ENERGY OUTLOOK

FOR GHANA

Demand and Supply Outlook

2025

2025 ENERGY OUTLOOK FOR GHANA

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DECEMBER 2024

ADDRESS

Ghana Airways Avenue
Airport Residential Area
(behind Alliance Francaise)

Private Mail Bag
Ministries Post Office
Accra – Ghana

POSTCODE

GA-037-3212

CONTACT

PHONE:
0302-813-756/7

FAX:
0302813764

WEBSITE:
www.energycom.gov.gh

EMAIL:
info@energycom.gov.gh

FOLLOW US:

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EnergyCommissionGhana

EXECUTIVE SUMMARY

The Energy Commission fulfilment of its mandate under the Energy Commission Act (Act 541, 1997) Section 2 Sub-section 2c presents supply and demand forecasts for electricity, petroleum and woodfuel for the year 2025.

Electricity Sub-sector

As of December 29, 2024, Ghana's system peak load stood at 3,952 MW, representing a 9.2% increase from the 2023 recorded peak demand of 3,618 MW. In 2025, the system peak load is estimated to be 4,125 MW, reflecting a 4.4% increase from 2024. Factors to influence the peak demand in 2025 include economic growth and increased loads across ECG and NEDCo distribution zones. In November 2024, total electricity consumption reached 22,410 GWh, with a projected year-end figure of 24,688 GWh. In 2025, projected electricity consumption is 25,836 GWh, representing a 4.7% increase.

Hydro, thermal, and renewables constitute Ghana's electricity generation mix. Installed generation capacity, excluding embedded capacity as of November 2024, was 5,260 MW, with a total dependable capacity of 4,856 MW. The installed capacity increased to 5,507 MW (with a dependable capacity of 5,060 MW) if embedded capacity at the sub-transmission (distribution grid) level is added.

In 2025, an installed capacity of 5,260 MW with a dependable capacity of 4,855 MW will be available to the grid and utilised to meet the projected system peak demand of 4,125 MW, giving a reserve margin of 18%. However, factoring in planned scheduled maintenance for generation units and fuel supply situation, the available capacity could be 4,656 MW of the total dependable capacity.

Hydropower and thermal plants are projected to generate 8,561 GWh (33.1%) and 16,997 GWh (65.8%) of total electricity supply in 2025. The remaining supply of 196 GWh, representing 0.8%, is expected to be met by other renewables, including solar PV and biogas operating at the sub-transmission level. Power import in 2025 is not anticipated. However, inadvertent energy exchanges estimated at 82 GWh (0.3%) on tie-lines could

result from transient flows. Emergency imports may be necessitated because of short-term capacity shortages caused by faults or fuel supply contingencies.

In 2025, natural gas will remain the predominant fuel for thermal power facilities. The projected total natural gas consumption for electricity generation in 2025 is approximately 151.4 TBtu (133,976.7 MMscf). In 2025, an estimated 344,387 barrels of HFO will be required by the AKSA to fuel some of its units. The total fuel expenditure for the year is estimated at US$1,248.23 million, with US$1,217.54 million, about 97.5% expected to be used for the procurement of natural gas, while the remaining amount for the procurement of HFO to fuel some units of the AKSA plant.

Petroleum Sub-sector

Crude oil production from the Jubilee, TEN, and Sankofa fields totalled 36.841 million barrels as of September 2024, marking a 4.01% increase compared to 2023. The Jubilee field dominated with 24.468 million barrels, while TEN recorded a slight increase to 5.149 million barrels. However, Sankofa experienced a 14.6% decline in output due to operational challenges. Average daily production rose to 134,426 barrels per day, surpassing projections by 15.08%. Brent crude oil prices averaged $82 per barrel in 2024, driven by global economic trends, OPEC+ policy decisions, and geopolitical tensions.

As of July 2024, total raw gas exports reached 70,903 MMscf, reflecting an 11.8% increase compared to 2023. Sankofa accounted for 49,734 MMscf, while the Atuabo Gas Processing Plant processed 25.27% of the total gas produced. Lean gas supply rose to 70,578 MMscf, because of higher electricity generation and industrial demand.

The total consumption of petroleum products as of August 2024 stood at 3,400 kilotonnes, surpassing projections by 8.6%. Gasoil and gasoline consumption increased by 17% and 11.9%, respectively.

Crude oil production is projected to grow modestly to 50.34 million barrels, driven by increased output from Jubilee (+7%) and TEN (+2%), offset by a decline in Sankofa (-13%). Average daily production is expected to rise slightly to 135,336 barrels per day.

Total domestic lean gas supply is forecasted at 116,840 MMscf, including contributions from Jubilee, TEN, and Sankofa fields. Natural gas imports from Nigeria are expected to maintain a minimum of 73 MMscfd, with potential increases based on payment guarantees. Non-power industrial demand is projected to rise to 13,788 MMscf, driven by new industrial facilities whilst power demand is projected at 134,572 MMscf.

Gas supply shortfalls are, however, expected during scheduled maintenance of the Jubilee and Sankofa fields, WAGP, as well as during peak-demand periods. The gas supply deficit in 2025 is expected to worsen, starting with a shortfall of 9 MMscfd in January, rising to 47 MMscfd in February and 50 MMscfd in March due to maintenance on the WAGP and Jubilee facilities. Full nominated volumes are expected from April, but the 412 MMscfd supply will be insufficient to meet demand for power and non-power purposes until August. A planned shutdown by ENI in September will cause a 32 MMscfd deficit, and a 15-day shutdown in November will lead to a larger deficit of 102 MMscfd.

The total consumption of petroleum products is projected at 5,484.73 kilotonnes, a 5.13% increase over 2024, driven by increased demand for gasoil, gasoline, and LPG.

Woodfuel Sub-sector

In 2024, wood extraction for direct use as firewood was estimated at 1,499 Ktoe, while extraction for charcoal production was 2,488 Ktoe. Other biomass production, mainly crop residue, was estimated at 29 Ktoe. In 2025, firewood extraction is projected to increase by 3.9% to 1,558 Ktoe, while charcoal production is expected to rise by 2.3% to 2,488 Ktoe. Other biomass production will remain at 29 Ktoe.

The residential sector was the largest biomass consumer in 2024, with households using 2,485 Ktoe, while the industrial and services sectors consumed 298 Ktoe and 107 Ktoe, respectively. Biomass consumption has been on the rise over the past decade, but this trend could be reversed with increased LPG penetration, especially in rural areas. In 2025, household biomass consumption is expected to reach 2,504 Ktoe, with the services and industrial sectors consuming 113 Ktoe and 320 Ktoe, respectively.

In 2024, the national average price per kilogram of charcoal was GH¢2.27 which is lower than the average price of LPG per kilogram (GH¢15.81). Considering the efficiencies of LPG stove and charcoal stoves, the cost of utilising charcoal in the traditional charcoal stove is 58% cheaper than using LPG. When improved cookstove such as Gyapa is used instead of LPG, the saving is more than half of the cost of using LPG. The price of LPG is driven by developments in the global crude oil market and the depreciation of the Ghanaian Cedi. Anticipated for 2025 is a modest increase in charcoal prices, with the potential for growth aligning closely with the national inflation rate for the year at worst.

PREFACE

ENERGY COMMISSION is mandated to prepare, review and periodically update indicative national plans to ensure that reasonable demands for energy are met in a sustainable manner. The Commission is also mandated to secure and maintain a comprehensive database for national decision-making for the efficient development and utilisation of energy resources available to the nation. The Commission's jurisdiction includes promoting and ensuring uniform rules of practice for the production, transmission, wholesale supply, distribution and sale of electricity and natural gas.

In fulfilment of its mandates, the Commission has been preparing an annual energy demand and supply outlook to provide guidelines to energy sector operators and potential investors as well as the wider business community wishing to operate in the country. The 2025 Annual Energy Outlook is to give government, industry and business, indications of the levels/quantities of electricity, liquid and gaseous fuels that would be required to be provided by the energy producers for this year.

The Energy Outlook for Ghana outlines projections for energy demand and supply for the year 2025. It provides an overview of the actual performance of the energy sector, specifically the electricity and petroleum industry performance, as well as the woodfuel subsector of the preceding year (2024), comparing actuals to projections. It continues to forecast 2025 energy demand and supply.

In this report, 'Demand' is used when referring to gross fuel or energy required by a demand sector, e.g., residential, commercial, or industry. 'Supply Requirement' is supply or generation/production plus transmission/transport losses.

Your comments and suggestions are most welcome.

Ing. Oscar Amonoo Neizer
Executive Secretary

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ABBREVIATION

AGPP	Atuabo Gas Processing Plant
ATK	Aviation Turbo Kerosene
BGS	Bui Generation Station
BPA	Bui Power Authority
BSPs	Bulk Supply Points
CEB	Communauté Electrique du Bénin
CIE	Compagnie Ivoirienne d'Électricité
COVID-19	Novel Coronavirus Disease
ECG	Electricity Company of Ghana
EIA	US Energy Information Administration
EMOP	Electricity Market Oversight Panel
ESD	Emergency Shutdown
FPSO	Floating Production Storage and Offloading
GDP	Gross Domestic Product
GNGC	Ghana National Gas Company
GNPC	Ghana National Petroleum Corporation
GRIDCo	Ghana Grid Company
GWh	Gigawatt hour
HFO	Heavy Fuel Oil
IPPs	Independent Power Producers
kg	Kilogram
km	Kilometer
Ktoe	Thousand Tonnes of Oil Equivalent
KTPP	Kpone Thermal Power Plant
kV	Kilovolt
kW	Kilowatt
LCO	Light Crude Oil
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MAF	Million Acre Feet
MGO	Marine Gas Oil
MMBtu	Million British Thermal unit
MMscf	Million Standard Cubic Feet
MVA	Megavolt Amperes
MVAr	Megavolt Ampere of Reaction Power
MW	Megawatt
MWp	Megawatts-peak

NEDCo	Northern Electricity Distribution Company
NG	Natural Gas
N-Gas	Nigeria Gas
NITS	National Interconnected Transmission System
NMS	Network Manager System
NPA	National Petroleum Authority
OCTP	Offshore Cape Three Point
OMCs	Oil Market Companies
ORF	On-shore Receiving Facility
PC	Petroleum Commission
PIAC	Public Interest and Accountability Committee
PPTC	Power Planning Technical Committee
PURC	Public Utilities Regulatory Commission
PV	Photovoltaics
RFO	Residual Fuel Oil
SAPP	Sunon Asogli Power Plant
SCADA	Supervisory Control and Data Acquisition
TAPCO	Takoradi Power Company
Tbtu	Trillion British Thermal Unit
TDS	Takoradi Distribution Station
TEN	Tweneboa, Enyenra, Ntomme
TICO	Takoradi International Company
TOR	Tema Oil Refinery
TT1PP	Tema Thermal Power Plant 1
TT2PP	Tema Thermal Power Plant 2
TTIP	Tema-Takoradi Interconnection Pipeline
TUF	Transformer Utilization Factor
US WTI	US West Texas Intermediate
VALCO	Volta Aluminium Company
VRA	Volta River Authority
WAGP	West Africa Gas Pipeline
WAGPCo	West Africa Gas Pipeline Company
WAPCO	West Africa Pipeline Company
WAPP	West African Power Pool

Chapter 1: Introduction

1.1 Introduction

The dynamics of Ghana's energy sector are shaped by a complex interplay of factors such as weather conditions, economic growth, inflation, and energy efficiency initiatives. Economic growth, in particular, plays a pivotal role in driving energy demand, especially within the commercial and industrial sectors. In 2024, Ghana experienced robust economic growth, far surpassing initial projections. After a steady GDP[1] growth of 4.7% in the first quarter, 7.0% in the second, and 7.2% in the third, the nation is poised to achieve a higher-than-expected overall real GDP growth rate in 2024. Going into 2025, the country's economy is expected to continue experiencing robust growth. The International Monetary Fund (IMF)[2] has projected an overall real GDP growth of 4.4% for 2025. This anticipated economic expansion is expected to drive an increase in energy demand across all sectors.

