

ENERGY COMMISSION OF GHANA



NATIONAL ENERGY STATISTICS

2005 - 2014

APRIL, 2015
STRATEGIC PLANNING AND POLICY DIVISION

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 2015 National Energy Statistics provides a time series data on Ghana's energy supply and use situation largely from 2005 to 2014.

This publication was prepared with data from the main energy sector institutions, including the Ministries of Power and Petroleum, Volta River Authority (VRA), Ghana Grid Company (GRIDCo), Ghana National Petroleum Corporation (GNPC), National Petroleum Authority (NPA), Tema Oil Refinery (TOR), Public Utility Regulatory Commission (PURC), Electricity Company of Ghana (ECG), Northern Electricity Distribution Company (NEDCo), West African Gas Pipeline Company (WAPCo), West African Gas Pipeline Authority (WAGPA), 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 2015 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	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 Gas	37.55 cubic metres (m ³)	
1 MMBTU of Gas	5.82 bbl of crude oil equivalent	

**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>Charcoal production is based on the fact that between 4 – 5 units of wood have been used to produce one 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	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

Conversion factors	Factors used to convert quantities from original physical unit into a common accounting unit for the purpose of aggregating different energy sources. The 'tonnes of oil equivalent' has been adopted as the accounting unit
Charcoal Kiln	A conversion device where combustion is initiated in a woodpile within the device and proceeds with a very limited supply of air until the wood is reduced to charcoal. This process is often called carbonization.
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 Consumption by final user, i.e. energy which is not being used for transformation into other forms of energy
Production	It is the production of primary energy, i.e. crude oil, natural gas, hydro, renewable etc. that is extracted.
Import and export	Import and export comprise quantities having crossed the national territorial boundaries of the country
International Marine Bunkers	Covers those quantities delivered to ships that are engaged in international navigation
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 number

Total Primary Energy Supply (TPES)	It is made up of production + import - export +/- stock changes
Statistical differences	It include the sum of the unexplained differences for individual fuels as they appear in the energy statistics
Electricity Plants	Refer to plants which are designed to produce electricity only
Petroleum refinery	Shows the use of primary energy for the manufacture of finished petroleum products and corresponding outputs
Own Use	It is the primary and secondary energy consumed by transformation industries for heating, pumping, lighting and other purposes

SECTION ONE: ENERGY INDICATORS AND BALANCES

Table 1.1: Energy Indicators (2006 – 2014)

Energy Indicator	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Primary Energy Supply	KTOE	6,398.0	6,404.0	6,273.0	6,036.0	6,946.0	7,609.0	8,362.0	8,564.0	9,147.0
Total Final Energy Consumed	KTOE	5,176.9	5,274.1	5,209.8	5,731.7	5,670.2	6,192.1	6,556.9	6,889.0	7,016.4
Total Petroleum Products Consumed	KTOE	1,872.6	2,126.6	2,071.3	2,597.7	2,491.1	2,826.6	3,317.5	3,422.3	3,377.5
Total Biomass Consumed	KTOE	2,671.3	2,593.7	2,517.8	2,493.3	2,463.9	2,575.6	2,588.8	2,676.0	2,791.7
Total Electricity Generated	GWh	8,430.0	6,978.0	8,324.0	8,958.0	10,167.0	11,200.0	12,023.8	12,870.0	12,963.0
Total Electricity Consumed	GWh	7,361.9	6,440.5	7,219.4	7,452.4	8,317.4	9,186.6	9,258.0	10,583.2	11,081.3
Population	million	21.80	22.30	22.90	23.40	24.70	25.30	25.90	26.50	27.00
GDP (Constant 2006 prices)	million Ghana cedis	18,705.1	19,913.4	21,592.2	22,336.0	24,101.0	27,486.0	30,040.0	32,242.0	33,589.0
Total Primary Energy Supply/GDP	TOE/GHS 1,000 of GDP	0.34	0.32	0.29	0.27	0.29	0.28	0.28	0.27	0.27
Total Final Energy Consumed/GDP	TOE/GHS 1,000 of GDP	0.28	0.26	0.24	0.26	0.24	0.23	0.22	0.21	0.21
Total Petroleum Products Consumed/GDP	TOE/GHS 1,000 of GDP	0.10	0.11	0.10	0.12	0.10	0.10	0.11	0.11	0.10
Total Electricity Consumed/GDP	kWh/GHS 1,000 of GDP	393.58	323.43	334.35	333.65	345.10	334.23	308.19	328.24	329.91
Total Primary Energy Supply/capita	TOE/capita	0.29	0.29	0.27	0.26	0.28	0.30	0.32	0.32	0.34
Total Energy Consumed/capita	TOE/capita	0.24	0.24	0.23	0.24	0.23	0.24	0.25	0.26	0.26
Total Petroleum Products Consumed/capita	TOE/capita	0.09	0.10	0.09	0.11	0.10	0.11	0.13	0.13	0.13
Total Biomass Consumed/capita	TOE/capita	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.10
Total Electricity Generated/capita	kWh/capita	386.7	312.9	363.5	382.8	411.6	442.7	464.2	485.7	480.1
Total Electricity Consumed/capita	kWh/capita	337.7	288.8	315.3	318.5	336.7	363.1	357.5	399.4	410.4
Grid Emission Factor (wind/solar power projects)	tCO ₂ /MWh	N.A	0.409	0.414	0.409	0.352	0.324	0.348	0.505	0.320
Grid Emission Factor (all other power projects)	tCO ₂ /MWh	N.A	0.576	0.559	0.565	0.508	0.438	0.482	0.726	0.358

Source: GDP and Population data from Ghana Statistical Service

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 - 2014 (ktoe)

