ENERGY COMMISSION OF GHANA


# NATIONAL ENERGY STATISTICS 2007 - 2016

***(Revised)***

**April, 2017**

**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 2017 National Energy Statistics provides a time series data on Ghana's energy supply and use situation largely from 2007 to 2016. Data before 2007 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 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 2017 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 | 27.66 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 |

*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.*

*Between 4 – 5 mass units of wood are used to produce one mass unit of charcoal in the country*

| Charcoal Source | Average Weight (kg) of Charcoal | | |
|---|---|---|---|
| | Mini Bag | Maxi Bag | Moisture Content |
| 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

| | |
|---|---|
| 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. |
| 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. *Refer to Section 6: End Use Statistics* |
| Final Energy Consumption | Energy utilized by final user. |
| Production | It is the production of primary energy, i.e. crude oil, natural gas, hydro, renewable etc. that is extracted. |
| Total Primary Energy Supply | It is made up of production + imports – export +/- stock changes |
| 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 |
| International Aviation Bunkers | Covers quantities delivered to airplanes that are engaged in international aviation |
| 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 |
| Statistical differences | It include the sum of the unexplained differences for individual fuels as they appear in the energy statistics |
| Electricity Plants | Refer to power generation plants which are designed to produce electricity only |
| 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 ENERGY BALANCE

**Table 1.1: Energy Indicators (2007 – 2016)**

| Energy Indicator | Unit | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015[1] | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Primary Energy Supply | KTOE | 6,404 | 6,273 | 6,036 | 6,946 | 7,609 | 8,362 | 8,564 | 9,147 | 9,550 | 9,660 |
| Total Final Energy Consumed | KTOE | 5,259 | 5,187 | 5,706 | 5,629 | 6,174 | 6,613 | 6,887 | 6,983 | 7,162 | 7,086 |
| Total Electricity Generated | GWh | 6,978 | 8,324 | 8,958 | 10,167 | 11,200 | 12,024 | 12,870 | 12,963 | 11,492 | 13,022 |
| Total Electricity Consumed | GWh | 6,441 | 7,219 | 7,454 | 8,317 | 9,187 | 9,258 | 10,583 | 10,695 | 9,685 | 11,418 |
| Total Petroleum Products Consumed | KTOE | 2,127 | 2,071 | 2,598 | 2,491 | 2,827 | 3,318 | 3,422 | 3,377 | 3,545 | 3,320 |
| Total Biomass Consumed | KTOE | 2,594 | 2,518 | 2,493 | 2,464 | 2,576 | 2,589 | 2,676 | 2,792 | 2,785 | 2,783 |
| Population | million | 22.3 | 22.9 | 23.4 | 24.7 | 25.3 | 25.9 | 26.5 | 27.0 | 27.7 | 28.3 |
| GDP (Constant 2006 prices) | million Ghana cedis | 19,913.4 | 21,592.2 | 22,336.0 | 24,101.0 | 27,486.0 | 30,040.0 | 32,237.0 | 33,522.0 | 34,808.0 | 36,016.0 |
| Energy Intensity of the Economy | TOE/GHS 1,000 of GDP | 0.26 | 0.24 | 0.26 | 0.23 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 | 0.20 |
| Total Energy Consumed/capita | TOE/capita | 0.24 | 0.23 | 0.24 | 0.23 | 0.24 | 0.26 | 0.26 | 0.26 | 0.26 | 0.25 |
| Total Electricity Generated/capita | kWh/capita | 312.9 | 363.5 | 382.8 | 411.6 | 442.7 | 464.2 | 485.7 | 480.1 | 414.9 | 460.2 |
| Total Electricity Consumed/capita | kWh/capita | 288.9 | 315.3 | 318.5 | 336.7 | 363.1 | 357.4 | 399.4 | 396.1 | 349.6 | 403.5 |
| Total Petroleum Products Consumed/capita | TOE/capita | 0.10 | 0.09 | 0.11 | 0.10 | 0.11 | 0.13 | 0.13 | 0.13 | 0.13 | 0.12 |
| Total Biomass Consumed/capita | TOE/capita | 0.12 | 0.11 | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Total Electricity Consumed/GDP | kWh/GHS 1,000 of GDP | 323.5 | 334.4 | 333.7 | 345.1 | 334.2 | 308.2 | 328.3 | 319.0 | 278.2 | 317.0 |
| Total Primary Energy Supply/GDP | TOE/GHS 1,000 of GDP | 0.32 | 0.29 | 0.27 | 0.29 | 0.28 | 0.28 | 0.27 | 0.27 | 0.27 | 0.27 |
| Total Petroleum Products Consumed/GDP | TOE/GHS 1,000 of GDP | 0.11 | 0.10 | 0.12 | 0.10 | 0.10 | 0.11 | 0.11 | 0.10 | 0.10 | 0.09 |
| Total Primary Energy Supply/capita | TOE/capita | 0.29 | 0.27 | 0.26 | 0.28 | 0.30 | 0.32 | 0.32 | 0.34 | 0.34 | 0.34 |
| Grid Emission Factor (wind/solar projects) | tCO2/MWh | 0.41 | 0.41 | 0.41 | 0.35 | 0.32 | 0.35 | 0.51 | 0.32 | 0.28 | 0.39 |
| Grid Emission Factor (all other projects) | tCO2/MWh | 0.58 | 0.56 | 0.57 | 0.51 | 0.44 | 0.48 | 0.73 | 0.36 | 0.31 | 0.43 |

[1]Revised

Source: GDP and Population data from Ghana Statistical Service

NB: Total Electricity Consumed include commercial losses

Grid Emission Factor is the amount of $CO_2$ emitted per unit of electricity generated and supplied into the national grid

**Table 1.2: Energy Balance, 2016 (ktoe)**

| SUPPLY AND CONSUMPTION | Crude Oil | Natural Gas | Petroleum Products | Biomass | Hydro | Solar | Electricity | Total |
|---|---|---|---|---|---|---|---|---|
| Indigenous Production | 4,706.2 | 587.3 | - | 3,602.4 | 478.3 | 2.3 | - | 9,376.5 |
| 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 | - | - | -2.5 | - | - | - | - | -2.5 |
| International Aviation Bunkers | - | - | -122.6 | - | - | - | - | -122.6 |
| Stock Changes | -81.4 | - | - | - | - | - | - | -81.4 |
| Total Energy Supply | 1,741.8 | 688.2 | 3,059.5 | 3,600.5 | 478.3 | 2.3 | 27.9 | 9,598.4 |
| Electricity Plants | -492.7 | -517.6 | -402.6 | - | -478.3 | -2.3 | 1,119.9 | -773.5 |
| Oil Refinery | -784.3 | - | 765.4 | - | - | - | - | -18.9 |
| Other Transformation | - | - | - | - | - | - | - | - |
| Own use | - | - | - | - | - | - | -7.2 | -7.2 |
| Losses | - | - | - | -817.1 | - | - | -158.7 | -975.8 |
| Final Energy Consumption | - | - | 3,320.2 | 2,783.4 | - | - | 982.0 | 7,085.5 |
| Residential Sector | - | - | 175.7 | 2,440.1 | - | - | 503.2 | 3,119.0 |
| Commerce & Services Sector | - | - | 14.0 | 122.0 | - | - | 221.0 | 357.1 |
| Industry | - | - | 384.6 | 221.3 | - | - | 257.0 | 862.9 |
| Agriculture & Fisheries Sector | - | - | 103.2 | - | - | - | 0.3 | 103.5 |
| Transport | - | - | 2,642.3 | - | - | - | 0.5 | 2,642.8 |
| Statistical Difference | 464.9 | 170.5 | 160.9 | - | - | - | - | 796.3 |

NB: Electricity consumption include commercial losses

## SECTION TWO: PRIMARY ENERGY SUPPLY AND FINAL ENERGY CONSUMPTION

**Table 2.1: Primary Energy Supply (ktoe)**

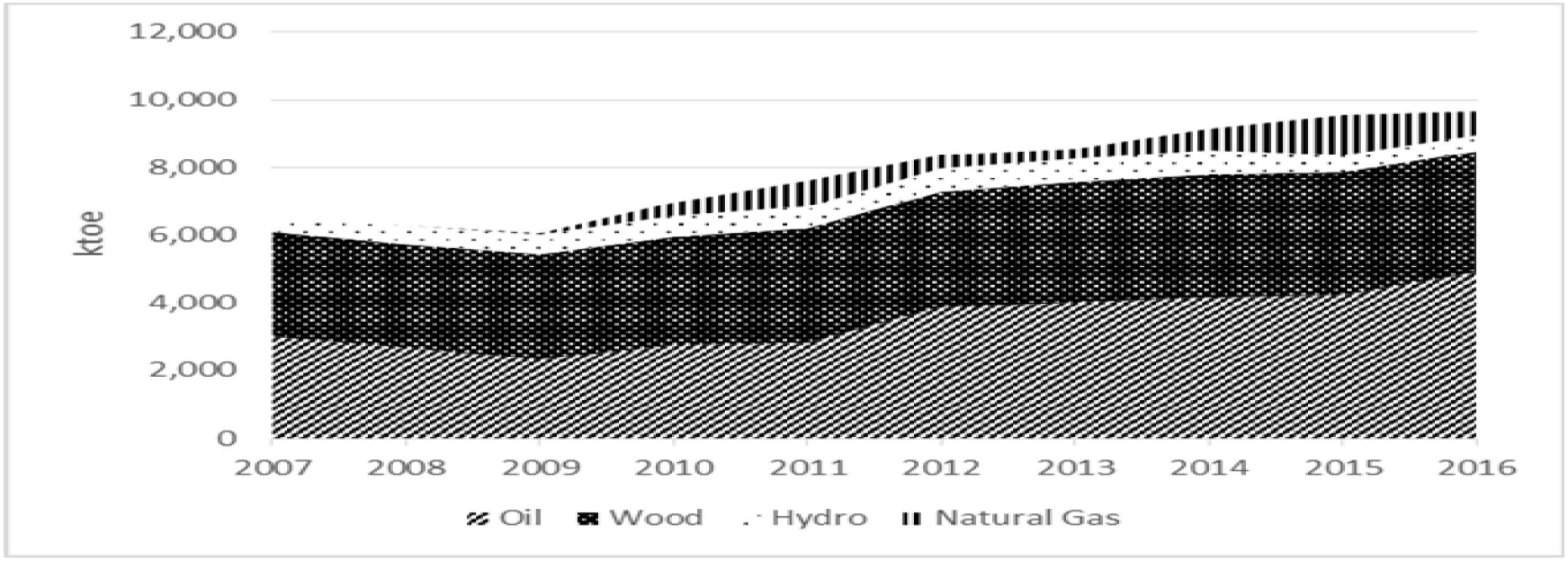
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Oil** | 3,017 | 2,672 | 2,316 | 2,744 | 2,820 | 3,870 | 4,011 | 4,177 | 4,248 | 4,889 |
| **Natural Gas** | N.A | N.A | 5 | 394 | 769 | 390 | 292 | 621 | 1,182 | 688 |
| **Hydro** | 321 | 533 | 591 | 602 | 650 | 694 | 708 | 721 | 503 | 478 |
| **Solar** | N.A | N.A | N.A | N.A | N.A | N.A | 0 | 0 | 0 | 2 |
| **Biomass*** | 3,068 | 3,070 | 3,127 | 3,207 | 3,371 | 3,409 | 3,554 | 3,629 | 3,618 | 3,602 |
| **Total** | **6,406** | **6,275** | **6,039** | **6,947** | **7,610** | **8,363** | **8,565** | **9,148** | **9,551** | **9,660** |

N. A means Not Available.

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

*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)**

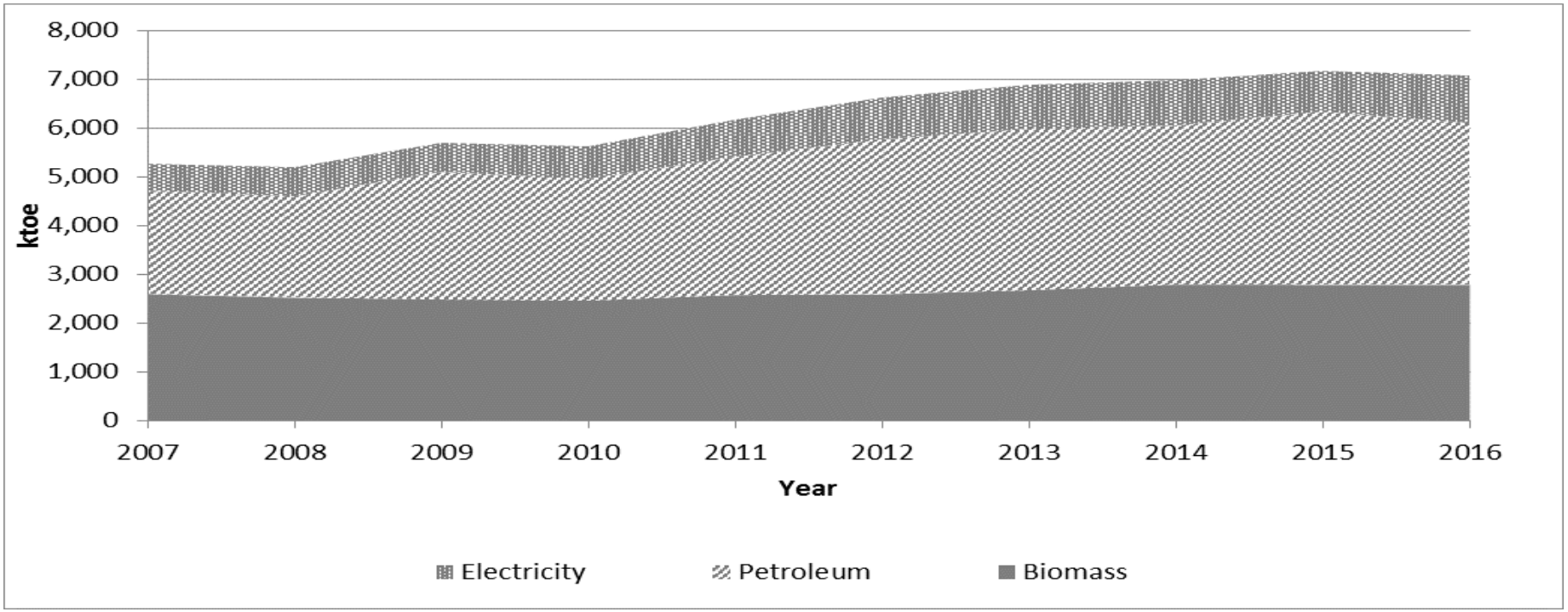
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015[1] | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Electricity** | 539.2 | 597.7 | 615.4 | 674.2 | 772.1 | 851.9 | 908.4 | 919.8 | 832.9 | 982.0 |
| **Petroleum Products** | 2,126.6 | 2,071.3 | 2,597.7 | 2,491.1 | 2,826.6 | 3,172.1 | 3,303.0 | 3,271.7 | 3,544.6 | 3,320.2 |
| **Biomass*** | 2,593.7 | 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 |
| **Total** | **5,259.5** | **5,186.8** | **5,706.3** | **5,629.2** | **6,174.3** | **6,612.8** | **6,887.4** | **6,983.2** | **7,162.2** | **7,085.5** |

[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.

