



GHANA WHOLESALE ELECTRICITY MARKET BULLETIN

MARKET WATCH

Monthly Market Data Analysis

ISSUE NO. 29

1st May 2018 to 31st May 2018

This Bulletin covers major developments in the Wholesale Electricity Market (WEM) of Ghana from 1st May, 2018 to 31st May, 2018. It analyses the performance of the key WEM indicators against their benchmarks, and examines the likely implications of any discernable trends in the market. This edition of the WEM bulletin continues with the series on the financial sustainability of the Power Sector for May 2018.

The Energy Commission (EC) would very much appreciate and welcome comments from readers on the Bulletin. 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.

HIGHLIGHTS OF THE MONTH

Overview of the Month

There was a marginal reduction in electricity supply by 5% in May 2018, from 47.01 GWh per day in April 2018 to 44.67 GWh per day in May 2018. This was predominantly due to reduced generation from thermal sources and lower demand in May 2018. Average electricity generation from thermal sources reduced from 30.25 GWh per day in April 2018 to 28.14 GWh per day in May 2018. This notwithstanding, TAPCO, Karpowership and Ameri power plants recorded an increase in generation in May 2018 by 17.2%, 11% and 31.7% respectively. Average electricity generation from hydro sources also reduced, but marginally in May 2018, from 16.32 GWh per day in April 2018 to 16.23 GWh per day in May 2018. This was due to a significant reduction in electricity generation from Bui GS by 40.7% in May 2018. Average electricity generation from Bui GS reduced from 2.51 GWh per day in April 2018 to 1.49 GWh per day in May 2018. Generation from Akosombo GS and Kpong GS however increased from 11.62 GWh per day and 2.19 GWh per day in April 2018 to 12.43 GWh per day and 2.31 GWh per day in May 2018 respectively. The rate of drop in the water level for Akosombo dam stood at 0.046 feet per day in May 2018. The Bui dam water level reduced from 0.147 feet per day in April to 0.095 feet per day in May 2018. The reduced rate of drop in water level for the Bui GS was due to reduced generation in May 2018.

Liquid fuel consumption increased marginally in May 2018 by 0.02% from 408,913

Table 1. Table 1. Projected and Actual Outturn of electricity demand and supply in April 2018 and May 2018

	May 2018		April 2018	
	Projected	Actual Outturn	Projected	Actual Outturn
Total Supply (GWh)	1,412.6	1,384.8	1,396.0	1,410.0
Source by Power Plants (GWh)				
AKOSOMBO	311.7	385.2	302.3	348.5
KPONG	51.1	71.7	49.2	63.7
BUI	57.4	46.1	55.5	75.3
Sunon Asogli	117.8	137.5	117.8	171.1
TAPCO	89.3	64.4	57.6	53.2
TICO	202.4	199.2	195.6	224.4
TT1PP	59.5	30.5	-	61.6
CENIT	30.7	-	32.3	-
TT2PP	-	-	-	-
MRP	-	-	-	-
Karpowership	271.3	249.1	267.8	217.3
AMERI	75.9	81.5	49.0	59.9
KTPP	-	16.0	61.2	-
Trojan Power	-	-	-	-
CENPOWER	107.5	0.7	104.0	-
ARSA	35.4	39.8	101.3	86.4
BXC Solar	2.2	2.4	2.1	2.8
VRA Solar	0.4	0.2	0.3	-
Genser	-	33.7	-	33.5
Total Generation (GWh)	1,412.6	1,378.0	1,396.0	1,399.8
Imports (GWh)	-	6.8	-	10.2
Total Supply (GWh)	1,412.6	1,384.8	1,396.0	1,410.0
Deficit (GWh)	-	(27.8)	-	14.0
Ghana Coincident Peak Load (MW)	2,414.0	2,283.9	2,426.0	2,265.8
System Coincident Peak Load (MW)	2,497.0	2,406.1	2,509.0	2,432.9

HIGHLIGHTS OF THE MONTH

barrels in April 2018 to 408,975 barrels in May 2018 due to the increase in consumption of LCO and DFO by SAPP and KTPP respectively. Natural gas supply from WAGPCo to Tema and Kpone reduced significantly by 23.08% in May 2018 from 67.84 MMSCFD in April 2018 to 52.18 MMSCFD. On the Contrary, natural gas flow rate from AGPP to Aboadze increased marginally from 94.04 MMSCFD in April 2018 to 94.76 MMSCFD in May 2018. On average, 283 tonnes per day of LPG was consumed for electricity production in May 2018.

There was a marginal reduction of 1.1% in the System Peak Load and a marginal increase of 0.8% in the Ghana Peak Load in May 2018. The System Peak Load decreased from 2,432.9 MW in April 2018 to 2,406.1 MW in May 2018. The Ghana Peak Load on the contrary increased from 2,265.8 MW in April 2018 to 2,283.9 MW in May 2018. Average demand has reduced from 1,958.7 MW in April 2018 to 1,861.3 MW in May 2018.

Electricity import in May 2018 reduced significantly by 35.6%, from 0.34 GWh per day in April 2018 to 0.22 GWh per day in May 2018. Similarly, export of electricity to both CIE and CEB reduced significantly by 35.7% from 2.66 GWh per day in April 2018 to 1.71 GWh per day in May 2018. Export during peak hours reached a maximum of 91 MW to CEB and 94 MW to CIE in May 2018.

Electricity Demand and Supply

Electricity Demand

The System Peak Load witnessed a marginal reduction of 1.1% in May 2018 from 2,432.9 MW in April 2018 to 2,406.1 MW. The reduction in the System Peak Load was significantly due to reduction in export to CIE and CEB in May 2018. At the System Peak Load, export to CIE and CEB were recorded at 61 MW and 70 MW respectively in May 2018. The System Peak Load was 90.9 MW lower than the projected 2,497 MW under the 2018 ESP. On the Contrary, the Ghana Peak Load witnessed a marginal increase of 0.8% in May 2018, from 2,265.8 MW in April 2018 to 2,283.9 MW in May 2018. Generation from hydro sources constituted 46.7% and 39.5% for both the System Peak Load and the Ghana Peak Load respectively in May 2018. Average demand for electricity reduced by about 97 MW in May 2018, from 1,958.7 MW in April 2018 to 1,861.3 MW.