Therefore, the 2025 Annual Energy Outlook for Ghana seeks to provide an analysis of the country's energy landscape, offering insights into energy demand and supply for 2025. This aims to provide an indication of quantities of energy demand and supply to guide the government, potential investors and the wider business community wishing to operate in the country. To achieve this, the actual performance of the energy sector in 2024 is evaluated, with a particular focus on the electricity, petroleum, and woodfuel subsectors. The outlook then delves into projections for energy demand and supply in 2025 and discusses the challenges the sector is expected to face, equipping stakeholders with actionable information for strategic decision-making.

[1] Ghana Statistical Service: National Accounts - Annual GDP by Production Approach https://statsghana.gov.gh/nationalaccount_macros.php?Stats=MjkwMzA1NjI0LjE0MTU=/webstats/oq43q9p651

[2] International Monetary Fund (IMF): Ghana: Transforming a Crisis into a Journey Toward Prosperity: Ghana and the IMF

Chapter Two: Electricity Outlook 2025

2.1 Electricity Demand Outlook

2.1.1 Projected Peak Demand for 2025

As of December 29, 2024, Ghana's system peak load, observed on December 19, 2024, is 3,952 MW. This peak load signifies a 9.2% increase compared to the recorded peak demand of 3,618 MW during the same period in 2023.

In 2025, the country's system peak load is estimated at 4,125 MW, representing a 4.4% increase from the expected 2024-year-end peak demand of 3,952 MW. The peak for 2025 is anticipated to take place in December 2025 (see Figure 1). This estimate is accompanied by a 95% confidence interval, with a lower bound of 3,595 MW and an upper bound of 4,629 MW.

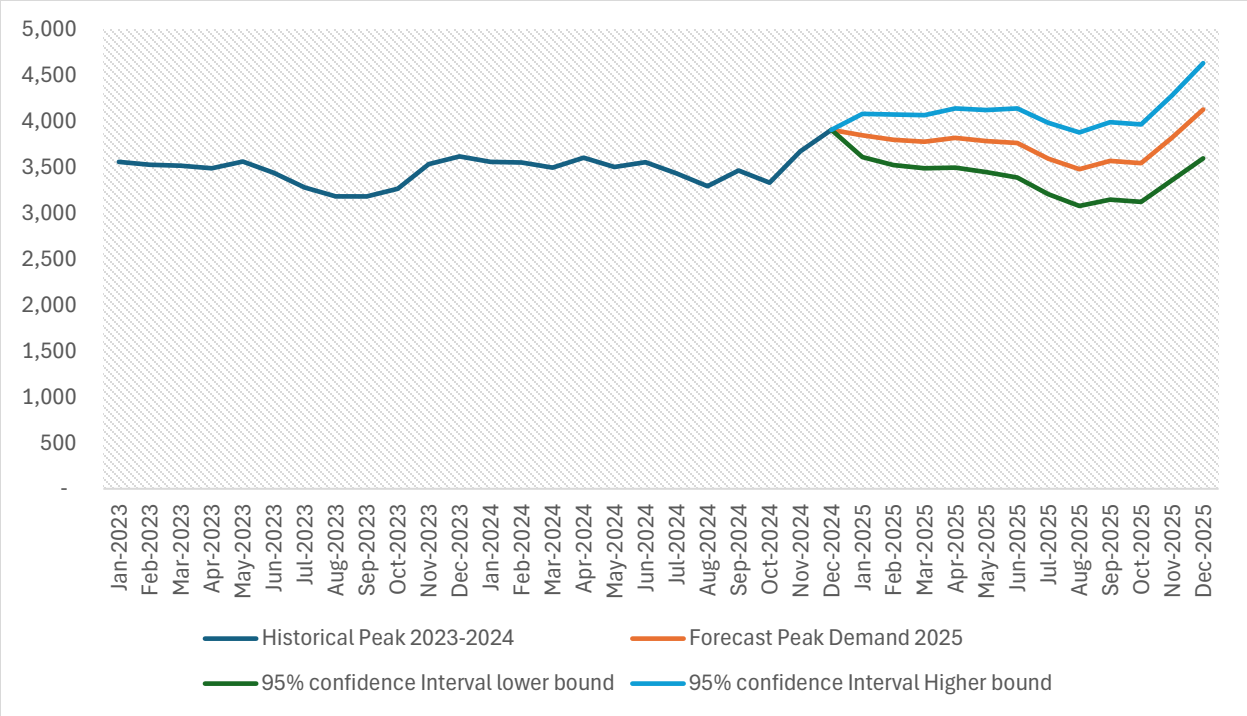


Figure 1: Monthly projected peak demand for 2025 with a 95% confidence interval

In 2025, it is anticipated that ECG and NEDCo will contribute 67.3% and 8.6% to the system peak, while Export and the Mines are expected to contribute 8.5% and 5.8% respectively. VALCO, operating on two pot-lines, is expected to contribute 2.8%, and other direct customers are expected to contribute 1.6%. Transmission loss, along with network usage, is estimated to contribute 3.9% to the system peak (see Figure 2).

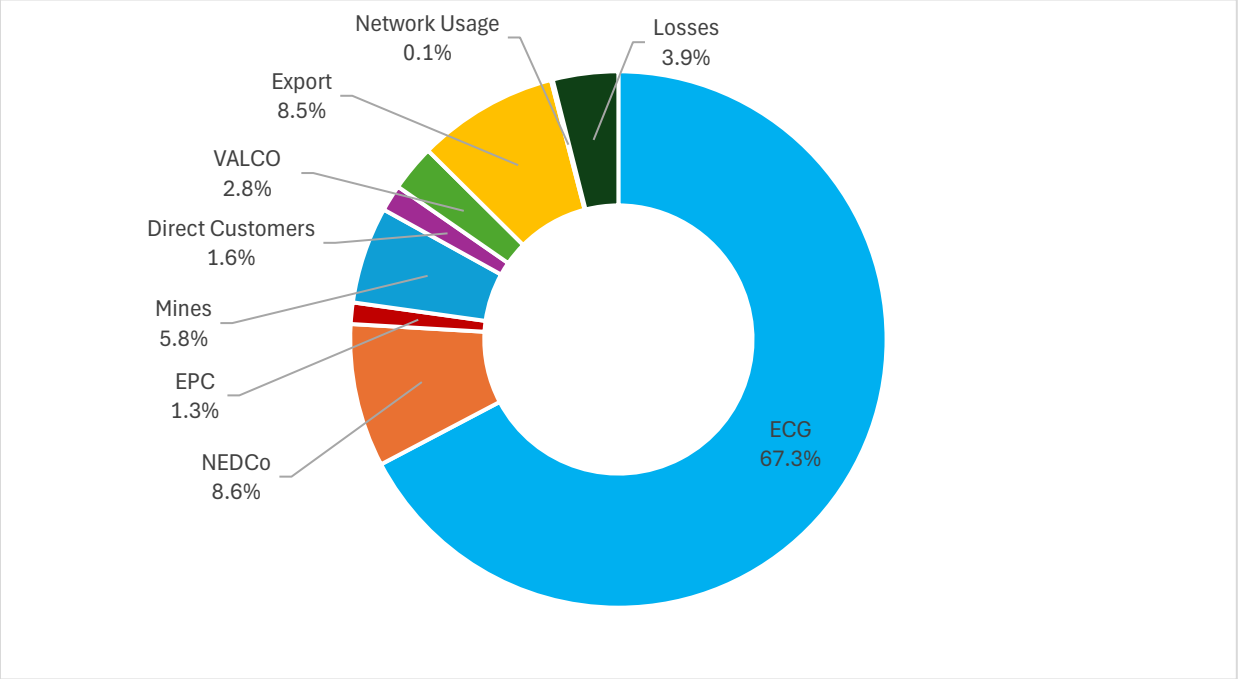


Figure 2: Share of projected peak demand by customer class in 2025

2.1.2 Projected Electricity Consumption for 2025

As of November 2024, total electricity consumption reached 22,410 GWh, reflecting a 4.6% growth compared to the corresponding period in 2023. The projected total electricity consumption for the entire year of 2024 is expected to be 24,688 GWh, representing a 4.8% increase over the 2023 consumption of 23,551 GWh, indicating growing demand for electricity.

In 2025, the projected electricity consumption is 25,836 GWh, representing a 4.7% increase from the expected consumption in 2024. This estimated electricity consumption for 2025 falls within a 95% confidence interval, with a lower bound of 23,275 GWh and an upper bound of 28,382 GWh (see Figure 3).