* Refer to Table 5.2

**Figure 2.2 Trend in Final Energy Consumed**



## SECTION THREE: ELECTRICITY

**Table 3.1: Installed Electricity Generation Capacity (End of December, 2016)**

| PLANT | INSTALLED CAPACITY (MW) | DEPENDABLE CAPACITY (MW) |
|---|---|---|
| **Hydro** | | |
| Akosombo | 1,020 | 960 |
| Bui | 400 | 360 |
| Kpong | 160 | 148 |
| ***Sub-Total*** | ***1,580*** | ***1,468*** |
| **Thermal** | | |
| Takoradi Power Company (TAPCO) | 330 | 300 |
| Takoradi International Company (TICO) | 340 | 320 |
| Sunon Asogli Power (Ghana) Limited (SAPP) - IPP | 200 | 180 |
| Sunon Asogli Power (Ghana) Limited (SAPP2) - IPP | 180 | 170 |
| Cenit Energy Ltd (CEL) - IPP | 126 | 100 |
| Tema Thermal 1 Power Plant (TT1PP) | 126 | 110 |
| Tema Thermal 2 Power Plant (TT2PP) | 50 | 45 |
| Mines Reserve Plant (MRP) | 80 | 70 |
| Kpone Thermal Power Plant (KTPP) | 220 | 200 |
| Karpowership | 235 | 220 |
| Ameri Plant | 250 | 240 |
| Trojan* | 25 | 22 |
| Genser* | 30 | 18 |
| ***Sub-Total*** | ***2,192.0*** | ***1,995*** |
| **Renewables** | | |
| Safisana Biogas* | *0.1* | *0.1* |
| VRA Solar* | 2.5 | 2 |
| BXC Solar* | 20 | 16 |
| ***Sub-Total*** | ***22.6*** | ***18.1*** |
| **Total** | **3,794.6** | **3,481.1** |

*Connected at the sub-transmission level

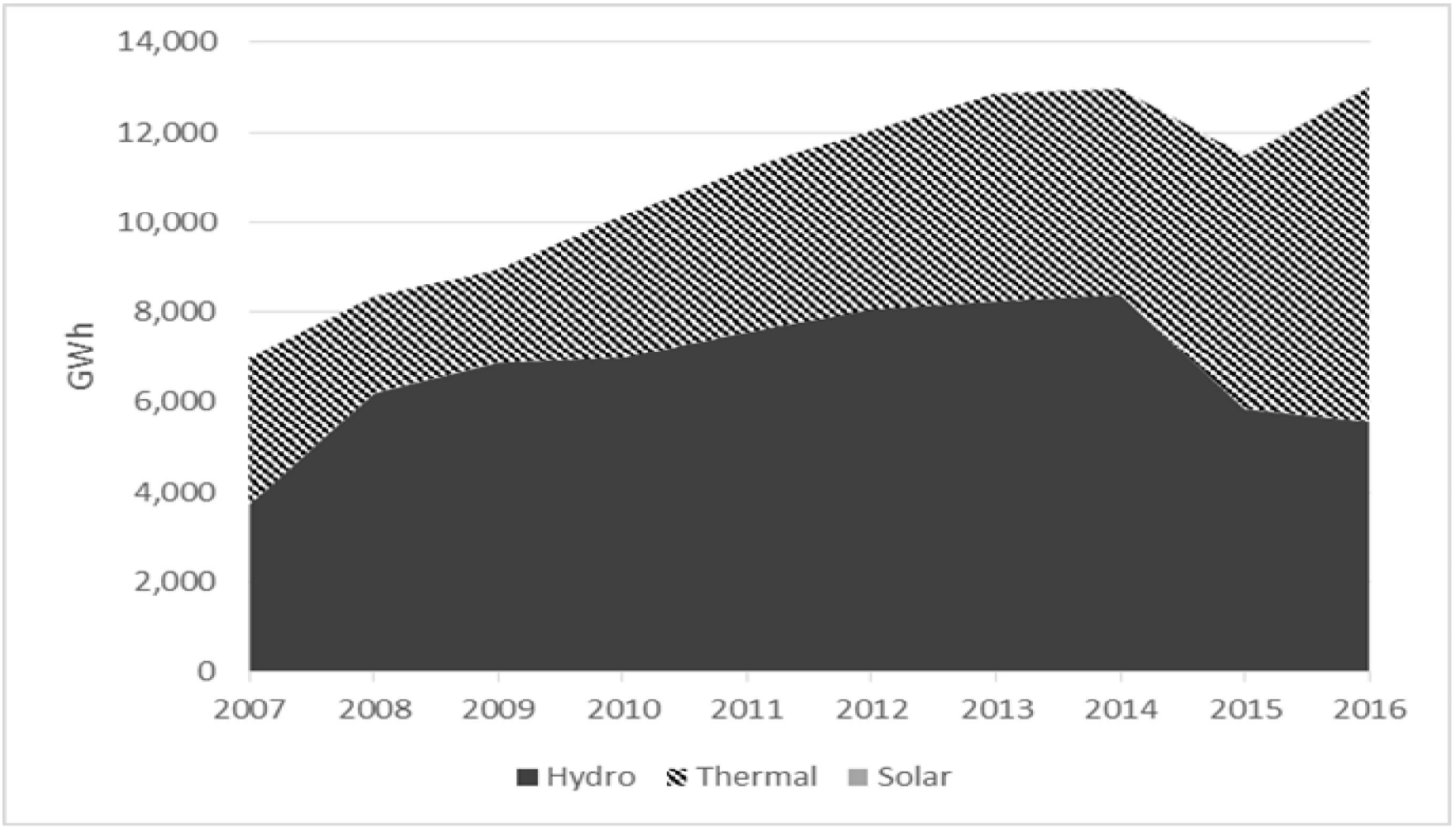
**Table 3.2: Electricity Generation by Plant (GWh) per Installed Capacity (MW)**

| Plant | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Hydro Generation*** | | | | | | | | | | |
| Akosombo | 3,104 | 5,254 | 5,842 | 5,961 | 6,495 | 6,950 | 6,727 | 6,509 | 4,156 | 3,854 |
| Kpong | 623 | 941 | 1,035 | 1,035 | 1,066 | 1,121 | 1,144 | 1,148 | 819 | 763 |
| Bui | - | - | - | - | - | - | 362 | 730 | 870 | 944 |
| *Sub-Total* | *3,727* | *6,195* | *6,877* | *6,996* | *7,561* | *8,071* | *8,233* | *8,387* | *5,845* | *5,561* |
| ***Thermal Generation*** | | | | | | | | | | |
| Takoradi Power Company (TAPCO) | 1,521 | 874 | 453 | 1,234 | 1,137 | 1,061 | 1,783 | 890 | 1,784 | 1,204 |
| Takoradi International Company (TICO) | 1,417 | 1,063 | 1,040 | 1,160 | 657 | 1,168 | 1,032 | 712 | 1,336 | 1,926 |
| Tema Thermal 1 Power Plant (TT1PP) | - | - | 570 | 591 | 559 | 622 | 475 | 697 | 541 | 178 |
| 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 | 170 | 3 |
| Tema Thermal 2 Power Plant (TT2PP) | - | - | - | 28 | 50 | 141 | 94 | 223 | 216 | 25 |
| Sunon Asogli Power (Ghana) Ltd (SAPP) | - | - | - | 138 | 1,224 | 848 | 694 | 1,255 | 1,185 | 377 |
| CENIT Energy Ltd (CEL) | - | - | - | - | - | 94 | 454 | 513 | 317 | 413 |
| Takoradi T3 | - | - | - | - | - | - | 102 | 87 | 31 | - |
| Karpowership[1] | - | - | - | - | - | - | - | - | 64 | 1,822 |
| Ameri Plant | - | - | - | - | - | - | - | - | 0 | 1,233 |
| Trojan* | - | - | - | - | - | - | - | - | - | 54 |
| Kpone Thermal Power Plant (KTPP) | - | - | - | - | - | - | - | - | - | 198 |
| *Sub-Total* | *3,251* | *2,129* | *2,081* | *3,171* | *3,639* | *3,953* | *4,635* | *4,572* | *5,644* | *7,435* |
| ***Renewables*** | | | | | | | | | | |
| Safisana Biogas* | - | - | - | - | - | - | - | - | - | 0.04 |
| VRA Solar* | - | - | - | - | - | - | 3 | 4 | 3 | 3 |
| BXC Solar* | - | - | - | - | - | - | - | - | - | 24 |
| *Sub-Total* | - | - | - | - | - | - | 3 | 4 | 3 | 26 |
| **Total Generation** | **6,978** | **8,324** | **8,958** | **10,167** | **11,200** | **12,024** | **12,870** | **12,963** | **11,492** | **13,022** |
| **Installed Capacity (MW)** | **1,935** | **1,981** | **1,970** | **2,165** | **2,170** | **2,280** | **2,831** | **2,831** | **3,656** | **3,795** |

- means power plant is not available;

*connected at the sub-transmission level; [1]A 10MW steam component has been added, increasing the installed capacity from 225MW to 235MW
Source: GRIDCo and ECG;

**Figure 3.1: Trend in Electricity Generation**




NB: Solar is not showing because it is negligible

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

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Import** | 435 | 275 | 198 | 106 | 81 | 128 | 27 | 51 | 223 | 511 |
| **Export** | 246 | 538 | 752 | 1,036 | 691 | 667 | 530 | 522 | 587 | 187 |
| **Net Import** | 189 | -263 | -554 | -930 | -610 | -539 | -503 | -471 | -364 | 324 |

Source: GRIDCo
NB: 'Negative net import' means net export

**Figure 3.2: Electricity Import, Export and Net Import**

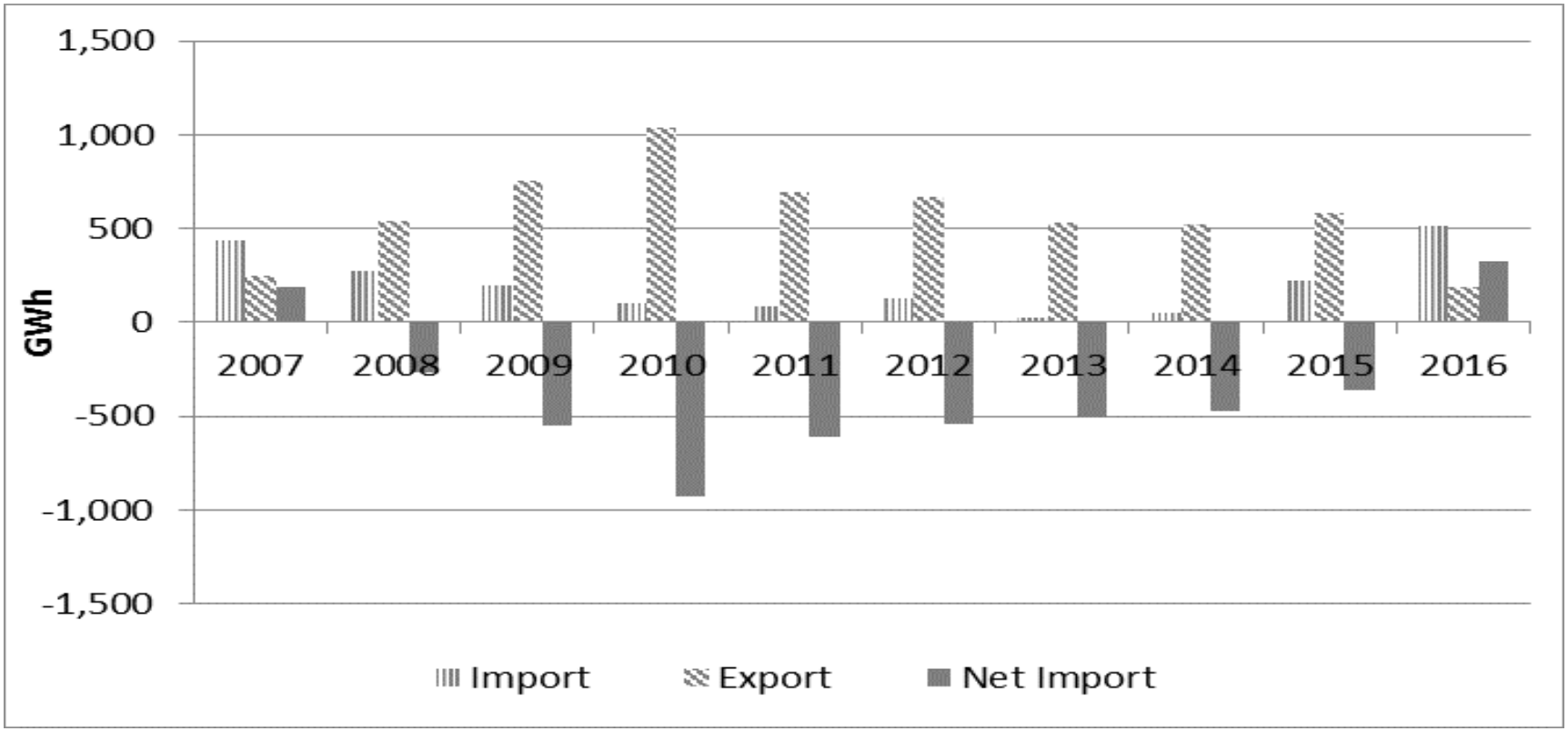


**Table 3.4: Installed Capacity, Dependable Capacity and Peak Load (MW)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Installed Capacity | 1,935 | 1,981 | 1,970 | 2,165 | 2,170 | 2,280 | 2,831 | 2,831 | 3,656 | 3,795 |
| Dependable Capacity | 1735 | 1735 | 1765 | 1940 | 1945 | 2045 | 2487 | 2577 | 3363 | 3521.1 |
| Peak Load | 1,274 | 1,367 | 1,423 | 1,506 | 1,665 | 1,729 | 1,943 | 1,970 | 1,933 | 2,087 |