Electricity supply

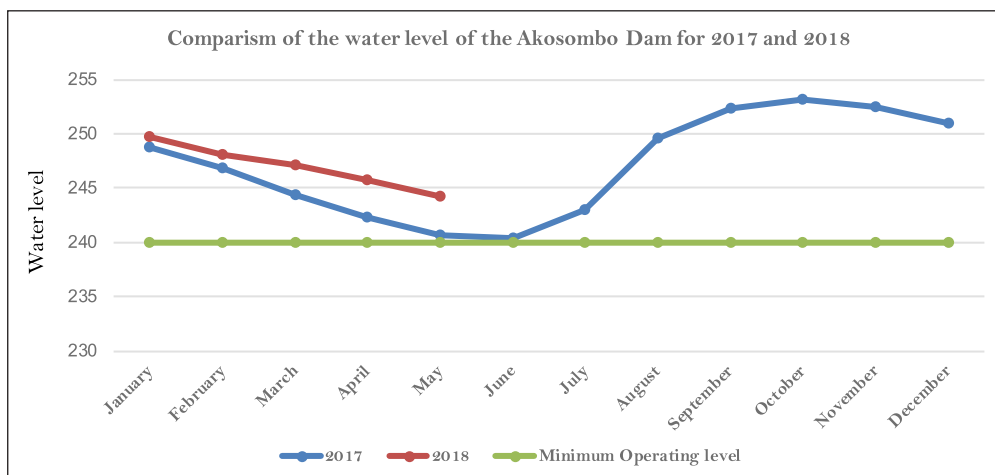
Average electricity supplied in May 2018 reduced by 5%, from 47.01 GWh per day in April 2018 to 44.67 GWh per day in May 2018. Total electricity supplied in May 2018 reduced marginally by 1.81% from 1,410.24 GWh in April 2018 to 1,384.77 GWh in May 2018. Electricity generated from hydropower plants in the total electricity supplied in May 2018 increased from 34.7% in April 2018 to 36.3%. Out of the total electricity supplied in May 2018, 1,377.96 GWh was generated from domestic sources and 6.81 GWh imported from CIE. The total electricity supplied in May 2018 was 28.23 GWh lower than the 1,413 GWh projected under the 2018 ESP.

Hydro Dam Levels

Akosombo Dam Water Level dropped in May 2018

The rate of drop in the water level of the Akosombo GS still stood at 0.046 feet per day in May 2018 as the same figure was recorded in April 2018. The stable rate of drop was due to a marginal inflow into the dam. The water level of 245.7 feet at the beginning of the month dropped by 1.42 feet to 244.28 feet at the end of May 2018. The water level was 4.28 feet above the minimum operating level of 240 feet and was 3.62 feet above the water level recorded for the same period in May 2017.

Figure 1: Month-End Water Level for Akosombo Dam from January 2017 to May 2018



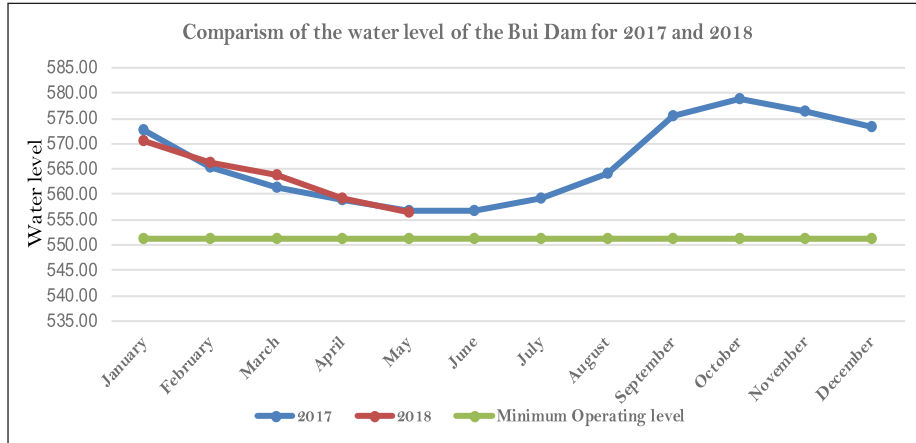
HIGHLIGHTS OF THE MONTH

Bui Dam Water Level continued to decline in May 2018

There was a reduction in the rate of drop in the water level for Bui GS in May 2018 from 0.147 feet per day in April to 0.095 feet per day. The reduced rate of drop in the water level was due to reduced generation from the Bui GS in May 2018. The Bui dam water level dropped by 2.95 feet to 556.35 feet at the end of the month. The water level was 5.6 feet above the minimum operating level of 551.18 feet and was 0.43 feet lower than the water level recorded for the same period in May 2017.

Figure 2 shows comparative end of month trajectory of the level of water in the Bui dam from January 2017 to May 2018.

Figure 2: Month-End Water Level for Bui Dam from January 2017 to May 2018

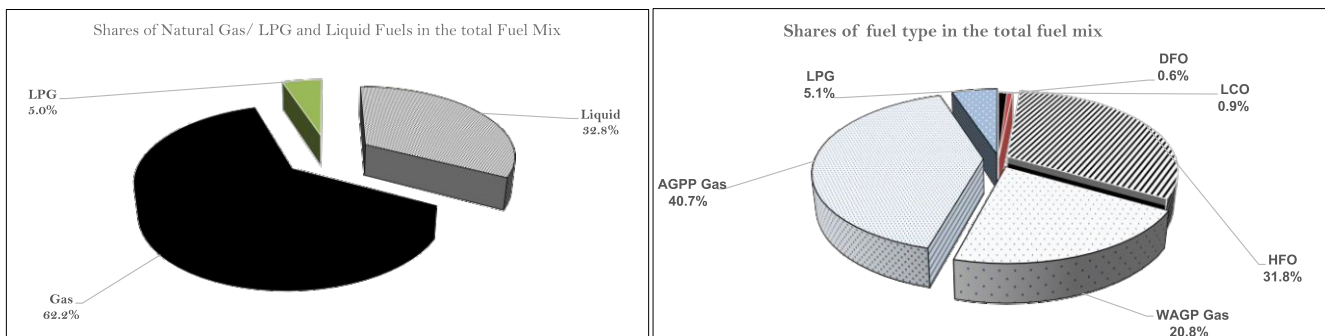


Fuel Supply for Power Generation

The consumption of natural gas continues to dominate the total fuel mix in May 2018. Natural gas consumption accounted for 62.2% of the total fuel mix and was marginally lower than the 63% recorded in April 2018. The share of natural gas supply from AGPP in the total fuel mix increased from 36% in April 2018 to 40.7% in May 2018 to continue its dominance in the total fuel mix. Similarly, the share of natural gas supply from WAGPCo decreased from 27% in April 2018 to 20.8% in May 2018. Liquid fuel share in the total fuel mix increased marginally from 32% in April 2018 to 32.8% in May 2018. The shares of HFO in the total fuel mix continue to decline from 41% in March 2018 and 32% in April 2018 to 31.8% in May 2018. The consumption of LCO in the total fuel mix increased marginally from 0.1% in April 2018 to 0.94% in May 2018. DFO consumption increased in May 2018 from no consumption in April 2018 to 0.6%.

Figure 3a and Figure 3b shows the shares of sources of fuel and fuel type in the generation fuel mix for electricity generation respectively.

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



Natural gas flow rate from WAGPCo decreased in May 2018

Natural gas flow rate from WAGP to Tema and Kpone decreased by 23.1% in May 2018 from 67.84 MMSCFD in April 2018 to 52.18 MMSCFD. Total natural gas consumption in Tema and Kpone reduced from 2,087.45 MMSCF in April to 1,694.99 MMSCF in May 2018. Natural gas from WAGP contributed 33.8% of the total natural gas consumed in May 2018.

