

ENERGY COMMISSION OF GHANA



**NATIONAL ENERGY STATISTICS
2008 - 2017**

April, 2018

STRATEGIC PLANNING AND POLICY DIRECTORATE

FOREWORD

THE ENERGY COMMISSION has the mandate to prepare, review and update periodically indicative national plans to ensure that reasonable demands for energy are met in a sustainable manner. In addition, the Energy Commission is mandated to secure and maintain a comprehensive data base for national decision making for the efficient development and utilisation of energy resources available to the nation. In fulfilment of its mandates, the Energy Commission publishes statistics of the Energy Sector annually.

The 2018 National Energy Statistics provides a time series data on Ghana's energy supply and use situation largely from 2008 to 2018. Data before 2008 can be obtained from the Commission.

This publication was prepared with data from the main energy sector institutions, including the Ministry of Energy, Volta River Authority (VRA), Ghana Grid Company (GRIDCo), Ghana National Petroleum Corporation (GNPC), National Petroleum Authority (NPA), Tema Oil Refinery (TOR), Public Utilities Regulatory Commission (PURC), Electricity Company of Ghana (ECG), Northern Electricity Distribution Company (NEDCo), West African Gas Pipeline Company (WAPCo), as well as data from the Bank of Ghana (BoG) and the Ghana Statistical Service (GSS). The cooperation and assistance of all these agencies and entities are gratefully acknowledged.

It is our expectation that, the statistics contained in this publication would be useful to a wide range of users including planners, policy makers, researchers and students.

We are very much appreciative for the feedback received from users. These have been used to correct and improve the data provided in this year's publication. The 2018 National Energy Statistics therefore override those of previous years.

We would appreciate very much any feedback by way of comments and suggestions from readers.

This publication is available on our website www.energycom.gov.gh

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ABBREVIATIONS

GW	Gigawatt
GWh	Gigawatt-hour
kWh	kilowatt-hour
MMBTU	Million British Thermal Unit
MW	Megawatt
MWh	Megawatt-hour
W / kW	Watt / kilowatt
ATK/DPK	Aviation Turbine Kerosene/Dual Purpose Kerosene
ECG	Electricity Company of Ghana
GNPC	Ghana National Petroleum Corporation
LCO	Light Crude Oil
LPG	Liquefied Petroleum Gas
NEDCo	Northern Electricity Distribution Company
RFO	Residual Fuel Oil
TAPCO	Takoradi Power Company Ltd
TICO	Takoradi International Company
TOE	Tonnes of Oil Equivalent
TOR	Tema Oil Refinery
VALCO	Volta Aluminium Company
VRA	Volta River Authority
WAGP	West African Gas Pipeline
WAGPA	West African Gas Pipeline Authority

CONVERSION FACTORS

Ghana Standard Figures

Petroleum

Crude Oil	1 Tonne	1.01- 1.02 TOE
Gasoline:	1 Tonne	1.05 TOE
Kerosene:	1 Tonne	1.03 TOE
Jet Fuel:	1 Tonne	1.03 TOE
Diesel /Gas Oil:	1 Tonne	1.02 TOE
Residual Fuel Oil:	1 Tonne	0.97 TOE
LPG:	1 Tonne	1.08 TOE
7 barrels of crude Oil	1 Tonne of crude oil	
1 cubic metre of crude oil	6.29 barrels	
1 barrel	36 imperial gallons	163.66 Litres
1 GJ of Natural Gas	1.05 MMBTU	1.07 Mscf
1 MMBTU of Natural Gas	27.096 cubic metres (m ³)	
1 MMBTU of Natural Gas	5.82 bbl of crude oil equivalent	
1,000 m ³ of Natural Gas	36.906 mmBtu	

**Ghana Standard Figures
Electricity**

1000 W	1 kW
1000 kW	1 MW
1000 MW	1 GW
1000 kWh	1 MWh
1000 MWh	1 GWh
1 GWh	86 TOE
1 GWh	3600 GJ
1 TOE	41.86 GJ

Woodfuel

Firewood/fuelwood	1 Tonne	0.30 - 0.36 TOE	
Charcoal	1 Tonne	0.68 - 0.88 TOE	
Sawdust/sawmill residues/wood chips	1 Tonne	0.20 - 0.30 TOE	
<i>Low side reflecting average dry wood and corresponding Charcoal in the forest zones and the high side reflecting average dry wood and corresponding charcoal in the savannah zones of the country.</i>			
<i>Between 4 – 5 mass units of wood are used to produce one mass unit of charcoal in the country</i>			
Charcoal Source	Average Weight (kg) of Charcoal		Moisture Content
	Mini Bag	Maxi Bag	
Sawmill residue	21 – 22	44 - 45	Up to 40%
Savannah wood	30 – 32	55 - 60	Up to 20%
Acacia plant	31 – 32	57 - 63	Up to 20%
All other woods	25 – 27	50 - 55	Up to 25%

GLOSSARY

Average	It is a measure of central tendency. It could be mean, median or mode depending upon the distribution of the data. For a normal distribution set, the mean, median and mode are the same.
Electricity Plants	Refer to power generation plants which are designed to produce electricity only. The electricity captured in this report does not cover off-grid and individual private imbedded generation.
Energy Balance	Shows in a consistent accounting framework, the production, transformation and final consumption of all forms of energy for a given country in a given period of time, with quantities expressed in terms of a single accounting unit for purposes of comparison and aggregation. The Energy balance presents an overview of the energy produced and consumed in a system, matching input and output for a specific period of time, usually one year.
Final Energy Consumption	Energy utilised by final user.
Import and export	Import and export comprise quantities having crossed the national territorial boundaries of the country
International Aviation Bunkers	Covers quantities delivered to airplanes that are engaged in international aviation
International Marine Bunkers	Covers those quantities delivered to ships that are engaged in international navigation
Own Use	It is the primary and secondary energy consumed by transformation industries for heating, pumping, lighting and other purposes
Production	It is the production of primary energy, i.e. crude oil, natural gas, hydro, renewable etc. that is extracted.
Statistical differences	It include the sum of the unexplained differences for individual fuels as they appear in the energy statistics
Stock changes	Reflect the differences between opening stock levels on the first day of the year and closing levels on the last day of the year of stocks on national territory held by producers, importers, energy transformation industries and large consumers. A stock build is shown as negative number and a stock draw as a positive.
Total Energy Supply	It is made up of production + import - export + stock changes
Total Primary Energy Supply	It is made up of production + imports – export +/- stock changes

SECTION ONE: ENERGY INDICATORS AND ENERGY BALANCE

Table 1.1: Energy Indicators (2008 – 2017)

Energy Indicator	Unit	2008	2009	2010	2011	2012	2013	2014	2015	2016 ¹	2017
Total Primary Energy Supply	KTOE	6,273	6,036	6,946	7,609	8,362	8,564	9,147	9,550	9,520	9,614
Total Final Energy Consumed	KTOE	5,187	5,706	5,629	6,174	6,613	6,887	6,983	7,162	7,035	6,984
Grid Electricity Generated	GWh	8,324	8,958	10,167	11,200	12,024	12,870	12,963	11,492	13,022	14,068
Grid Electricity Consumed	GWh	7,219	7,454	8,317	9,187	9,258	10,583	10,695	9,685	11,418	12,091
Total Petroleum Products Consumed	KTOE	2,071	2,598	2,491	2,827	3,318	3,422	3,377	3,545	3,274	3,115.0
Total Biomass Consumed	KTOE	2,518	2,493	2,464	2,576	2,589	2,676	2,792	2,785	2,783	2,829.4
Population	million	22.9	23.4	24.7	25.3	25.9	26.5	27.0	27.7	28.3	29.0
GDP (Constant 2006 prices)	million Ghc	21,592	22,336	24,101	27,486	30,040	32,237	33,522	34,808	36,016	39,175
GDP, PPP (constant 2011 international \$)	million \$	66,290	69,502	74,993	85,526	93,474	100,309	104,307	108,392	112,268	121,811
Energy Intensity (TPES/GDP in constant 2006 prices)	TOE/million GHc	290.5	270.2	288.2	276.8	278.4	265.7	272.9	274.4	264.3	245.4
Energy Intensity in PPP (TPES/ GDP in PPP) ²	TOE/million US\$	94.6	86.8	92.6	89.0	89.5	85.4	87.7	88.1	84.8	78.9
Total Energy Consumed/capita	TOE/capita	0.23	0.24	0.23	0.24	0.26	0.26	0.26	0.26	0.25	0.24
Grid Electricity Generated/capita	kWh/capita	363.5	382.8	411.6	442.7	464.2	485.7	480.1	414.9	460.2	485.8
Grid Electricity Consumed/capita	kWh/capita	315.3	318.5	336.7	363.1	357.4	399.4	396.1	349.6	403.5	417.5
Total Petroleum Products Consumed/capita	TOE/capita	0.09	0.11	0.10	0.11	0.13	0.13	0.13	0.13	0.12	0.11
Total Biomass Consumed/capita	TOE/capita	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Grid Electricity Consumed/GDP	kWh/GHS 1,000 of GDP ³	334.4	333.7	345.1	334.2	308.2	328.3	319.0	278.2	317.0	308.6
Total Primary Energy Supply/GDP	TOE/GHS 1,000 of GDP ³	0.29	0.27	0.29	0.28	0.28	0.27	0.27	0.27	0.26	0.25
Total Petroleum Products Consumed/GDP	TOE/GHS 1,000 of GDP ³	0.10	0.12	0.10	0.10	0.11	0.11	0.10	0.10	0.09	0.08
Total Primary Energy Supply/capita	TOE/capita	0.27	0.26	0.28	0.30	0.32	0.32	0.34	0.34	0.34	0.33
Grid Emission Factor (wind/solar projects)	tCO ₂ /MWh	0.41	0.41	0.35	0.32	0.35	0.51	0.32	0.28	0.39	0.39
Grid Emission Factor (all other projects)	tCO ₂ /MWh	0.56	0.57	0.51	0.44	0.48	0.73	0.36	0.31	0.43	0.43

¹Revised

²Measures energy efficiency in line with Sustainable development Goal (SDG) 7.

³GDP in constant 2006 prices

Source: GDP (in constant 2006 prices) and Population data from Ghana Statistical Service

GDP in PPP (constant 2011 international \$) from Worldbank database. 2017 data is estimated

NB: Total Electricity Consumed include commercial losses

Grid Emission Factor is the amount of CO₂ emitted per unit of electricity generated and supplied into the national grid

Table 1.2: Energy Balance, 2017 (ktoe)

SUPPLY AND CONSUMPTION	Crude Oil	Natural Gas	Petroleum Products	Biomass	Solar	Hydro	Electricity	Total
Production	8,547.3	850.5	123.0	3,903.3	2.4	482.9	-	13,909.4
Imports	237.9	295.2	4,221.3	-	-	-	21.2	4,775.6
Exports	-8,304.2	-	-471.2	-1.8	-	-	-23.0	-8,800.3
International Marine Bunkers	-	-	-90.7	-	-	-	-	-90.7
International Aviation Bunkers	-	-	-154.5	-	-	-	-	-154.5
Stock changes	-311.7	-	43.9	-	-	-	-	-267.9
Total energy supply	169.2	1,145.6	3,917.0	3,901.5	2.4	482.9	-1.8	9,616.9
Statistical differences	-27.8	1.4	220.0	-	-	-	0.1	193.6
Electricity plants	-168.5	-1,039.4	-627.4	-	-2.4	-482.9	1,209.8	-1,110.9
Oil refineries	-24.5	-	16.5	-	-	-	-	-8.0
Other transformation	-	-	-	-	-	-	-	-
Energy industry own use	-4.1	-76.0	-	-	-	-	-6.1	-86.2
Losses	-	-	-	-1,072.1	-	-	-162.0	-1,234.1
Final energy consumption	-	28.8	3,086.2	2,829.4	-	-	1,039.8	6,984.2
Residential	-	-	176.3	2,481.4	-	-	532.5	3,190.2
Industry	-	28.8	291.1	223.5	-	-	264.1	807.5
Commerce & Service	-	-	16.5	124.5	-	-	242.5	383.5
Agriculture & Fisheries	-	-	75.1	-	-	-	0.3	75.4
Transport	-	-	2,526.2	-	-	-	0.5	2,526.6
Non Energy Use	-	-	0.9	-	-	-	-	0.9