**Figure 3.3: Trend in Installed Capacity, Dependable Capacity and Peak Load**

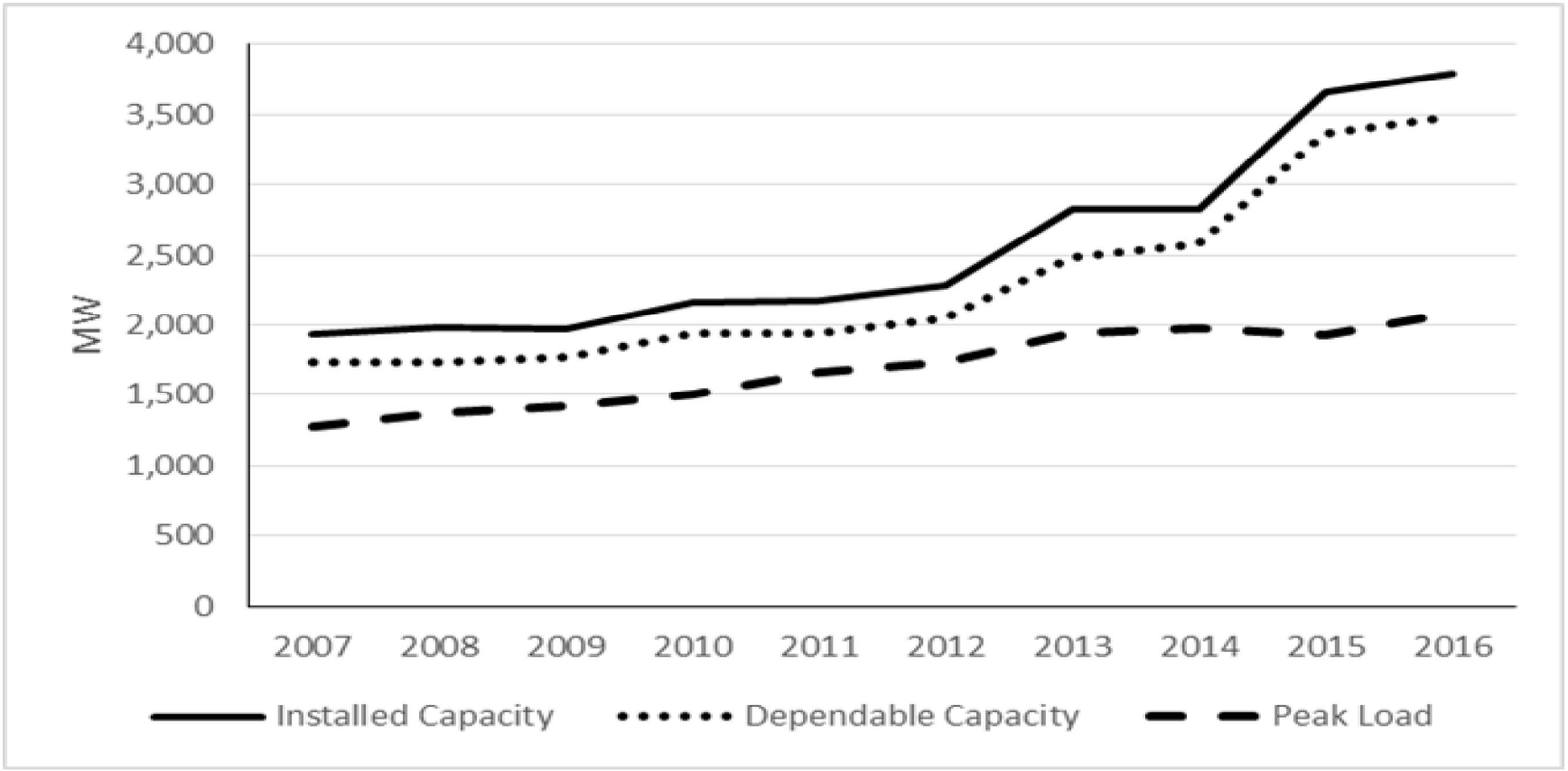


**Table 3.5: Peak Load (MW)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ghana Load at Peak** | 1,158 | 1,208 | 1,263 | 1,391 | 1,520 | 1,658 | 1,791 | 1,853 | 1,757 | 1,997 |
| **System Peak** | 1,274 | 1,367 | 1,423 | 1,506 | 1,665 | 1,729 | 1,943 | 1,970 | 1,933 | 2,087 |

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 3.4: Trend in Peak Load**

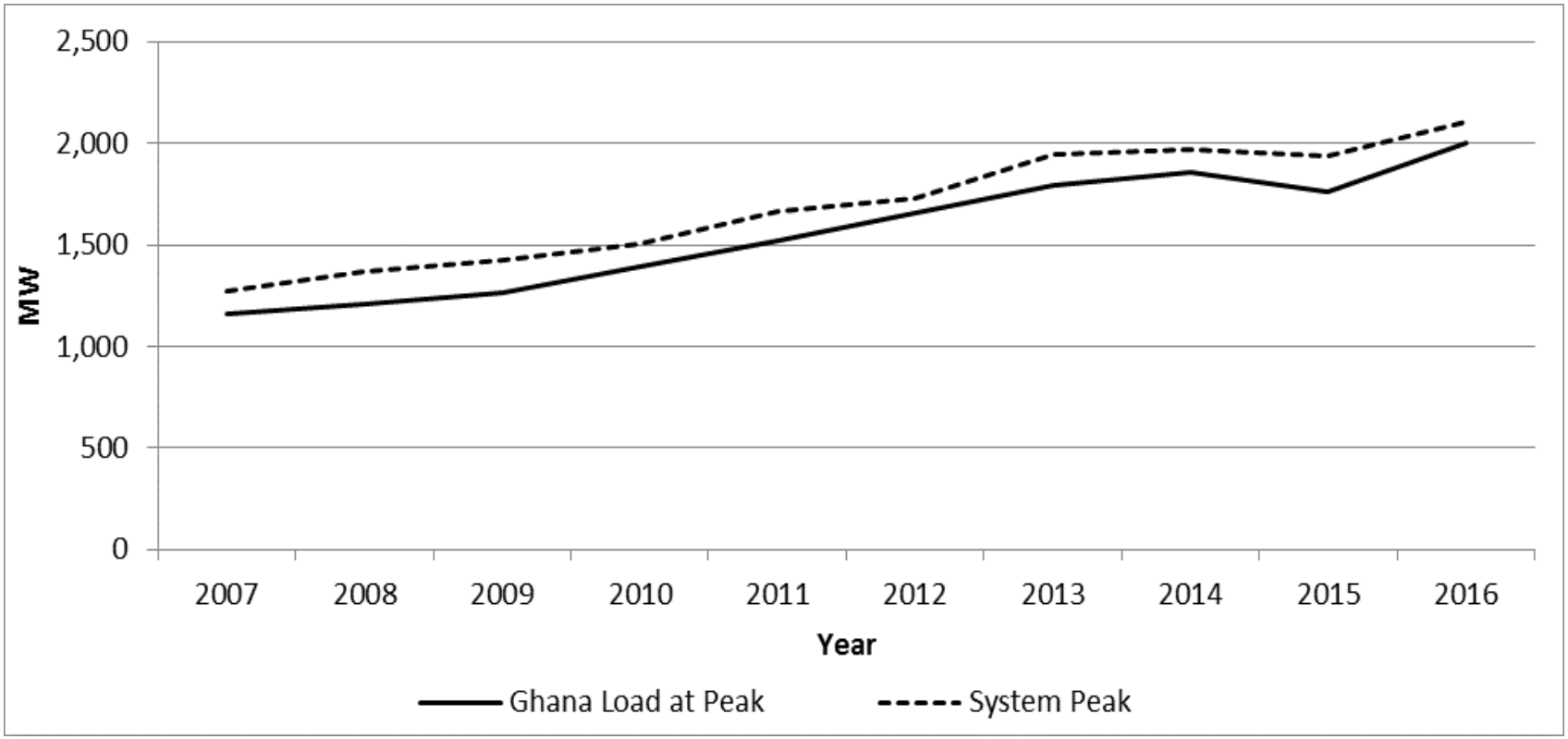


**Table 3.6: Transmission Losses**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Transmission Losses (GWh) | 256 | 303 | 343 | 380 | 531 | 522 | 570 | 565 | 402 | 607 |
| Transmission Losses (%) | 3.5 | 3.5 | 3.8 | 3.7 | 4.7 | 4.3 | 4.8 | 4.3 | 3.8 | 4.4 |

Source: GRIDCo

**Figure 3.5: Trend in Transmission Losses**

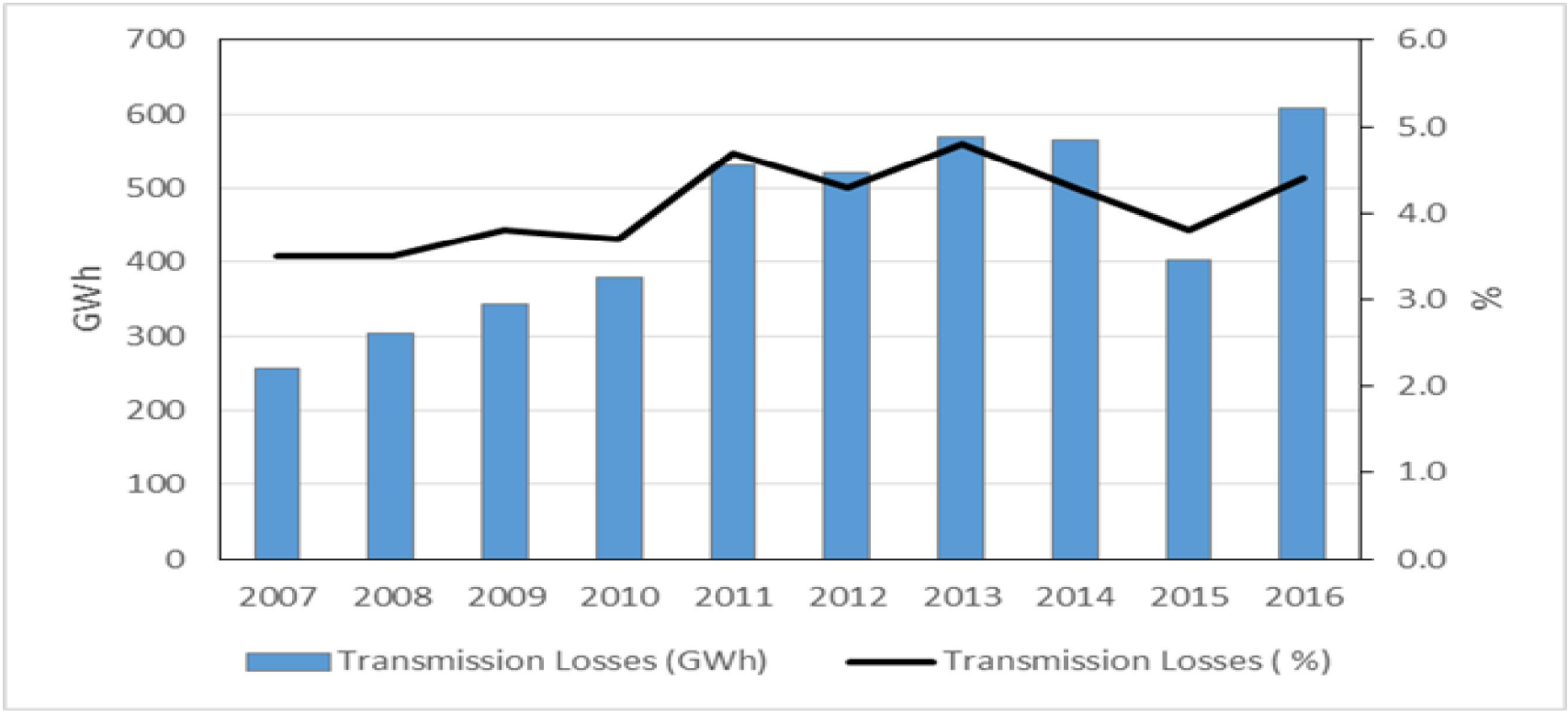


**Table 3.7: Akosombo Dam Month End Elevation (feet)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **January** | 241.5 | 253.1 | 261.7 | 266.1 | 273.8 | 269.8 | 266.25 | 256.1 | 245.4 | 241.4 |
| **February** | 239.4 | 251.4 | 259.9 | 264.5 | 272.4 | 268 | 264.25 | 254.1 | 244.0 | 240.2 |
| **March** | 237.4 | 249.2 | 258.1 | 262.6 | 270.8 | 265.9 | 262.16 | 251.8 | 242.3 | 238.9 |
| **April** | 236.3 | 247.5 | 256.9 | 260.7 | 269.1 | 264.1 | 260.3 | 249.5 | 240.8 | 237.6 |
| **May** | 235.9 | 246.0 | 255.0 | 259.0 | 267.4 | 262.6 | 258.72 | 247.6 | 239.2 | 236.5 |
| **June** | 235.5 | 245.0 | 254.0 | 258.0 | 266.4 | 261.4 | 257.04 | 245.5 | 238.4 | 235.5 |
| **July** | 235.2 | 246.4 | 254.1 | 257.7 | 266.7 | 263.2 | 256.15 | 244.5 | 237.5 | 235.9 |
| **August** | 239.5 | 252.9 | 258.8 | 259.7 | 267.6 | 264 | 255.08 | 243.3 | 238.1 | 240.2 |
| **September** | 252.5 | 261.4 | 266.3 | 269.8 | 271.7 | 267.6 | 258.1 | 247.7 | 241.8 | 247.5 |
| **October** | 256.4 | 266.4 | 270.4 | 277 | 274.7 | 270.8 | 260.75 | 250.5 | 244.8 | 253.0 |
| **November** | 255.8 | 265.1 | 270.3 | 276.7 | 273.7 | 270 | 259.36 | 249.1 | 244.0 | 252.0 |
| **December** | 254.7 | 263.6 | 268.2 | 275.4 | 271.9 | 268.4 | 257.7 | 247.1 | 242.7 | 250.5 |