Natural gas flow rate from GNGC increased marginally in May 2018.

Natural gas flow rate from AGPP to Aboadze Power Enclave increased marginally by 0.8% from 94.04 MMSCFD in April 2018 to 94.76 MMSCFD in May 2018. There was a shutdown of the FPSO Kwame Nkrumah on the 28th May, 2018 for turret remediation works. An average of 78 MMSCFD was supplied from the TEN fields from the 28th May, 2018. The total natural gas consumed in May 2018 increased by 6.2% from 2,632.18 MMSCF in April 2018 to 2,794.93 MMSCF in May 2018. The share of natural gas in the total natural gas consumed increased from 57.7% in April 2018 to 66.2% in May 2018.

HIGHLIGHTS OF THE MONTH

Figure 4a: Contribution of Natural Gas Supply by sources

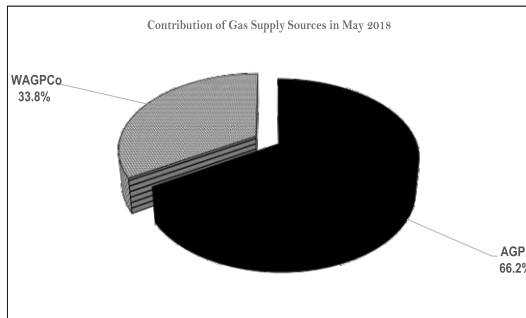
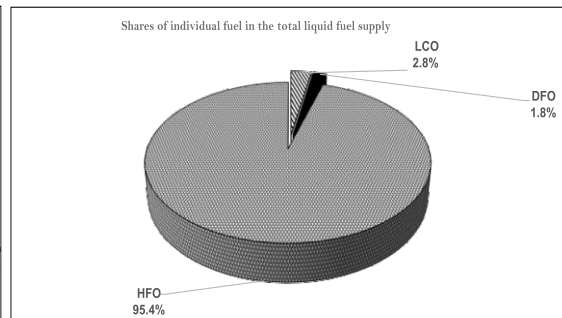


Figure 4b: Contribution of individual fuel in the liquid fuel supply



Liquid Fuel

The consumption of liquid fuel increased marginally in May 2018 by 0.02% from 408,913 barrels in April 2018 to 408,975 barrels. The share of DFO in the total liquid fuel consumed increased from no consumption in April 2018 to 1.8% in May 2018. Similarly, LCO share in the total liquid fuel consumed increased from 0.2% in April 2018 to 2.8% in May 2018. The share of HFO in the total liquid fuel consumed reduced marginally from 99% in April 2018 to 95.4% in May 2018.

Plant by Plant Highlights

Electricity Generation at the Akosombo Generation Station (GS) increased in May 2018

Generation from the Akosombo GS increased in May 2018 by 7% from 11.62 GWh per day in April 2018 to 12.43 GWh per day. The total electricity generated from the Akosombo GS was 385.24 GWh in May 2018 and was 36.72 GWh more than the 348.52 GWh generated in April 2018. The total electricity generated constituted 27.82% to the total electricity supplied and was 23.5% higher than the 312 GWh projected under the 2018 ESP. The Akosombo GS contributed 809 MW to the System Peak Load and 580 MW to the Ghana Peak Load, representing 33.6% and 25.4% of the System Peak Load and the Ghana Peak Load respectively.

Electricity supply by Kpong Generation Station (GS) increased marginally in May 2018

The average electricity generation from the Kpong GS increased marginally in May 2018 from 2.19 GWh per day in April 2018 to 2.31 GWh per day. A total of 71.67 GWh of electricity was generated by the power plant in May 2018 and was 5.93 GWh higher than the 65.74 GWh in April 2018. The total electricity generated by the power plant contributed 5.2% of the total electricity supplied in May 2018. The Kpong GS total generation was 40.5% more than the 51 GWh projected under the 2018 ESP. The power plant contributed 113 MW to the System Peak Load and 115 MW to the Ghana Peak Load, representing 4.7% of the System Peak Load and 5% of the Ghana Peak Load.

Electricity supply by the Bui Generation Station (GS) reduced significantly in May 2018

Average generation from the Bui GS reduced significantly by 40.7% in May 2018. The average electricity generation decreased from 2.51 GWh per day in April 2018 to 1.49 GWh per day in May 2018. Likewise, the total electricity supplied by the Bui GS decreased by 38.7% from 75.32 GWh in April 2018 to 46.15 GWh in May 2018. The total electricity supplied by the power plant contributed 3.33% of the total electricity supplied and was 19% lower than the 57 GWh projected under the 2018 ESP. Bui GS contributed 202.5 MW to the System Peak Load and 206 MW to the Ghana Peak Load, representing 8.4% of the System Peak Load and 9.02% of the Ghana Peak Load in May 2018.

Generation by the Sunon Asogli Power Plant's (SAPP) reduced in May 2018

There was 10.9% reduction in the average electricity generation from Sunon Asogli Power Plant (SAPP) in May 2018. The average electricity generation decreased from 5.7 GWh per day in April 2018 to 5.08 GWh per day in May 2018. The SAPP generated a total of 157.5 GWh in May 2018 and was 8% lower than the 171.11 GWh generated in April 2018. The total electricity generation of SAPP contributed 11.4% of the total electricity supplied and was 33.5% higher than the 118 GWh projected under the 2018 ESP. The SAPP contributed 182.5 MW to the System Peak Load and 330 MW to the Ghana Peak Load, representing 7.6% and 14.5% of the System Peak Load and the Ghana Peak Load respectively. The power plant consumed a total of 1,212.82 MMSCF of natural gas and 13,020 barrels of LCO in May 2018. The heat rate of the power plant increased marginally from 7,902.85 Btu/kWh recorded in April 2018 to 8,022.35 Btu/kWh in May 2018.

CENIT Power Plant's continued to be offline in May 2018

The CENIT Power Plant remained offline in May 2018. The power plant was however projected to produce 31 GWh in May under the 2018 ESP.

Ameri Energy Power Plant's generation increased significantly in May 2018

Average electricity generation from the Ameri power plant increased significantly in May 2018 by 31.7%. Ameri power plant's average electricity generation increased from 2 GWh per day in April 2018 to 2.63 GWh per day in May 2018. Correspondingly, the total electricity supplied by the power plant increased significantly by 36.1%, from 59.9 GWh in April 2018 to 81.54 GWh in May 2018. The total electricity generation from the Ameri power plant contributed 5.9% of the total electricity supplied in May 2018 and was 5.54 GWh higher than the projected 76 GWh under the 2018 ESP. Ameri contributed 96.4 MW to the System Peak Load and 220.4 MW to the Ghana Peak Load, representing 4% of the System Peak Load and 9.7% of the Ghana Peak Load. The power plant consumed 715.86 MMSCF of natural gas in May 2018. The heat rate of the power plant increased marginally from 10,140.25 Btu/kWh in April 2018 to 10,191.96 Btu/kWh in May 2018.