SUPPLY AND CONSUMPTION	Crude Oil	Natural Gas	Petroleum Products	Wood	Charcoal	Hydro	Solar	Electricity	Total
Indigenous Production	5,435.0	52.6	-	3,628.7	-	721.3	0.3	-	9,837.8
Imports	707.1	568.0	3,512.1	-	-	-	-	4.4	4,791.6
Exports	-5,446.5	-	-	0.0	-0.4	-	-	-44.9	-5,491.7
International Marine Bunkers	-	-	-11.0	-	-	-	-	-	-11.0
International Aviation Bunkers	-	-	-105.6	-	-	-	-	-	-105.6
Stock Changes	149.9	-	-64.7	-	-	-	-	-	85.2
Total Energy Supply	845.4	620.6	3,330.8	3,628.7	-0.4	721.3	0.3	-40.5	9,106.3
Electricity Plants	-599.7	-595.6	-1.5	-	-	-721.3	-0.3	1,114.8	-803.6
Oil Refinery	-177.3	-	131.2	-	-	-	-	-	-46.1
Other Transformation	-	-	-	-2,049.0	1,212.4	-	-	-	-836.6
Own use	-12.1	-	-	-	-	-	-	-5.0	-17.1
Losses	-51.2	-	-	-	-	-	-	-150.4	-201.6
Final Energy Consumption	-	-	3,271.9	1,579.7	1,212.0	-	-	953.0	7,016.6
Residential Sector	-	-	185.0	1,304.8	1,101.7	-	-	410.3	3,001.8
Commerce & Services Sector	-	-	15.0	31.6	106.7	-	-	215.8	369.1
Industry	-	-	357.6	243.3	3.6	-	-	326.2	930.7
Agriculture & Fisheries Sector	-	-	104.5	-	-	-	-	0.2	104.7
Transport	-	-	2,609.8	-	-	-	-	0.5	2,610.3
Statistical Difference	5.1	25.0	-82.9	-	-	-	-	-34.0	-86.8

NB: All crude oil produced is exported

SECTION TWO: PRIMARY ENERGY SUPPLY AND FINAL ENERGY CONSUMPTION

Table 2.1: Primary Energy Supply (ktoe)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Oil	2,140	2,815	3,017	2,672	2,316	2,744	2,820	3,870	4,011	4,177
Natural Gas	N.A	N.A	N.A	N.A	5	394	769	390	292	621
Hydro	484	483	321	533	591	602	650	694	708	721
Wood	3,174	3,100	3,066	3,068	3,124	3,206	3,370	3,408	3,553	3,628
Total	5,798	6,398	6,404	6,273	6,036	6,946	7,609	8,362	8,564	9,147

N. A means Not Available

Figure 2.1: Trend in Primary Energy Supply (ktoe)