Source: GRIDCo and VRA

**Table 3.8: Electricity Purchases and Sales by ECG (GWh)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Purchases** | 5,146 | 5,799 | 6,052 | 6,771 | 7,259 | 7,944 | 8,479 | 8,370 | 7,544 | 9,316 |
| **Sales** | 3,909 | 4,316 | 4,482 | 4,972 | 5,285 | 6,079 | 6,496 | 6,262 | 5,831 | 7,115 |
| **Losses** | 1,237 | 1,483 | 1,570 | 1,799 | 1,974 | 1,865 | 1,983 | 2,108 | 1,713 | 2,201 |
| ***% Losses*** | *24.0* | *25.6* | *25.9* | *26.6* | *27.2* | *23.5* | *23.4* | *25.2* | *22.7* | *23.6* |

[1]Technical and commercial losses

Source: GRIDCo, VRA and ECG

**Table 3.9: Electricity Purchases and Sales by NEDCo (GWh)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Purchases** | 494 | 529 | 566 | 635 | 719 | 822 | 937 | 998 | 1013 | 1,140 |
| **Sales** | 366 | 392 | 413 | 511 | 581 | 658 | 737 | 758 | 719 | 763 |
| **Losses** | 128 | 137 | 153 | 124 | 138 | 164 | 200 | 240 | 294 | 377 |
| ***% Losses*** | *25.9* | *25.9* | *27.0* | *19.5* | *19.2* | *20.0* | *21.3* | *24.0* | *29.0* | *33.1* |

[1]Technical and commercial losses

Source: GRIDCO, VRA and NEDCo

**Table 3.10: Electricity Consumption by Customer Class (GWh)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015[1] | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Residential** | 1,996 | 2,168 | 2,275 | 2,483 | 2,527 | 2,819 | 3,060 | 2,772 | 2,436 | 3,932 |
| **Non-residential** | 802 | 876 | 924 | 966 | 1,199 | 1,549 | 1,532 | 1,529 | 1,530 | 1,066 |
| **Special Load Tariff[2]** | 2,687 | 2,963 | 2,951 | 3,174 | 3,901 | 4,153 | 4,435 | 4,680 | 4,179 | 4,528 |
| **Street lighting** | 101 | 132 | 144 | 254 | 296 | 369 | 445 | 540 | 536 | 603 |
| **Total** | **5,586** | **6,139** | **6,294** | **6,877** | **7,922** | **8,890** | **9,472** | **9,521** | **8,681** | **10,129** |

[1]Revised
[2]Special 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**

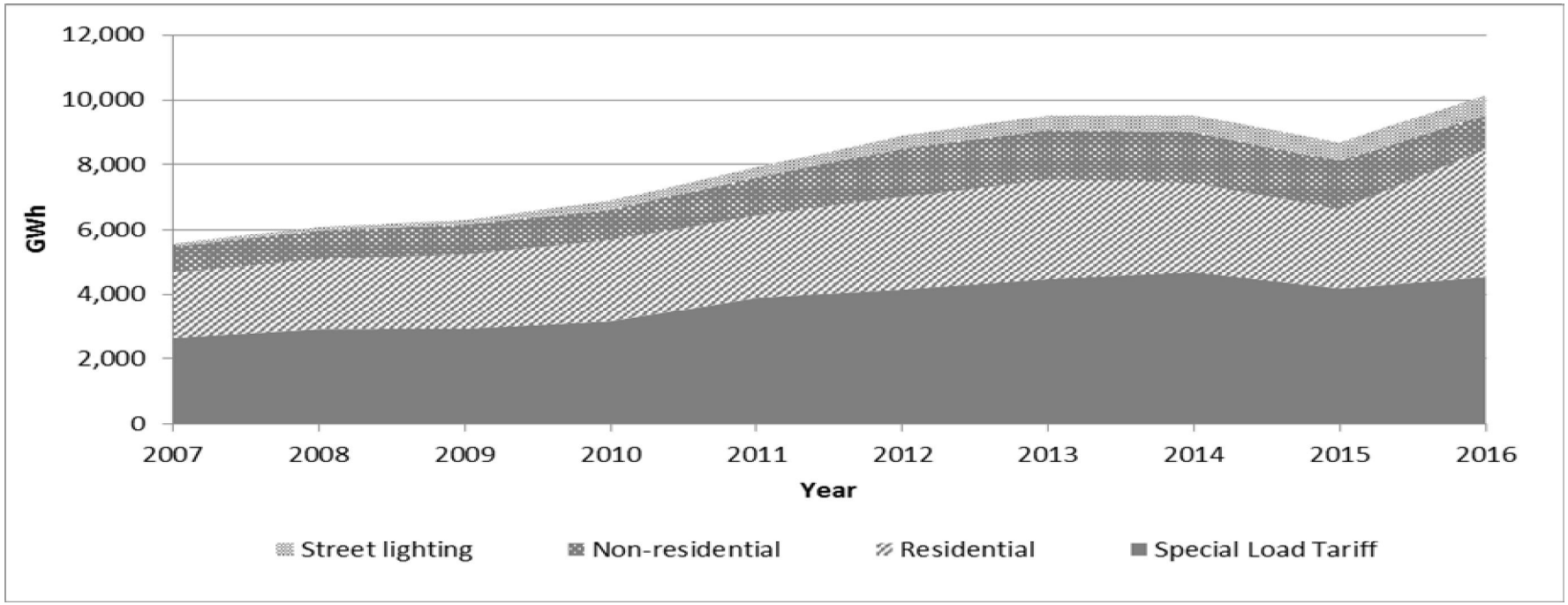


**Table 3.11: Electricity Distribution Reliability Indices**

| RELIABILITY INDEX | OPERATIONAL AREA | REGULATORY BENCHMARK (Per L.I 1935) | AVERAGE VALUES | | | |
|---|---|---|---|---|---|---|
| | | | 2015 | | 2016 | |
| | | | ECG | NEDCo | ECG | NEDCo |
| **System Average Interruption Frequency Index (SAIFI)**<br>• $\text{SAIFI (Interruptions/Customer)} = \frac{\text{Sum of all Customer Interruptions}}{\text{Total Number of Customers Served}}$<br>*This is a measure of the number of times that a customer is interrupted during an operational year.* | | Maximum number of outages permitted per year | | | | |
| | Metro | 6 | 18 | N/A | 27 | N/A |
| | Urban | 6 | 19 | N/A | 39 | 42 |
| | Rural | 6 | 27 | N/A | 47 | N/A |
| | | | | | | |
| **System Average Interruption Duration Index (SAIDI)**<br>• $\text{SAIDI(Hours/Customer)} = \frac{\text{Sum of all Customer Interruption Durations}}{\text{Total Number of Customers Served}}$<br>*This is a measures of the average duration of interruptions recorded for the distribution system during an operational year.* | | Maximum average duration of outage permitted per year | | | | |
| | Metro | 48 hours | 40 | N/A | 60 | N/A |
| | Urban | 72 hours | 34 | N/A | 67 | 41 |
| | Rural | 144 hours | 51 | N/A | 72 | N/A |
| | | | | | | |
| **Cumulative Average Interruption Duration Index (CAIDI)**<br>• $\text{CAIDI(Hours)} = \frac{\text{SAIDI}}{\text{SAIFI}} = \frac{\text{Sum of all Customer Interruption Durations}}{\text{Total Number of Customer Interruptions}}$<br>*This is a measure of the average duration of interruptions for only customers interrupted during an operational year.* | | Average duration of outage permitted per year for customers interrupted only | | | | |
| | Metro | 8 Hours | 2 | N/A | 2 | N/A |
| | Urban | 12 Hours | 2 | N/A | 1 | 1 |
| | Rural | 24 Hours | 2 | N/A | 2 | N/A |

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)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015[1] | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Saltpond Field** | 189,378 | 213,730 | 173,444 | 97,642 | 75,731 | 105,464 | 98,289 | 97,301 | 46,630 | FC |
| **Jubilee Field** | NE | NE | NE | 1,267,700 | 23,757,695 | 28,831,136 | 36,760,348 | 37,201,691 | 37,411,661 | 26,981,640 |
| **TEN Field** | NE | NE | NE | NE | NE | NE | NE | NE | NE | 5,316,140 |
| **Total** | **189,378** | **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** |

[1]Revised
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**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Quantity (bbl)** | 189,378 | 213,730 | 173,444 | 97,642 | 24,731,475 | 26,430,934 | 36,048,290 | 37,702,873 | 36,459,906 | 26,058,002 |
| **Quantity (kilotonnes)** | 27.1 | 30.5 | 24.8 | 13.9 | 3,533.1 | 3,775.8 | 5,149.8 | 5,386.1 | 5,208.6 | 3,722.6 |
| **Value (million US$)** | N.A | N.A | N.A | N.A | 2,779 | 2,976 | 3,885 | 3,585 | 1,931 | 1,345 |

NA means data not available
Source: Bank of Ghana

**Table 4.3: Crude Oil Import (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Import** | 2,053.7 | 1,975.8 | 982.8 | 1,661.6 | 1,531.6 | 1,209.5 | 1,302.3 | 693.2 | 310.5 | 1,445.6 |
| ***For refinery*** | *1,242.5* | *1,396.7* | *441.4* | *961.1* | *1,274.2* | *505.8* | *374.4* | *70.1* | *61.8* | *988.6* |
| ***For electricity generation*** | *811.2* | *579.1* | *541.4* | *700.5* | *257.4* | *703.7* | *927.8* | *623.1* | *248.7* | *456.9* |

Source: VRA, TOR & NPA

**Figure 4.1: Imported Crude Oil Use**

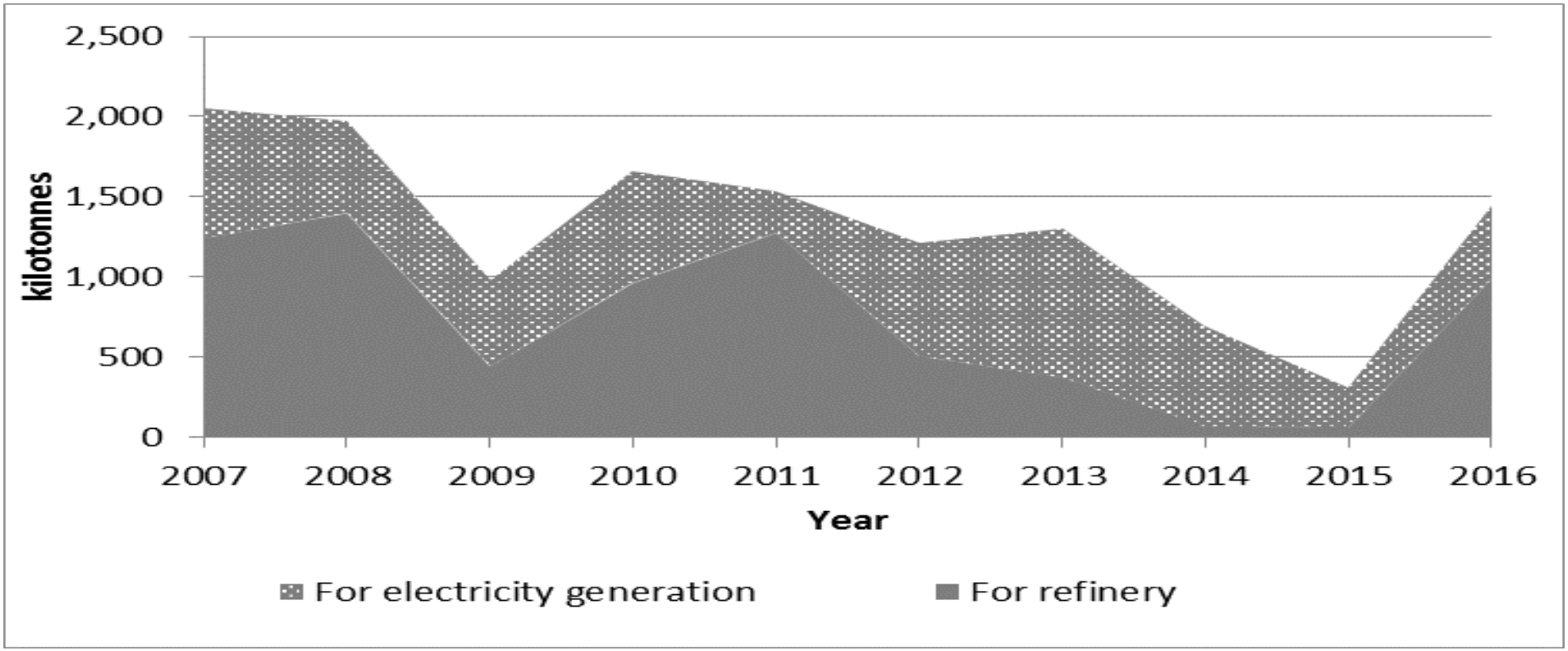



**Table 4.4: Natural Gas Supply**

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

NB: Import is Natural Gas delivered to the Volta River Authority (VRA) through the West Africa Gas Pipeline whilst production is gas delivered to VRA by Ghana National Gas Company (GNGC)
Source: WAGPCo, GNGC & VRA