Kpone Thermal Power Plant's (KTPP) come back online in May 2018

The KTPP come back online and commenced the commissioning of its gas turbines on natural gas on 22nd May, 2018. The power plant generated an average of 2 GWh per day for eight days in May 2018. The power plant generated a total of 15.98 GWh in May 2018. The total generation from the power plant contributed 1.2% of the total electricity supplied in May 2018. The power plant did not contribute to both the System Peak Load and the Ghana Peak Load in May 2018. A total of 140.33 MMSCF of natural gas and 8,450 barrels of DFO was consumed by the power plant to generate the 15.98 GWh in May 2018. In May 2018, the power plant was projected to be offline under the 2018 ESP. The heat rate of KTPP was estimated to be 11,492.91 Btu/kWh.

HIGHLIGHTS OF THE MONTH

The Karpowership Power Plant's generation increased in May 2018

The Karpowership average electricity generation increased by 11% from 7.24 GWh per day in April 2018 to 8.04 GWh per day in May 2018. The total electricity generation of 249.14 GWh from the power plant was 31.84 GWh higher than the 217.3 GWh in April 2018. The increment in electricity generated by the Karpowership was due to increase in fuel supply to the power plant. The total electricity generation by the power plant contributed 18% of the total electricity supplied in May 2018. The Karpowership generated 5.9% lower than the 271 GWh projected under the 2018 ESP. Karpowership contributed 454.6 MW to the System Peak Load and 455.1 MW to the Ghana Peak Load, representing 19% of the System Peak Load and 19.9% of the Ghana Peak Load in May 2018. The power plant consumed a total of 333,464 barrels of HFO to generate the 249.14 GWh at an improved heat rate from 8,102.31 Btu/kWh in April 2018 to 8,097.77 Btu/kWh in May 2018.

AKSA Power Plant's generation reduced significantly in May 2018

The average electricity generation from the AKSA power plant in May 2018 reduced significantly by 55.5%. Average electricity generation reduced from 2.88 GWh per day in April 2018 to 1.28 GWh per day in May 2018. Consequently, the total electricity supplied by the power plant reduced by 54% from 86.42 GWh in April 2018 to 39.77 GWh in May 2018. AKSA's total electricity supplied contributed 2.9% of the total generation in May 2018 but was 13.6% higher than the 31 GWh projected under the 2018 ESP. The AKSA power plant contributed 103.1 MW to the System Peak Load and 14.4 MW to the Ghana Peak Load, representing 4.3% and 0.6% of the System Peak Load and the Ghana Peak Load respectively. A total of 54,040 barrels of HFO was consumed by the power plant to generate the 39.77 GWh, with an increased heat rate from 8,199.68 Btu/kWh in April 2018 to 8,220.58 Btu/kWh in May 2018.

Takoradi International Company (TICO) generation decreased in May 2018

TICO's average generation decreased in May 2018 by 14.1%, from 7.48 GWh per day in April 2018 to 6.43 GWh per day in May 2018. The TICO power plant recorded a total electricity generation of 199.24 GWh in May 2018 and was 11.2% lower than the 224.4 GWh generated in April 2018. The total electricity generated from the power plant constituted 14.4% of the total electricity supplied and was 2.76 GWh lower than the projected generation of 202 GWh under the 2018 ESP. The power plant contributed 337 MW to the System Peak Load and 316 MW to the Ghana Peak Load in May 2018. These constituted 14% of the System Peak Load and 13.8% of the Ghana Peak Load. TICO consumed a total of 1,420.05 MMSCF of natural gas to generate a total of 199.24 GWh at an estimated heat rate of 7,433.88 Btu/kWh in May 2018, an increment in heat rate when compared with 7,258.87 Btu/kWh in April 2018.

Takoradi Power Company (TAPCO) Plant's generation increased in May 2018

The TAPCO power plant's average electricity generation increased by 17.2% in May 2018 from 1.77 GWh per day in April 2018 to 2.08 GWh per day in May 2018. The total electricity generation of 64.35 GWh by TAPCO in May 2018 was 21.1% higher than the 53.15 GWh generated in April 2018. The total electricity generation of 64.35 GWh constituted 4.7% of the total electricity supplied in May 2018 and was 27.7% lower than the 89 GWh projected under the 2018 ESP. TAPCO contributed 108 MW to the System Peak Load, constituting 4.49% of the System Peak Load in May 2018. The power plant did not contribute to the Ghana Peak Load in May 2018. The power plant consumed a total of 659.02 MMSCF of natural gas with an improved heat rate of 10,681.36 Btu/kWh in May 2018 from 10,738.26 Btu/kWh in April 2018.

Tema Thermal 1 Power Plant's (TT1PP) decreased in May 2018

The average electricity generation from TT1PP decreased significantly by 52.2% in May 2018. TT1PP average electricity generation reduced from 2.05 GWh per day in April 2018 to 0.98 GWh per day in May 2018. Similarly, the total electricity generation from TT1PP reduced significantly by 50.6% in May 2018 from 61.61 GWh in April 2018 to 30.45 GWh in May 2018. The total electricity generated by the power plant constituted 2.2% of the total supply in May 2018 and was 49.3% lower than the 60 GWh projected under the 2018 ESP. The power plant did not contribute to the System Peak Load but contributed 106 MW to the Ghana Peak Load, representing 4.6% of the Ghana Peak Load. TT1PP consumed a total of 341.84 of natural gas to generate the 30.45 GWh, with an improvement in heat rate from 11,558.87 Btu/kWh in April 2018 to 11,057.99 Btu/kWh in May 2018.

Trojan Power Plant's continued to be offline in May 2018

The Trojan Power Plants in both Tema and Kumasi have been offline since July 2017 and continued to be offline in May 2018 due to fuel supply challenges.

Genser Power Plant's generation decreased marginally in May 2018

The Genser power plant average generation decreased marginally by 2.9% in May 2018 from 1.12 GWh per day in April 2018 to 1.09 GWh per day. On the contrary, the total electricity generated by Genser increased marginally by 0.4% from 33.53 GWh in April 2018 to 33.65 GWh in May 2018 due to greater number of days in May than in April. The total electricity supplied by the power plant constituted 2.4% of the total supply in May 2018. Genser power plant consumed a total of 8,758 tonnes of LPG, with a increased heat rate from 10,994.8 Btu/kWh in April 2018 to 11,100.99 Btu/kWh in May 2018.

BXC Solar generation decreased in May 2018

The BXC solar power plant's average electricity generation decreased by 15.1% in May 2018 from 0.09 GWh per day in April 2018 to 0.08 GWh per day in May 2018. The total electricity generated by the power plant of 2.43 GWh in May 2018 was 12.3% lower than the 2.77 GWh in April 2018. The solar power plant contributed 0.2% of the total electricity supplied in May 2018. The BXC solar power plant generated 10.5% higher than the 2.2 GWh projected under 2018 ESP.