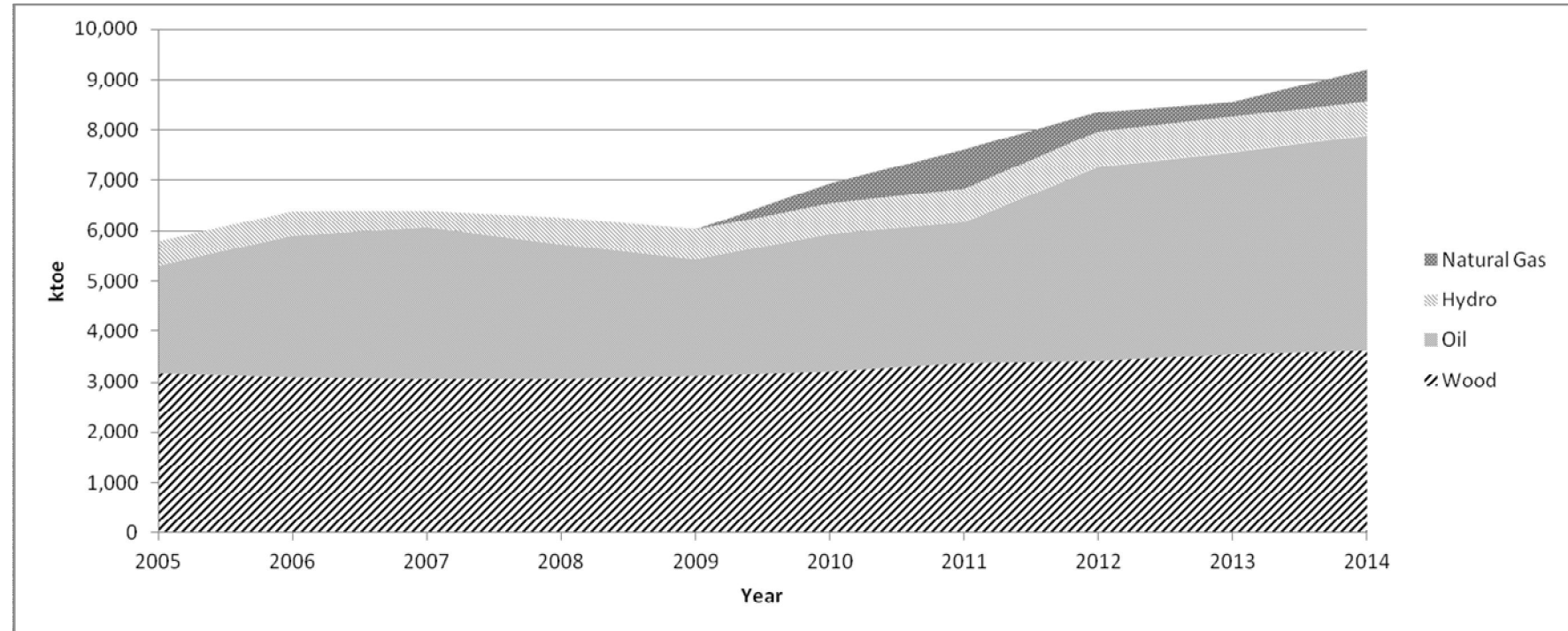
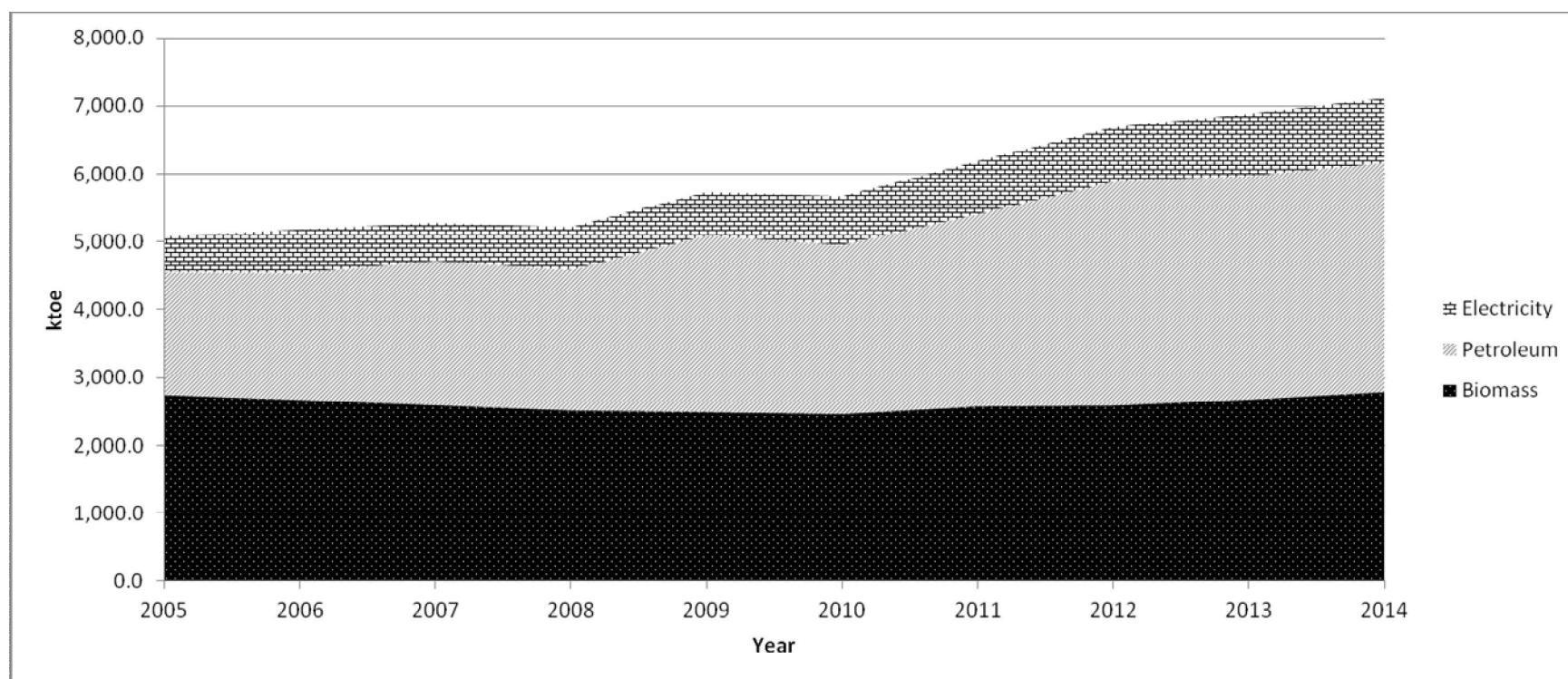


Table 2.2 Final Energy Consumed (ktoe)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Electricity	512.8	633.0	553.8	620.8	640.8	715.2	789.9	796.0	910.0	953.0
Petroleum	1,817.6	1,872.6	2,126.6	2,071.3	2,597.7	2,491.1	2,826.6	3,172.1	3,303.0	3,271.7
Biomass	2,745.2	2,671.3	2,593.7	2,517.8	2,493.3	2,463.9	2,575.6	2,588.8	2,676.0	2,791.7
Total	5,075.7	5,176.9	5,274.1	5,209.8	5,731.7	5,670.2	6,192.1	6,556.9	6,889.0	7,016.4

Figure 2.2 Trend in Final Energy Consumed



SECTION THREE: ELECTRICITY

Table 3.1: Installed Electricity Generation Capacity (End of December, 2014)

PLANT	FUEL TYPE	INSTALLED CAPACITY (MW)	Share (%)
Hydro			
Akosombo	Water	1,020	36.0
Bui	Water	400	14.1
Kpong	Water	160	5.7
Sub-Total		1,580	55.8
Thermal			
Takoradi Power Company (TAPCO)	LCO/Natural Gas	330	11.7
Takoradi International Company (TICO)	LCO/Natural Gas	220	7.8
Sunon Asogli Power (Ghana) Limited (SAPP) - IPP	Natural Gas	200	7.1
Cenit Energy Ltd (CEL) - IPP	LCO	126	4.5
Tema Thermal 1 Power Plant (TT1PP)	LCO/Natural Gas	110	3.9
Tema Thermal 2 Power Plant (TT2PP)	DFO/Natural Gas	50	1.8
Takoradi T3	LCO/Natural Gas	132	4.7
Mines Reserve Plant (MRP)	DFO/Natural Gas	80	2.8
Sub-Total		1,248	44.1
Renewables			
VRA Solar	Solar	2.5	0.1
Sub-Total		2.5	0.1
Total		2,831	100

Table 3.2: Electricity Generation by Plant (GWh) per Installed Capacity (MW)