NB: Electricity consumption include commercial losses

Table 1.3: Energy Balance, 2016 (ktoe)¹

SUPPLY AND CONSUMPTION	Crude Oil	Natural Gas	Petroleum Products	Biomass	Solar	Hydro	Electricity	Total
Production	4,706.2	591.5	86.9	3,602.4	2.3	478.3	-	9,467.7
Imports	1,474.5	100.9	3,738.1	-	-	-	43.9	5,357.4
Exports	-4,357.5	-	-553.5	-1.9	-	-	-16.1	-4,929.0
International Marine Bunkers	-	-	-2.4	-	-	-	-	-2.4
International Aviation Bunkers	-	-	-122.6	-	-	-	-	-122.6
Stock changes	-223.5	-	-	-	-	-	-	-223.5
Total Energy Supply	1,599.8	692.4	3,146.5	3,600.5	2.3	478.3	27.9	9,547.6
Statistical differences	240.8	169.9	245.0	-	-	-	-0.3	655.4
Electricity plants	-492.7	-517.6	-402.3	-	-2.3	-478.3	1,120.0	-773.2
Oil refineries	-784.3	-	678.4	-	-	-	-	-105.9
Energy industry own use	-81.9	-	-	-	-	-	-6.1	-88.0
Losses	-	-	-	-817.1	-	-	-160.1	-977.2
Final Energy Consumption	-	4.8	3,264.5	2,783.4	-	-	982.0	7,034.7
Residential	-	-	177.1	2,441.0	-	-	503.2	3,121.3
Industry	-	4.8	348.5	219.9	-	-	257.0	830.2
Commerce & Service	-	-	14.9	122.5	-	-	221.0	358.4
Agriculture & Fisheries	-	-	82.7	-	-	-	0.3	83.0
Transport	-	-	2,639.9	-	-	-	0.5	2,640.4
Non Energy Use	-	-	1.4	-	-	-	-	1.4

¹Revised

NB: Electricity consumption include commercial losses

SECTION TWO: PRIMARY ENERGY SUPPLY AND FINAL ENERGY CONSUMPTION

Table 2.1: Primary Energy Supply (ktoe)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Oil (ktoe)	2,672	2,316	2,744	2,820	3,870	4,011	4,177	4,248	4,746	4,086
<i>Oil (%)</i>	42.6	38.4	39.5	37.1	46.3	46.8	45.7	44.5	49.9	42.5
Natural Gas (ktoe)	-	5	394	769	390	292	621	1,182	692	1,146
<i>Natural Gas (%)</i>	-	0.1	5.7	10.1	4.7	3.4	6.8	12.4	7.3	11.9
Hydro (ktoe)	533	591	602	650	694	708	721	503	478	478
<i>Hydro (%)</i>	8.5	9.8	8.7	8.5	8.3	8.3	7.9	5.3	5.0	5.0
Solar (ktoe)	-	-	-	-	-	0	0	0	2	2
<i>Solar (%)</i>	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0
Biomass (ktoe)	3,070	3,127	3,207	3,371	3,409	3,554	3,629	3,618	3,601	3,902
<i>Biomass (%)</i>	48.9	51.8	46.2	44.3	40.8	41.5	39.7	37.9	37.8	40.6
Total	6,275	6,039	6,947	7,610	8,363	8,565	9,148	9,551	9,520	9,614
Total (%)	100	100	100	100	100	100	100	100	100	100

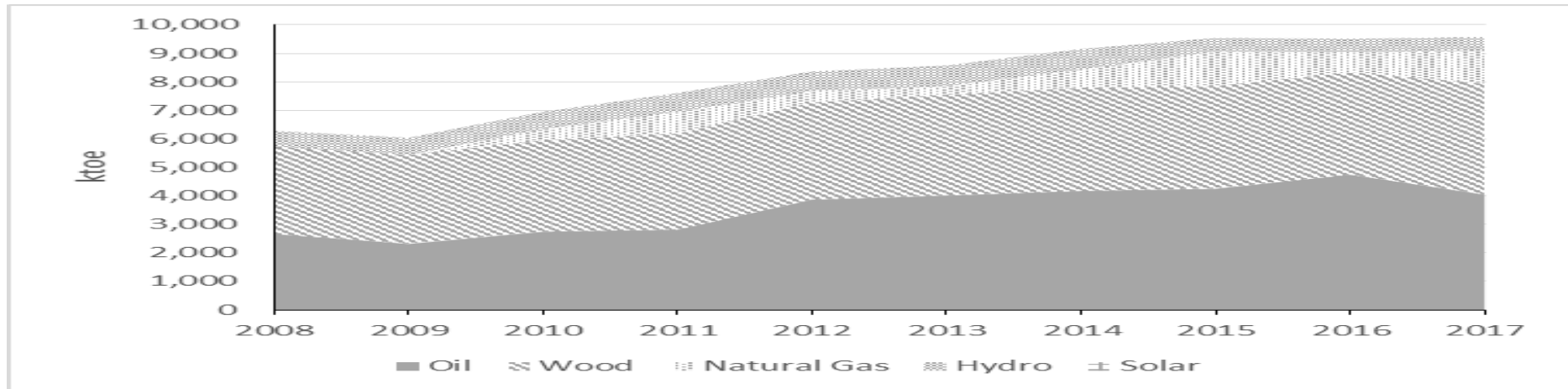
¹Revised

- means Not Available.

NB.: There is no information or data on solar (sunlight) used for drying of cash crops, commercial wood and clothing.

*Refer to Table 5.1

Figure 2.1: Trend in Primary Energy Supply



NB: Solar is not showing because it is negligible

Table 2.2 Final Energy Consumed (ktoe)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Grid Electricity (ktoe)	597.7	615.4	674.2	772.1	851.9	908.4	919.8	832.9	981.7	1,039.8
<i>Grid Electricity (%)</i>	<i>11.5</i>	<i>10.8</i>	<i>12.0</i>	<i>12.5</i>	<i>12.9</i>	<i>13.2</i>	<i>13.2</i>	<i>11.6</i>	<i>13.9</i>	<i>14.9</i>
Petroleum (ktoe)	2,071.3	2,597.7	2,491.1	2,826.6	3,172.1	3,303.0	3,271.7	3,544.6	3,274.2	3,115.0
<i>Petroleum (%)</i>	<i>39.9</i>	<i>45.5</i>	<i>44.3</i>	<i>45.8</i>	<i>48.0</i>	<i>48.0</i>	<i>46.9</i>	<i>49.5</i>	<i>46.5</i>	<i>44.6</i>
Biomass (ktoe)	2,517.8	2,493.3	2,463.9	2,575.6	2,588.8	2,676.0	2,791.7	2,784.7	2,783.4	2,829.4
<i>Biomass (%)</i>	<i>48.5</i>	<i>43.7</i>	<i>43.8</i>	<i>41.7</i>	<i>39.1</i>	<i>38.9</i>	<i>40.0</i>	<i>38.9</i>	<i>39.5</i>	<i>40.5</i>
Total	5,186.8	5,706.3	5,629.2	6,174.3	6,612.8	6,887.4	6,983.2	7,162.2	7,039.3	6,984.2
Total (%)	100	100	100	100	100	100	100	100	100	100

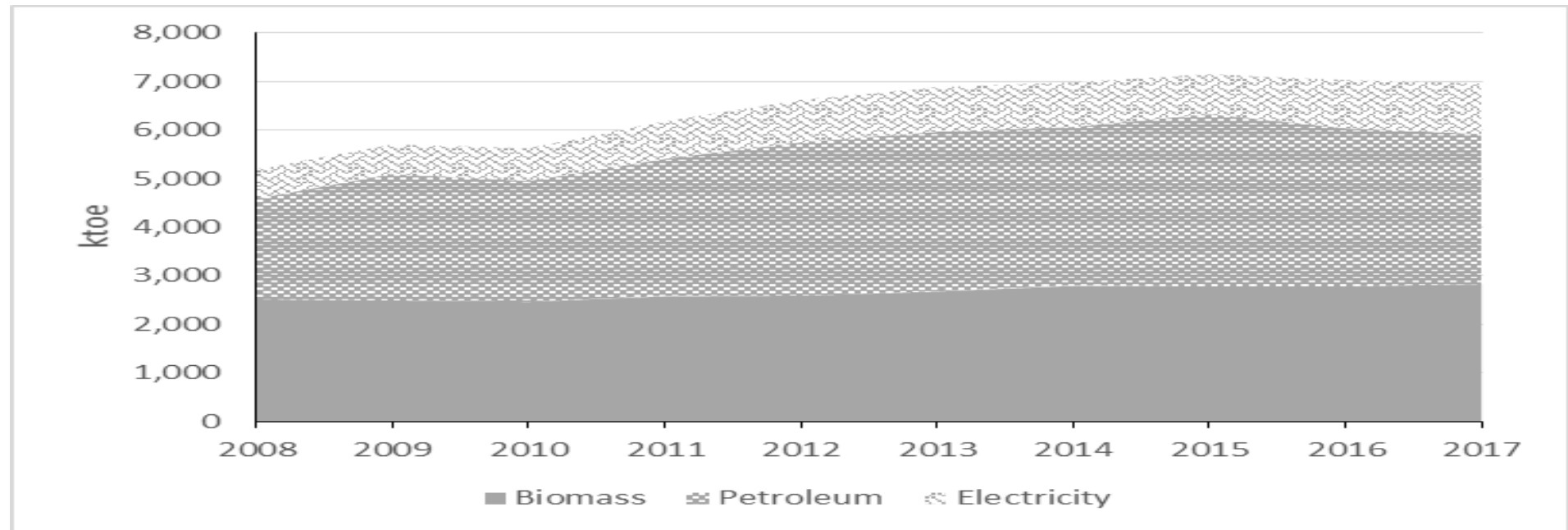
¹ Revised

NB: Electricity consumption include commercial losses. There is also no information or data on solar (sunlight) used for drying of cash crops, commercial wood and clothings.

NB: Petroleum products consumed in 2016 and 2017, include natural gas used in industry

* Refer to Table 5.2

Figure 2.2 Trend in Final Energy Consumed



SECTION THREE: ELECTRICITY

Table 3.1: Installed Grid Electricity Generation Capacity (End of December, 2017)

PLANT	INSTALLED CAPACITY (MW)	DEPENDABLE CAPACITY (MW)
Hydro		
Akosombo	1,020	900
Bui	400	340
Kpong	160	140
Sub-Total	1,580	1,380
Thermal		
Takoradi Power Company (TAPCO)	330	300
Takoradi International Company (TICO)	340	320
Sunon Asogli Power (Ghana) Limited (SAPP) - IPP	560	520
Cenit Energy Ltd (CEL) - IPP	110 (126) ¹	100
Tema Thermal 1 Power Plant (TT1PP)	110 (126) ¹	100
Tema Thermal 2 Power Plant (TT2PP)	80	70
Kpone Thermal Power Plant (KTPP)	220	200
Karpowership	470	450
Ameri Plant	250	230
AKSA	260	220
Trojan ²	44	40
Genser ²	22	18
Sub-Total	2,796	2,568
Renewables		
Safisana Biogas ²	0.1	0.1
VRA Solar ²	2.5	2
BXC Solar ²	20	16
Sub-Total	22.6	18.1
Total	4,398.6	3,966.1

¹Nameplate as licensed by the Energy Commission

²Connected at the sub-transmission level

Table 3.2: Installed Renewable Electricity Capacity (kW)

Year	Off-grid		On-grid				Mini-Grid		Installed
	Solar	Wind	Dist. SPV	Utility Solar	W2E	Hydro	Solar	Wind	
2013	-	-	495	2,500	-	-	-	-	2,995
2014	1,350	-	443	-	-	-	-	-	1,793
2015	4,003	20	700	20,000	100	4,000	256	11	29,090
2016	1,238	-	2,626	-	-	-	-	-	3,865
2017	678	-	4,266	-	-	-	58	-	5,002
TOTAL	7,269	20	8,530	22,500	100	4,000	314	11	42,744

NB: Dist. SPV = Distributed Solar PV; W2E = Waste – to – Energy

Source: Ministry of Energy & Energy Commission

Figure 3.1: Share in Total installed Renewable Energy Capacity

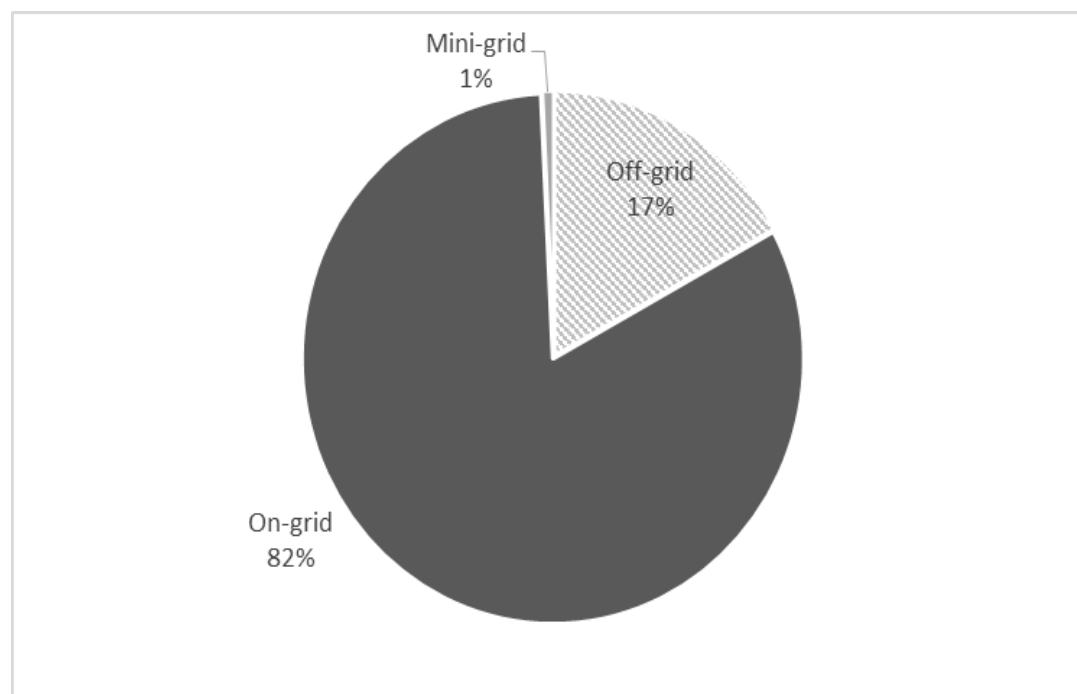


Table 3.3: Grid Electricity Generation by Plant (GWh) and Total Installed Capacity (MW)