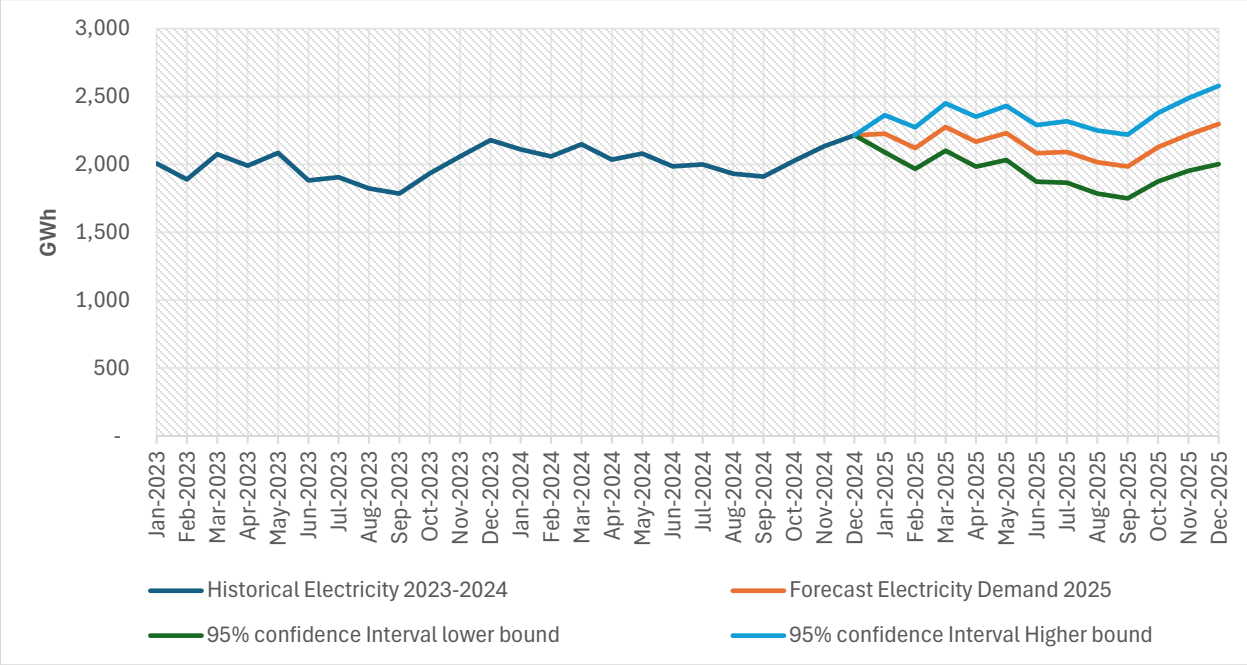
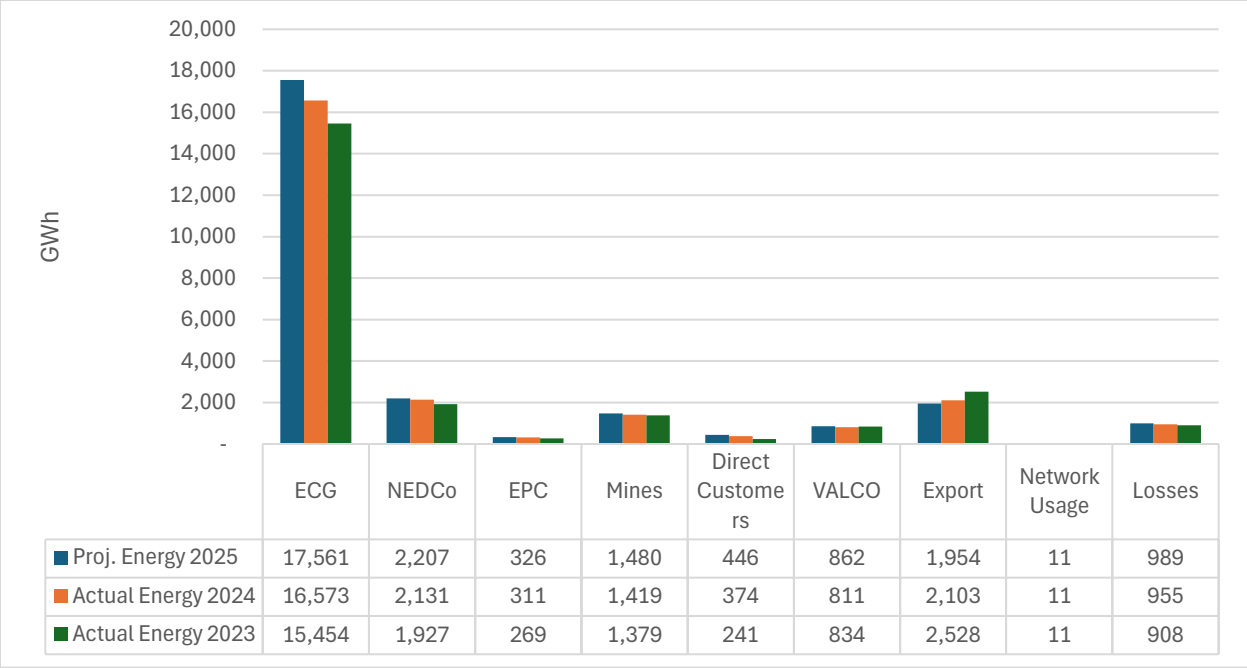


Figure 3: Projected monthly energy for 2025 with 95% confidence interval

As of November 2024, the amount of electricity ECG and NEDCo consumed is 15,026 GWh and 1,938 GW respectively. These figures are higher than the 14,039 GWh and 1,771 GWh consumed in the same period in 2023. By the end of the year, ECG and NEDCo consumption are expected to reach 16,573 GWh and 2,131 GWh, representing 7.2% and 10.6% increase from the previous year. Anticipated consumption for other customers by year-end 2024 compared with 2023 is shown in Figure 4.

In 2025, ECG consumption is estimated to reach 17,561 GWh, representing a 6.0% increase from 2024 consumption. Customers' forecast for 2025 are shown in Figure 4.



	ECG	NEDCo	EPC	Mines	Direct Customers	VALCO	Export	Network Usage	Losses
Proj. Energy 2025	17,561	2,207	326	1,480	446	862	1,954	11	989
Actual Energy 2024	16,573	2,131	311	1,419	374	811	2,103	11	955
Actual Energy 2023	15,454	1,927	269	1,379	241	834	2,528	11	908

Figure 4: Projected electricity consumption by customer classes, Network Usage and Losses

ECG's share of electricity consumption will be 68.0% of the total projected electricity consumption for 2025. NEDCo is expected to constitute 8.5% of total consumption. Export (to Togo/Benin, Côte d'Ivoire and SONABEL) and Mines are projected to consume 7.6% and 5.7% of total electricity consumption, respectively (see Figure 5).

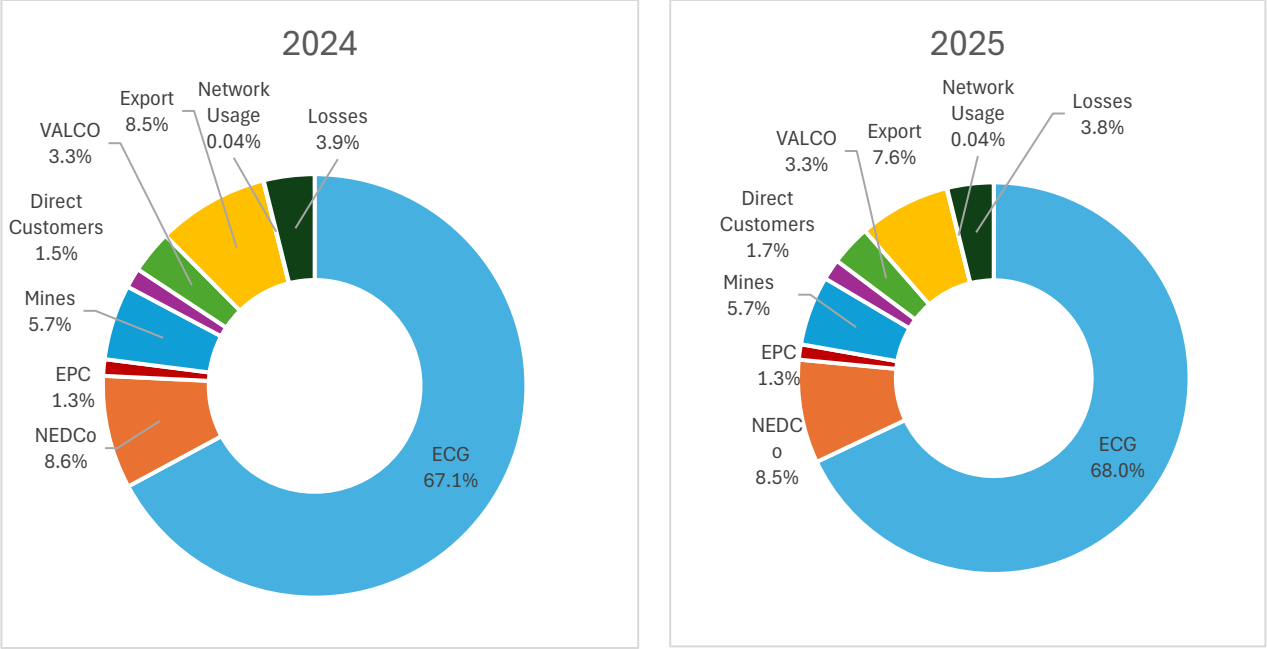


Figure 5: Share of projected electricity consumption by the various customer classes, and Losses

2.1.2.1 Transmission Loss in 2025

As of November 2024, transmission loss as a percentage of total electricity transmitted stood at 3.9% (874 GWh), the same as in 2023 and is anticipated to remain at 3.9% (915 GWh) by year-end 2024. In 2025, transmission loss is forecast to increase slightly to 955 GWh (representing 3.9% of the total electricity to be transmitted).

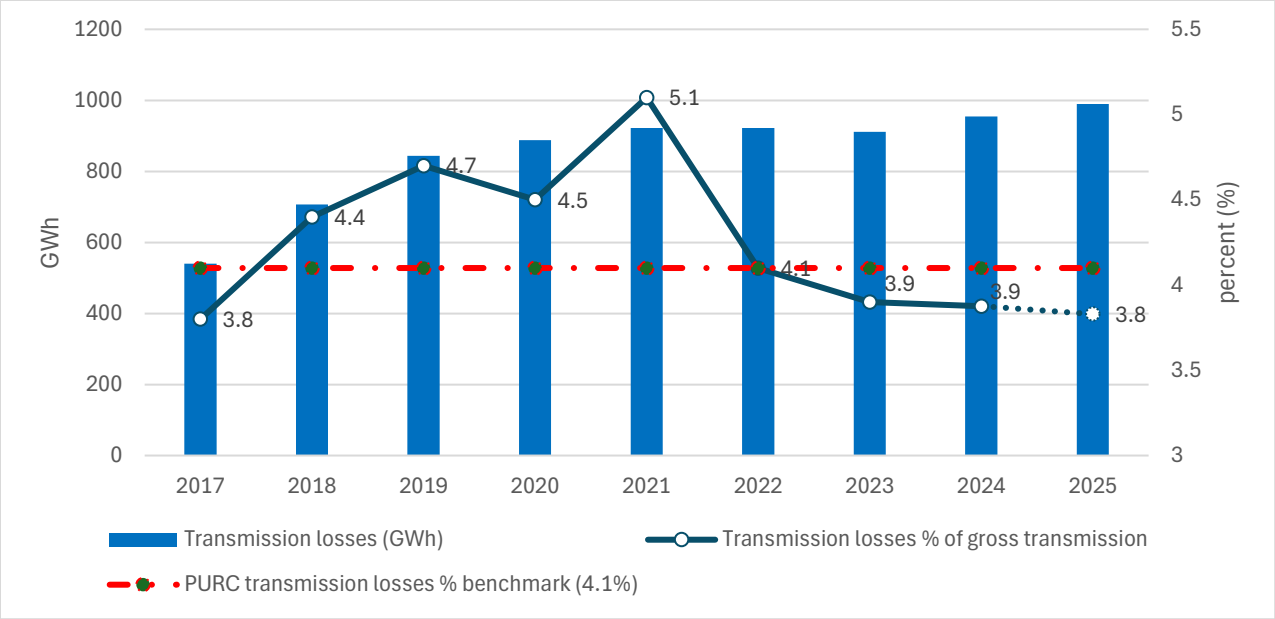
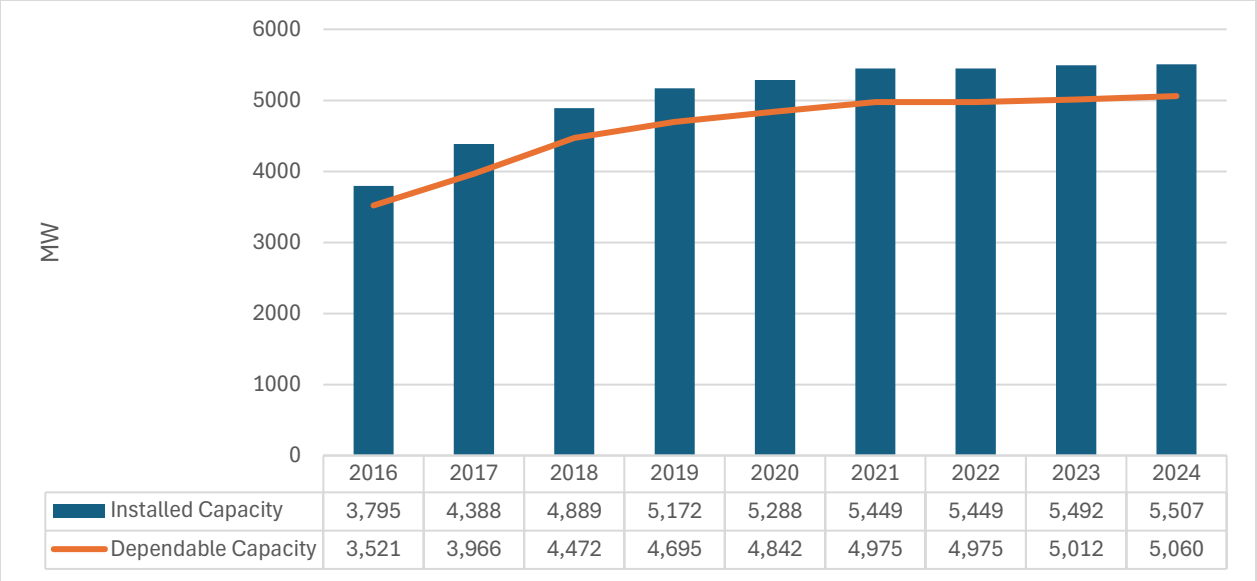


Figure 6: Trend in transmission losses

2.2 Electricity Supply Outlook

2.2.1 Generation Sources for 2025

Ghana's electricity generation sources are hydro, thermal (fired using natural gas, light crude oil, heavy fuel oil and diesel) and renewables (solar and biogas). Electricity generation capacity has increased over the last few years, as depicted in Figure 7.