Plant	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Hydro Generation										
Akosombo	4,718	4,690	3,104	5,254	5,842	5,961	6,495	6,950	6,727	6,509
Kpong	911	929	623	941	1,035	1,035	1,066	1,121	1,144	1,148
Bui	-	-	-	-	-	-	-	-	362	730
<i>Sub-Total</i>	<i>5,629</i>	<i>5,619</i>	<i>3,727</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>
Thermal Generation										
Takoradi Power Company (TAPCO)	831	1,416	1,521	874	453	1,234	1,137	1,061	1,783	890
Takoradi International Company (TICO)	328	1,395	1,417	1,063	1,040	1,160	657	1,168	1,032	712
Tema Thermal 1 Power Plant (TT1PP)	-	-	-	-	570	591	559	622	475	697
Tema Reserve Power Plant (TRPP)	-	-	162	85	-	-	-	-	-	-
Emergency Reserve Power Plant (ERPP)	-	-	80	45	-	-	-	-	-	-
Kumasi Reserve Power Plant (KRPP)	-	-	33	16	-	-	-	-	-	-
Mines Reserve Plant (MRP)	-	-	38	46	18	20	12	20	-	195
Tema Thermal 2 Power Plant (TT2PP)	-	-	-	-	-	28	50	141	94	223
Sunon Asogli Power (Ghana) Ltd (SAPP)	-	-	-	-	-	138	1,224	848	694	1,255
Cenit Energy Ltd (CEL)	-	-	-	-	-	-	-	94	454	513
Takoradi T3	-	-	-	-	-	-	-	-	102	87
<i>Sub-Total</i>	<i>1,159</i>	<i>2,811</i>	<i>3,251</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>
Renewables										
VRA Solar	-	-	-	-	-	-	-	-	3	4
Total	6,788	8,430	6,978	8,324	8,958	10,167	11,200	12,024	12,870	12,963
Installed Capacity (MW)¹	1,730	1,730	1,935	1,935	1,970	2,165	2,170	2,296	2,831*	2,831

Source: GRIDCo

- means Not Available

*Revised

Figure 3.1: Trend in Electricity Generation

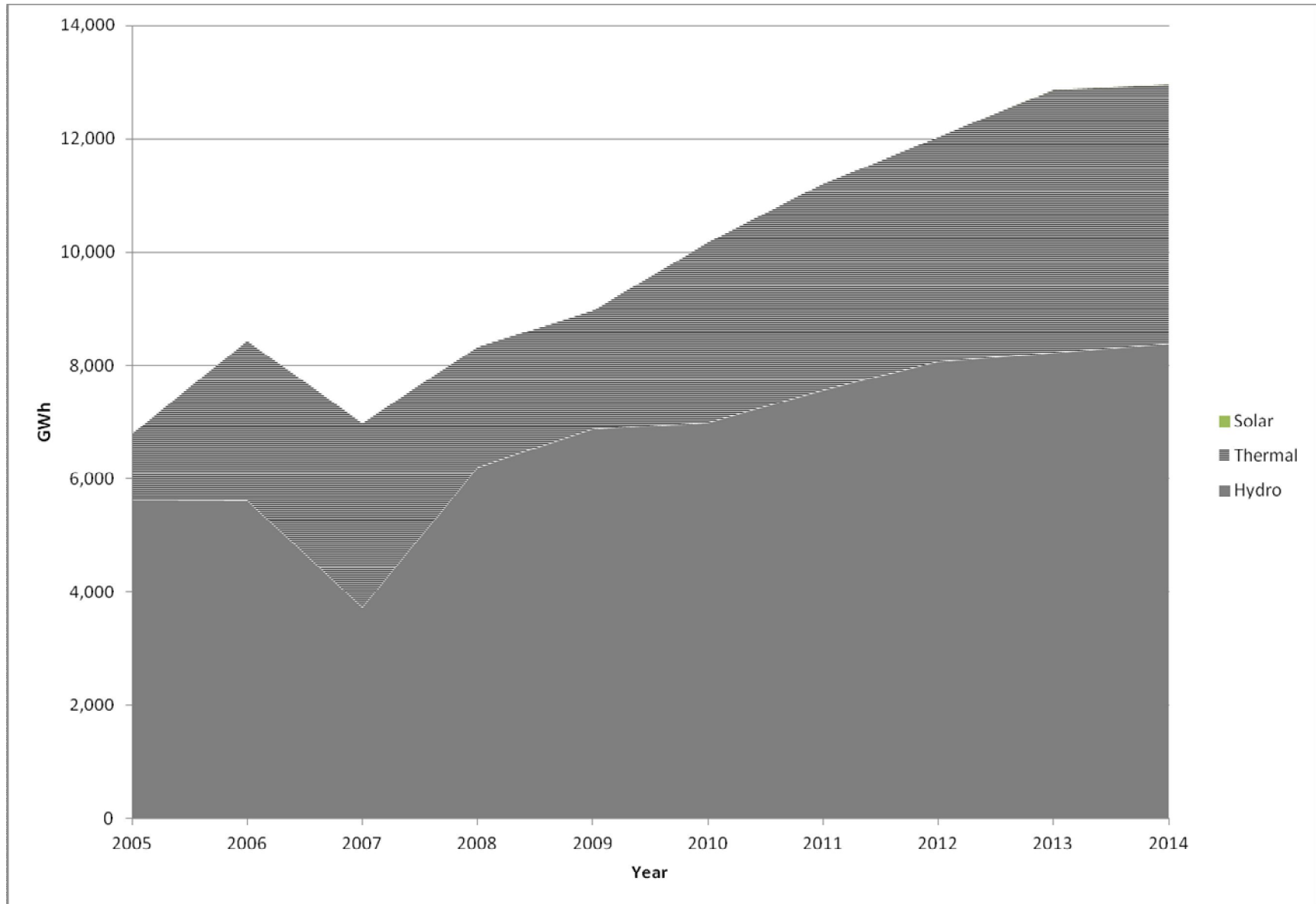


Table 3.3: Electricity Import, Export and Net Import (GWh)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Import	815	629	435	275	198	106	81	128	27	51
Export	639	754	246	538	752	1,036	691	667	530	522
Net Import	176	-125	189	-263	-554	-930	-610	-539	-503	-471

