
CENPOWER	9.26
AKSA ENERGY	6.08
Twin City	6.08
Bridgepower	0.00

Daily System and Ghana Peak loads

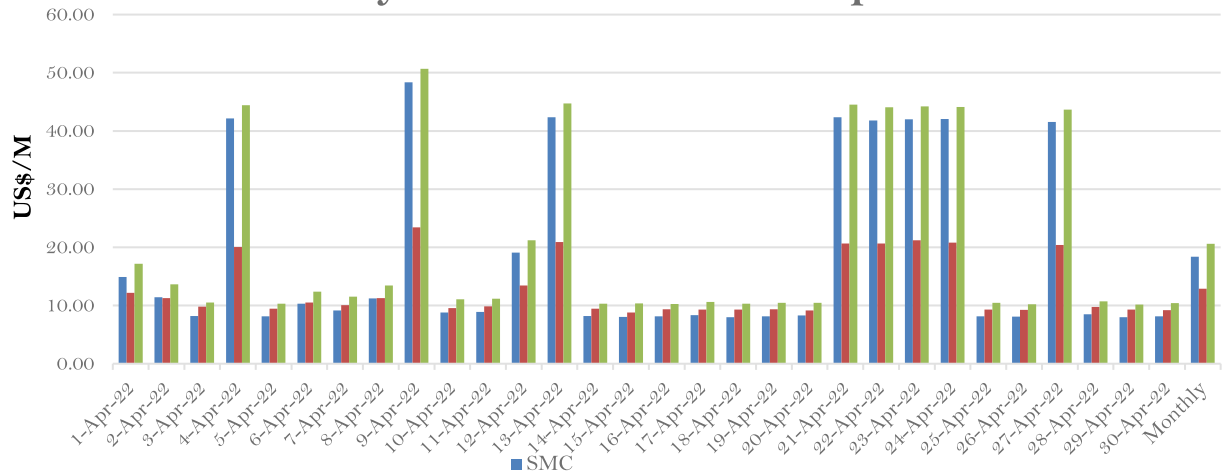


Daily electricity supply and load factor



ECONOMIC FACT SHEET

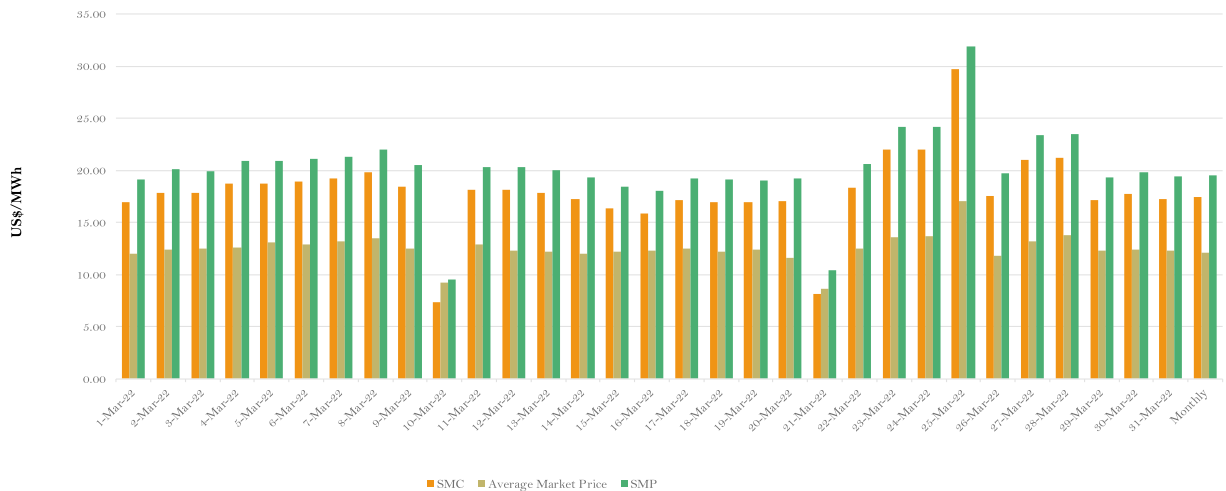
Summary of Market Prices for April 2022



Monthly Average Electricity Prices in the WEM

		Apr-22	Mar-22	Change
Average Market Price (AMP)	US\$/MWh	129.06	122.53	6.53
System Marginal Cost (SMC)	US\$/MWh	183.93	178.09	5.83
System Marginal Price (SMP)	US\$/MWh	206.14	199.05	7.09