VRA Navrongo Solar generation decreased in May 2018

The VRA Navrongo solar power plant's total electricity generation decreased by 15.9% in May 2018 from 0.23 GWh in April 2018 to 0.2 GWh in May 2018. The power plant's total electricity generation constituted 0.01% of the total electricity supplied in May 2018. The solar plant was projected to supply 0.4 GWh under the 2018 ESP but supplied 50% lower than projected in May 2018.

Electricity Exchange – Imports and Exports decreased significantly in May 2018

The average electricity import from La Cote D'Ivoire continued to decrease from 0.34 GWh per day in April 2018 to 0.22 GWh per day in May 2018. A total of 6.81 GWh of electricity was imported in May 2018 which was 33.5% lower than the 10.24 GWh in April 2018. The total electricity import constituted 0.5% of the total electricity supplied in May 2018. Electricity import did not contribute to the System Peak Load but constituted 6 MW of the Ghana Peak Load, representing 0.3% in May 2018.

The average electricity export to CIE decreased by 9.9% in May 2018, from 0.35 GWh per day in April 2018 to 0.32 GWh per day. Similarly, the total electricity supplied to CIE reduced from 10.5 GWh in April 2018 to 9.78 GWh in May 2018. However, average electricity export to CEB decreased by 41.9%, from 2.31 GWh per day in April 2018 to 1.34 GWh per day in May 2018. The total electricity export to CEB reduced significantly from 69.39 GWh in April 2018 to 41.63 GWh in May 2018.

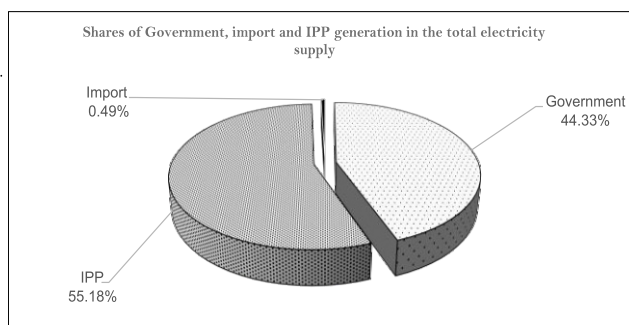
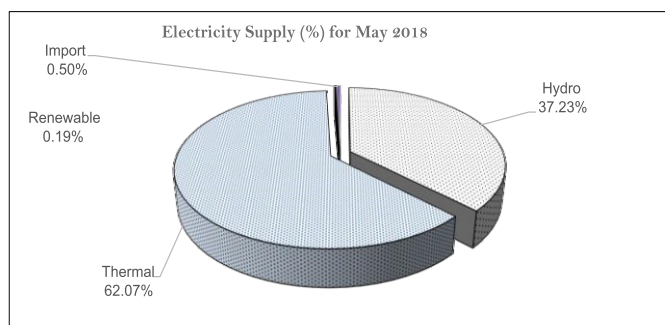
The total electricity exported in May 2018 was 4.9% higher than the 49 GWh projected under the 2018 ESP. Ghana continues to be a net exporter of electricity in May 2018.

OPERATIONAL FACT SHEET

Peak Electricity Supply - May 2018			
Source of Supply	Generation at System Peak Load of May 2018 (MW)	Generation at Ghana Peak Load of May 2018 (MW)	Electricity Supply (GWh)
AKOSOMBO	809.00	580.00	385.24
KPONG	113.00	115.00	71.67
BUI	202.50	206.00	46.15
SAPP	182.50	330.00	157.50
TAPCO	108.00	-	64.35
TICO	337.00	316.00	199.24
TT1PP	-	106.00	30.45
CENIT	-	-	-
TT2PP	-	-	-
MRP	-	-	-
KARPOWER	454.60	455.10	249.14
AMERI	96.40	220.40	81.54
KTPP	-	-	15.98
Trojan Power	-	-	-
CENPOWER	-	-	0.67
AKSA	103.10	14.40	39.77
BXC Solar	-	-	2.43
Safisana	-	-	-
VRA Solar	-	-	0.20
Genser	-	-	33.65
IMPORT	-	6.00	6.81
Export to CEB	70.00	-	41.63
Export to CIE	61.00	65.00	9.78
System Coincident Peak Load	2,406.10	-	-
Ghana Coincident Peak Load	-	2,283.90	-
Total Supply	-	-	1,384.77
Total Supply without export	-	-	1,333.36

Ghana Electricity Demand & Supply		
		May-18
Maximum System Peak Load	MW	2,406.1
Minimum System Peak Load	MW	1,988.0
Average Peak Generation	MW	2,227.4
System Base Load	MW	1,227.6
Total Electricity	GWh	1,384.8
Load Factor (LF)	%	75.3

OPERATIONAL FACT SHEET



Power Plant Data for May 2018

	Installed Capacity (MW)	Plant Capacity Utilization (%)	Electricity Generation (GWh)	Natural Gas Consumption (MMBtu)	LCO Consumption (MMBtu)	DFO Consumption (MMBtu)	HFO Consumption (MMBtu)	LPG Consumption (MMBtu)
Akosombo	1,020.00	50.76	385.24	-	-	-	-	-
Kpong	160.00	60.21	71.67	-	-	-	-	-
Bui	400.00	15.51	46.15	-	-	-	-	-
SEAP	560.00	37.80	157.50	1,194,630.09	68,878.05	-	-	-
TAPCO	330.00	26.21	64.35	687,356.12	-	-	-	-
TICO	340.00	78.76	199.24	1,481,108.86	-	-	-	-
TT1PP	126.00	32.48	30.45	336,715.88	-	-	-	-
CENIT	126.00	-	-	-	-	-	-	-
TT2PP	49.50	-	-	-	-	-	-	-
MRP	-	-	-	-	-	-	-	-
KARPOWER	470.00	71.25	249.14	-	-	-	2,017,459.99	-
AMERI	250.00	43.84	81.54	831,041.99	-	-	-	-
TROJAN	56.00	-	-	-	-	-	-	-
KTPP	220.00	9.76	15.98	138,228.62	-	45,378.72	-	-
AKSA	320.00	16.70	39.77	-	-	-	326,941.67	-
Genser	95.00	47.61	33.65	-	-	-	-	373,548.25
Total	4,522.50	40.85	1,374.66	4,669,081.56	68,878.05		2,344,401.66	373,548.25