Source: GRIDCo

NB: Negative net import means net export

Figure 3.2: Electricity Import, Export and Net Import

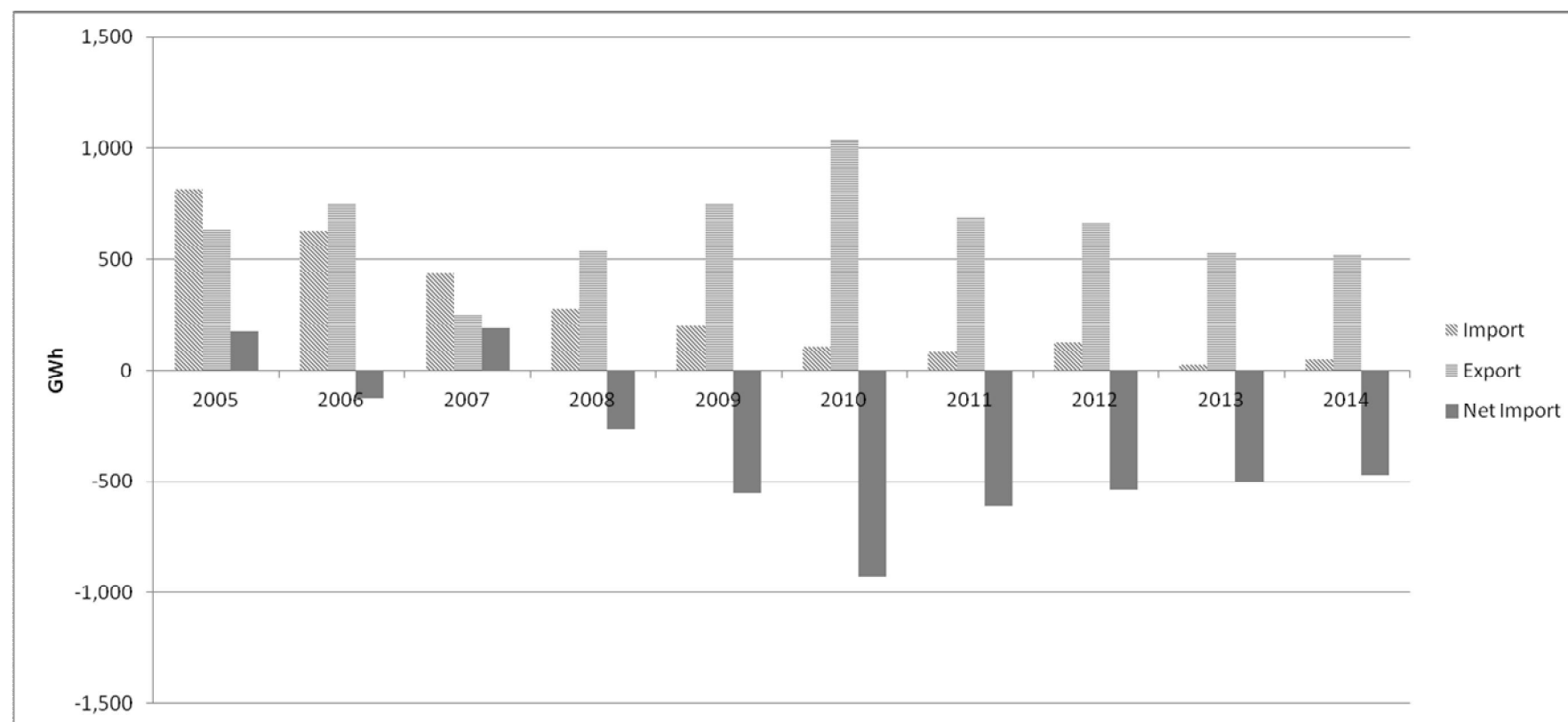


Table 3.4: Peak Load (MW)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Ghana Load at Peak	1,064	1,104	1,158	1,208	1,263	1,391	1,502	1,658	1,791	1,970
System Peak	1,325	1,393	1,274	1,367	1,423	1,506	1,665	1,729	1,943	2,061