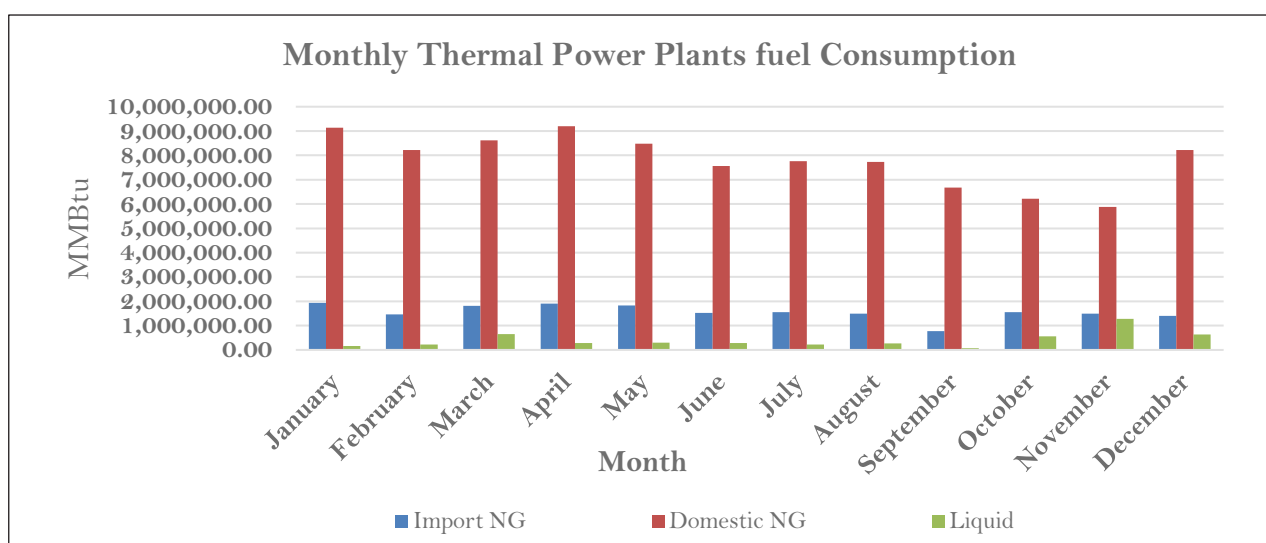
Summary of Market Prices for March 2022



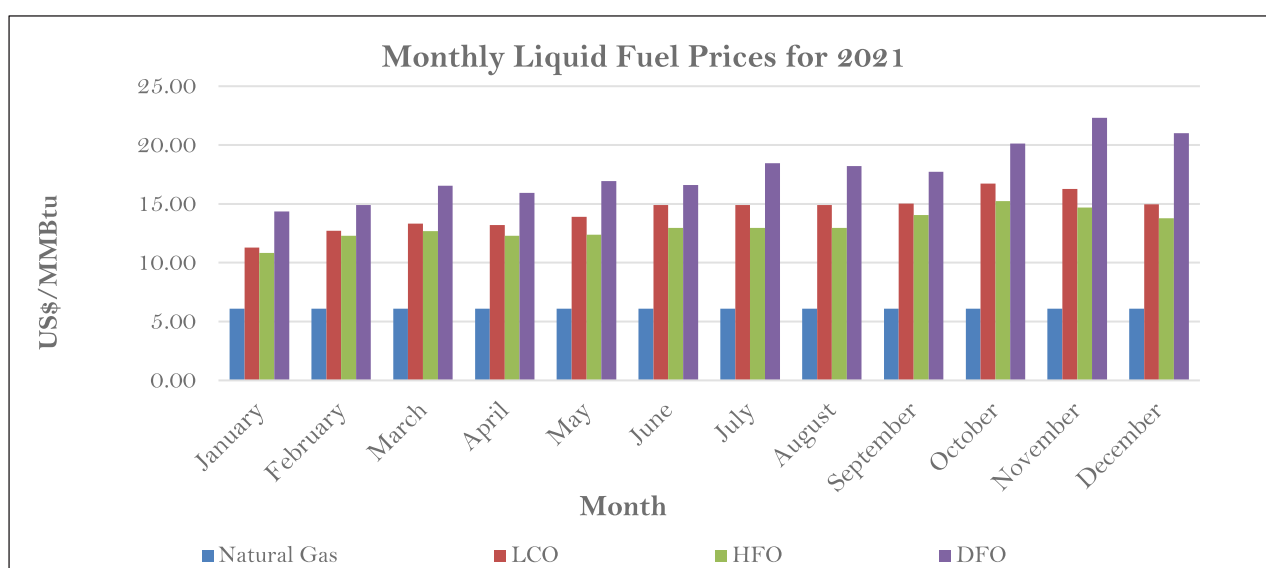
Performance of the Wholesale Electricity Market (WEM) in 2021 Fuel Consumption and prices in 2021