**Figure 4.2: Trend in Natural Gas Supply**

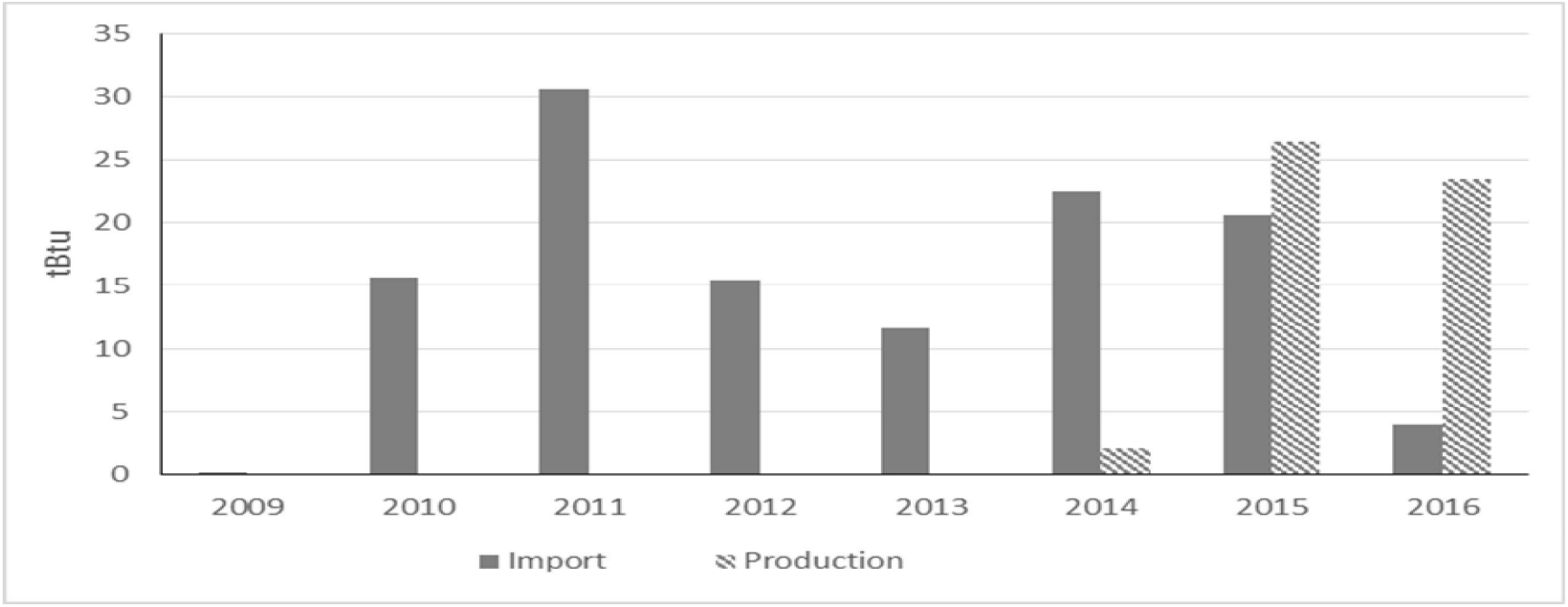



**Table 4.5: Petroleum Products Production (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **LPG** | 67.3 | 54.6 | 14.0 | 31.6 | 44.6 | 26.8 | 25.6 | 3.3 | 2.0 | 114.2 |
| **Gasolines** | 493.0 | 391.2 | 135.0 | 337.7 | 344.3 | 157.7 | 167.3 | 40.4 | 31.8 | 244.0 |
| **Kerosene** | 122.0 | 168.6 | 48.7 | 71.0 | 52.6 | 21.1 | 14.6 | 4.5 | 0.2 | 24.5 |
| **ATK** | 65.8 | 21.3 | 1.3 | 116.7 | 116.1 | 47.6 | 59.8 | 9.4 | 18.2 | 37.6 |
| **Gas Oil** | 398.2 | 360.5 | 102.8 | 292.6 | 309.8 | 121.5 | 113.3 | 27.8 | 28.0 | 254.7 |
| **Fuel Oils** | 48.7 | 225.4 | 25.3 | 96.8 | 90.6 | 79.2 | 43.5 | 43.7 | 8.9 | 64.0 |
| **Total** | **1,194.9** | **1,221.5** | **327.1** | **946.4** | **958.0** | **454.0** | **424.2** | **129.2** | **89.1** | **739.0** |

Source: Tema Oil Refinery

**Figure 4.3: Trend in Petroleum Products Production**

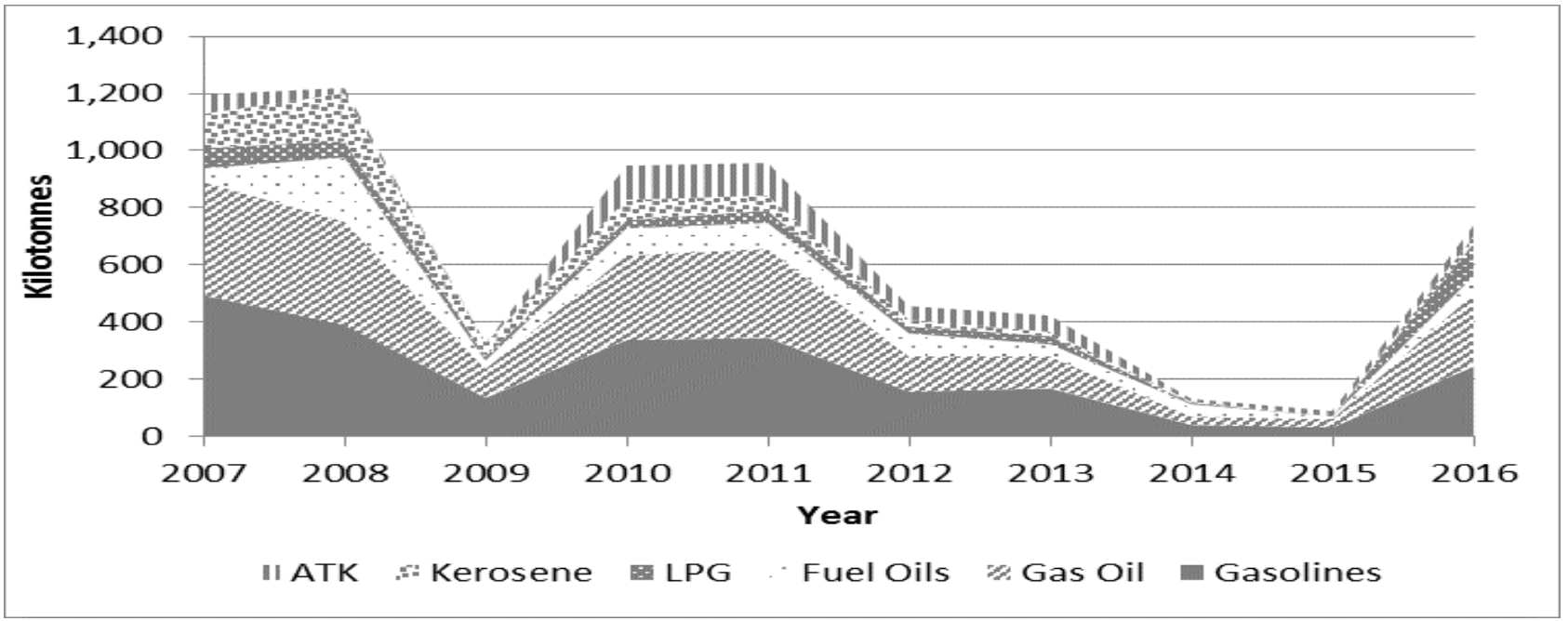



**Table 4.6: Petroleum Products Import (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **LPG** | 47.2 | 67.8 | 150.6 | 148.0 | 177.8 | 241.6 | 203.9 | 236.4 | 197.7 | 177.9 |
| **Gasolines** | 274.9 | 254.5 | 563.4 | 570.1 | 712.8 | 811.5 | 1,017.4 | 1,254.3 | 1,182.1 | 1,235.7 |
| **Kerosene** | 66.7 | 136.4 | 77.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Gasoil** | 806.9 | 579.0 | 969.5 | 871.7 | 1,200.6 | 1,309.4 | 1,638.7 | 1,742.1 | 2,161.0 | 1,719.8 |
| **Fuel Oil** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 44.3 | 48.6 | 0.0 | 20.6 |
| **DPK** | 0.0 | 0.0 | 0.0 | 0.0 | 17.5 | 115.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **ATK** | 42.6 | 156.2 | 83.5 | 0.0 | 0.0 | 95.7 | 41.4 | 112.4 | 109.1 | 112.7 |
| **Total** | **1,238.3** | **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** |

Source: National Petroleum Authority

**Figure 4.4: Trend in Petroleum Products Import**

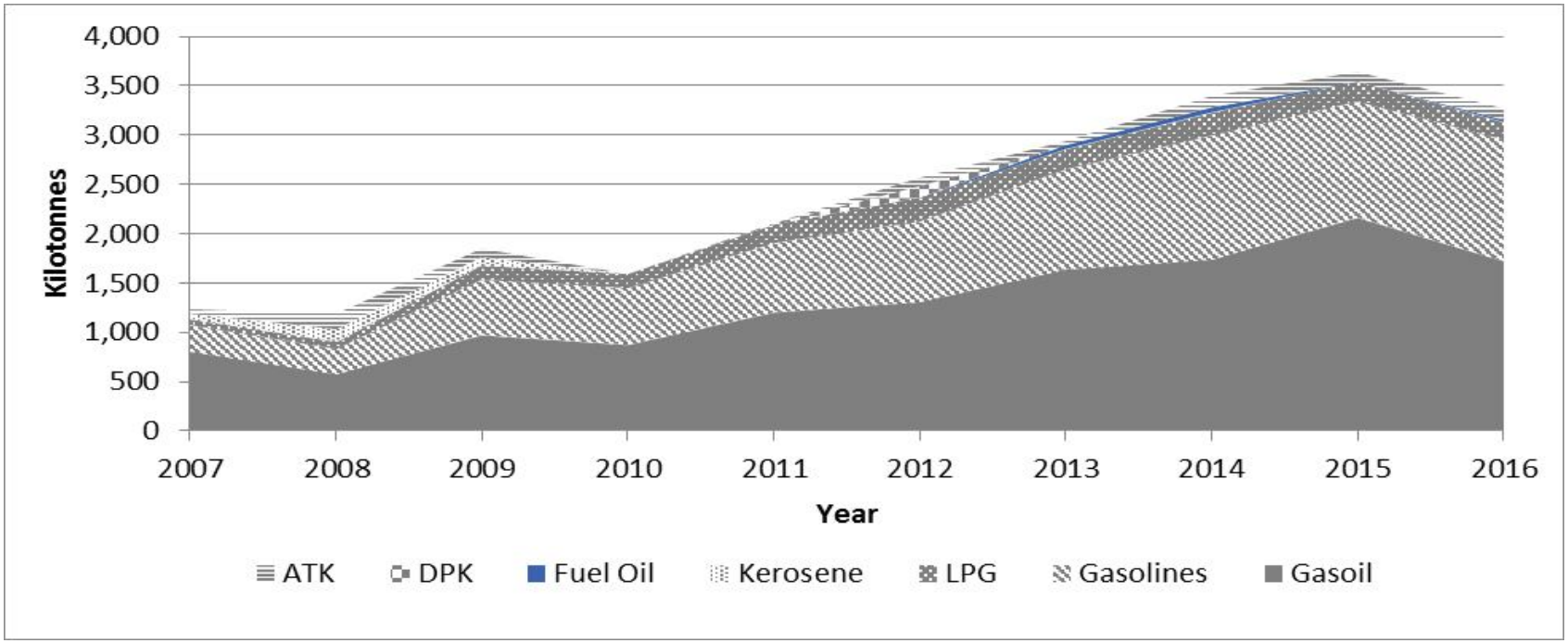



**Table 4.7: Petroleum Products Export (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **LPG** | 9.6 | 5.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 25.1 |
| **Gas Oil** | 52.7 | 88.4 | 381.9 | 290.9 | 356.5 | 80.8 | 51.8 | 10.8 | 10.3 | 170.1 |
| **Residual Fuel Oil** | 26.2 | 148.4 | 30.2 | 40.6 | 43.5 | 44.5 | 3.7 | 0.0 | 0.0 | 69.8 |
| **Heavy Gasoline** | 133.7 | 73.0 | 20.5 | 93.6 | 141.1 | 54.3 | 36.0 | 10.2 | 9.9 | 112.8 |
| **ATK** | 2.5 | 0.3 | 0.0 | 103.0 | 128.5 | 131.0 | 122.3 | 105.6 | 101.9 | 115.0 |
| **Premium Gasoline** | 0.0 | 5.1 | 20.6 | 9.9 | 13.4 | 0.0 | 0.0 | 0.0 | 0.0 | 158.8 |
| **Total** | **224.7** | **320.2** | **454.3** | **538.0** | **683.1** | **310.6** | **213.8** | **126.6** | **122.1** | **651.6** |