Source: VRA & GRIDCo

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

Figure 3.3: Trend in Peak Load

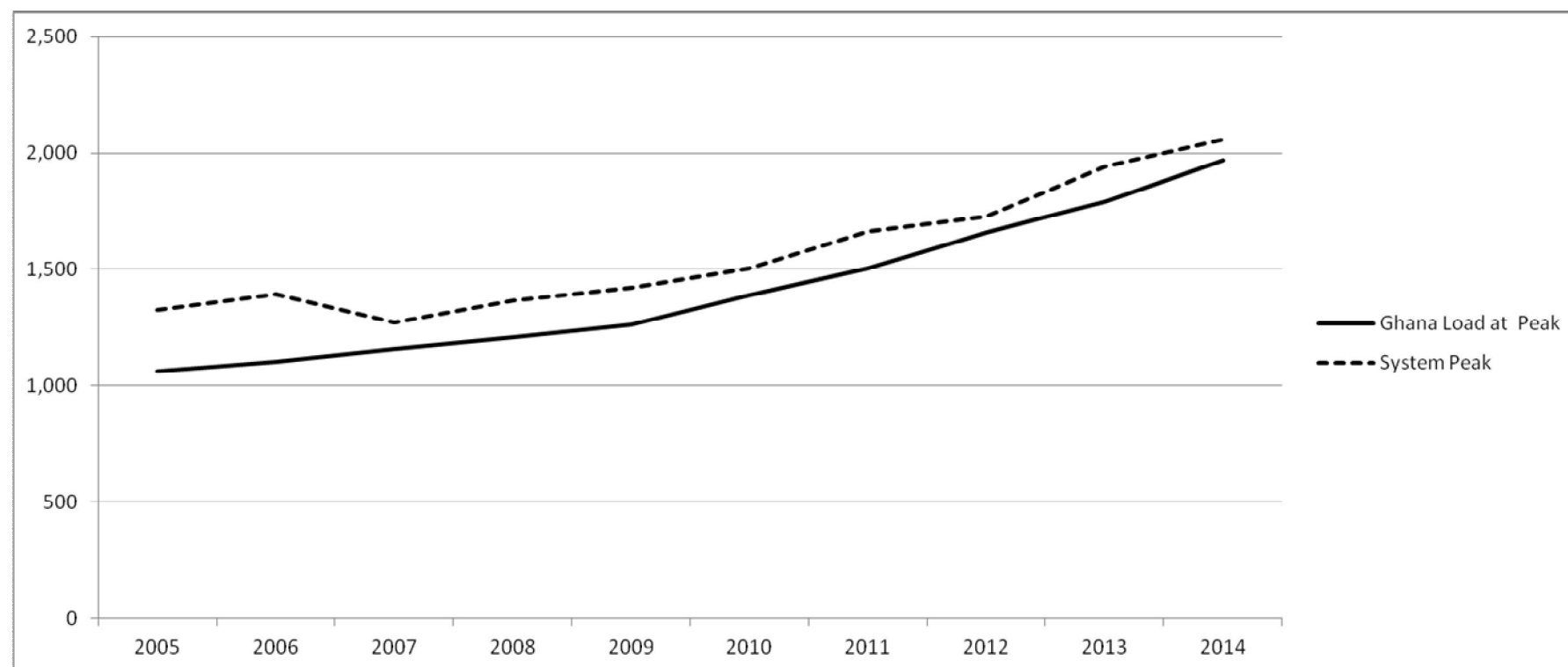


Table 3.5: Akosombo Dam Month End Elevation (feet)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
January	252.3	248.0	241.5	253.1	261.7	266.1	273.8	269.8	266.3	256.1
February	250.4	246.1	239.4	251.4	259.9	264.5	272.4	268.0	264.3	254.1
March	248.7	243.8	237.4	249.2	258.1	262.6	270.8	265.9	262.2	251.8
April	247.0	241.5	236.3	247.5	256.9	260.7	269.1	264.1	260.3	249.5
May	245.3	239.8	235.9	246.0	255.0	259.0	267.4	262.6	258.7	247.6
June	244.4	238.5	235.5	245.0	254.0	258.0	266.4	261.4	257.0	245.5
July	244.7	237.0	235.2	246.4	254.1	257.7	266.7	263.2	256.2	244.5
August	246.2	236.7	239.5	252.9	258.8	259.7	267.6	264.0	255.1	243.3
September	250.0	240.9	252.5	261.4	266.3	269.8	271.7	267.6	258.1	247.7
October	253.4	246.0	256.4	266.4	270.4	277.0	274.7	270.8	260.8	250.5
November	252.1	245.7	255.8	265.1	270.3	276.7	273.7	270.0	259.4	249.1
December	250.1	243.8	254.7	263.6	268.2	275.4	271.9	268.4	257.7	247.1