	2016	2017	2018	2019	2020	2021	2022	2023	2024
Installed Capacity	3,795	4,388	4,889	5,172	5,288	5,449	5,449	5,492	5,507
Dependable Capacity	3,521	3,966	4,472	4,695	4,842	4,975	4,975	5,012	5,060

Figure 7: Installed and dependable capacity in the recent past

Total installed electricity generation capacity increased from 3,795 MW in 2016 to 5,507 MW as of December 2024, representing an increase of 45.1%. Dependable capacity increased from 3,521 MW to 5,060 MW over the same period. Excluding embedded generation units, installed capacity as of the end of December 2024 was 5,260 MW, with a total dependable capacity of 4,856 MW. Table 7 shows the full complement of power plants in Ghana and shares of installed and dependable capacities by generating sources (hydro, thermal and other renewable).

Table 1: Installed generation capacity as of the end of December 2024

Power Plant	Fuel Type	Installed Capacity (Nameplate)	% Share	Dependable Capacity	% Share
Hydro Power Plants					
Akosombo	Hydro	1,020		900	
Bui	Hydro	404		371	
Kpong	Hydro	160		140	
	Sub-total	**1,584**	**28.8%, *30.1%**	**1,411**	**27.9% *29.1%**
Thermal Power Plants					
Takoradi Power Company (TAPCO)	Oil/NG	330		315	
Takoradi International Company (TICO)	Oil/NG	340		330	
Sunon–Asogli Power (SAPP)	NG	560		530	
Tema Thermal Plant1 (TT1P)	Oil/NG	110		100	
Tema Thermal Plant2 (TT2P)	Oil/NG	80		70	
CENIT Energy Ltd (CEL)	Oil/NG	110		100	
Kpone Thermal Power Plant (KTPP)	Oil/NG	220		200	
Anwomaso Thermal	NG	250		230	
Karpower	NG/HFO	470		450	
AKSA	HFO/NG	370		330	
Cenpower	Oil/NG	360		340	
Amandi	Oil/NG	210		201	
Early Power	NG/LPG	200		190	
Genser (grid)	NG/LPG	66		58.8	
	Sub-total	**3,676**	**69.9%**	**3,444.8**	**70.9%**
Genser (embedded)	NG/LPG	115		99	
Sub–total (incl. embedded gen.)		**3,791**	**68.8%**	**3,543.8**	**70.0%**
Renewables (excl. large hydro)					
VRA Solar (Navrongo)	Solar	2.5		2	
Meinergy Solar	Solar	20		16	
BXC Solar	Solar	20		16	
VRA Solar (Lawra)	Solar	6.5		5.2	
VRA Solar (Kaleo)	Solar	28		22	
Tsatsadu Hydro	Hydro	0.045		0.045	
Bui Solar	Solar	55		44	
Safisana Biogas	Biogas	0.1		0.1	
Sub – total		**132.145**	**2.4%**	**105.345**	**2.1%**
Total (excl embedded gen.)		**5,260**		**4,855.8**	
Total (incl embedded gen.)		**5,507.145**		**5,060.345**	

*Capacity share excluding embedded generation capacity

As of November 2024, hydro plants contributed 28.8% of the total installed capacity, with conventional thermal plants and renewable sources contributing 68.8% and 2.4% respectively. Thermal plants contributed to meeting about 70.0% of the peak demand in 2024. In 2025, no committed power plants (plants expected to come online during the year) are anticipated to be commissioned. Thus, only existing capacity as of December 2024 will be considered for electricity supply in 2025.

2.2.2 Generation Sources Availability in 2025

2.2.2.1 Hydro Generation Sources

For 2025, all six units of Akosombo hydropower will be available for power generation. This gives an operating capacity of up to 900 MW with an average capacity of 150 MW for each of the six available units. Also, the Kpong hydropower plant (downstream of Akosombo) will have all four units available in 2025, with a total capacity of 140 MW. Bui hydropower plant is expected to operate one unit (110 MW) off-peak and a maximum of two units (220 MW) at peak in 2025. In critical situations, all three units (330 MW) will be dispatched to meet demand.

2.2.2.2 Thermal Generation Sources

Dependable capacity to be made available for thermal generation in 2025 amounts to 3,445 MW. Thermal facilities are primarily located in the South-East and South-West enclaves. Thermal plants in the South-East constitute 52.5% of the total dependable capacity, while the South-West is 43.6%. A power enclave in the Ashanti is the most recent, and it is expected to, among others, improve system reliability. Six units, constituting 96.1% of the 250 MW Ameri plant, were relocated to the Ashanti enclave.

In terms of ownership, Independent Power Producers (IPPs) will continue to play a significant role, providing about 65% of the dependable capacity while the remaining 35.1% is supplied by the Volta River Authority (VRA).

2.2.2.3 Renewable Generation Sources

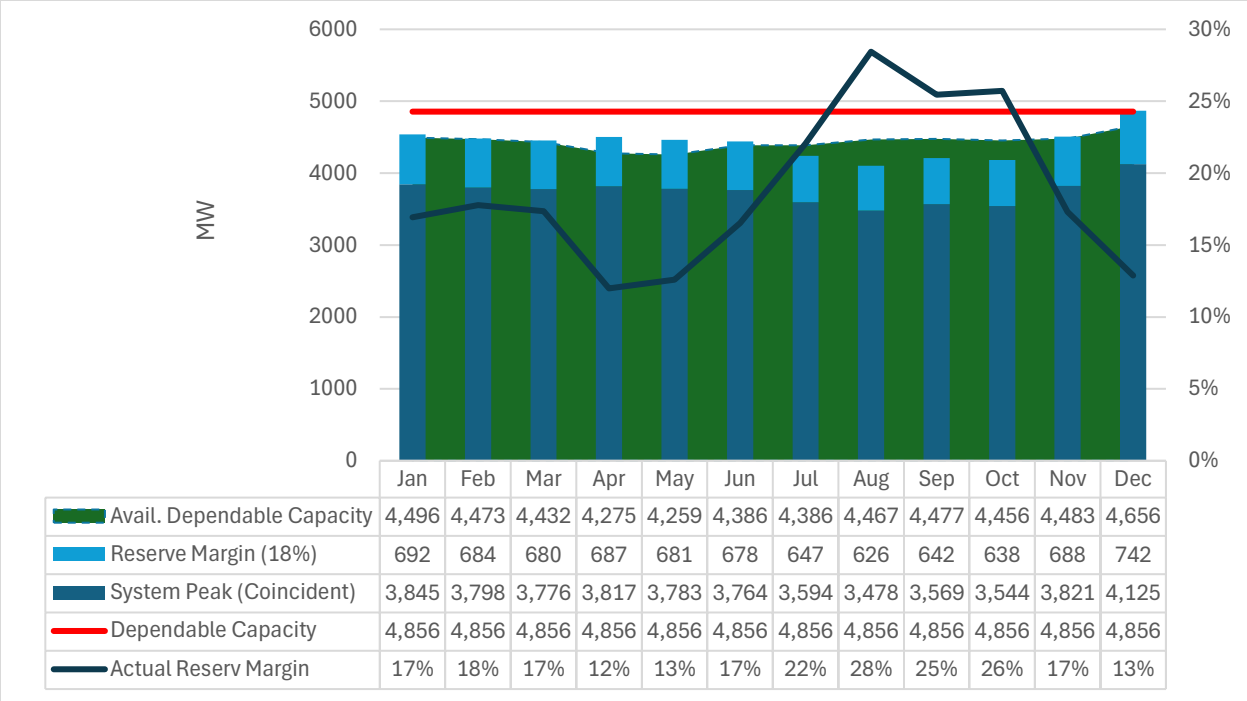
In the pursuit of a more sustainable and affordable energy future, Ghana has committed to developing its other renewable energy resources (Solar, wind and biomass). The total renewable capacity going into 2025 is 132 MW. The Volta River Authority (VRA) contributes a total of 37 MW from a few solar plants. These include a 2.5 MWp solar plant in Navrongo, a 6.5 MWp facility in Lawra, and a 28 MWp installation in Kaleo. The Bui Power Authority (BPA) adds substantial contributions through its 50 MWp Bui Solar PV farm and a 5 MWp floating solar facility to the renewable capacity. There are also private players, including BXC and Meinergy, contributing 20 MWp each to the renewable capacity.

2.2.2.4 Electricity Import

Power import in 2025 is not anticipated. However, inadvertent energy exchanges estimated at 82 GWh on tie-lines could result from transient flows. Emergency imports may be necessitated because of short-term capacity shortages caused by faults or fuel supply contingencies.

2.2.3 Generation Capacity and Projected Peak Demand

Available monthly dependable capacities, taking planned units' maintenance and fuel supply situation into consideration, are shown in Figure 8. The monthly demand-supply balance for 2025 results in reserve margins between 12% and 28%. A reserve margin of 12% in April is due mainly to planned generation maintenance and fuel supply contingency. Such a situation will require re-arrangement of non-critical outages.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avail. Dependable Capacity	4,496	4,473	4,432	4,275	4,259	4,386	4,386	4,467	4,477	4,456	4,483	4,656
Reserve Margin (18%)	692	684	680	687	681	678	647	626	642	638	688	742
System Peak (Coincident)	3,845	3,798	3,776	3,817	3,783	3,764	3,594	3,478	3,569	3,544	3,821	4,125
Dependable Capacity	4,856	4,856	4,856	4,856	4,856	4,856	4,856	4,856	4,856	4,856	4,856	4,856
Actual Reserv Margin	17%	18%	17%	12%	13%	17%	22%	28%	25%	26%	17%	13%

Figure 8: Projected monthly available capacity versus system peak for 2025

2.2.4 Demand-Supply Balance for 2025

The criteria to be used to determine which power plants would be dispatched during the year are as follows:

i. Power Purchase Agreement signed with IPPs
ii. Power plant nomination based on off-taker requirements
iii. Availability of fuel for power plants
iv. Must-run plants (e.g., solar)
v. System stability requirements
vi. PURC and EMOP energy allocation for the year

It should be noted that in instances where there is a supply surplus, some plants would not be dispatched. The aggregated electricity demand-supply balance for 2025 is presented in Table 4.