Natural gas flow rate

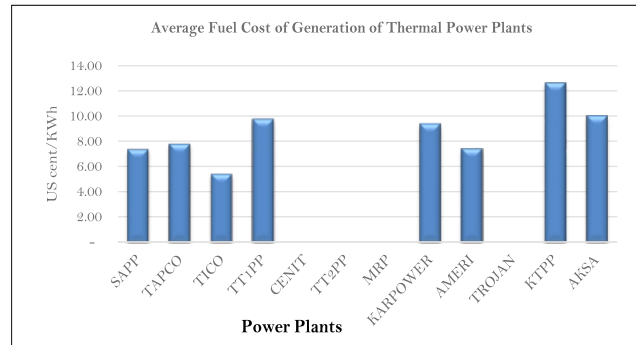
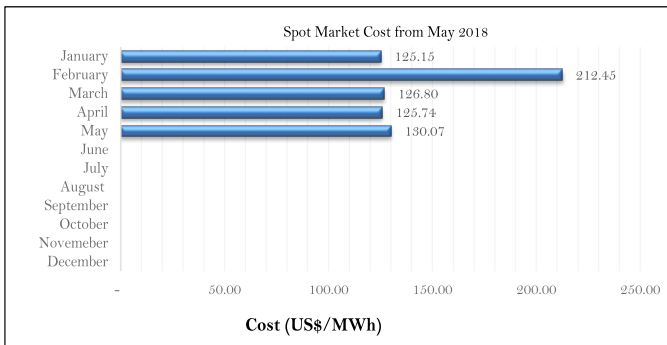
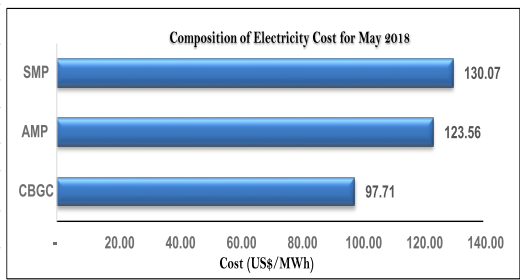
Location	Monthly Average
Etoki	46.11
Tema WAGPCo	52.18
Aboadze WAGPCo	0.00
Aboadze GNGC	94.76

May-18

	Beginning month (ft)	End month (ft)	Change in water level
Hydro Dam			(feet)
Akosombo	245.7	244.28	-1.42
Bui	559.31	556.35	-2.95

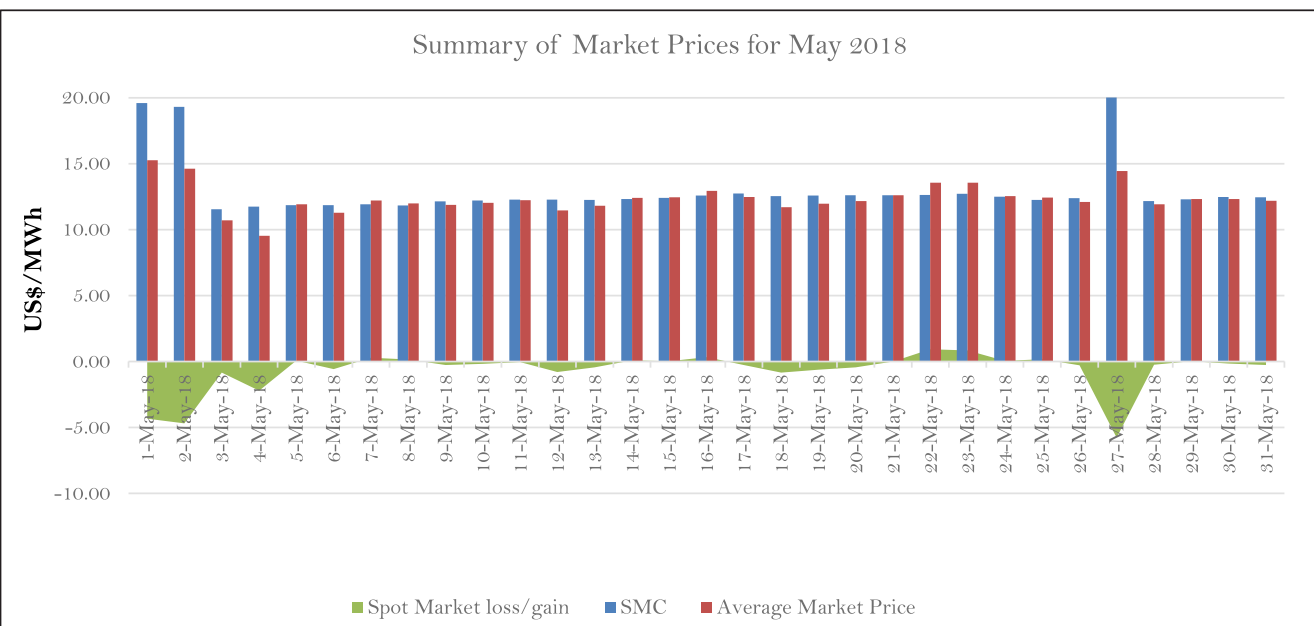
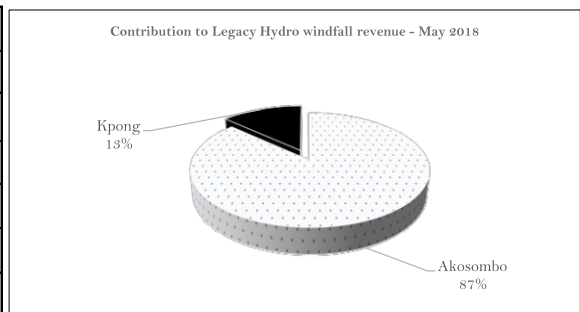
ECONOMIC FACT SHEET

		May-18	Apr-18	Change
Average Market Price	US\$/MWh	123.56	122.06	1.50
System Marginal Cost (SMC)	US\$/MWh	130.07	125.74	4.33
Composite Bulk Generation Charge (CBGC)	US\$/MWh	97.71	97.71	-
Deviation of TAC from CBGC	US\$/MWh	(25.85)	(24.35)	(1.50)
Deviation of SMC from CBGC	US\$/MWh	(32.36)	(28.03)	(4.33)



May-18				
Power Plant	Average Cost US\$/MWh	Average SMP US\$/MWh	Difference US\$/MWh	Windfall Revenue US\$
Akosombo	26.60	130.07	103.47	39,860,596.71
Kpong	45.59	130.07	84.48	6,054,671.44
Total	72.18	-	-	45,915,268.15

Average Fuel Prices		
Fuel Type	Unit	May-18 Delivered Cost
Natural Gas	US\$/MMBtu	8.06
LCO	US\$/BBL	82.16
HFO	US\$/Tonne	418.00
DFO	US\$/Tonne	707.78



Other Market News and Trends

1.0 Financial Sustainability of the Power Sector

1.1 Ability to Recover Cost

1.1.1 Electricity generation unit cost

The average cost of electricity generated (fixed cost and variable cost) was estimated to be recovered adequately in May 2018. The average cost of bulk generation in May 2018 reduced marginally from GHp42.8/kWh in April 2018 to 41.79 in May 2018 due to relative stable supply of natural gas to Tema and Kpone and increased generation from hydro sources. The average cost of bulk generation was GHp1.19/kWh lower than the gazette BGT of GHp42.98/kWh in May 2018. In United State Dollars (USD), average cost of generation reduced marginally from US Cent 9.71/kWh in April 2018 to US Cent 9.48/kWh in May 2018. This represent a difference of US Cent 0.23/kWh in May 2018.