Source: GRIDCo and VRA

Figure 3.4: Trend in Akosombo Dam Monthly Elevation

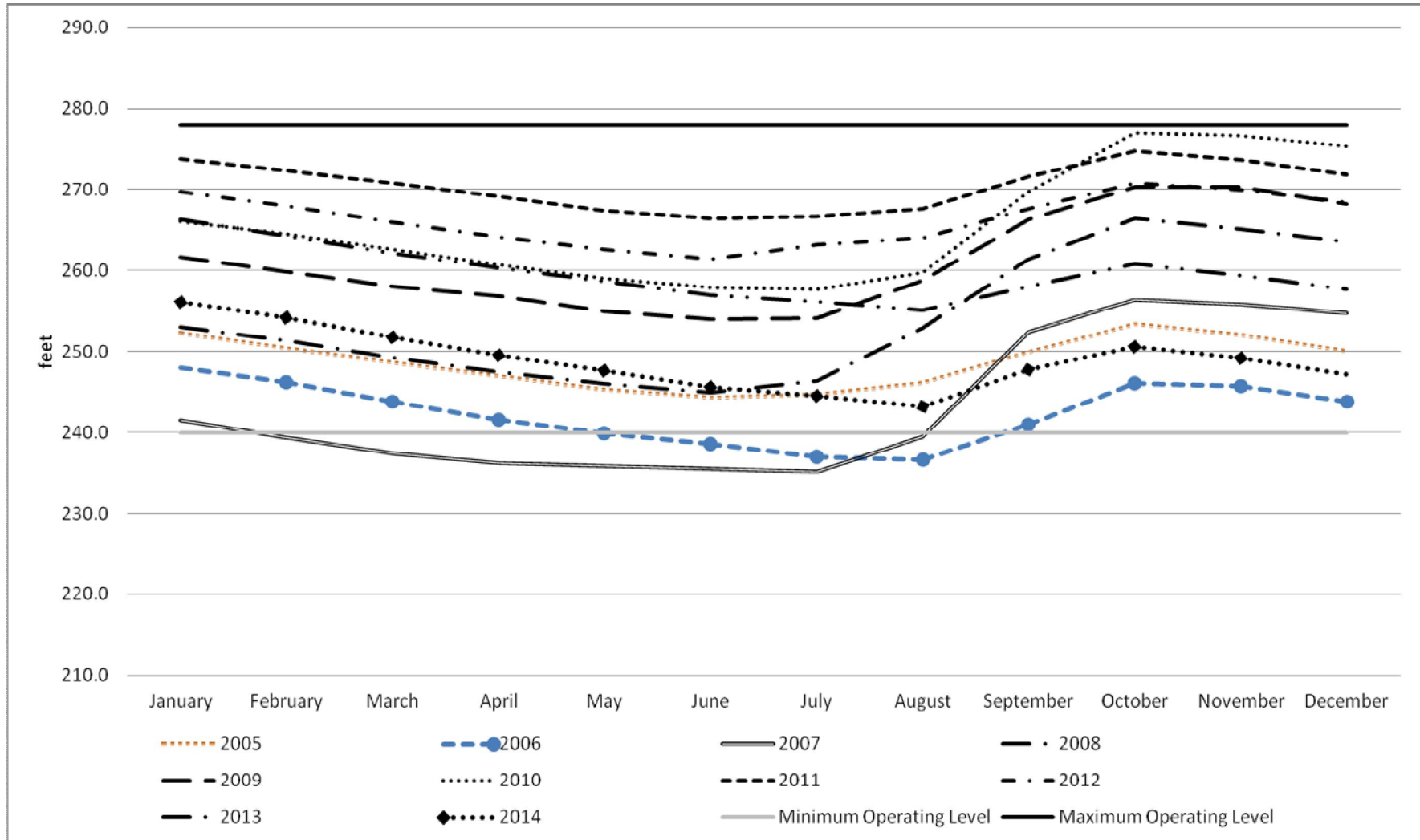


Table 3.6: Transmission Losses

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Transmission Losses	249.0	318.0	256.0	303.0	343.0	380.0	531.0	522.0	569.7	565.1
Losses as a % of net Generation	3.3	3.5	3.5	3.5	3.8	3.7	4.7	4.3	4.8	4.3

Source: GRIDCo and VRA

Figure 3.5: Trend in Transmission Losses

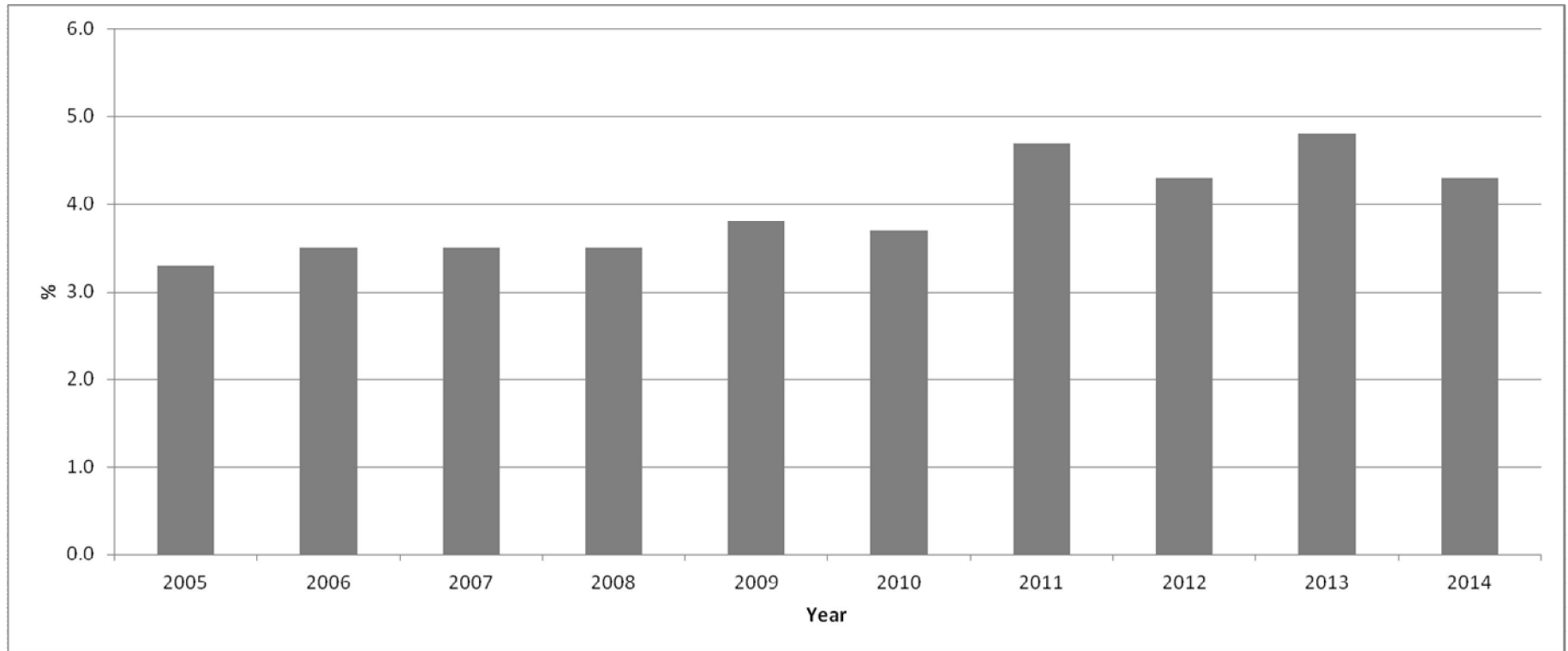


Table 3.7: Electricity Purchases and Sales by ECG

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Purchases (GWh)	5,045	5,253	5,146	5,799	6,052	6,771	7,259	7,944	8,479	8,370
Total Sales (GWh)	3,761	3,978	3,906	4,335	4,442	4,952	5,339	6,041	6,476	6,246
Distribution Losses (GWh) ¹	1,285	1,275	1,240	1,464	1,610	1,819	1,920	1,903	2,003	2,124
Percentage Losses	25.5	24.3	24.1	25.2	26.6	26.9	26.4	24.0	23.6	25.4