Table 2: Projected electricity demand/supply balance for 2025, GWh

Customer Class	**Demand/Supply**
Domestic	23,020
VALCO	862
Export (CEB+CIE+SONABEL)	1,954
Proj. Energy Consumption	**25,836**
Generation Sources	
Hydro	
Akosombo	6,205
Kpong	1,095
Bui	1,261
Sub-total	**8,561**
Thermal	
AKSA	512
Amandi	1,463
Anwomaso	1,144
CENIT	56
Cenpower	1,939
EarlyPower	1,163
Karpower	2,675
KTPP	550
SAPP	2,959
TAPCO	1,999
TICO	1,409
Import	82
TT1PP	670
TT2PP	-
Genser	457
Sub-total	**17,079**
Renewable	
BuiSolar	81
BXCSolar	24
MeinergySolar	28
VRA Solar Keleo	49
VRA Solar Lawra	10
VRA Solar Naverongo	3
Safisana	1
Sub-total	**196**
Grand Total	**25,836**

As of November 2024, hydro generation marked a noteworthy ascent, recording 9,077 GWh, representing a substantial 9.5% increase compared to the same period in 2023. This surge

was primarily attributed to exceptionally high inflows into the Akosombo dam in 2023. Projections suggest that by the end of 2024, hydro generation will be about 9,943 GWh.

In 2025, total hydro generation is estimated to be 8,561 GWh, signifying a 13.9% decrease from the full-year generation of 2024. The envisaged decline in hydro generation in 2025 is attributed to a reversal of astronomical high inflows into the Akosombo dam in 2023, prompting water spillage to preserve the structural integrity of the dam.

A greater portion of electricity generation is from thermal sources. Between January and November 2024, the total electricity generated from thermal sources amounted to 13,178 GWh, an increase from the 12,999 GWh generated during the same period in 2023. Estimates indicate that by the end of 2024, the generation from thermal sources is expected to reach 14,580 GWh, marking a 2.7% increase from the year-end generation recorded in 2023. The forecast for year-end 2025 suggests a total generation of 16,997 GWh, reflecting a 16.7% increase over the generation in 2024 (see Figure 9).

Generation from renewable sources is expected to be 196 GWh in 2025, down from an anticipated 166 GWh by the end of 2024 (see Figure 9).

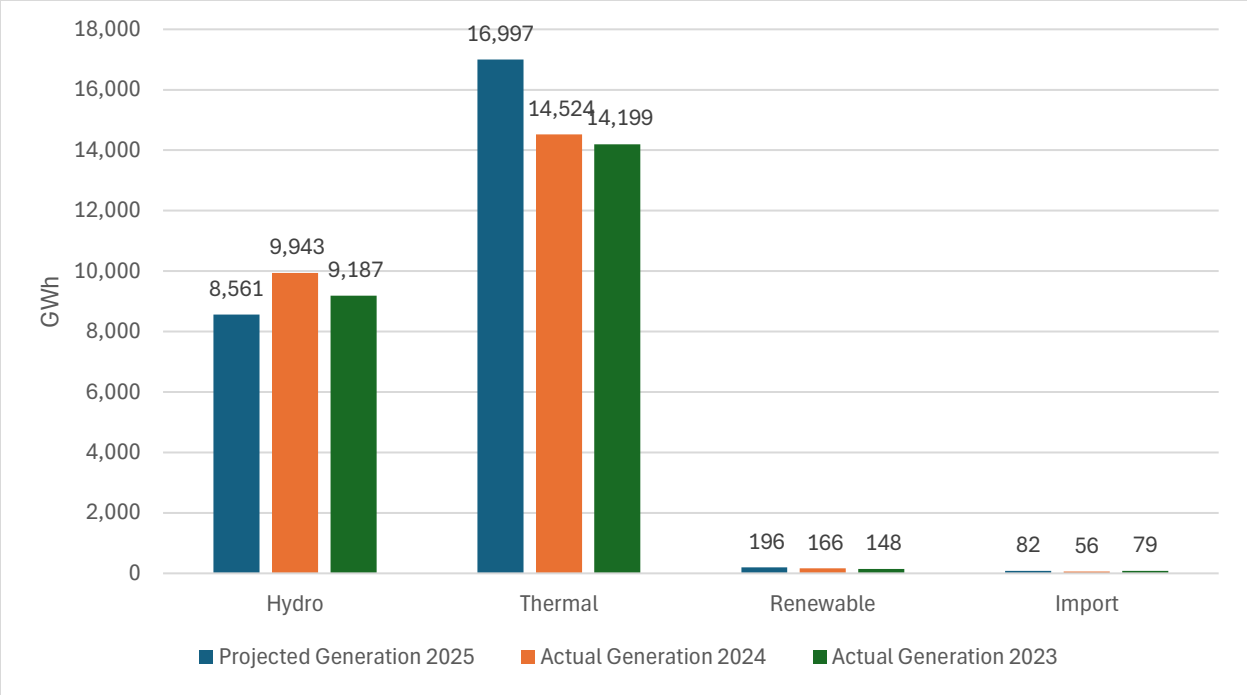


Figure 9: Projected electricity generation by generation source for 2025

Figure 10 shows the share of generation from various sources in 2025. Thermal generation and hydro generation would constitute 66.1% and 33.1% of total generation in 2024. Generation from renewable sources (solar PV and Biogas) would constitute 0.8%. This indicates the dominance of thermal generation in Ghana's overall generation mix and, consequently, the critical role that fuel availability to the thermal plants plays in power supply reliability and supply security in the Ghana power system.

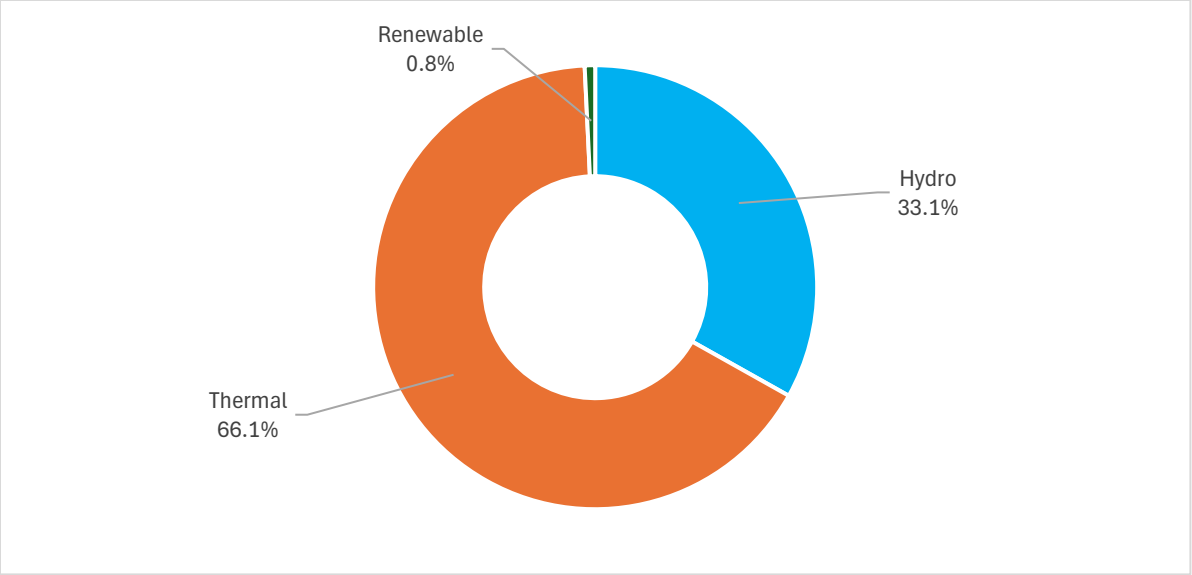


Figure 10: Share of electricity supply by generation source in 2025

2.3 Fuel Supply Outlook

2.3.1 Fuel Requirements

Natural gas will continue to be the dominant fuel for thermal electricity generation in 2025. It is expected to come from indigenous gas fields (Jubilee, TEN and ENI Sankofa) and from import through WAGP. Based on the projected electricity supply from thermal sources, the total natural gas requirement for power generation for 2025 is projected to be 151.4 TBtu. The total fuel requirement for each thermal plant is shown in Figure 11.