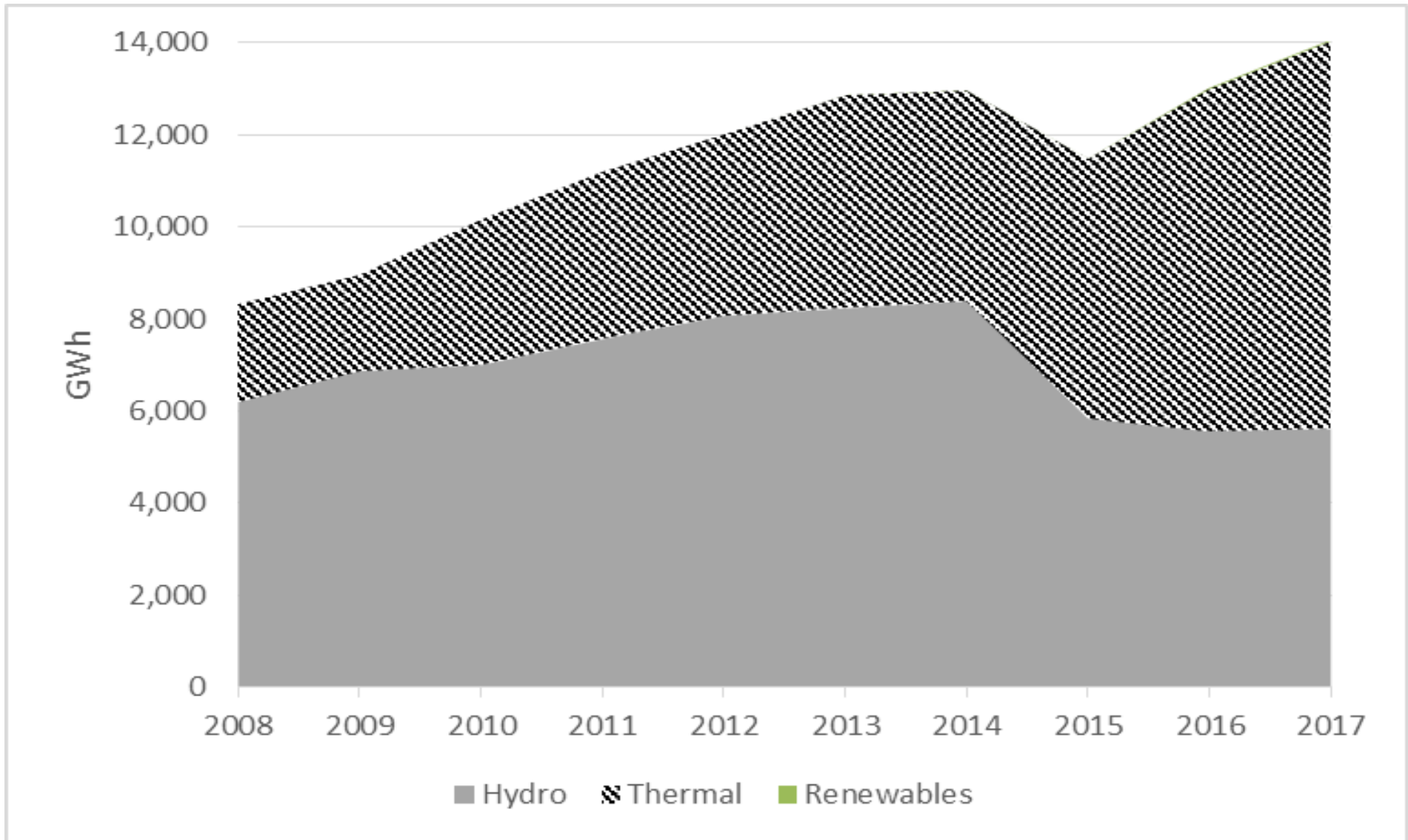
Plant	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Hydro Generation										
Akosombo	5,254	5,842	5,961	6,495	6,950	6,727	6,509	4,156	3,854	4,282
Kpong	941	1,035	1,035	1,066	1,121	1,144	1,148	819	763	752
Bui	0	0	0	0	0	362	730	870	944	582
<i>Sub-Total</i>	<i>6,195</i>	<i>6,877</i>	<i>6,996</i>	<i>7,561</i>	<i>8,071</i>	<i>8,233</i>	<i>8,387</i>	<i>5,845</i>	<i>5,561</i>	<i>5,616</i>
Thermal Generation										
Takoradi Power Company (TAPCO)	874	453	1,234	1,137	1,061	1,783	890	1,784	1,204	686
Takoradi International Company (TICO)	1,063	1,040	1,160	657	1,168	1,032	712	1,336	1,926	1,880
Tema Thermal 1 Power Plant (TT1PP)	-	570	591	559	622	475	697	541	178	365
Tema Reserve Power Plant (TRPP)	85	-	-	-	-	-	-	-	-	-
Emergency Reserve Power Plant (ERPP)	45	-	-	-	-	-	-	-	-	-
Kumasi Reserve Power Plant (KRPP)	16	-	-	-	-	-	-	-	-	-
Mines Reserve Plant (MRP)	46	18	20	12	20	-	195	170	3	-
Tema Thermal 2 Power Plant (TT2PP)	-	-	28	50	141	94	223	216	25	0.5
Sunon Asogli Power (Ghana) Ltd (SAPP)	-	-	138	1,224	848	694	1,255	1,185	377	1,417
Cenit Energy Ltd (CEL)	-	-	-	-	94	454	513	317	413	59
Takoradi T3	-	-	-	-	-	102	87	31	-	-
Karpowership	-	-	-	-	-	-	-	64	1,822	1,814
Ameri Plant	-	-	-	-	-	-	-	0	1,233	1,229
Trojan*	-	-	-	-	-	-	-	-	54	52
Kpone Thermal Power Plant (KTPP)	-	-	-	-	-	-	-	-	198	124
AKSA Energy Ltd	-	-	-	-	-	-	-	-	-	799
<i>Sub-Total</i>	<i>2,129</i>	<i>2,081</i>	<i>3,171</i>	<i>3,639</i>	<i>3,953</i>	<i>4,635</i>	<i>4,572</i>	<i>5,644</i>	<i>7,435</i>	<i>8,424</i>
Renewables										
Safisana Biogas*	-	-	-	-	-	-	-	-	0.04	0.08
VRA Solar*	-	-	-	-	-	3	4	3	2.5	3
BXC Solar*	-	-	-	-	-	-	-	-	24	25
<i>Sub-Total</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>3</i>	<i>4</i>	<i>3</i>	<i>26</i>	<i>28</i>
Total Generation	8,324	8,958	10,167	11,200	12,024	12,870	12,963	11,492	13,022	14,069
Installed Capacity (MW)	1,981	1,970	2,165	2,170	2,280	2,831	2,831	3,656	3,795	4,398

- means power plant is not available;

*connected at the sub-transmission level;

Source: GRIDCo and ECG;

Figure 3.2: Trend in Grid Electricity Generation



NB: Renewables is not showing because it is negligible

Table 3.4: Grid Electricity Import, Export and Net Import (GWh)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Import	275	198	106	81	128	27	51	223	511	247
Export	538	752	1,036	691	667	530	522	587	187	268
Net Import	-263	-554	-930	-610	-539	-503	-471	-364	324	-21

Source: GRIDCo

NB: 'Negative net import' means net export

Figure 3.3: Grid Electricity Import, Export and Net Import

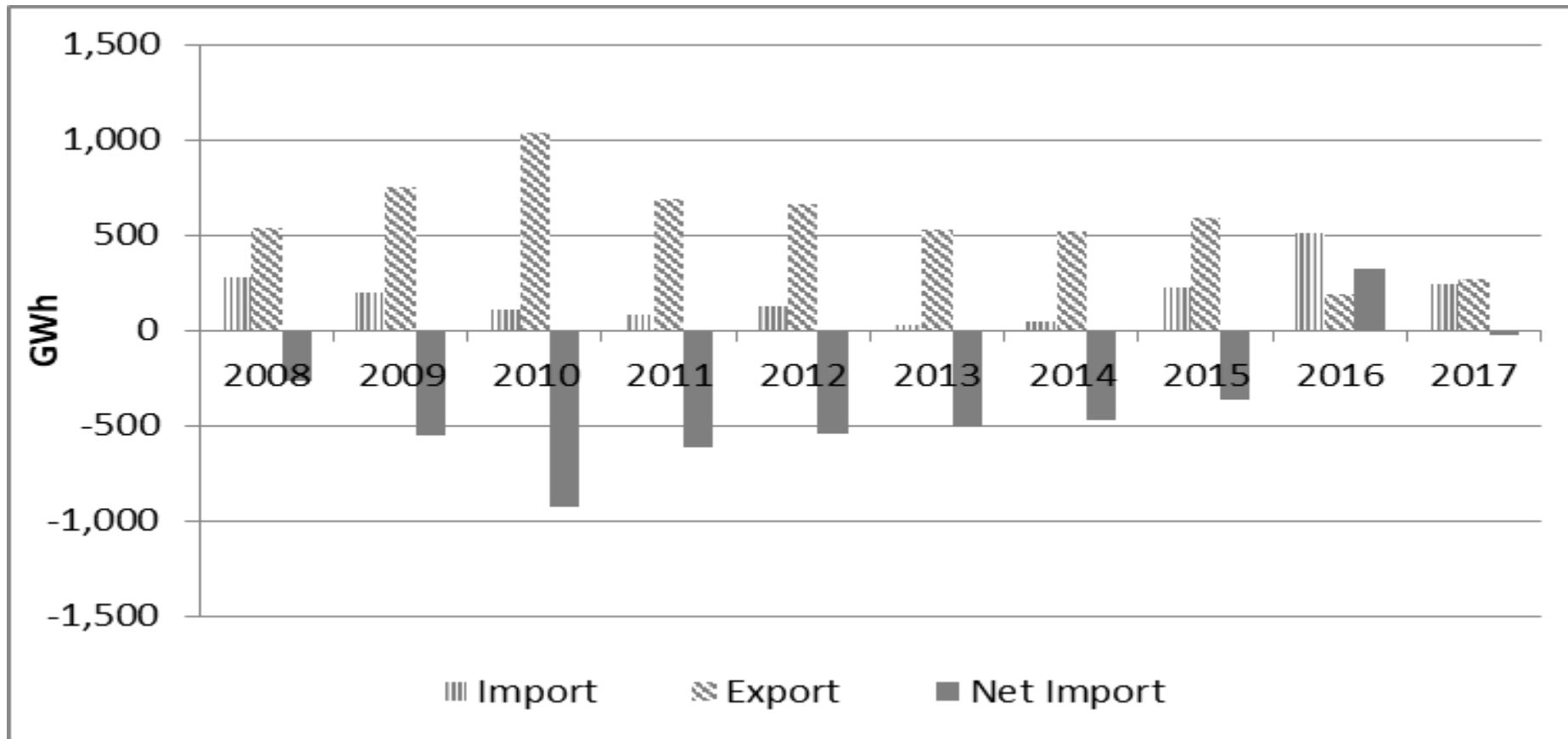


Table 3.5: Grid Installed Capacity, Dependable Capacity and Peak Load (MW)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Installed Capacity	1,981	1,970	2,165	2,170	2,280	2,831	2,831	3,656	3,795	4,388
Dependable Capacity	1,735	1,765	1,940	1,945	2,045	2,487	2,577	3,363	3,521	3,971
Peak Load	1,367	1,423	1,506	1,665	1,729	1,943	1,970	1,933	2,078	2,192