Natural gas has become the predominant fuel used for electricity production by the thermal power plant in Ghana. Natural gas consumption in the fuel consumption mix by thermal power plants has increased from 94.4% in 2020 to 95.8% in 2021. Natural gas consumption increased by 6 Tbtu in 2021 from 106 Tbtu in 2020 to 112 Tbtu. There are three sources of natural gas supply for electricity production by power plants in Ghana. This includes two domestic oil and gas fields and imports from Nigeria through the West African Gas Pipeline (WAGP). Natural gas supply through the WAGP accounted for 16.6% of the total natural gas consumed. Supply through the domestic gas fields, that is, Offshore Cape Three Point (OCTP) and Jubilee/Tweneboa, Enyenra, Ntomme (Ten), accounted for 64% and 19.4% respectively.

Liquid fuels used in Ghana include natural gas, Light Crude oil (LCO), Heavy Fuel Oil (HFO) and a little Distillate Fuel Oil (DFO). Liquid fuel consumption decreased from 6.2 Tbtu in 2020 to 4.9 Tbtu in 2021. HFO accounted for 59.3% of the total liquid fuel consumed in 2021. This was higher than the 52.2% recorded in 2020. LCO and DFO accounted for 38.7% and 2.1% of the total liquid fuel consumed in 2021.



Natural gas was the cheapest fuel used for electricity generation by thermal power plants in 2021. Gazetted price of natural gas remained constant at US\$6.08/MMBtu throughout 2021. HFO, LCO and DFO all saw increases in their prices in 2021. HFO prices increased at an average monthly rate of US\$0.29/MMBtu while LCO increased at a rate of US\$0.38/MMBtu. DFO saw the highest average increase of US\$0.63/MMBtu per month in 2021. HFO prices in 2021 averaged US\$13.09, compared to US\$14.34/MMBtu for LCO and US\$17.76/MMBtu for DFO.



HFO prices for electricity generation in 2021 increased from US\$419.29 per tonne in January to US\$597.14 per Tonne in December. LCO prices likewise increased from an average of US\$59.8 per barrel in January to US\$79.2 per barrel. Also, DFO prices increased from US\$601.9 per Tonne in January 2021 to US\$848 per Tonne in December 2021.

The increasing and unstable cost of liquid fuels and the relative stability in prices of natural gas underscores the need to put in adequate measures to ensure an adequate and reliable supply of natural gas to power plants for electricity generation.

Energy Commission's Senior High Schools' Renewable Energy Challenge



Ghana Education
Service (GES)

**3RD EDITION
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THEME:

**CLEAN COOKING & FOOD PROCESSING USING RENEWABLE
ENERGY TECHNOLOGIES**

Entry Requirements

- a. Participation is open to all Public Second Cycle Institutions.
- b. The School must submit details of its proposed project to the Regional Coordinator of Science, Technology, Mathematics and Innovation Education (STMIE).
- c. The submission may include the following:
 - i. Completed Registration Form by the school; and
 - ii. A brief project proposal of what the school intends to present at the Regional Challenge.
- d. Each school shall submit only one project.



Cookstoves



Fuels



Food Processing

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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
 KTRP = 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
 TT2PP = Tema Thermal 2 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

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