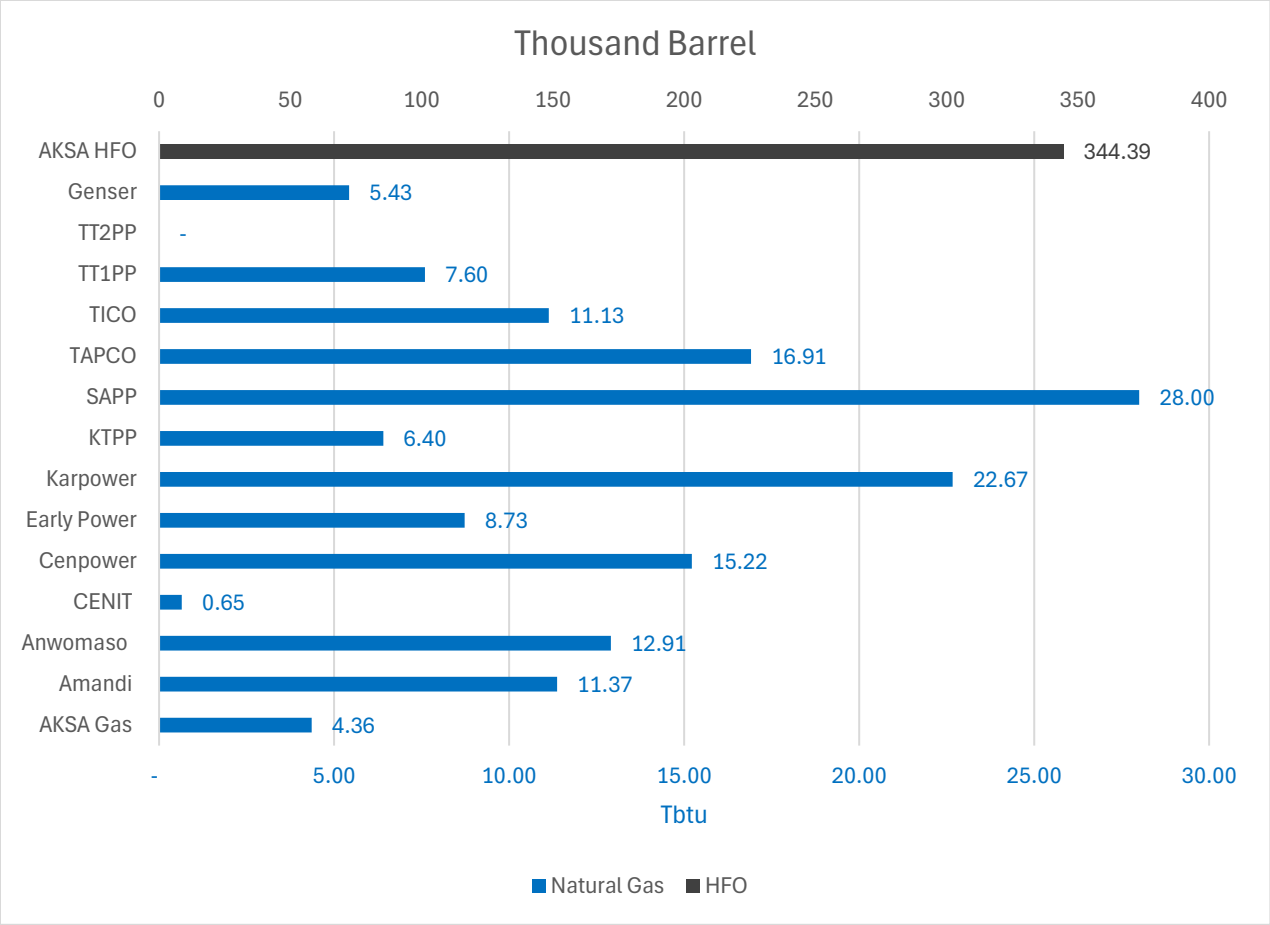


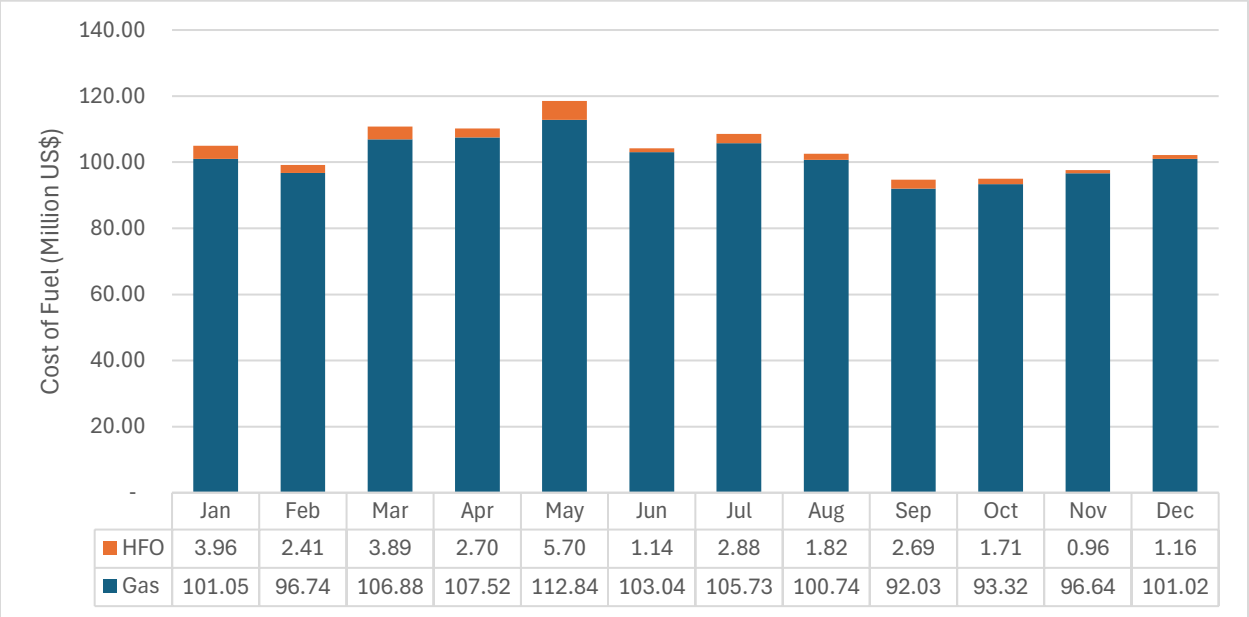
Figure 11: Thermal plants' fuel requirements for 2025

The AKSA plant fuels some of its units using HFO and is expected to operate those as a standby in 2025. The plant will require a total of 344,387 barrels in the year. Light crude oil (LCO) and diesel would be required as backup fuels for some plants because of anticipated gas supply outages.

2.3.2 Fuel Price and Cost

It is expected that the Weighted Average Cost of Gas (WACOG) will remain at US$8.04/MMBtu. Thus, about US$1,217.54 million would be needed for gas procurement in 2025. This translates to a monthly average of US$101.46 million. HFO for the running of the AKSA plant would be procured at an expected delivery price of US$90/barrel and about $30.99 million will be required to procure HFO. Overall, an amount of US$1,248.53 million

is required to purchase fuel for thermal power generation in 2025. Figure 12 presents the monthly total cost of natural gas and HFO.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HFO	3.96	2.41	3.89	2.70	5.70	1.14	2.88	1.82	2.69	1.71	0.96	1.16
Gas	101.05	96.74	106.88	107.52	112.84	103.04	105.73	100.74	92.03	93.32	96.64	101.02

Figure 12: Expected monthly total cost of natural gas and HFO for thermal plants in 2025

2.5 Electricity Supply Challenges in 2025

2.5.1 Fuel Supply Challenges

Hydro Risk

Even though there are high prospects for rainfall in 2025, it would still be prudent to continue the conservative dispatch of the hydro plants to ensure that the reservoirs are not drawn down below their minimum operating levels to guarantee sustainable operations in the coming years. The availability and reliability of the thermal units are key to maintaining the planned hydro draft rate.

Fossil Fuel Risk

Currently, all thermal power plants in Ghana (except some units of the AKSA plant) run on natural gas as their primary fuel. About 80.0% of the thermal plants are dual-fueled, with their secondary fuel being liquid fuels (LCO and DFO). These plants provide strategic options

for generations in instances where gas supply interruptions occur due to planned and unplanned maintenance of gas facilities.

In 2025, significant gas supply challenges are expected due to major planned maintenance activities (see Section 5.2.5). Consequently, it will be essential to either increase gas supply from import and available domestic sources (Sankofa or AGPP) or procure liquid fuels to ensure the continued operation of the dual-fueled thermal plants during these maintenance periods.

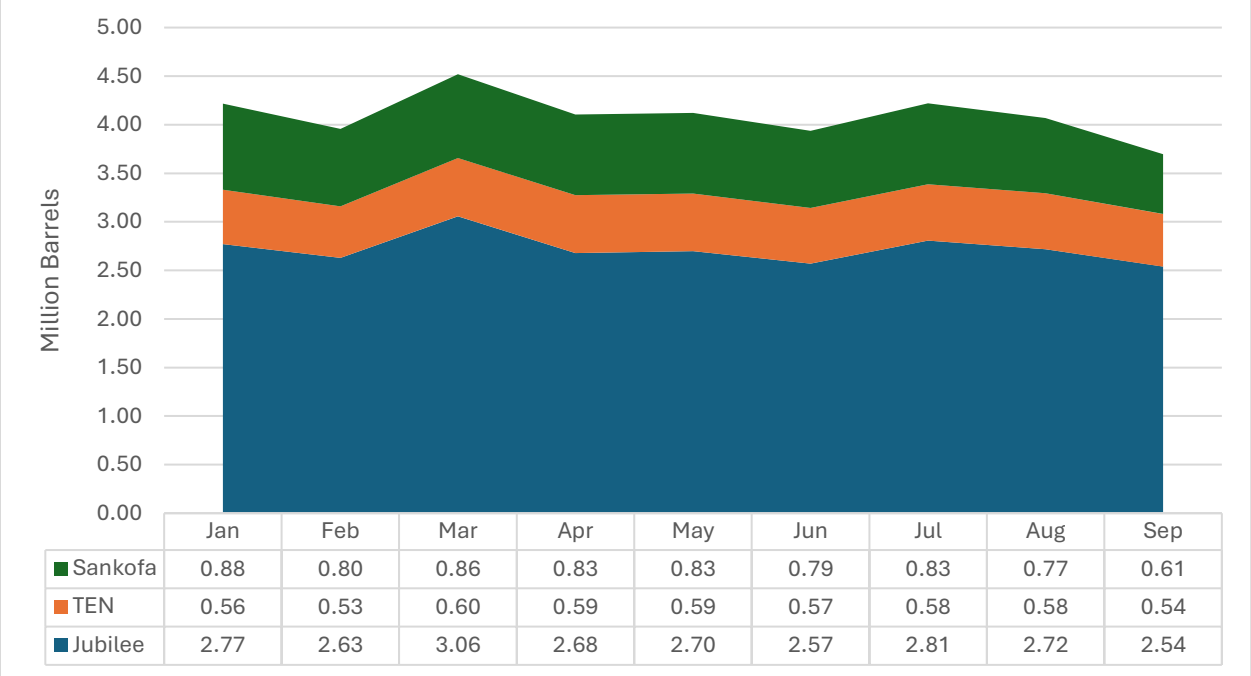
Chapter Three: Petroleum Outlook 2025

3.1 Petroleum Sector Performance in 2024

3.1.1 Crude Oil Production

Crude oil production in Ghana continues to be from the three main fields: Jubilee, Tweneboa Enyenra Ntomme (TEN), and Sankofa Gye Nyame (hereafter referred to as the Sankofa field).

As of September 2024, total crude oil output from these fields reached 36.841 million barrels, an increase of about 4.01% from the 35.419 million barrels produced during the same period in 2023. This growth in production is largely attributed to newly appraised and producing-wells in the Jubilee field since November 2023. Figure 13 illustrates the monthly crude oil production from these three fields up to September 2024.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sankofa	0.88	0.80	0.86	0.83	0.83	0.79	0.83	0.77	0.61
TEN	0.56	0.53	0.60	0.59	0.59	0.57	0.58	0.58	0.54
Jubilee	2.77	2.63	3.06	2.68	2.70	2.57	2.81	2.72	2.54

Figure 13: Monthly crude oil production up to September 2024.

Source: Petroleum Commission (PC), GNPC

As of September 2024, the Jubilee field produced a total of 24.468 million barrels of crude oil, up from 21.939 million barrels over the same period in 2023. The TEN field recorded

5.149 million barrels, an increase from 5.017 million barrels in the previous year. The highest cumulative monthly oil produced within the reporting period was recorded in March 2024, because of the ramping up of J03-P and J69-P (post-commissioning of J69-P in late February)[3]. The low production obtained in June 2024 was mainly attributed to facility upsets. Production was reduced to manage high flaring because of the low-pressure gas compressor (LPGC-A) trip and Ghana National Gas Limited Company (GNGLC) processing plant trip. Conversely, the Sankofa field experienced a 14.6% decline, producing 7.223 million barrels compared to 8.462 million barrels in 2023. According to the Petroleum Commission, the reduced production from the Sankofa fields was mainly due to the ongoing repairs of an electrical failure following the unplanned plant shutdown that occurred in October 2023 and the unavailability of a High-Pressure Flash Gas compressor. This repair work resulted in the choking down of some wells to minimize flaring rates.

Average daily production across the three fields also rose in 2024, reaching 134,426 barrels per day—an increase of 3.65% from 129,687 barrels per day in 2023. This daily output exceeded the projected[4] average daily production for 2024 by 15.08% (Figure 14).