Table 1.1.1 shows the comparison between the cost of generation of power plants for April 2018 and May 2018 with the approved BGT tariff by the PURC showing the effect of exchange rate variability on the ability to recover cost. Analysis A presents the BGT in terms of GHp/kWh which is the predominate currency for payment in the regulated market. Analysis B presents the effect of exchange rate of the BGT.

Table 1.1.1 Comparison between cost of generation and PURC approve tariff for April 2018 and May 2018

	Apr-18	May-18
Analysis A		
Bulk Cost of Generation (GWh/kWh)	42.80	41.79
PURC CBGT (GHp/kWh)	42.98	42.98
Difference (GHp/kWh)	0.18	1.19
Analysis B		
Cost of Generation (USCent/kWh)	9.41	9.48
PURC CBGT (USCent/kWh)	9.71	9.71
Difference (USCent/kWh)	0.30	0.23
Average Monthly Exchange rate (GHS/US\$)	4.41	4.41

The effect of exchange rate was not influential as the average cost of generation was lower than PURC gazetted BGT of US Cent 9.71/kWh. The ability to recover cost was clearly met in May 2018.

1.2 Ability to reliably meet demand

1.2.1 Ratio of installed capacity to Demand and Capacity Factor

The ratio of installed capacity to demand measures the extent to which our installed capacity adequately meets demand. Globally, this ratio is above 2.0 in all economic classes. The ratio of installed capacity to demand increased from 2.32 in April 2018 to 2.55 in May 2018 and compares favorably with the other regional averages and other economic classes except lower middle income and low income countries.

The capacity factor of the power system measures the extent to which the supply system is being utilized. Capacity factor in May 2018 reduced marginally from 46% in April 2018 to 45% due to a reduction in electricity supply in May 2018. The capacity factor fell short of the average for all the economic classes but was higher than lower income economies.

Table 1.2.1 Ratio of installed capacity to demand and capacity factor for April 2018 and May 2018

	Ghana		World	SSA	OECD	HIGH Income Non-OECD	Upper Middle Income	Lower Middle Income	Low Income
	Apr-18	May-18							
Ratio of Installed capacity to Demand	2.32	2.55	2.60	2.20	2.30	2.50	2.40	3.10	2.90
Capacity Factor	0.46	0.45	0.50	0.50	0.50	0.50	0.50	0.50	0.40

1.2.2 Reserve Margin

The reserve margin of the supply system serves as an indicator in measuring the reliability of a power system. The reserve margin, especially the constrained reserve margin throws more light on the utilization of the installed capacity of the country. Constrained reserve margin takes into consideration planned maintenance, unplanned maintenance and fuel supply difficulties. That is, power plants that are technically available, have fuel available and could come up online when needed within the period under study.

Table 1.2.2 Average Constrained and Unconstrained reserve margin

Reserve Margin	Apr-18	May-18
Constrained Reserve Margin (%)	15.63	16.00
Unconstrained Reserve Margin (%)	46.47	46.25

The constrained reserve margin continues to be at an average of 16% in May 2018 due to fuel supply challenges to power plants. The reserve margin was 2% below the 18% to 25% recommended by the International Energy Agency (IEA) and the Power Sector Reforms. There was however 33.25% of capacity unavailable due to technical and fuel supply challenges in May 2018.

1.3 Ability to make investments

1.3.1 Capacity Annual Growth and Ratio of installed Capacity growth to demand growth

The capacity annual growth indicator measures the annual growth in the installed capacity as a means of our ability to make investment in the power sector. Ghana's installed capacity grew by 16.4% between May 2017 and May 2018, compared to the 8.7% recorded between April 2017 and April 2018. This measure is significantly higher than the average for SSA, Upper Middle Income; Lower Middle Income and Low Middle Income Countries.

Table 1.3.1 Capacity annual growth and Ratio of installed capacity growth to demand growth

	Ghana		SSA	High Income Non-OECD	Upper Middle Income	Lower Middle Income	Low Income
	Apr-18	May-18					
Capacity Annual growth (%)	8.66	16.4	3.10	3.10	2.70	3.90	3.40
Ratio of installed capacity growth to demand growth	1.30	2.66	0.20	0.60	0.70	0.30	0.02

A high growth in capacity will be insignificant if it is not able to meet the required demand. The indicator that measures the ability of the growth in capacity to meet the growth in demand is the ratio of the growth in installed capacity to growth in demand. The ratio of installed capacity growth to demand growth increased in May 2018, from 1.3 in April 2018 to 2.66. This is as a result of a decrease in demand for May 2018 as compared to growth in installed capacity. This ratio is however higher than the average for the World, OECD countries and all the Economic Classes of the world.

1.4 Ability to operate according to environmental and social norms

1.4.1 Emission factor and Fossil fuel dependency

The proportion of hydro generation in the total electricity supply increased, resulting in a reduction in thermal generation. Correspondingly, fossil fuel dependency reduced accordingly from 64.4% in April 2018 to 63% in May 2018. The estimated fossil fuel dependency is higher than the average for the World, SSA, Lower Middle Income and Low Income but lower than High Income Non-OECD and Upper Middle Income economies.

The reduced fossil fuel dependency had no significant effect on the emission factor for May 2018 due to increase in consumption of LCO and DFO. The emission factor continues to be 0.34 KgCO₂/kWh in May 2018. The emission factor for May 2018 was relatively lower than the average for World, SSA and High Income countries. It was however higher than the average for low income economies.

Table 1.4.1 compares Ghana's emission factor and fossil fuel dependency with indicators from economies and region of the world.

Table 1.4.1 Emission Factor and Fossil fuel dependency for the April of 2018

	Ghana		World	SSA	High Income Non-OECD	Upper Middle Income	Lower Middle Income	Low Income
	Apr-18	Apr-18						
Emission Factor (KgCO₂/kWh)	0.34	0.34	0.60	0.50	0.90	0.70	0.50	0.30
Fossil Fuel Dependency (%)	64.35	63	60.70	45.30	84.40	66.40	59.40	40.60

1.4 Conclusions

The installed capacity of Ghana continues to be more than two folds of our demand even though there has been a relative increase in demand from 2,158.2 MW in May 2017 to 2,409.1 MW in May 2018. However, the ratio of installed capacity growth to demand growth from May 2017 to May 2018 was 2.55 and was marginally higher than the growth of 2.32 from April 2017 to April 2018. Capacity factor however, reduced from 46% in April 2018 to 45% in May 2018. The constrained reserve margin of 16% was relatively stable in May 2018 as the same was recorded in April 2018. The lower recordings of the capacity factor and the constrained reserve margin was due to fuel supply challenges, reduction in demand and technically unavailable capacity of power plants in May 2018. The emission factor of 0.34 KgCO₂/kWh in April 2018 was also recorded in May 2018. This value is lower than the average for World, High Income Non- OECD, and SSA and Lower Middle Income countries.