Figure 3.4: Trend in Grid Installed Capacity, Dependable Capacity and Peak Load

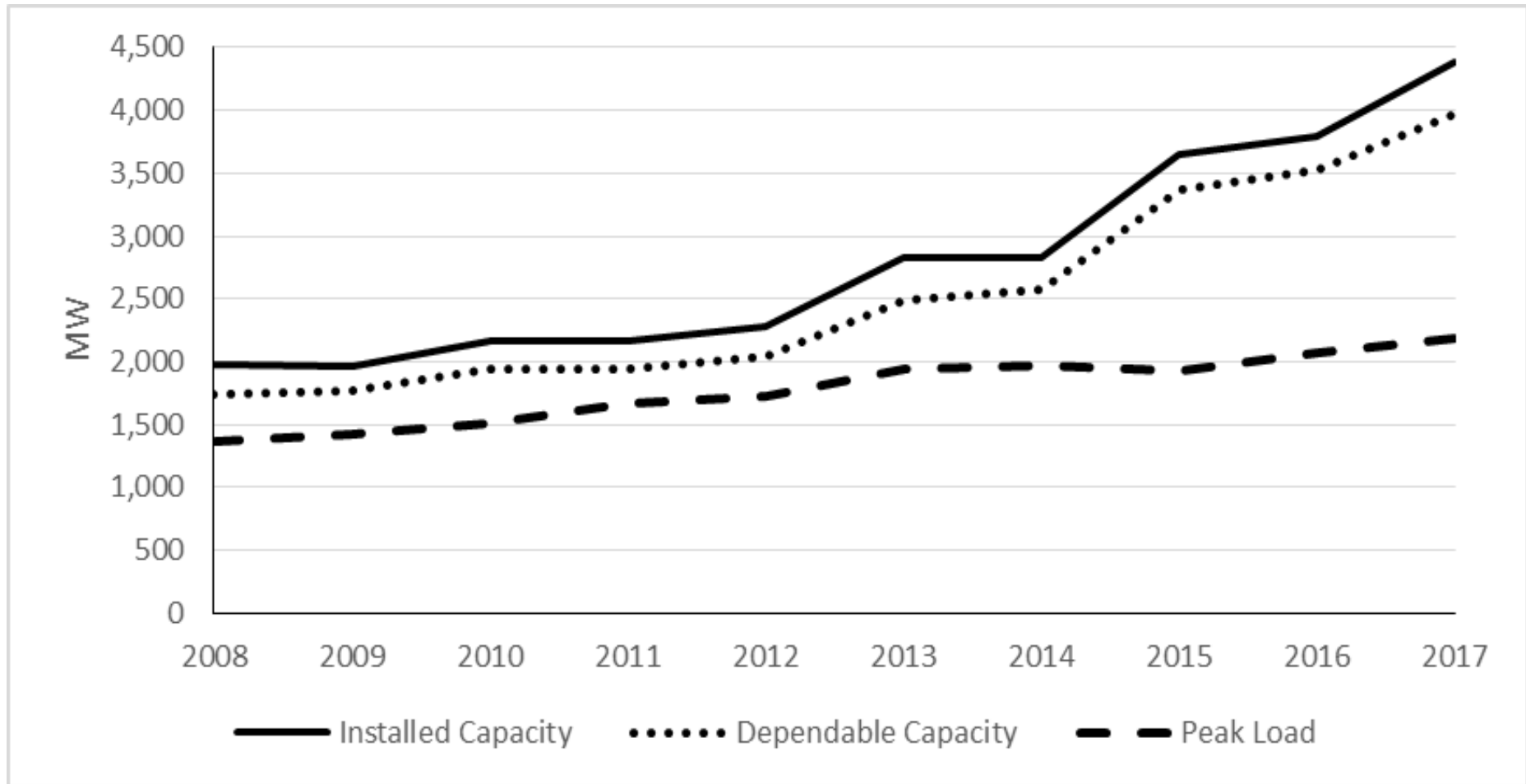


Table 3.6: Peak Load (MW)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ghana Load at Peak	1,208	1,263	1,391	1,520	1,658	1,791	1,853	1,757	1,997	2,077
System Peak	1,367	1,423	1,506	1,665	1,729	1,943	1,970	1,933	2,078	2,192

NB: Ghana Load at Peak = Maximum Demand for Ghana (ECG +NEDCo + Direct Customers of VRA + Mines)

System Peak = Ghana Load at Peak + VALCO Load + Export Load

Source: VRA & GRIDCo

Figure 3.5: Trend in Peak Load

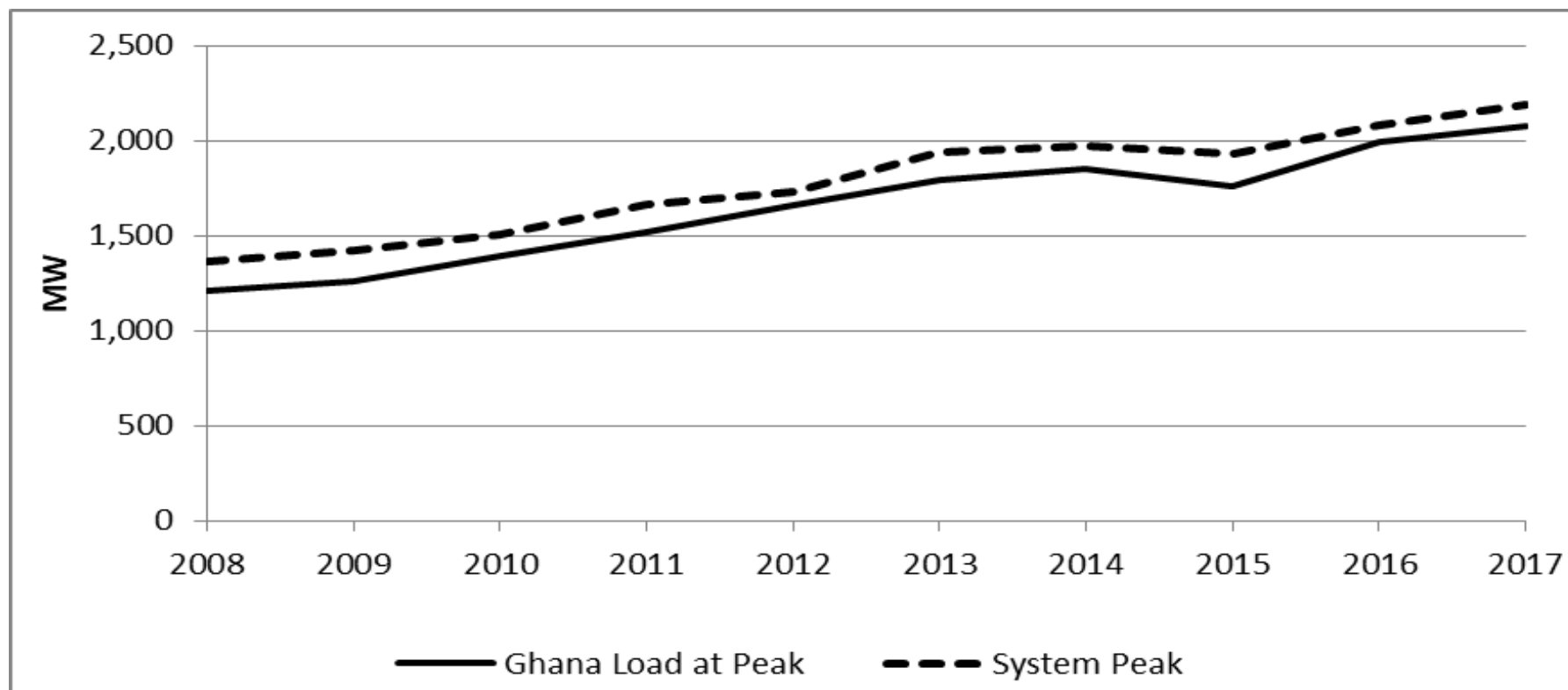


Table 3.7: Transmission Losses

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Transmission Losses (GWh)	303	343	380	531	522	570	565	402	607	587
Transmission Losses as a % of total electricity transmitted	3.6	3.8	3.7	4.8	4.3	4.4	4.3	3.4	4.4	4.1

Source: GRIDCo

Figure 3.6: Trend in Transmission Losses

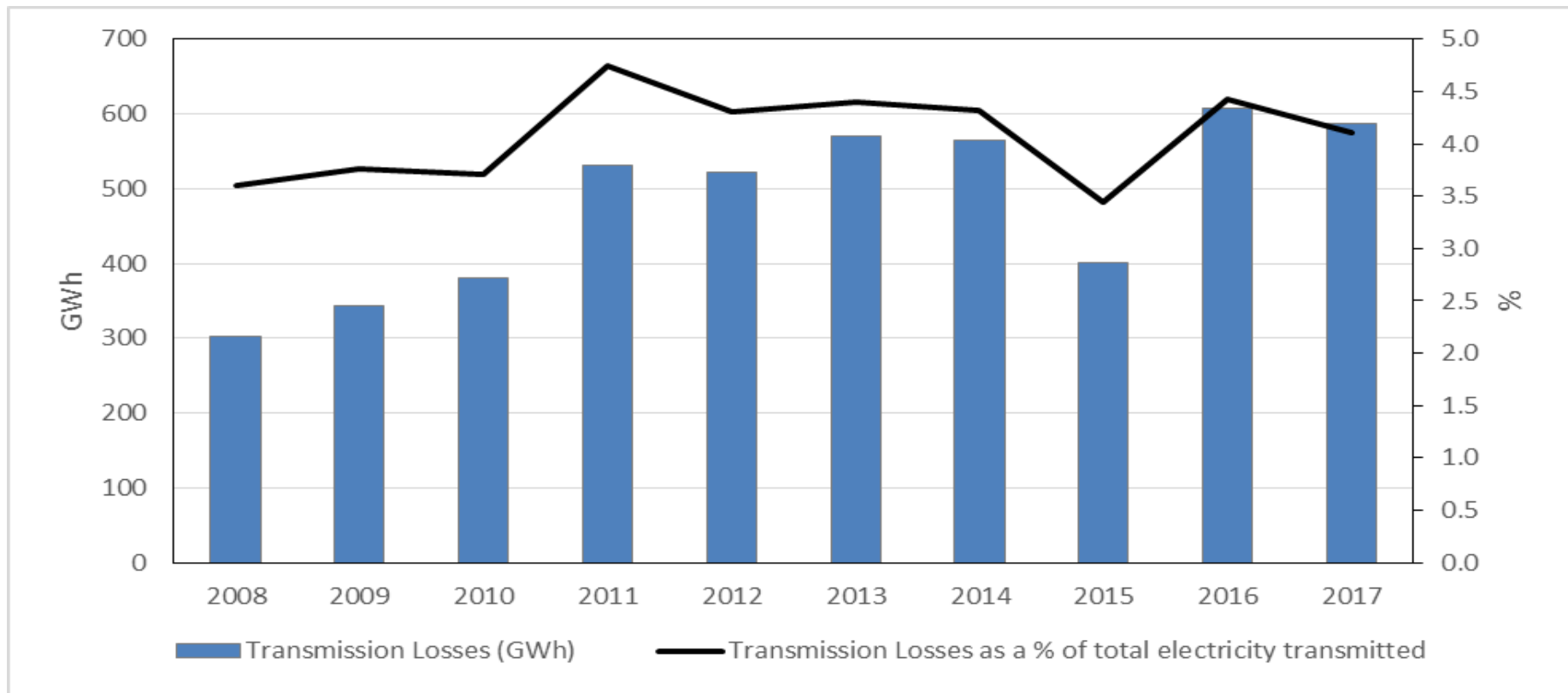


Table 3.8: Akosombo Dam Month End Elevation (feet)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	253.1	261.7	266.1	273.8	269.8	266.25	256.1	245.4	241.4	248.8
February	251.4	259.9	264.5	272.4	268	264.25	254.1	244.0	240.2	246.9
March	249.2	258.1	262.6	270.8	265.9	262.16	251.8	242.3	238.9	244.5
April	247.5	256.9	260.7	269.1	264.1	260.3	249.5	240.8	237.6	242.3
May	246	255	259	267.4	262.6	258.72	247.6	239.2	236.5	240.7
June	245	254	258	266.4	261.4	257.04	245.5	238.4	235.5	240.4
July	246.4	254.1	257.7	266.7	263.2	256.15	244.5	237.5	235.9	242.8
August	252.9	258.8	259.7	267.6	264	255.08	243.3	238.1	240.2	249.5
September	261.4	266.3	269.8	271.7	267.6	258.1	247.7	241.8	247.5	252.3
October	266.4	270.4	277	274.7	270.8	260.75	250.5	244.8	253.0	253.2
November	265.1	270.3	276.7	273.7	270	259.36	249.1	244.0	252.0	253.1
December	263.6	268.2	275.4	271.9	268.4	257.7	247.1	242.7	250.5	252.8