[3] https://www.piacghana.org/ova_doc/2024-piac-semi-annual-report/
[4] 2024 Energy (Supply and Demand) Outlook for Ghana: http://energycom.gov.gh/planning/data-center/energy-outlook-for-ghanalo

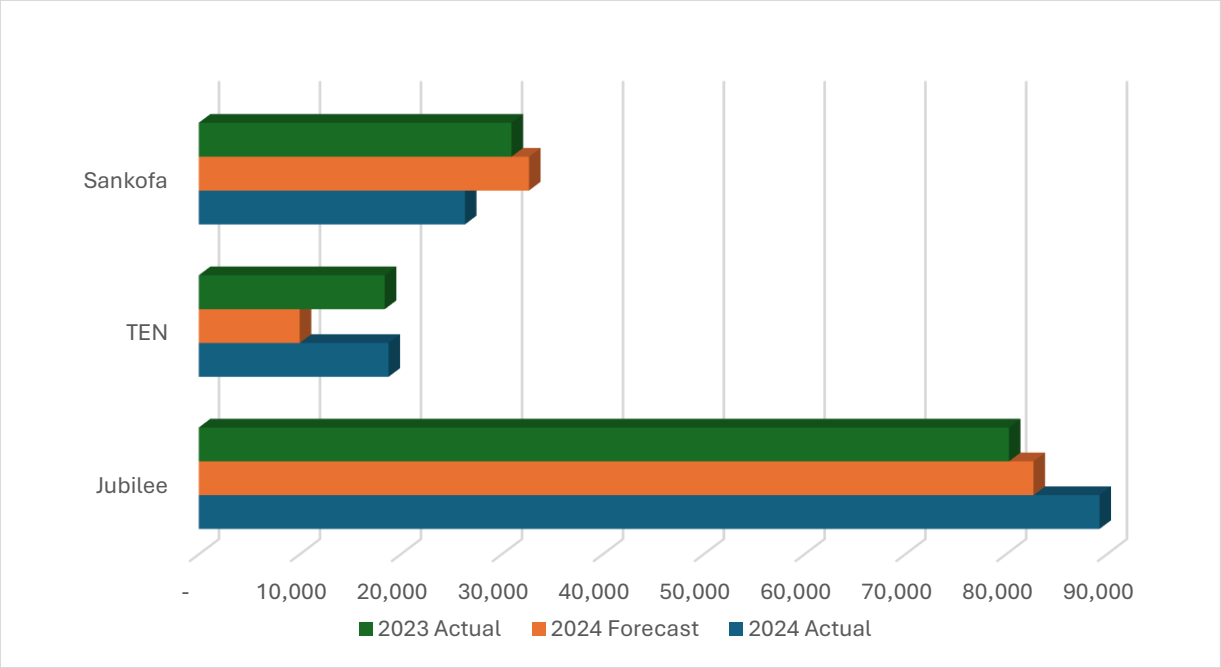
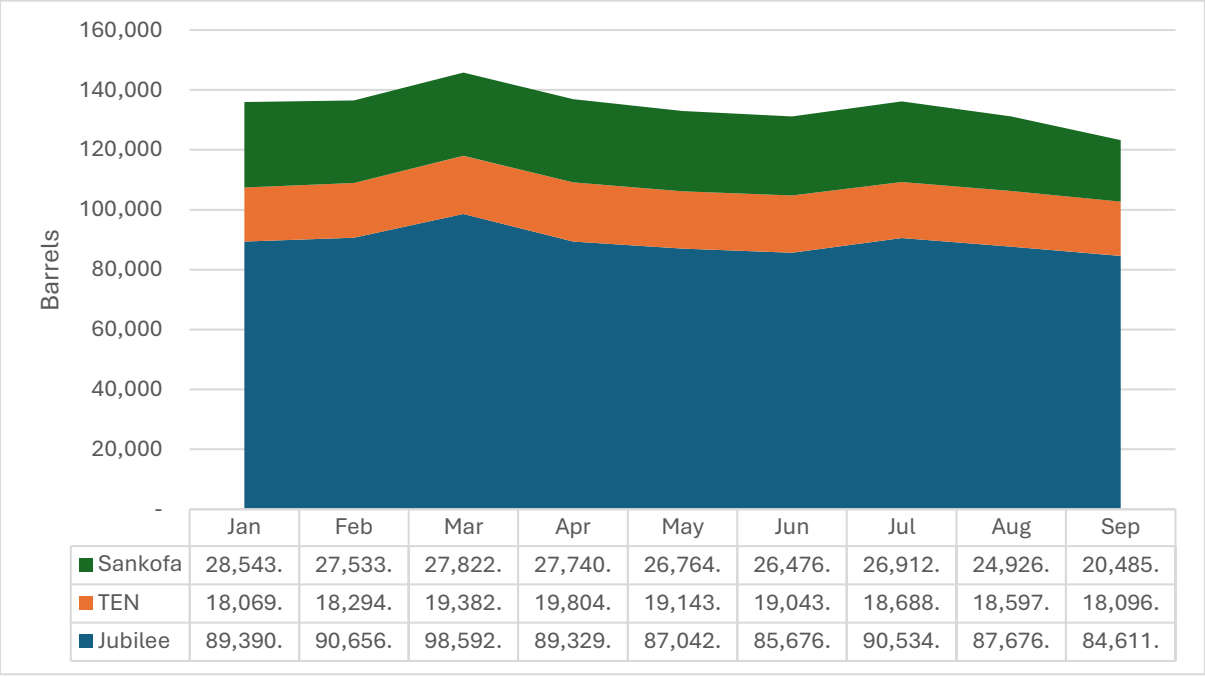


Figure 14: Actual and projected average daily production of crude oil (January-September)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Sankofa	28,543.	27,533.	27,822.	27,740.	26,764.	26,476.	26,912.	24,926.	20,485.
TEN	18,069.	18,294.	19,382.	19,804.	19,143.	19,043.	18,688.	18,597.	18,096.
Jubilee	89,390.	90,656.	98,592.	89,329.	87,042.	85,676.	90,534.	87,676.	84,611.

Figure 15: Monthly average daily volumes of crude oil production in 2024

Source: PC, GNPC

From January to September 2024, the Jubilee field's average daily production increased to 89,279 barrels, up by 11.19% from 80,297 barrels during the same period in 2023. The TEN

field also saw a slight increase in average daily production, rising from 18,417 barrels in 2023 to 18,791 barrels in 2024. However, the Sankofa field experienced a 14.9% decline in average daily production, dropping from 30,973 barrels per day in 2023 to 26,356 barrels per day in 2024.

3.1.2 2024 Crude Oil Price

In 2024, WTI and Brent crude oil prices showed notable fluctuations driven by global economic and geopolitical factors. Prices rose from $73.10 (WTI) and $78.36 (Brent) in January to a peak of $88.85 in April, fueled by recovering global demand, OPEC+ production cuts, and seasonal factors like the summer driving season. However, prices declined by November, with WTI at $69.76 and Brent at $73.63, influenced by OPEC's production decisions, competition from non-OPEC producers, and China's slowing demand[5]. Meanwhile, India's rising energy needs supported demand, partially offsetting China's decline. The Russia-Ukraine war added volatility through supply disruptions and sanctions, while broader economic trends and technological advancements underscored the complexities of the global oil market.

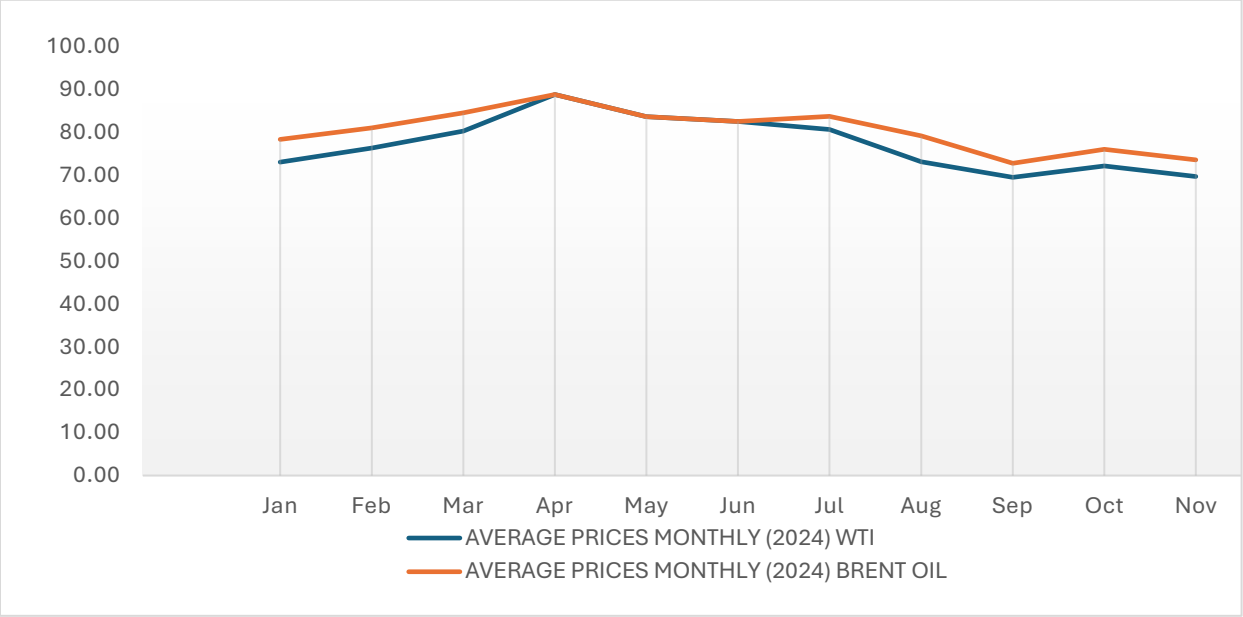


Figure 16: Trends in 2024 crude oil prices

[5]https://www.opec.org/opec_web/static_files_project/media/downloads/publications/OPEC_MOMR_July_2023.pdf

Source: U.S Energy Information Administration

3.1.3 Gas Export from Producing Fields 2024

From January to July 2024, total raw gas exports from Jubilee and TEN (associated gas) to the Atuabo Gas Processing Plant (AGPP) and from Sankofa (non-associated gas) to the ENI Offshore Receiving Facility (ENI ORF) increased significantly. As of July 2024, total gas exports reached 70,903.69 MMscf, marking an 11.8% rise compared to 63,401.85 MMscf exported over the same period in 2023. Figure 17 illustrates monthly gas exports from the three fields in 2024.

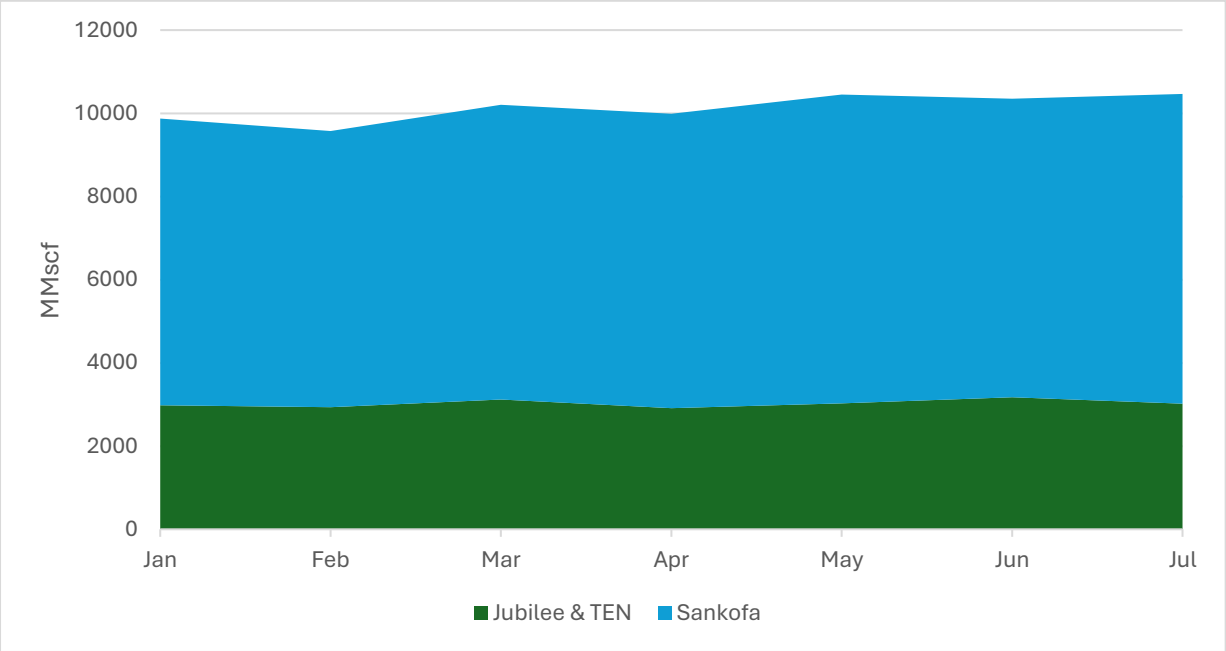


Figure 17: Monthly raw gas exported from Jubilee, TEN and Sankofa in 2024(Jan-July)
Source: PC

The Atuabo Gas Processing Plant (AGPP) continues to receive a steady supply of raw gas from the Jubilee and TEN fields. As of July 2024, combined gas exports from these fields under the substitution agreement totalled 21,170 MMscf. From January to July 2024, approximately 57.7% (48,393.3 MMscf) of the gas produced was reinjected to maintain reservoir pressure and support enhanced oil recovery, while total flared gas amounted to 9,592.5 MMscf. Gas exports to the AGPP represented 25.27% of the total gas produced. Notably, raw gas exports

from Jubilee and TEN for processing in 2024 were 2.1% higher than in the same period of 2023 (20,735 MMscf).