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

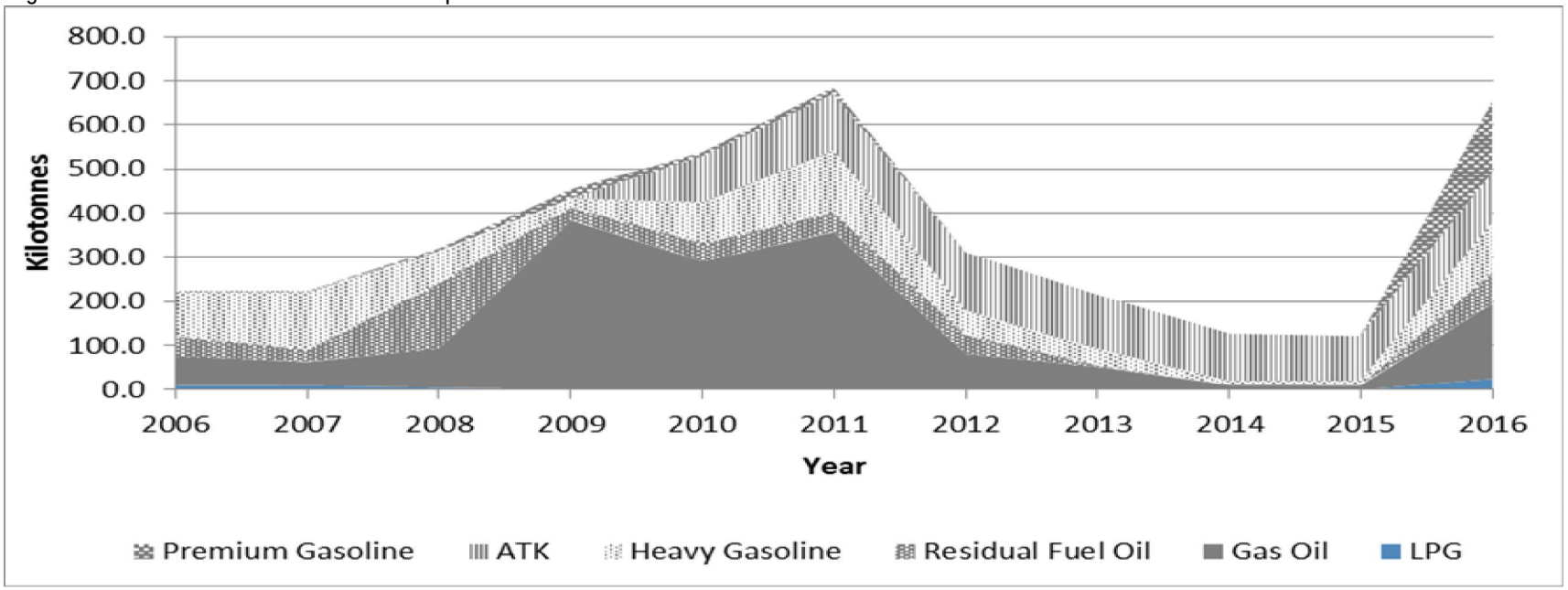



**Table 4.8: Petroleum Products Supplied to the Economy (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **LPG** | 93.3 | 117.6 | 220.6 | 178.4 | 214.4 | 268.5 | 251.8 | 241.5 | 279.0 | 281.5 |
| **Gasoline** | 544.2 | 545.0 | 701.4 | 737.8 | 807.0 | 992.7 | 1,080.6 | 1,102.3 | 1,163.2 | 1,069.2 |
| **Premix** | 41.0 | 50.7 | 55.1 | 32.4 | 45.6 | 58.9 | 53.4 | 56.2 | 47.2 | 56.0 |
| **Kerosene** | 63.3 | 34.6 | 89.3 | 49.3 | 62.4 | 45.6 | 27.8 | 9.3 | 6.9 | 8.1 |
| **ATK** | 122.8 | 119.2 | 124.7 | 108.4 | 135.3 | 141.3 | 131.9 | 113.9 | 112.0 | 132.2 |
| **Gas Oil** | 1,147.0 | 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 |
| **RFO** | 51.3 | 47.9 | 40.3 | 30.9 | 37.5 | 33.5 | 39.3 | 26.8 | 13.4 | 12.9 |
| **Total** | **2,062.9** | **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** |

Source: National Petroleum Authority

**Figure 4.6: Trend in Petroleum Products Supplied to the Economy**

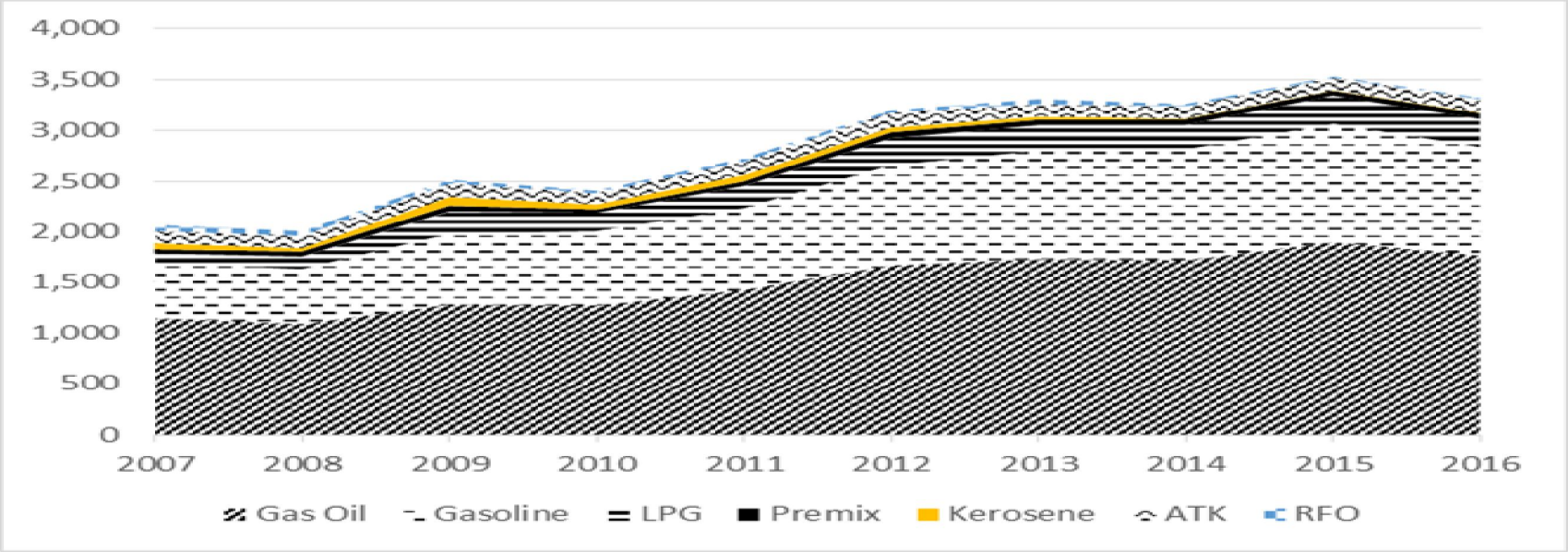
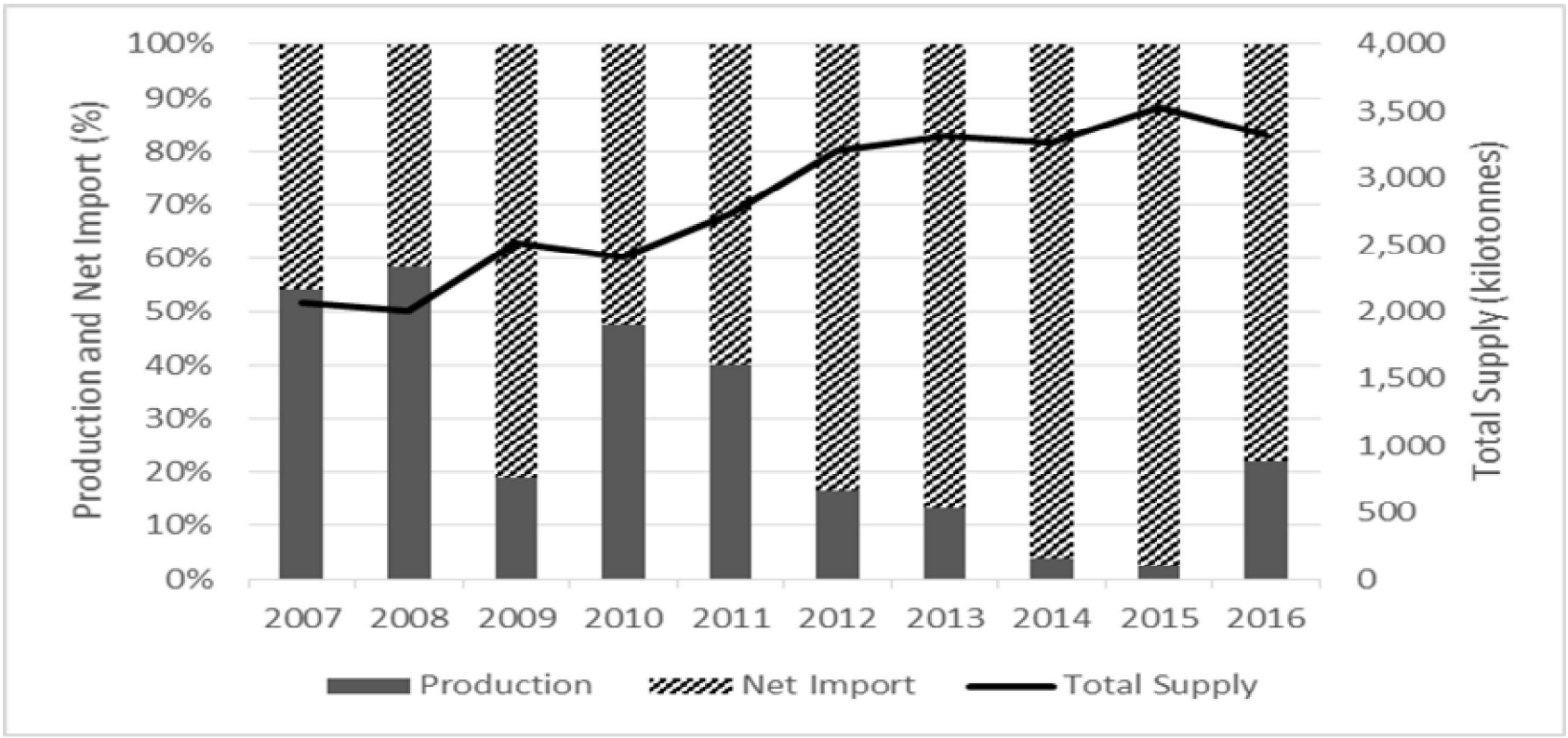



**Table 4.9: Production, Net import and Total Supply of Petroleum Products (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| Production | 1,194.9 | 1,221.5 | 327.1 | 946.4 | 958.0 | 454.0 | 424.2 | 129.2 | 89.1 | 739.0 |
| Net Import | 1,013.7 | 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 |
| Total Supply | 2,062.9 | 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 |

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)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Wood for charcoal** | 1,391.4 | 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 |
| **Wood for firewood** | 1,643.8 | 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 |
| **Other** | 32.9 | 31.3 | 30.4 | 29.8 | 30.7 | 30.4 | 29.7 | 30.0 | 30.0 | 29.4 |
| **Total** | **3,068.1** | **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** |

[1]include saw dust, sawmill residue etc.

NB: 2007-2009 figures extrapolated from 2003 field survey data. 2011-2016 figures extrapolated from 2010 field survey data.

**Table 5.2: Woodfuel Consumption (ktoe)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Firewood** | 1,643.8 | 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 |
| **Charcoal** | 917.0 | 920.9 | 942.9 | 944.0 | 1,010.0 | 1,038.8 | 1,111.6 | 1,212.0 | 1,210.0 | 1,214.0 |
| **Other** | 32.9 | 31.3 | 30.4 | 29.8 | 30.7 | 30.4 | 29.7 | 29.7 | 29.7 | 29.4 |
| **Total** | **2,593.7** | **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** |

[1]include saw dust, sawmill residue etc.

NB: 2007-2009 figures extrapolated from 2003 field survey data. 2011-2016 figures extrapolated from 2010 field survey data.