Source: GRIDCo and VRA

Table 3.9: Grid Electricity Purchases and Sales by ECG (GWh)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Purchases	5,799	6,052	6,771	7,259	7,944	8,479	8,370	7,544	9,316	9,783
Sales	4,316	4,482	4,972	5,285	6,079	6,496	6,262	5,831	7,115	7,575
Losses¹	1,483	1,570	1,799	1,974	1,865	1,983	2,108	1,713	2,201	2,208
% Losses	25.6	25.9	26.6	27.2	23.5	23.4	25.2	22.7	23.6	22.6

¹Technical and commercial losses

Source: GRIDCo, VRA and ECG

Table 3.10: Grid Electricity Purchases and Sales by NEDCo (GWh)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Purchases	529	566	635	719	822	937	998	1,013	1,140	1,224
Sales	392	413	511	581	658	737	758	719	763	889
Losses¹	137	153	124	138	164	200	240	294	377	335
% Losses	25.9	27.0	19.5	19.2	20.0	21.3	24.0	29.0	33.1	27.4

¹Technical and commercial losses

Source: GRIDCO, VRA and NEDCo

Table 3.11: Grid Electricity Sales by Customer Class (GWh)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Residential	2,168	2,275	2,483	2,527	2,819	3,060	2,772	2,436	3,932	3,931
Non-residential	876	924	966	1,199	1,549	1,532	1,529	1,530	1,066	1,353
Special Load Tariff¹	2,963	2,951	3,174	3,901	4,153	4,435	4,680	4,179	4,528	4,728
Street lighting	132	144	254	296	369	445	540	536	603	679
Total	6,139	6,294	6,877	7,922	8,890	9,472	9,521	8,681	10,129	10,692

¹Special load tariff customers of ECG and NEDCo as well as bulk customers of VRA including VALCO

Data do not include transmission and distribution (*commercial and technical*) losses

Source: ECG, NEDCo, VRA and GRIDCO

Figure 3.7: Grid Electricity Consumption by Customer Class

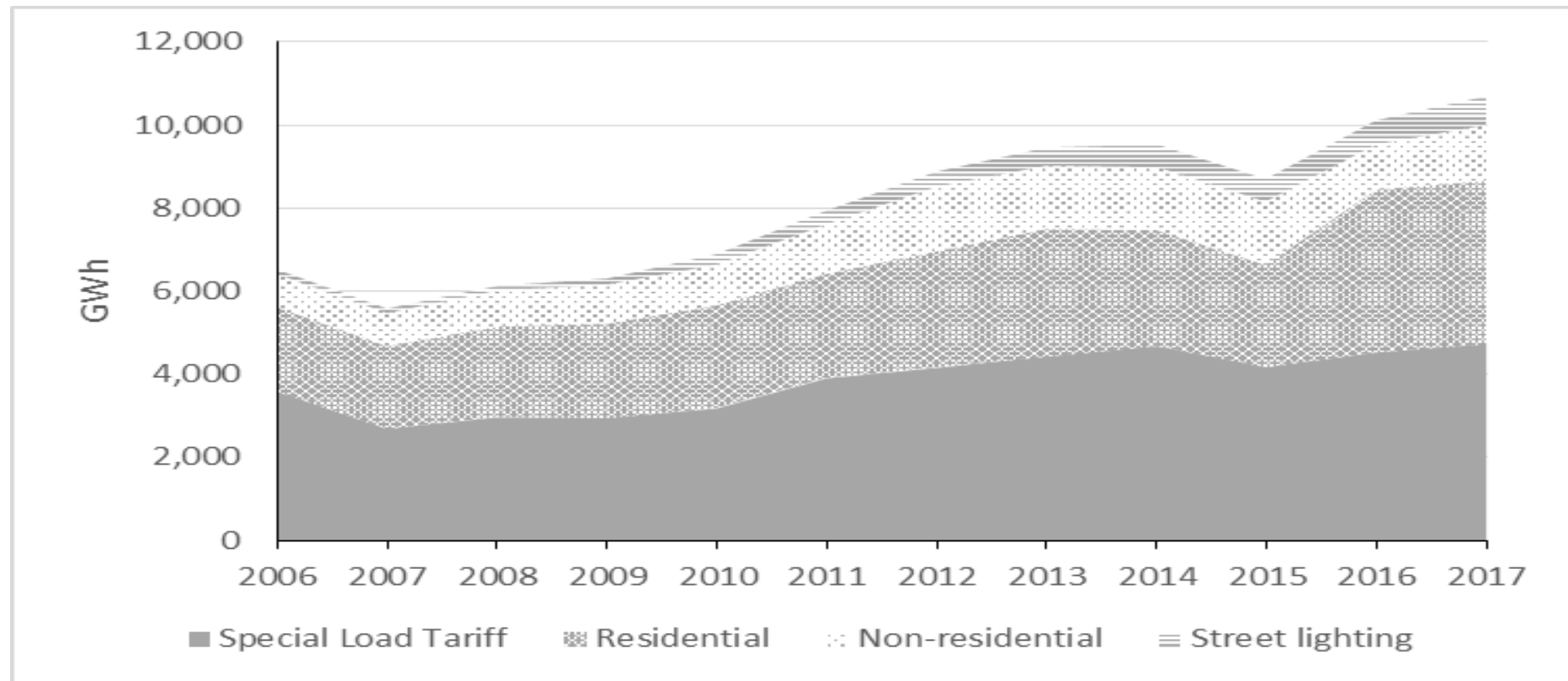


Table 3.12: Grid Electricity Distribution Reliability Indices

RELIABILITY INDEX	OPERATIONAL AREA	REGULATORY BENCHMARK (Per L.I 1935)	AVERAGE VALUES						
			2015		2016		2017		
			ECG	NEDCo	ECG	NEDCo	ECG	NEDCo	
System Average Interruption Frequency Index (SAIFI) $\text{SAIFI (Interruptions/customer)} = \frac{\text{Sum of all customer interruptions}}{\text{Total number of customers served}}$ <i>This is a measure of the number of times that a customer is interrupted during an operational year.</i>		Maximum number of outages permitted per year							
	METRO	6	18	N.A	27	42	48	132	
	URBAN	6	19		39		88		
	RURAL	6	27		47		57		
System Average Interruption Duration Index (SAIDI) $\text{SAIDI (Hours/customer)} = \frac{\text{Sum of all customer interruption durations}}{\text{Total number of customers served}}$ <i>This is a measure of the average duration of interruptions recorded for the distribution system during an operational year.</i>		Maximum average duration of outage permitted per year							
	METRO	48 Hours	161	N.A	130	41	77	117	
	URBAN	72 Hours	137		146		115		
	RURAL	144 Hours	203		159		135		
Cumulative Average Interruption Duration Index (CAIDI) $\text{CAIDI (Hours)} = \frac{\text{SAIDI}}{\text{SAIFI}} = \frac{\text{Sum of all customer interruption duration}}{\text{Total number of customer interruptions}}$ <i>This is a measure of the average duration of interruptions for customers interrupted during an operational year.</i>		Average duration of outages permitted per year for customers interrupted only							
	METRO	8 Hours	2	N.A	2	1	2	1	
	URBAN	12 Hours	2		1		1		
	RURAL	24 Hours	2		2		1		

N/A: data not provided.

Data provided by ECG and NEDCo

Values rounded to the nearest whole number

SECTION FOUR: PETROLEUM

Table 4.1: Crude Oil Production (bbls)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
From Saltpond Field	213,730	173,444	97,642	75,731	105,464	98,289	97,301	46,630	FC	FC
From Jubilee Field	NE	NE	1,267,700	23,757,695	28,831,136	36,760,348	37,201,691	37,411,661	26,981,640	32,749,975
TEN Field	NE	NE	NE	NE	NE	NE	NE	NE	5,316,140	20,452,577
Sankofa Gye Nyame Field	NE	NE	NE	NE	NE	NE	NE	NE	NE	5,455,512
Total	213,730	173,444	1,365,342	23,833,426	28,936,600	36,858,637	37,298,992	37,458,291	32,297,780	58,658,064

NE: - Field was not in existence

FC: - Field closed. Petroleum agreement for Saltpond field has been terminated and GNPC is in the process of decommissioning the field.

Source: Ghana National Petroleum Corporation

Table 4.2: Crude Oil Export

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Quantity (bbl)	213,730	173,444	97,642	24,731,475	26,430,934	36,048,290	37,702,873	36,459,906	29,904,461	56,989,873
Quantity (ktonnes)	30.5	24.8	13.9	3,533.1	3,775.8	5,149.8	5,386.1	5,208.6	4,272.1	8,141.4
Value (million US\$)	N.A	N.A	N.A	2,779	2,976	3,885	3,585	1,931	1,345	3,019

NA means data not available

Source: Bank of Ghana

Table 4.3: Crude Oil Import (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Import	1,975.8	982.8	1,661.6	1,531.6	1,209.5	1,302.3	693.2	310.5	1,445.6	233.2
For refinery	1,396.7	441.4	961.1	1,274.2	505.8	374.4	70.1	61.8	988.6	55
For electricity generation	579.1	541.4	700.5	257.4	703.7	927.8	623.1	248.7	456.9	178.2

Source: VRA, TOR & NPA

Figure 4.1: Imported Crude Oil Use

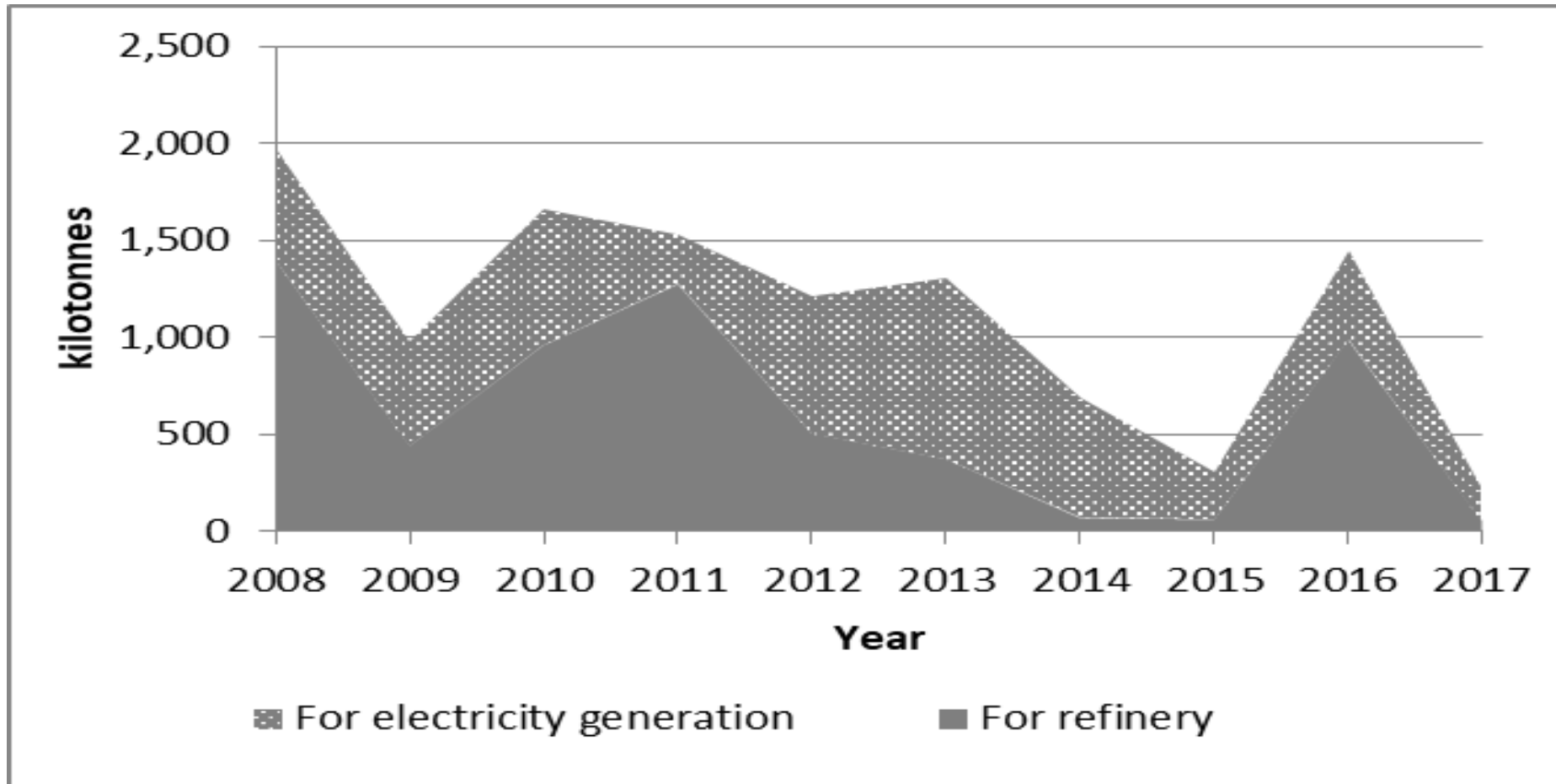


Table 4.4: Natural Gas Supply (mmBtu)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Import	-	197,977	15,616,648	30,524,558	15,447,347	11,573,011	22,541,001	20,625,394	4,002,683	11,712,897
Production	-	-	-	-	-	-	2,039,837	26,391,238	23,472,907	33,748,920