2.0 Performance Indicators of Power Plants

2.1 Capacity Utilization Factor (CUF)

The hydro power plants CUF generally increased in May 2018. Akosombo GS CUF increased marginally from 47.5% in April 2018 to 52.5% in May 2018, Kpong GS CUF increased from 57.1% in April 2018 to 62.2% in May 2018. Contrarily, the CUF of Bui GS declined from 26.2% in April 2018 to 16% in May 2018. This shows the increasing shares of hydro generation in the total electricity supply from 34.7% in April 2018 to 36.3% in May 2018.

There was a general reduction in CUF for most of the power plants like, SAPP, TICO, TT1PP, AKSA and Genser in May 2018. The CUF of SAPP and TICO declined from 42.4% and 91.7% in April 2018 to 39.1% and 81.4% in May 2018. Likewise, the CUF of TT1PP, AKSA and Genser declined from 67.9%, 37.5% and 49% in April 2018 to 33.6%, 17.3% and 49.2% in May 2018 respectively. On the contrary, the CUF of TAPCO, Ameri and Karpowership increased from 22.4%, 33.3% and 64.2% in April 2018 to 27.8%, 45.3%, and 73.6% in May 2018 respectively. KTRP recorded a CUF of 9.8% in May 2018.

The System Load Factor decreased from 78.4% in April 2018 to 75.3% in May 2018.

The Plant utilization factors of the various plants are contained in table 2.1.

Table 2.1.1: Power Plant Capacity Utilization, Average heat rate and Average Fuel Cost of Generation

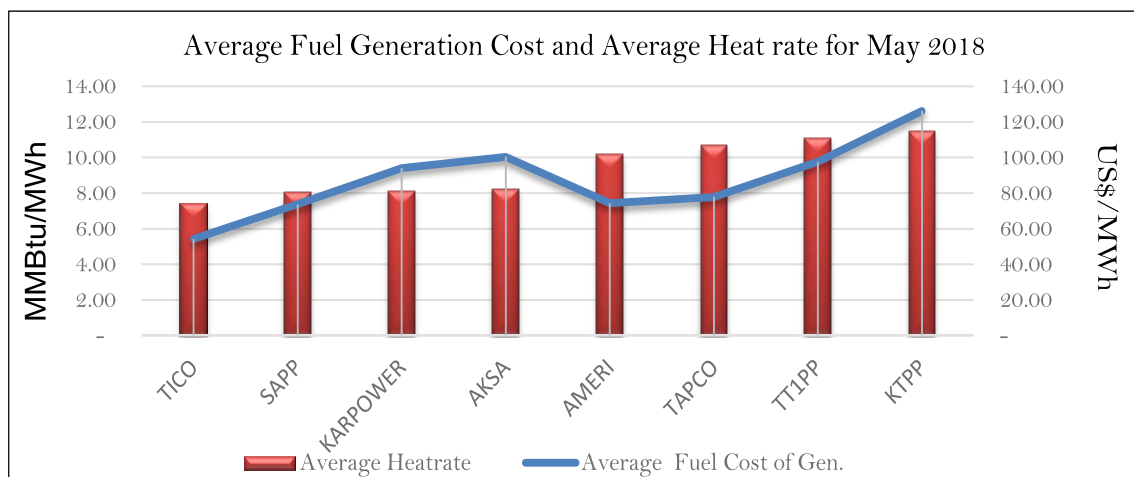
Power Plant	Capacity Utilization (%)	Average Heat rate (Btu/KWh)	Average Fuel Cost of Generation (US\$/MWh)
Akosombo	52.46	-	-
Kpong	62.21	-	-
Bui	16.02	-	-
SAPP	39.06	8,022.35	73.77
TAPCO	27.08	10,681.36	77.87
TICO	81.39	7,433.88	54.19
TT1PP	33.56	11,057.99	97.64
CENIT	-	-	-
TT2PP	-	-	-
MRP	-	-	-
KARPOWER	73.62	8,097.77	94.05
AMERI	45.30	10,191.96	74.30
TROJAN	-	-	-
KTRP	10.09	11,492.91	126.17
AKSA	17.26	8,220.58	100.36
Genser	49.20	11,100.99	-

2.2 Heat Rate (Fuel Efficiency)

There was a general reduction in the fuel efficiency of most of the thermal power plant with the exception of TAPCO and TT1PP. The fuel efficiency of TAPCO and TT1PP increased from 31.75% and 29.47% in April 2018 to 31.94% and 30.86% in May 2018 respectively. The SAPP, TICO and Ameri power plant witnessed a reduction in their fuel efficiency from 43.6%, 46.8% and 33.61% in April 2018 to 42.53%, 45.9% and 33.48% in May 2018 respectively. Similarly, the fuel efficiency of Karpowership and AKSA reduced marginally from 42.37% and 41.61% in April 2018 to 42.14% and 41.51% in May 2018 respectively. The fuel efficiency of Genser power plant reduced from 32.9% in April 2018 to 31.13% in May 2018. KTRPP recorded a fuel efficiency of 29.69% in May 2018.

Figure 2.1 shows the ranking of the thermal power plants based on their efficiency of the thermal power plants.

Figure 2.1: Fuel efficiency ranking of thermal power plants with their respective fuel cost of generation.



2.3 Average Fuel Cost of Electricity Generation

The average fuel cost of electricity generation increased by 4.5% from US\$75.25/MWh in April 2018 to US\$78.64/MWh in May 2018. The SAPP recorded an increase in average cost of electricity generation from US\$69.73/MWh in April 2018 to US\$73.77/MWh in May 2018 due to the consumption of LCO. TICO power plant's average cost of electricity generation increased from US\$52/MWh in April 2018 to US\$54.19/MWh in May 2018. The average cost of electricity generation for Karpowership and AKSA increased from US\$87.48/MWh and US\$93.4/MWh in April 2018 to US\$94.05/MWh and US\$100.36/MWh in May 2018 respectively due to increase in HFO price. Contrarily, the average fuel cost of electricity generation for TAPCO and TT1PP reduced marginally by 0.5% and 4.33% respectively in May 2018, from US\$78.28/MWh and US\$102.06/MWh in April 2018 to US\$77.87/MWh and US\$97.64/MWh in May 2018 respectively. The average fuel cost of electricity generation for KTRPP was US\$126.17/MWh in May 2018.

Acronyms

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
KTRPP = Kpone Thermal Power Plant	kWh = Kilo-watt hours
MRP = Mine Reserve Plant	LEAP = Long-range Energy Alternative Planning
LCO = Light Crude Oil	LI = Legislative Instrument
LTA = Long Term Average	MW = Megawatt
MMscf = Million Standard Cubic Feet	MWh = Mega-watt hours
NITS = National Interconnected Transmission System	PV = Photovoltaic
SAPP = Sunon Asogli Power Plant	SMP = System Marginal Price
SNEP = Strategic National Energy Plan	TEN = Tweneboa, Enyenra, Ntomme
TT2PP = Tema Thermal 2 Power Plant	TT2PP = Tema Thermal 2 Power Plant
VRA = Volta River Authority	WAGPCo = West African Gas Pipeline Company
WAGP = West African Gas Pipeline	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