**Table 5.3: Charcoal Export (kilotonnes)**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Quantity** | 3.6 | 2.9 | 4.3 | 1.4 | 0.8 | 2.0 | 0.8 | 0.5 | 0.4 | 2.7 |
| **Growth Rate (%)** | 24.1 | -19.4 | 48.3 | -67.4 | -42.9 | 150.0 | -61.4 | -35.3 | -20.0 | 575.0 |

## SECTION SIX: ENERGY PRICES

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

| Month | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **January** | 54.56 | 91.92 | 45.62 | 76.92 | 96.82 | 111.55 | 112.28 | 107.32 | 49.72 | 31.93 |
| **February** | 58.96 | 94.49 | 43.73 | 74.74 | 104.09 | 126.96 | 116.11 | 108.80 | 58.70 | 33.44 |
| **March** | 62.36 | 103.00 | 47.32 | 79.90 | 114.62 | 124.55 | 109.53 | 107.68 | 57.01 | 39.80 |
| **April** | 67.49 | 110.43 | 51.23 | 85.68 | 123.13 | 125.90 | 103.31 | 108.10 | 60.90 | 43.34 |
| **May** | 67.92 | 124.61 | 58.57 | 76.99 | 114.53 | 109.36 | 103.32 | 109.20 | 65.62 | 47.63 |
| **June** | 70.60 | 133.47 | 69.34 | 75.66 | 113.91 | 95.89 | 103.30 | 111.97 | 63.75 | 49.89 |
| **July** | 75.84 | 134.79 | 65.76 | 75.49 | 116.68 | 102.77 | 107.37 | 108.21 | 56.75 | 46.58 |
| **August** | 71.17 | 115.22 | 73.07 | 77.11 | 109.82 | 113.19 | 110.25 | 103.48 | 48.18 | 47.16 |
| **September** | 77.00 | 100.75 | 68.19 | 78.21 | 109.96 | 113.04 | 111.21 | 98.56 | 48.57 | 47.23 |
| **October** | 82.47 | 73.60 | 73.87 | 83.49 | 108.80 | 111.52 | 109.45 | 88.07 | 48.12 | 51.42 |
| **November** | 92.06 | 55.05 | 77.50 | 86.11 | 110.61 | 109.53 | 107.77 | 79.40 | 44.42 | 47.08 |
| **December** | 91.51 | 43.29 | 75.24 | 92.35 | 107.72 | 109.19 | 110.60 | 62.36 | 37.72 | 54.93 |

Source: Bank of Ghana

**Figure 6.1: Trend in Crude Oil Prices**

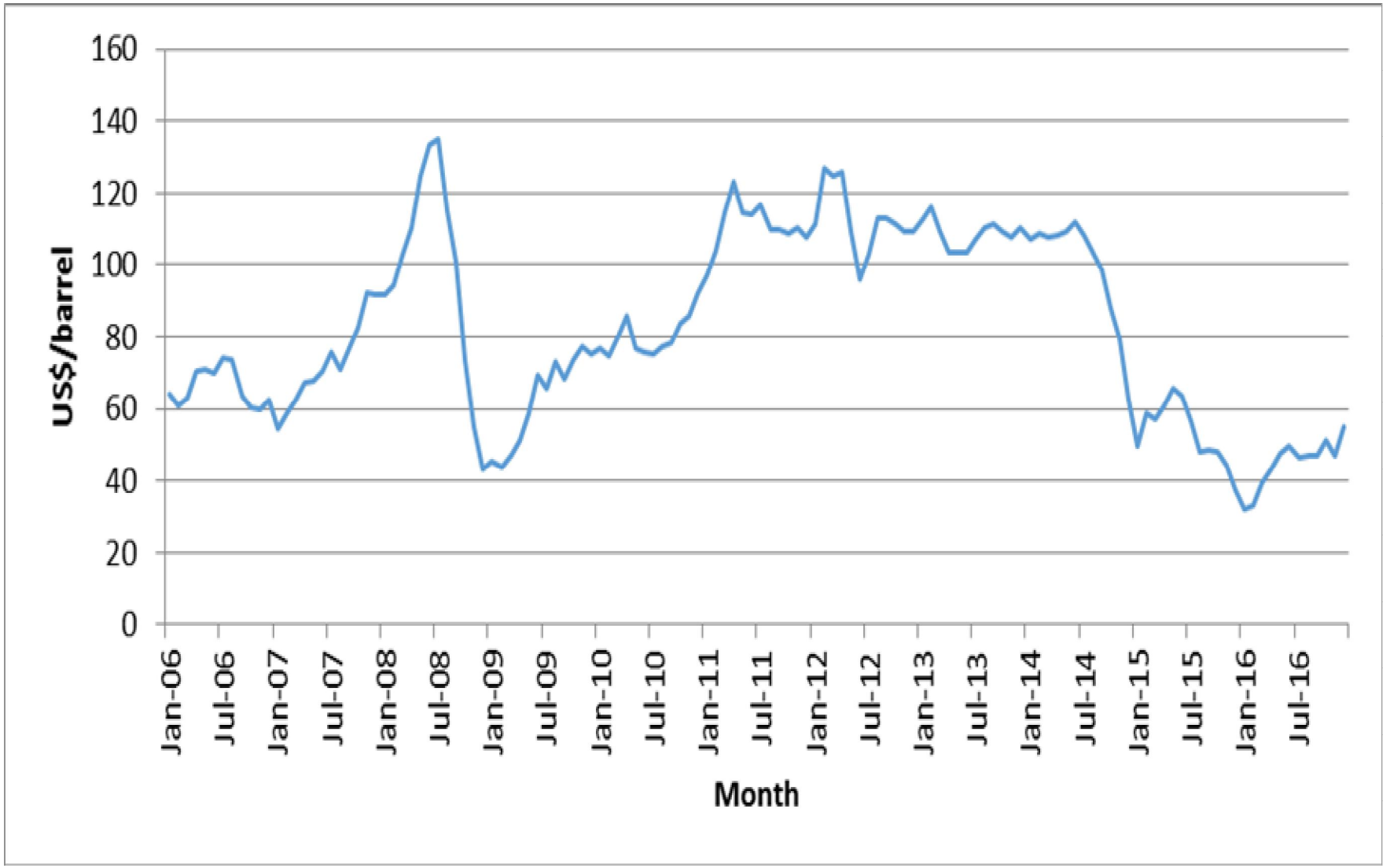


**Table 6.2: Electricity Tariff**

| Tariff Category | Effective Date | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dec, 2011 | Oct, 2013 | Jan, 2014 | Jul, 2014 | Oct, 2014 | Apr, 2015 | Jul, 2015 | Dec, 2015 | Apr, 2016 | July, 2016 |
| **Residential** | | | | | | | | | | |
| 0 - 50 (Exclusive) | 9.5 | 15.7 | 17.2 | 19.3 | 20.5 | 21.1 | 21.1 | 33.6 | 33.6 | 33.6 |
| 51 - 300 (GHp/kWh) | 17.6 | 31.4 | 34.5 | 38.7 | 41.2 | 42.3 | 42.3 | 67.3 | 67.3 | 67.3 |
| 301 - 600 (GHp/kWh) | 22.8 | 40.8 | 44.9 | 50.2 | 53.5 | 54.9 | 54.9 | 87.4 | 87.4 | 87.4 |
| 600+ (GHp/kWh) | 25.3 | 45.3 | 49.8 | 55.8 | 59.4 | 61.0 | 61.0 | 97.1 | 97.1 | 97.1 |
| Service Charge (GHp/month) | 165.3 | 295.7 | 324.5 | 363.8 | 387.5 | 397.7 | 397.7 | 633.2 | 633.2 | 633.2 |
| **Non-Residential** | | | | | | | | | | |
| 0 -300 (GHp/kWh) | 25.3 | 45.2 | 49.6 | 55.6 | 59.2 | 60.8 | 60.8 | 96.8 | 96.8 | 96.8 |
| 301 - 600 (GHp/kWh) | 26.9 | 48.1 | 52.8 | 59.2 | 63.0 | 64.7 | 64.7 | 102.1 | 103.0 | 103.0 |
| 600+ (GHp/kWh) | 42.4 | 75.9 | 83.3 | 93.4 | 99.5 | 102.1 | 102.1 | 162.5 | 162.5 | 162.5 |
| Service Charge (GHp/month) | 275.5 | 492.9 | 540.9 | 606.3 | 645.9 | 662.9 | 662.9 | 1,055.3 | 1,055.3 | 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 | 5,909.6 | 5,909.6 |
| Energy Charge (GHp/kWh) | 26.3 | 47.1 | 51.7 | 58.0 | 61.8 | 63.4 | 63.4 | 100.9 | 100.9 | 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 | 4,221.2 | 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 | 5,065.4 | 5,065.4 |
| Energy Charge (GHp/kWh) | 20.4 | 36.5 | 40.0 | 44.9 | 47.8 | 49.1 | 49.1 | 78.1 | 78.1 | 78.1 |
| Service Charge (GHp/month) | 1,542.9 | 2,760.3 | 3,028.9 | 3395..1 | 3,616.9 | 3,712.1 | 3,712.1 | 5,909.6 | 5,909.6 | 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 | 5,065.4 | 5,065.4 |
| Energy Charge (GHp/kWh) | 18.7 | 33.5 | 36.8 | 41.2 | 43.9 | 45.1 | 45.1 | 71.8 | 71.8 | 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 | 5,909.6 | 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 | 5,909.6 | 5,909.6 |
| Energy Charge (GHp/kWh) | 29.8 | 53.2 | 58.4 | 65.5 | 69.8 | 71.6 | 71.6 | 114.0 | 114.0 | 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 | 5,909.6 | 5,909.6 |

**Table 6.3: Average Electricity End User Tariff**

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| **GHS/kWh** | 0.097 | 0.148 | 0.148 | 0.211 | 0.245 | 0.232 | 0.307 | 0.464 | 0.541 | 0.817 |
| **Exchange Rate (GHS/US$)** | 0.97 | 1.20 | 1.43 | 1.45 | 1.55 | 1.88 | 1.97 | 3.20 | 3.68 | 3.89 |
| **US$/kWh** | 0.100 | 0.123 | 0.104 | 0.145 | 0.158 | 0.124 | 0.156 | 0.145 | 0.147 | 0.210 |

[1]Source: Bank of Ghana

**Figure 6.2: Trend in Average Electricity End User Tariff**

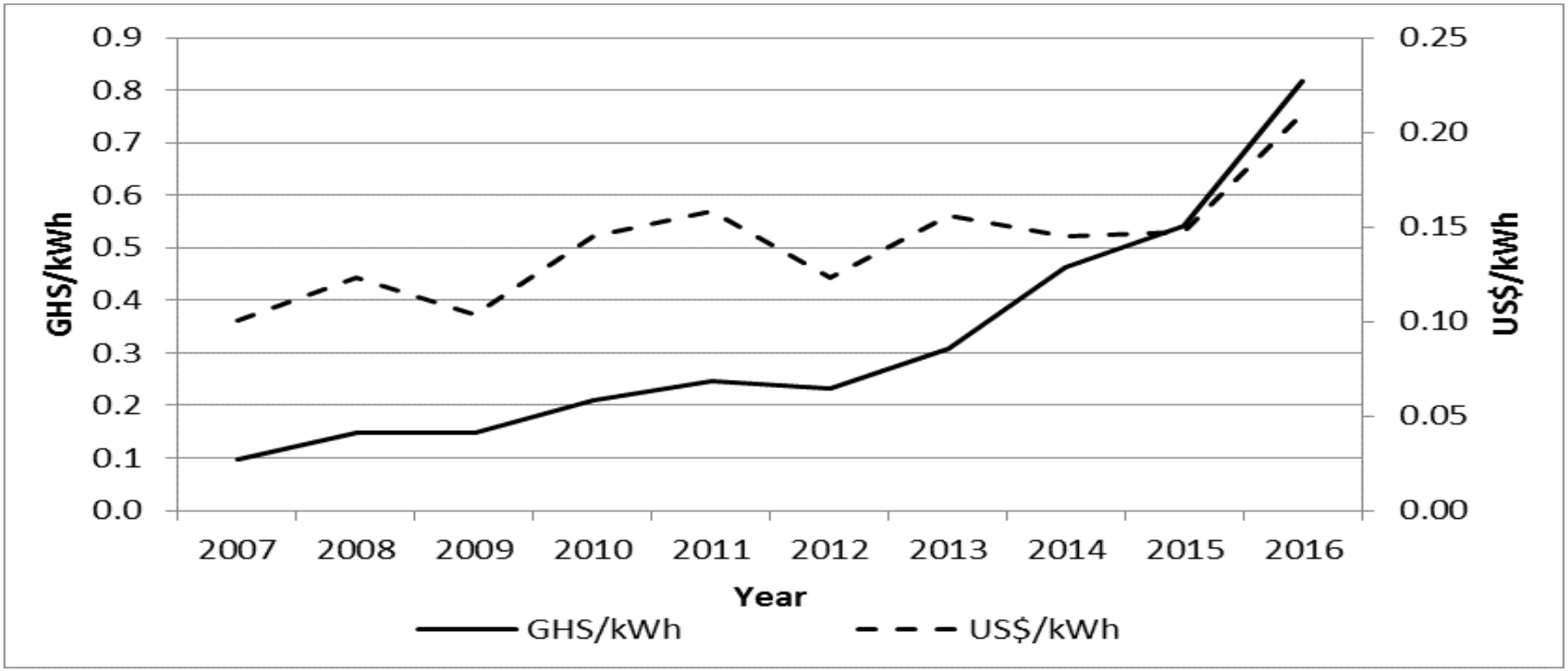


**Table 6.4: Average Charcoal Prices by Region**

| Region | Maxi Bag (Ghc) | | | | | | Mini Bag (Ghc) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Ashanti | 12.36 | 15.07 | 16.62 | 19.32 | 22.91 | 26.23 | 6.09 | 8.68 | 9.15 | 12.71 | 15.12 | 16.66 |
| Brong Ahafo | 9.39 | 11.04 | 12.58 | 15.81 | 20.27 | 22.48 | 4.75 | 6.20 | 7.11 | 9.22 | 12.15 | 13.61 |
| Central | 21.33 | 22.08 | 26.49 | 31.09 | 39.03 | 41.44 | 11.41 | 13.95 | 19.83 | 23.53 | 31.00 | 28.52 |
| Eastern | 12.00 | 16.76 | 19.03 | 22.21 | 30.55 | 30.55 | 7.00 | 11.69 | 13.44 | 16.62 | 21.51 | 21.51 |
| Greater Accra | 20.17 | 21.15 | 23.68 | 30.26 | 37.10 | 38.68 | 13.13 | 15.01 | 17.43 | 22.42 | 26.61 | 26.99 |
| Northern | 14.11 | 14.97 | 18.30 | 22.15 | 25.32 | 28.16 | 9.42 | 7.52 | 9.10 | 12.88 | 15.79 | 17.17 |
| Upper East | 10.00 | 19.51 | 24.93 | 30.65 | 34.45 | 36.67 | 5.11 | 11.96 | 14.80 | 20.35 | 23.00 | 22.75 |
| Upper West | 10.00 | 13.46 | 15.56 | 18.25 | 23.00 | 28.97 | 5.11 | 8.28 | 9.42 | 11.86 | 15.47 | 15.66 |
| Volta | 19.18 | 26.19 | 32.02 | 36.43 | 49.50 | 53.74 | 10.36 | 13.73 | 16.66 | 20.67 | 28.28 | 30.83 |
| Western | 15.33 | 23.85 | 25.79 | 28.58 | 32.96 | 37.00 | 10.37 | 13.60 | 15.30 | 18.20 | 21.68 | 23.85 |
| National | 15.23 | 18.23 | 21.19 | 25.11 | 31.15 | 33.92 | 8.83 | 11.04 | 13.22 | 16.66 | 20.14 | 21.67 |

NB: The average weight of a maxi and mini bag of charcoal can be found on page viii.