NB: Import is Natural Gas delivered through the West Africa Gas Pipeline whilst production is natural gas from Ghana National Gas Company (GNGC)

Source: WAGPCo, GNGC & VRA

Figure 4.2: Trend in Natural Gas Supply

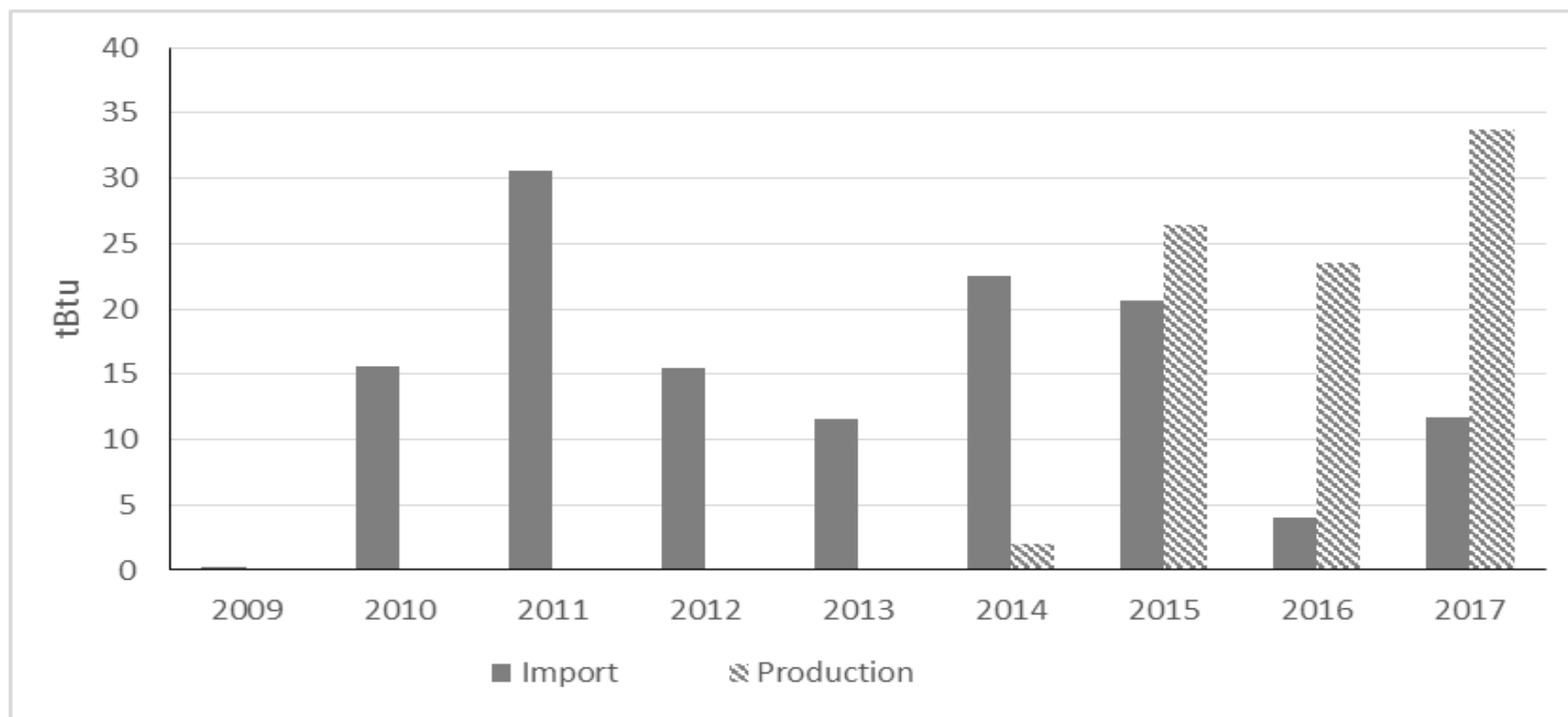


Table 4.5: Petroleum Products Production (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LPG	54.6	14.0	31.6	44.6	26.8	25.6	3.3	2.0	114.2	114.0
Gasolines	391.2	135.0	337.7	344.3	157.7	167.3	40.4	31.8	244.0	6.5
Kerosene	168.6	48.7	71.0	52.6	21.1	14.6	4.5	0.2	24.5	2.0
ATK	21.3	1.3	116.7	116.1	47.6	59.8	9.4	18.2	37.6	0.1
Gas Oil	360.5	102.8	292.6	309.8	121.5	113.3	27.8	28.0	254.7	6.1
Fuel Oils	225.4	25.3	96.8	90.6	79.2	43.5	43.7	8.9	64.0	1.3
Total	1,221.5	327.1	946.4	958.0	454.0	424.2	129.2	89.1	739.0	129.9

Source: Tema Oil Refinery & Ghana National Gas Company

Figure 4.3: Trend in Petroleum Products Production

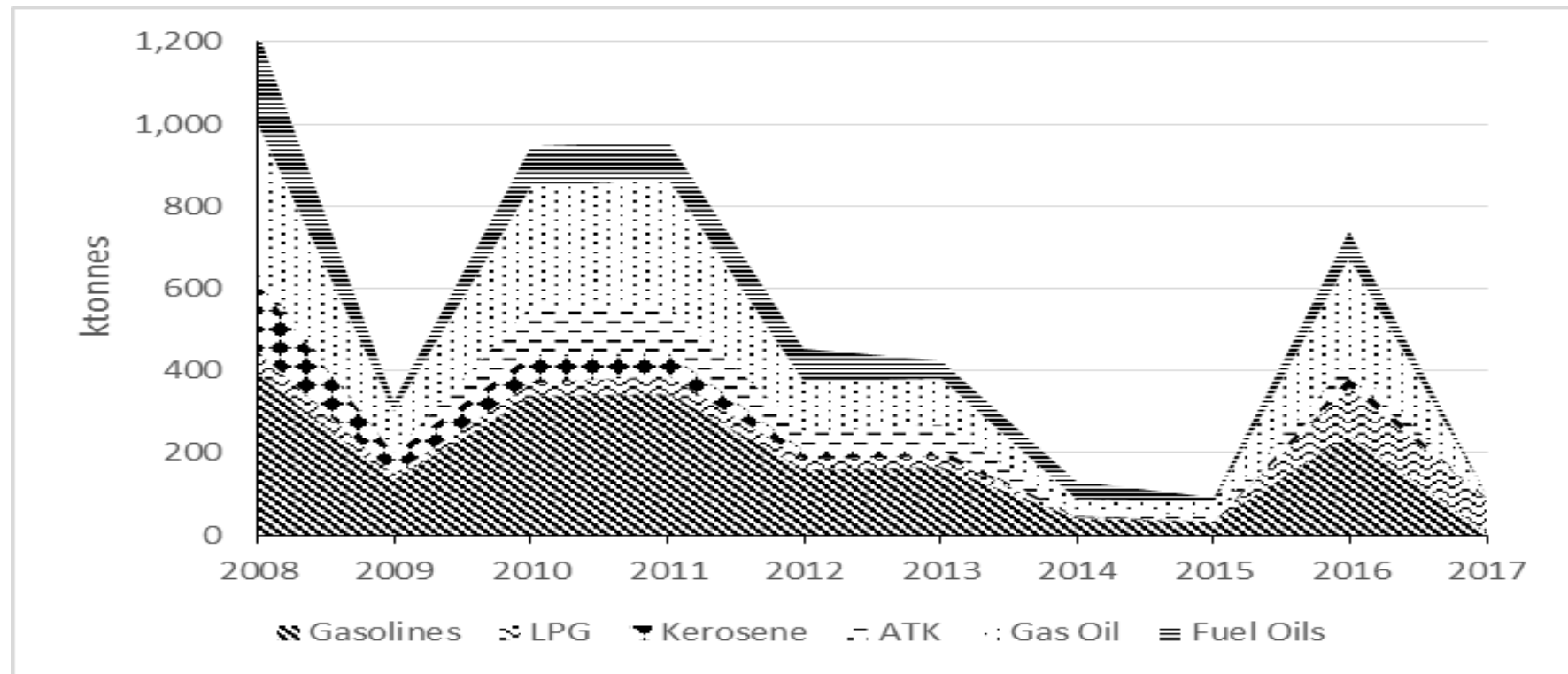


Table 4.6: Petroleum Products Import (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LPG	67.8	150.6	148.0	177.8	241.6	203.9	236.4	197.7	177.9	202.4
Gasolines	254.5	563.4	570.1	712.8	811.5	1,017.4	1,254.3	1,182.1	1,235.7	1304.1
Kerosene	136.4	77.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gasoil	579.0	969.5	871.7	1,200.6	1,309.4	1,638.7	1,742.1	2,161.0	1,719.8	1780.9
Fuel Oil	0.0	0.0	0.0	0.0	0.0	44.3	48.6	0.0	20.6	248.8
DPK	0.0	0.0	0.0	17.5	115.0	0.0	0.0	0.0	0.0	0.0
ATK	156.2	83.5	0.0	0.0	95.7	41.4	112.4	109.1	112.7	181.4
Total	1,194.0	1,844.6	1,589.9	2,108.7	2,573.2	2,945.6	3,393.8	3,649.9	3,266.7	3,717.6

Source: National Petroleum Authority

Figure 4.4: Trend in Petroleum Products Import

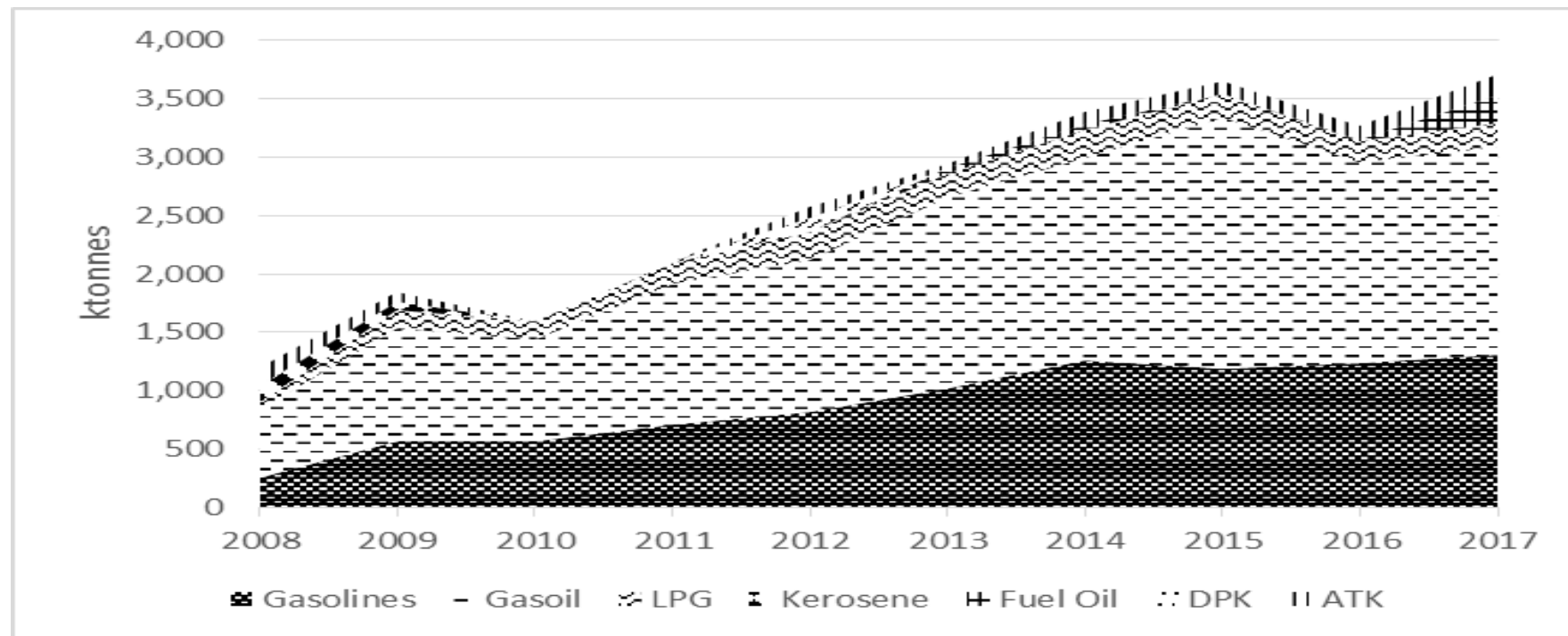


Table 4.7: Petroleum Products Export (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LPG	5.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	25.1	40.3
Gas Oil	88.4	381.9	290.9	356.5	80.8	51.8	10.8	10.3	170.1	190.2
Fuel Oil	148.4	30.2	40.6	43.5	44.5	3.7	0.0	0.0	69.8	53.0
Heavy Gasoline	73.0	20.5	93.6	141.1	54.3	36.0	10.2	9.9	112.8	11.1
ATK	0.3	0.0	103.0	128.5	131.0	122.3	105.6	101.9	115.0	150.0
Premium Gasoline	5.1	20.6	9.9	13.4	0.0	0.0	0.0	0.0	158.8	173.3
Total	320.2	454.3	538.0	683.1	310.6	213.8	126.6	122.1	651.6	618.0