¹Technical and commercial losses

Source: GRIDCo, VRA and ECG

Table 3.8: Electricity Purchases and Sales by NEDCo

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Purchases (GWh)	501	507	494	529	566	635	719	822	937	998
Total Sales (GWh)	365	356	365	392	404	473	581	658	737	758
Distribution Losses (GWh) ¹	136	151	129	137	162	162	138	164	200	239
Percentage Losses	27.1	29.8	26.1	25.9	28.6	25.5	19.2	20.0	21.3	24.0

¹Technical and commercial losses

Source: GRIDCO, VRA and NEDCo

Table 3.9: Electricity Consumption by Customer Class (GWh)

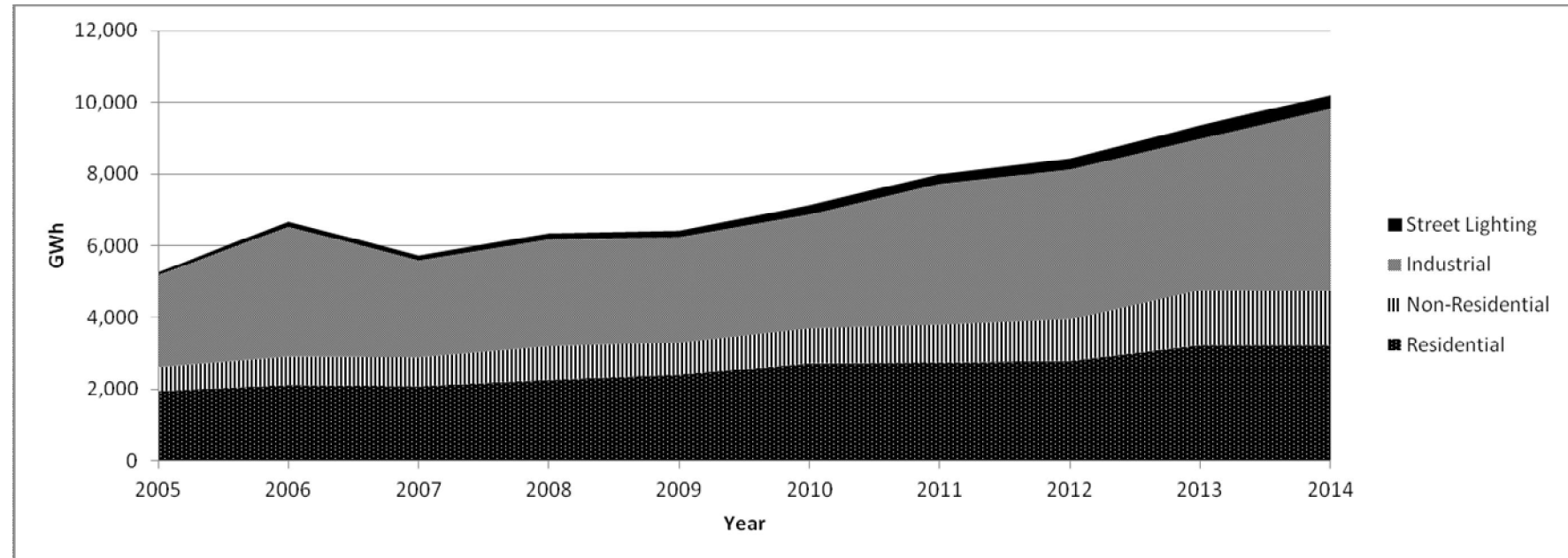
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Residential	1,956	2,130	2,095	2,269	2,418	2,738	2,761	2,803	3,228	3,223
Non-Residential	676	790	802	927	884	966	1,041	1,153	1,525	1,522
Industrial ¹	2,542	3,593	2,687	2,963	2,921	3,156	3,900	4,153	4,224	5,055
Street Lighting	85	144	137	171	184	264	274	315	377	382
Total	5,259	6,657	5,721	6,330	6,407	7,124	7,976	8,424	9,355	10,182

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 3.6: Electricity Consumption by Customer Class



SECTION FOUR: PETROLEUM

Table 4.1: Crude Oil Production (bbls)

Year	2,005	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014
From Saltpond Field	82,447	160,457	189,378	213,730	173,444	97,642	75,731	105,464	98,289	97,301
From Jubilee Field	-	-	-	-	-	1,267,700	23,757,695	28,831,136	36,760,348	37,201,691
Total	82,447	160,457	189,378	213,730	173,444	1,365,342	23,833,426	28,936,600	36,858,637	37,298,992

- Means Not available

Source: Ghana National Petroleum Corporation & Petroleum Commission

Table 4.2: Crude Oil Export

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Quantity (bbls)	82,447	160,457	189,378	213,730	173,444	97,642	24,731,475	26,430,934	36,048,290	37,702,873
Value (million US\$)	N.A	N.A	N.A	N.A	N.A	N.A	2,779	2,976	3,885	3,585

Source: Bank of Ghana

Table 4.3: Crude Oil Import (kilotonnes)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Import	1,967.5	1,712.8	2,053.7	1,975.8	982.8	1,661.6	1,531.6	1,209.5	1,302.3	693.2
For Refinery	1,645.5	962.2	1,242.5	1,396.7	441.4	961.1	1,274.2	505.8	374.4	70.1
For Electricity Generation	322.0	750.6	811.2	579.1	541.4	700.5	257.4	703.7	927.8	623.1

Source: VRA, TOR & NPA