**Table 6.5: Average Charcoal Price per kg**

| Region | Maxi Bag (Ghc) | | | | | | Mini Bag (Ghc) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Ashanti | 0.27 | 0.29 | 0.32 | 0.37 | 0.45 | 0.52 | 0.27 | 0.33 | 0.35 | 0.49 | 0.58 | 0.64 |
| Brong Ahafo | 0.19 | 0.19 | 0.22 | 0.27 | 0.33 | 0.42 | 0.19 | 0.20 | 0.23 | 0.30 | 0.36 | 0.40 |
| Central | 0.35 | 0.37 | 0.44 | 0.52 | 0.67 | 0.77 | 0.35 | 0.44 | 0.63 | 0.75 | 0.95 | 0.87 |
| Eastern | 0.27 | 0.32 | 0.36 | 0.42 | 0.58 | 0.64 | 0.23 | 0.45 | 0.52 | 0.64 | 0.75 | 0.72 |
| Greater Accra | 0.50 | 0.35 | 0.39 | 0.50 | 0.67 | 0.84 | 0.38 | 0.48 | 0.55 | 0.71 | 0.81 | 0.84 |
| Northern | 0.29 | 0.26 | 0.32 | 0.39 | 0.44 | 0.49 | 0.27 | 0.24 | 0.29 | 0.42 | 0.51 | 0.55 |
| Upper East | 0.20 | 0.34 | 0.43 | 0.53 | 0.60 | 0.64 | 0.19 | 0.39 | 0.48 | 0.66 | 0.74 | 0.73 |
| Upper West | 0.19 | 0.23 | 0.27 | 0.32 | 0.41 | 0.50 | 0.19 | 0.27 | 0.30 | 0.38 | 0.50 | 0.55 |
| Volta | 0.38 | 0.50 | 0.61 | 0.69 | 0.87 | 0.94 | 0.38 | 0.53 | 0.64 | 0.79 | 0.91 | 0.99 |
| Western | 0.38 | 0.45 | 0.49 | 0.54 | 0.64 | 0.72 | 0.29 | 0.52 | 0.59 | 0.70 | 0.83 | 0.92 |
| National | 0.30 | 0.33 | 0.39 | 0.46 | 0.57 | 0.65 | 0.27 | 0.39 | 0.46 | 0.58 | 0.69 | 0.72 |

## SECTION SIX: END USE STATISTICS

Data presented in this section is the result of a nationwide energy use survey conducted by the Energy Commission in 2011 and first published in 2012.

**Table 7.1: Average Annual Fuel Consumption per Household by Locality**

| LOCALITY | LPG (kg) | Charcoal (kg) | Firewood (kg) | Kerosene (lts) | Electricity (kWh) |
|---|---|---|---|---|---|
| National | 87 | 434 | 1,065 | 42 | 1,200 |
| Urban | 174 | 431 | 986 | 18 | 1,250 |
| Rural | 58 | 440 | 1,113 | 54 | 880 |
| Regional | | | | | |
| *Ashanti* | *108* | *488* | *1,153* | *41* | *1,200* |
| *Brong Ahafo* | *87* | *474* | *1,361* | *40* | *1,115* |
| *Central* | *87* | *418* | *994* | *52* | *1,200* |
| *Eastern* | *116* | *368* | *1,005* | *38* | *1,148* |
| *Greater Accra* | *120* | *449* | *903* | *36* | *1,484* |
| *Northern* | *58* | *510* | *1,174* | *50* | *804* |
| *Upper East* | *87* | *364* | *1,037* | *35* | *824* |
| *Upper West* | *72* | *531* | *1,234* | *62* | *720* |
| *Volta* | *87* | *374* | *830* | *46* | *856* |
| *Western* | *120* | *384* | *789* | *56* | *1,138* |

**Table 7.2: Average Annual Electricity Consumption by Electrical Appliances per Household (kWh)**

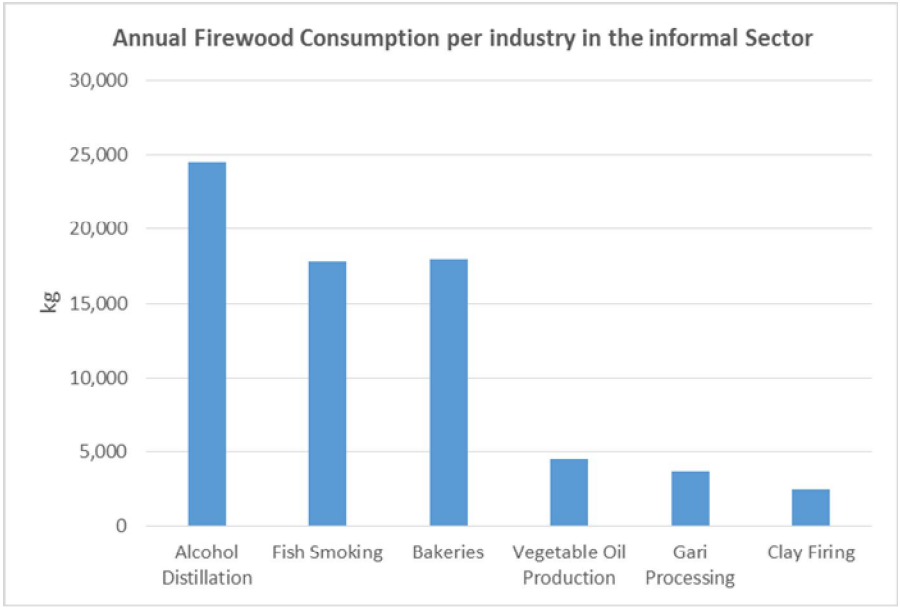
| Location | Refrigeration | Lighting | Television | Fan | Iron | Other Appliances |
|---|---|---|---|---|---|---|
| National | 924.0 | 261.6 | 146.4 | 132.0 | 58.8 | 55.2 |
| Urban | 877.2 | 261.6 | 146.4 | 146.4 | 57.6 | 66.0 |
| Rural | 1,227.6 | 261.6 | 128.4 | 128.4 | 55.2 | 44.4 |
| Regional | | | | | | |
| *Ashanti* | *876.6* | *240.2* | *131.5* | *102.3* | *66.5* | *49.3* |
| *Brong Ahafo* | *712.8* | *237.5* | *146.1* | *127.8* | *52.6* | *43.8* |
| *Central* | *876.6* | *233.0* | *116.9* | *112.3* | *51.1* | *43.8* |
| *Eastern* | *898.0* | *349.4* | *116.9* | *153.4* | *63.7* | *54.8* |
| *Greater Accra* | *1,227.4* | *355.3* | *175.3* | *166.2* | *53.9* | *105.2* |
| *Northern* | *657.5* | *327.6* | *131.5* | *192.8* | *53.7* | *49.3* |
| *Upper East* | *1,252.8* | *163.8* | *102.3* | *200.1* | *52.6* | *32.9* |
| *Upper West* | *876.6* | *192.2* | *131.5* | *179.0* | *52.6* | *52.0* |
| *Volta* | *1,314.9* | *262.1* | *109.6* | *127.8* | *52.6* | *38.0* |
| *Western* | *876.6* | *237.7* | *116.9* | *135.1* | *52.6* | *54.5* |

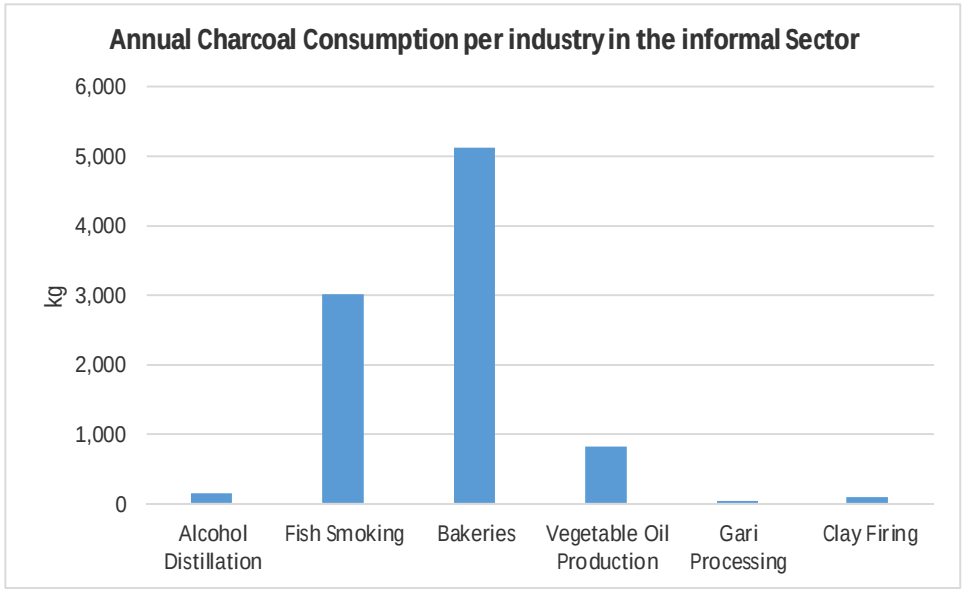
**Table 7.3: Average Annual Fuel Consumption per Industry in the Informal Sector**

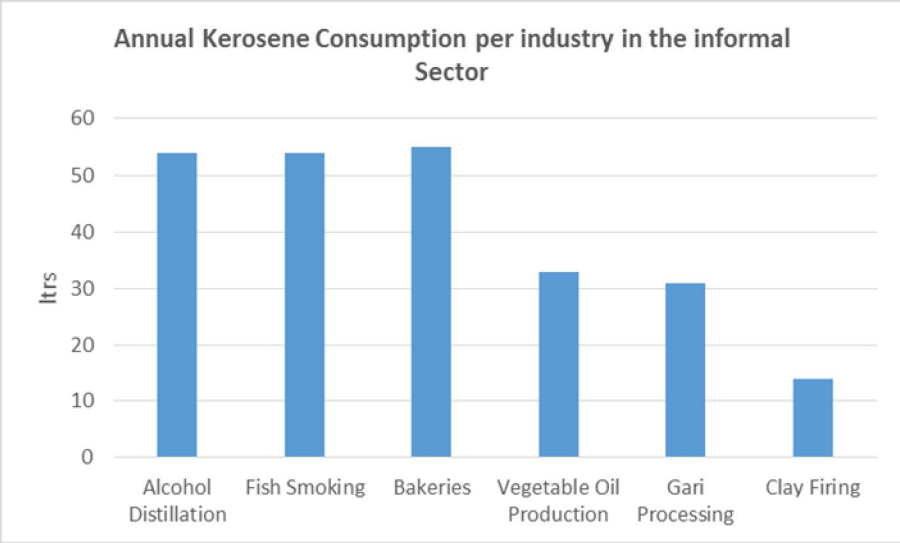
| Category | LPG (kg) | Charcoal (kg) | Firewood (kg) | Kerosene (lts) |
|---|---|---|---|---|
| Alcohol Distillation | N/A | 135 | 24,516 | 54 |
| Fish Smoking | N/A | 3,015 | 17,800 | 54 |
| Bakeries | 496 | 5,128 | 17,950 | 55 |
| Vegetable Oil Production (Palm oil, coconut oil etc) | 580 | 828 | 4,500 | 33 |
| Gari Processing | 367 | 25 | 3,660 | 31 |
| Clay Firing | N/A | 105 | 2,488 | 14 |

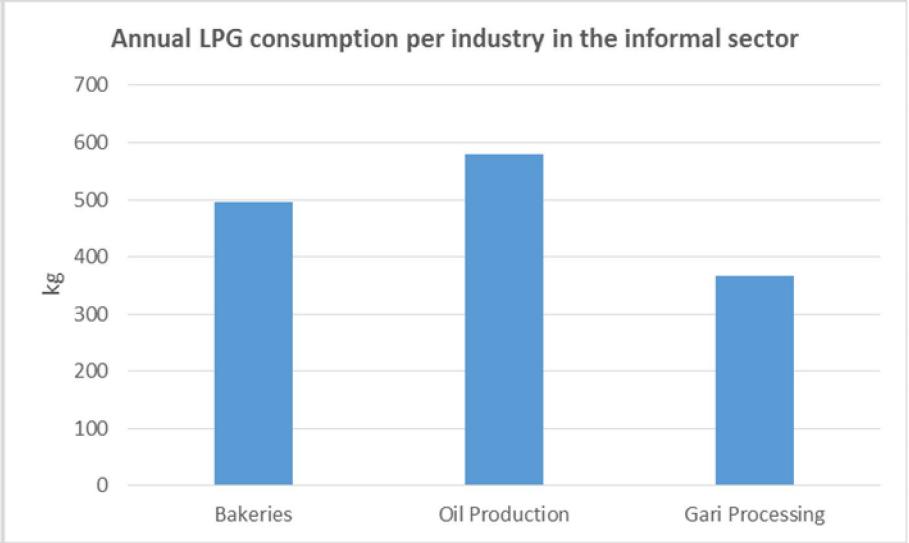
N/A means data not available

**Figure 7.1: Average Annual Fuel Consumption per industry in the Informal Sector**




Annual Kerosene Consumption per industry in the informal Sector
ltrs
60
50
40
30
20
10
0
Alcohol Distillation
Fish Smoking
Bakeries
Vegetable Oil Production
Gari Processing
Clay Firing


Annual LPG consumption per industry in the informal sector
kg
700
600
500
400
300
200
100
0
Bakeries
Oil Production
Gari Processing