NB: Gas Oil export includes sales to international marine bunkers

ATK export is sales to international aviation bunkers

Source: Tema Oil Refinery and National Petroleum Authority

Figure 4.5: Trend in Petroleum Products Export

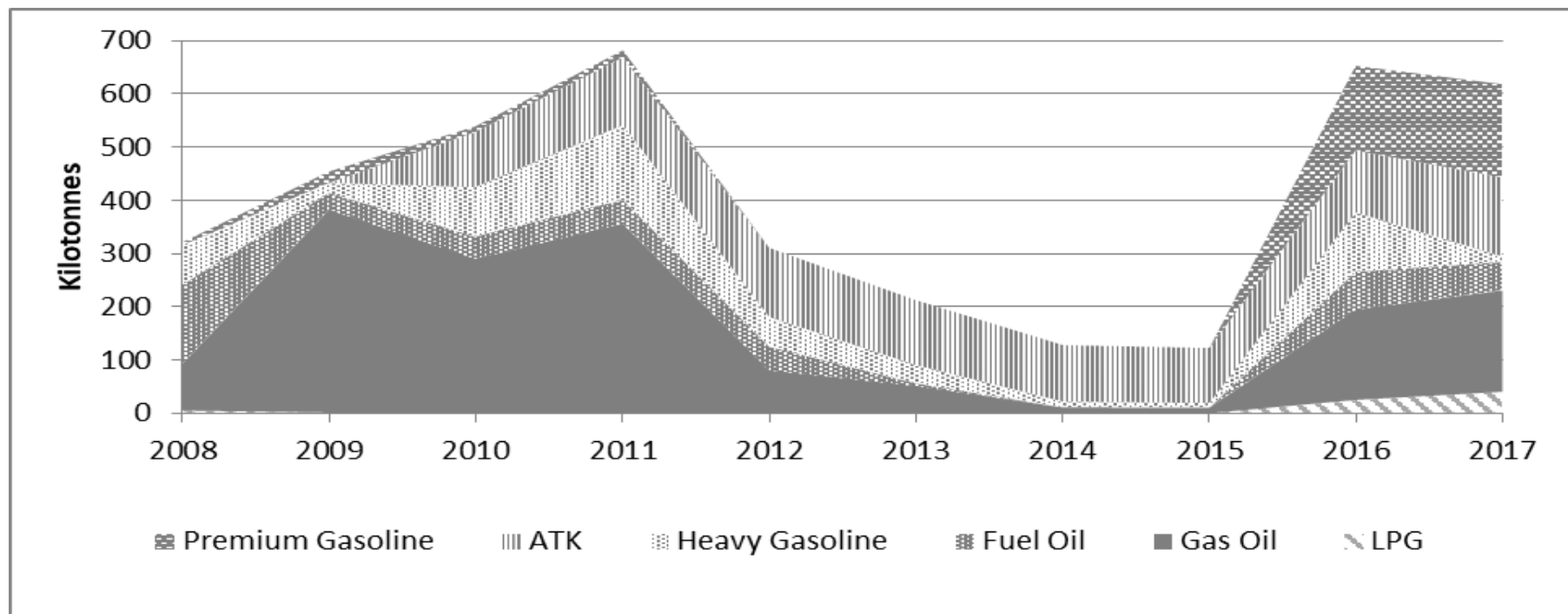


Table 4.8: Petroleum Products Supplied to the Economy (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LPG	117.6	220.6	178.4	214.4	268.5	251.8	241.5	279.0	281.5	358.9
Gasoline	545.0	701.4	737.8	807.0	992.7	1,080.6	1,102.3	1,163.2	1,069.2	1,072.6
Premix	50.7	55.1	32.4	45.6	58.9	53.4	56.2	47.2	56.0	68.8
Kerosene	34.6	89.3	49.3	62.4	45.6	27.8	9.3	6.9	8.1	5.6
ATK	119.2	124.7	108.4	135.3	141.3	131.9	113.9	112.0	132.2	166.6
Gas Oil	1,092.1	1,280.0	1,271.9	1,431.2	1,665.0	1,722.6	1,713.0	1,902.7	1,765.0	1,661.5
RFO	47.9	40.3	30.9	37.5	33.5	39.3	26.8	13.4	12.9	129.0
Total	2,007.1	2,511.4	2,409.1	2,733.4	3,205.5	3,307.4	3,263.1	3,524.4	3,324.8	3,462.9

Source: National Petroleum Authority

Figure 4.6: Trend in Petroleum Products Supplied to the Economy

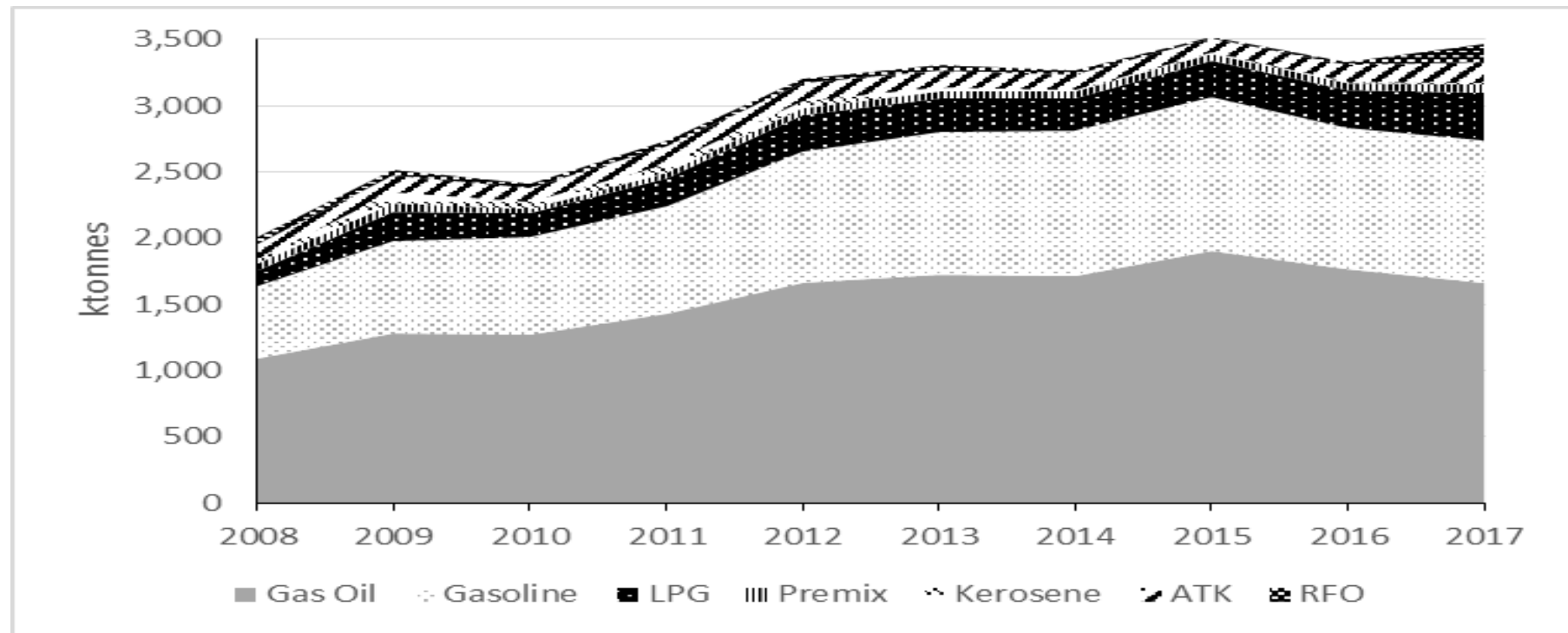
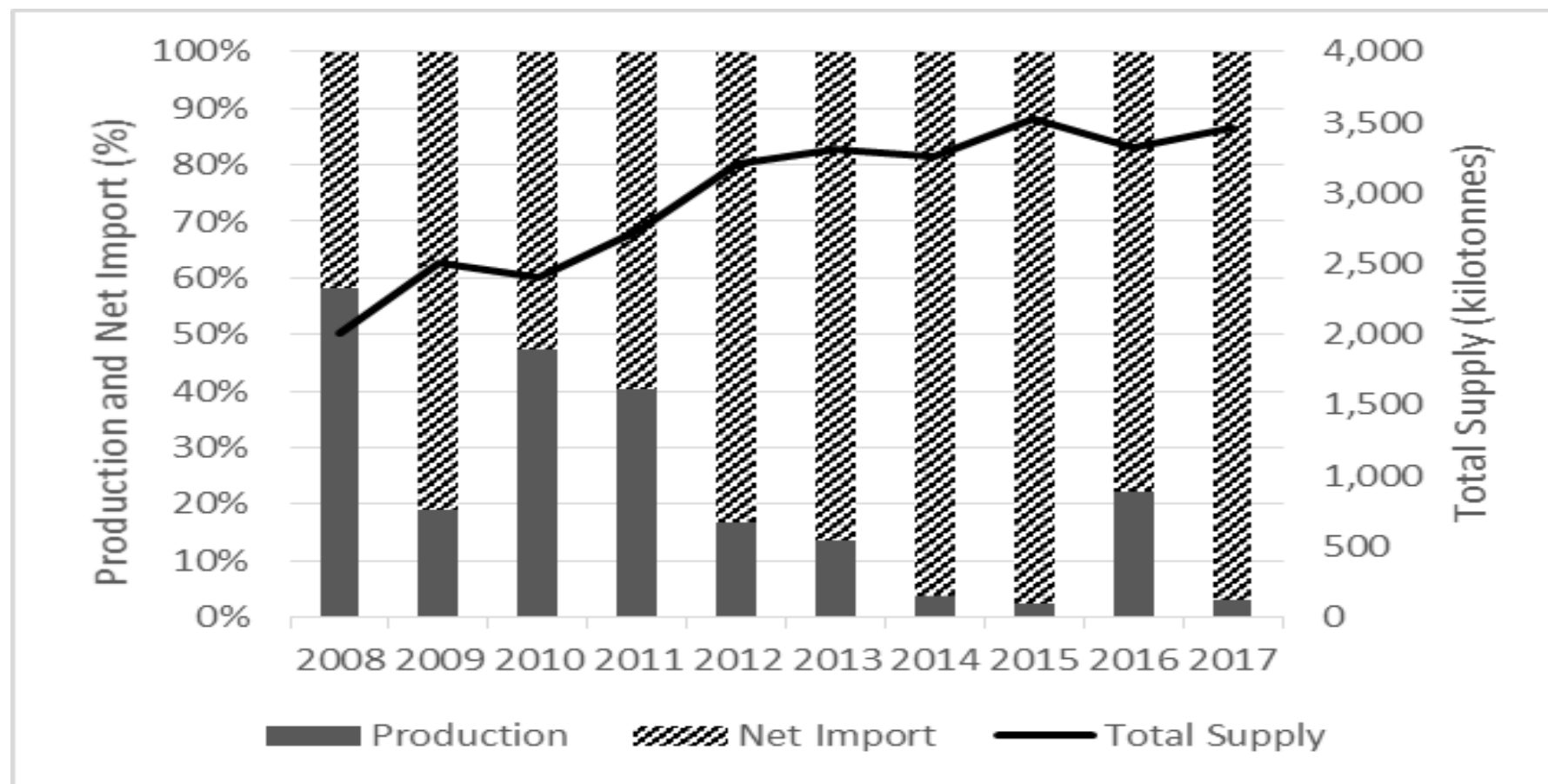


Table 4.9: Production, Net import and Total Supply of Petroleum Products (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Production	1,221.5	327.1	946.4	958.0	454.0	424.2	129.2	89.1	739.0	98.0
Net Import	873.8	1,390.3	1,051.9	1,425.6	2,262.6	2,731.8	3,267.1	3,527.8	2,615.1	3,099.6
Total Supply	2007.1	2,511.4	2,409.1	2,733.4	3,205.5	3,307.4	3,263.1	3,524.4	3,324.8	3,462.9

Net Import = Import – Export

Figure 4.7: Trend in Production, Net import and Total Supply of Petroleum Products



SECTION FIVE: WOODFUELS

Table 5.1: Woodfuel Supply (ktoe)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Wood for charcoal	1,473.5	1,576.7	1,687.1	1,805.2	1,859.3	1,989.5	2,049.0	2,043.0	2,033.0	2323.9
Wood for firewood	1,565.6	1,520.0	1,490.2	1,534.9	1,519.5	1,534.7	1,550.0	1,545.0	1,540.0	1550.0
Other	31.3	30.4	29.8	30.7	30.4	29.7	30.0	30.0	29.4	29.4
Total Wood Supply	3,070.4	3,127.0	3,207.0	3,370.7	3,409.2	3,553.9	3,629.0	3,618.0	3,602.4	3,903.3

¹include saw dust, sawmill residue etc.

NB: 2007-2009 figures extrapolated from 2003 field survey data. 2011-2017 figures extrapolated from 2010 field survey data.

Table 5.2: Woodfuel Consumption (ktoe)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Firewood	1,565.6	1,520.0	1,490.2	1,534.9	1,519.5	1,534.7	1,550.0	1,545.0	1,540.0	1550.0
Charcoal	920.9	942.9	944.0	1,010.0	1,038.8	1,111.6	1,212.0	1,210.0	1,214.0	1250.0
Other	31.3	30.4	29.8	30.7	30.4	29.7	29.7	29.7	29.4	29.4
Total	2,517.8	2,493.3	2,463.9	2,575.6	2,588.8	2,676.0	2,791.7	2,784.7	2,783.4	2,829.4

¹include saw dust, sawmill residue etc.

NB: 2007-2009 figures extrapolated from 2003 field survey data. 2011-2017 figures extrapolated from 2010 field survey data.

Table 5.3: Charcoal Export (kilotonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 ¹
Quantity	2.9	4.3	1.4	0.8	2.0	0.8	0.5	0.4	2.7	2.5
Growth Rate (%)	-19.4	48.3	-67.4	-42.9	150.0	-61.4	-35.3	-20.0	575.0	-7.4

¹Provisional

SECTION SIX: ENERGY PRICES

Table 6.1: Average Crude Oil Prices (US\$/barrel)

Month	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	91.92	45.62	76.92	96.82	111.55	112.28	107.32	49.72	31.93	55.51
February	94.49	43.73	74.74	104.09	126.96	116.11	108.80	58.70	33.44	55.98
March	103.00	47.32	79.90	114.62	124.55	109.53	107.68	57.01	39.80	52.53
April	110.43	51.23	85.68	123.13	125.90	103.31	108.10	60.90	43.34	53.72
May	124.61	58.57	76.99	114.53	109.36	103.32	109.20	65.62	47.63	51.11
June	133.47	69.34	75.66	113.91	95.89	103.30	111.97	63.75	49.89	47.54
July	134.79	65.76	75.49	116.68	102.77	107.37	108.21	56.75	46.58	49.2
August	115.22	73.07	77.11	109.82	113.19	110.25	103.48	48.18	47.16	51.87
September	100.75	68.19	78.21	109.96	113.04	111.21	98.56	48.57	47.23	55.23
October	73.60	73.87	83.49	108.80	111.52	109.45	88.07	48.12	51.42	57.47
November	55.05	77.50	86.11	110.61	109.53	107.77	79.40	44.42	47.08	62.87
December	43.29	75.24	92.35	107.72	109.19	110.60	62.36	37.72	54.93	62.27

Source: Bank of Ghana

Figure 6.1: Trend in Crude Oil Prices



Table 6.2: Electricity Tariff

Tariff Category	Effective Date							
	Dec, 2011	Oct, 2013	Jan, 2014	Jul, 2014	Oct, 2014	Apr, 2015	Jul, 2015	Dec, 2015
Residential								
0 - 50 (Exclusive)	9.5	15.7	17.2	19.3	20.5	21.1	21.1	33.6
51 - 300 (GHp/kWh)	17.6	31.4	34.5	38.7	41.2	42.3	42.3	67.3
301 - 600 (GHp/kWh)	22.8	40.8	44.9	50.2	53.5	54.9	54.9	87.4
600+ (GHp/kWh)	25.3	45.3	49.8	55.8	59.4	61.0	61.0	97.1
Service Charge (GHp/month)	165.3	295.7	324.5	363.8	387.5	397.7	397.7	633.2
Non-Residential								
0 -300 (GHp/kWh)	25.3	45.2	49.6	55.6	59.2	60.8	60.8	96.8
301 - 600 (GHp/kWh)	26.9	48.1	52.8	59.2	63.0	64.7	64.7	102.1
600+ (GHp/kWh)	42.4	75.9	83.3	93.4	99.5	102.1	102.1	162.5
Service Charge (GHp/month)	275.5	492.9	540.9	606.3	645.9	662.9	662.9	1,055.3
SLT - Low Voltage								
Maximum Demand (GHp/kVA/month)	1,542.9	2,760.3	3,028.9	3,395.1	3,616.9	3,712.1	3,712.1	5,909.6
Energy Charge (GHp/kWh)	26.3	47.1	51.7	58.0	61.8	63.4	63.4	100.9
Service Charge (GHp/month)	1,102.2	1,971.7	2,163.5	2,425.1	2,583.6	2,651.5	2,651.5	4,221.2
SLT - Medium Voltage								
Maximum Demand (GHp/kVA/month)	1,322.5	2,366.0	2,596.2	2,910.1	3,100.2	3,181.8	3,181.8	5,065.4
Energy Charge (GHp/kWh)	20.4	36.5	40.0	44.9	47.8	49.1	49.1	78.1
Service Charge (GHp/month)	1,542.9	2,760.3	3,028.9	3,395.1	3,616.9	3,712.1	3,712.1	5,909.6
SLT - High Voltage								
Maximum Demand (GHp/kVA/month)	1,322.5	2,366.0	2,596.2	2,910.1	3,100.2	3,181.8	3,181.8	5,065.4
Energy Charge (GHp/kWh)	18.7	33.5	36.8	41.2	43.9	45.1	45.1	71.8
Service Charge (GHp/month)	1,542.9	2,760.3	3,028.9	3,395.1	3,616.9	3,712.1	3,712.1	5,909.6
SLT-High Voltage - Mines								
Capacity Charge (GHp/kVA/Month)	1,542.9	2,760.3	3,028.9	3,395.1	3,616.9	3,712.1	3,712.1	5,909.6
Energy Charge (GHp/kWh)	29.8	53.2	58.4	65.5	69.8	71.6	71.6	114.0
Service Charge (GHp/Month)	1,542.9	2,760.3	3,028.9	3,395.1	3,616.9	3,712.1	3,712.1	5,909.6

Table 6.3: Average Grid Electricity End User Tariff

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
GHS/kWh	0.148	0.148	0.211	0.245	0.232	0.307	0.464	0.541	0.817	0.764
Exchange Rate (GHS/US\$) ¹	1.20	1.43	1.45	1.55	1.88	1.97	3.20	3.68	3.89	4.36
US\$/kWh	0.123	0.104	0.145	0.158	0.124	0.156	0.145	0.147	0.210	0.175

¹Source: Bank of Ghana

Figure 6.2: Trend in Average Grid Electricity End User Tariff

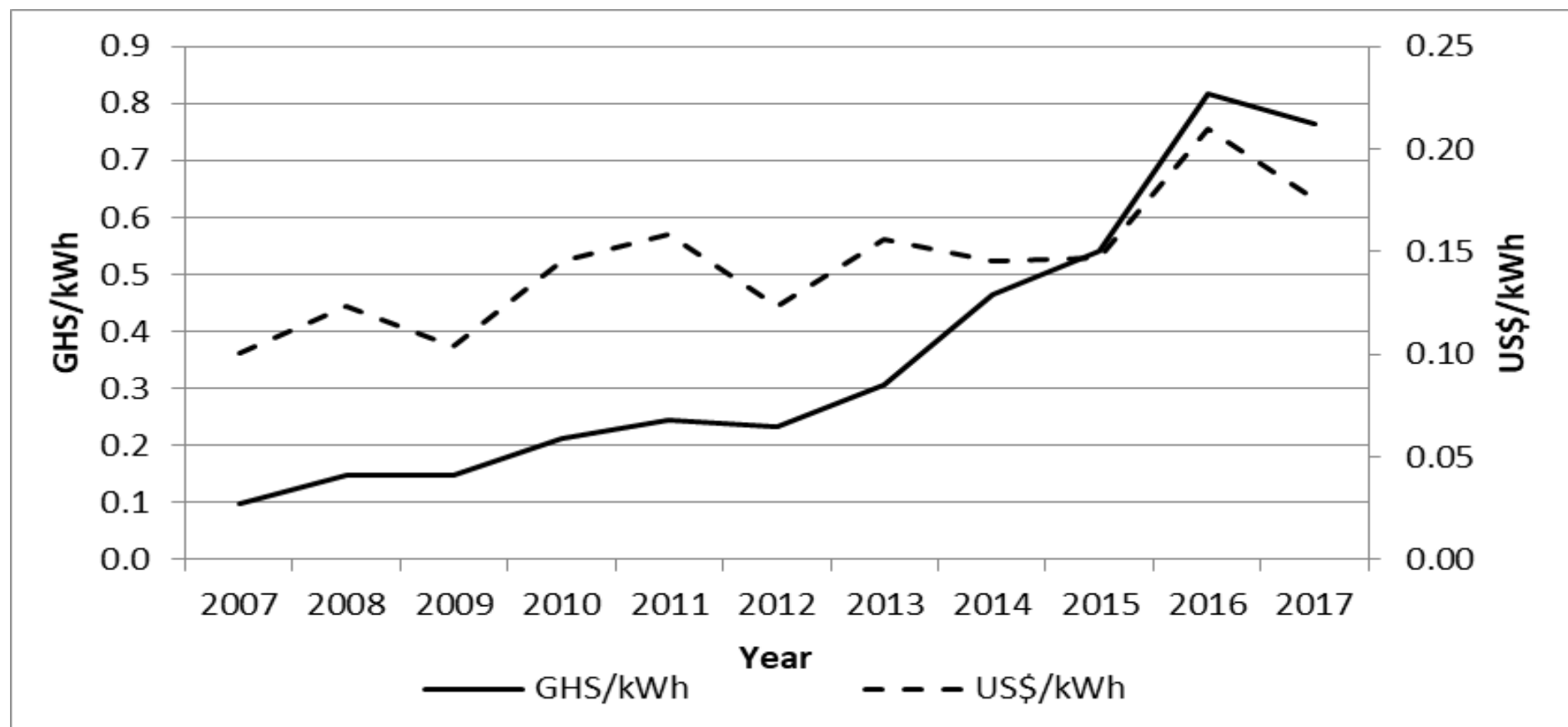


Table 6.4: Average Charcoal Prices by Region

Region	Maxi Bag (Ghc)							Mini Bag (Ghc)						
	2011	2012	2013	2014	2015	2016	2017	2011	2012	2013	2014	2015	2016	2017
Greater Accra	20.17	21.15	23.68	30.26	37.10	38.68	42.50	13.13	15.01	17.43	22.42	26.61	26.99	31.17
Ashanti	12.36	15.07	16.62	19.32	22.91	26.23	28.59	6.09	8.68	9.15	12.71	15.12	16.66	19.37
Western	15.33	23.85	25.79	28.58	32.96	36.68	43.13	10.37	13.60	15.30	18.20	21.68	23.85	27.17
Eastern	12.00	16.76	19.03	22.21	30.55	30.55	36.83	7.00	11.69	13.44	16.62	21.51	21.51	25.52
Central	21.33	22.08	26.49	31.09	39.03	41.44	47.33	11.41	13.95	19.83	23.53	31.00	28.52	32.25
Volta	19.18	26.19	32.02	36.43	49.50	38.16	50.00	10.36	13.73	16.66	20.67	28.28	27.17	35.34
Brong Ahafo	9.39	11.04	12.58	15.81	20.27	22.48	26.77	4.75	6.20	7.11	9.22	12.15	12.15	16.80
Northern	14.11	14.97	18.30	22.15	25.32	28.97	32.33	9.42	7.52	9.10	12.88	15.79	19.46	19.46
Upper East	10.00	19.51	24.93	30.65	34.45	36.67	38.49	5.11	11.96	14.80	20.35	23.00	30.83	24.67
Upper West	10.00	13.46	15.56	18.25	23.00	37.00	32.84	5.11	8.28	9.42	11.86	15.47	23.85	19.59
Country Average	15.23	18.23	21.19	25.11	31.15	35.39	37.88	8.83	11.04	13.22	16.66	20.14	21.82	25.13