The Sankofa field exported 49,734 MMscf, representing 93.3% of non-associated gas produced, to the Offshore Receiving Facility (ORF) between January and July 2024—matching its share in 2023. This volume reflected a 16.56% increase over the same period in 2023 (42,667 MMscf). A total of 8,149 MMscf was flared on the FPSO John Agyekum Kuffour during this period, with the remaining gas reinjected or used for onboard electricity generation.

From January to July 2024, the combined average daily gas export from the three fields was 333 MMscfd, marking a 1.1% increase over 2023. Figure 18 displays the monthly average gas exports from these fields in 2024.

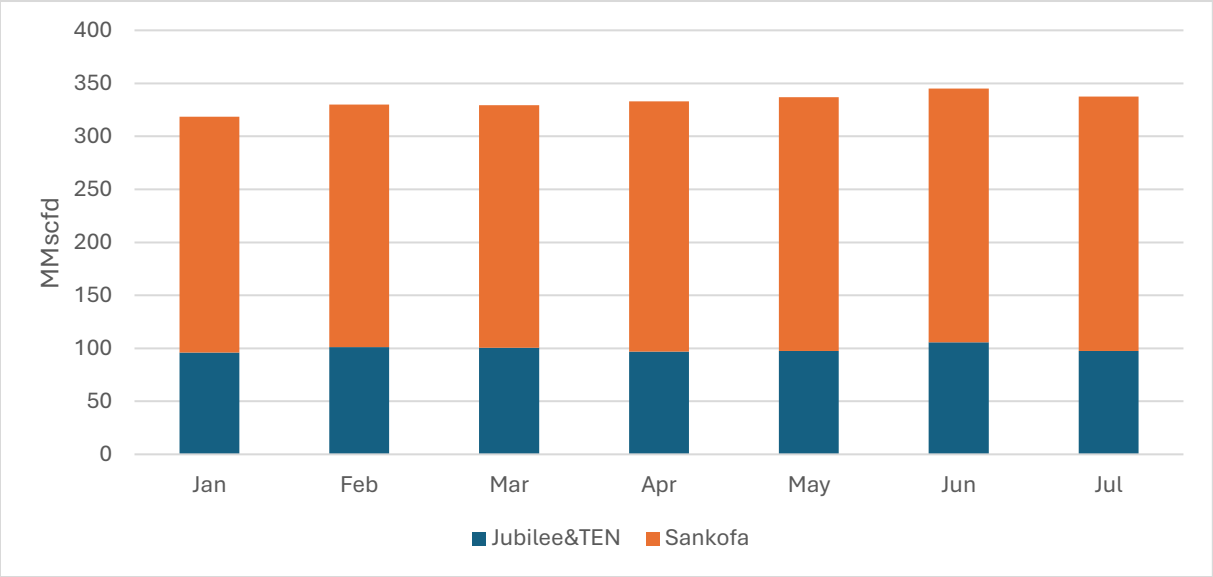


Figure 18: Monthly average daily export of gas from the three fields from January-July in 2024
Source: PC

The daily export of raw gas from the Jubilee and TEN fields averaged 99.4 MMscfd from January to July 2024, up from 95.4 MMscfd during the same period in 2023. Similarly, the daily average export of non-associated gas from the Sankofa field rose to 233.5 MMscfd in 2024, compared to 201 MMscfd in 2023.

3.1.4 Lean Gas Supplied In 2024

Between January and June 2024, total lean gas supply from domestic sources and imports rose to 70,578 MMscf, up from 64,400 MMscf recorded in 2023 over the same period. The supply in 2024 comprised 16,954 MMscf from the Atuabo Gas Processing Plant (AGPP) using raw gas from the Jubilee fields, 42,291 MMscf of non-associated gas received at the ENI Offshore Receiving Facility (ORF), and an additional 11,377 MMscf imported from Nigeria via the West African Gas Pipeline Company (WAGPCo). The increased supply in 2024 was driven by higher offtake for electricity generation and rising demand for non-power applications. Monthly lean gas supplies from these sources are shown in Figure 19.

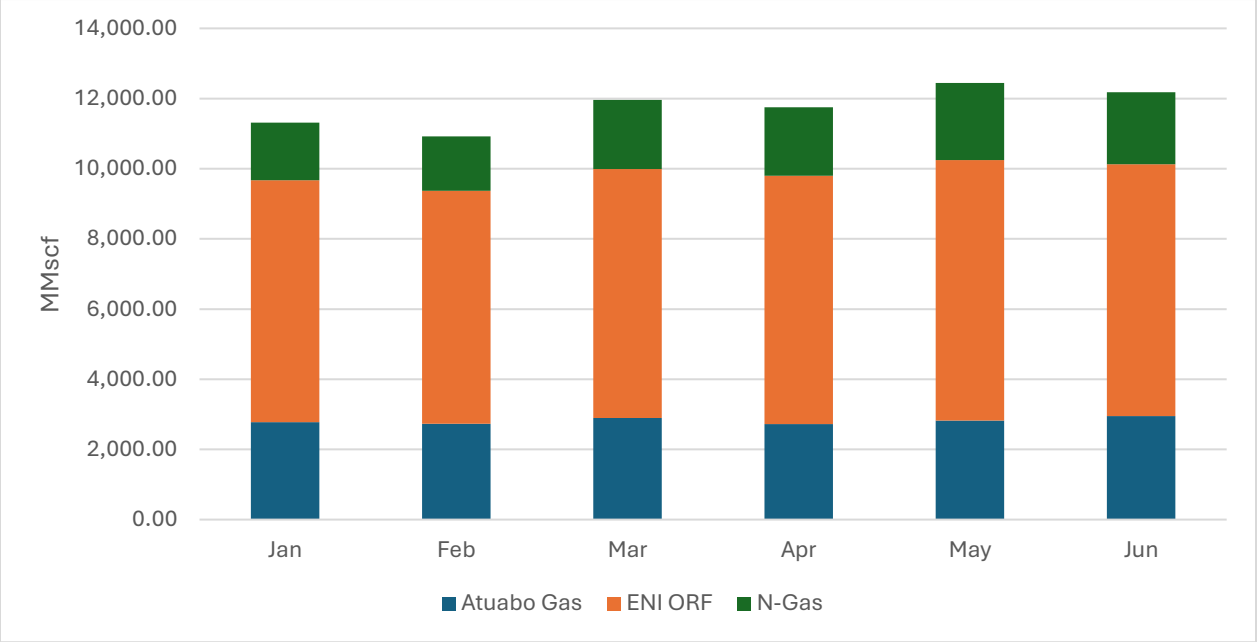


Figure 19: 2024 Monthly lean gas supplied by AGPP, ENI ORF and WAGPCo

Source: GNGC, VRA

The daily flow rate from AGPP averaged 85.79 MMscfd, slightly below the projected 97 MMscfd. Supply from ENI to the ORF averaged 233.98 MMscfd, approximately 1.5% below the 2024 projection of 237.5 MMscfd. Meanwhile, N-Gas averaged 62.86 MMscfd from January to June 2024, exceeding the projected rate of 60 MMscfd. Figure 20 presents the projected and actual flows of lean natural gas for 2024.

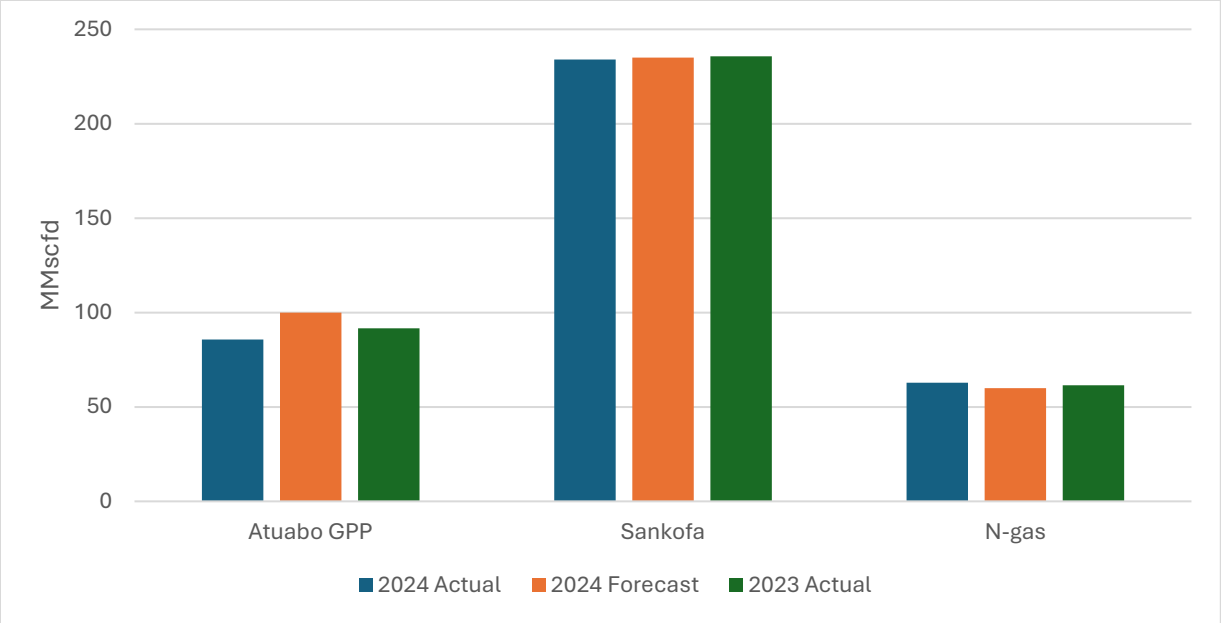


Figure 20: 2024 Actual and projected average daily lean natural gas flows (January-July)

As of August 2024, a total of 81,249.48 MMscf was consumed by power plants for electricity generation while industrial consumption stood at 6,262.97 MMscf.

3.1.5 2024 Petroleum Product Consumption

As of August 2024, total petroleum product consumption in the country reached 3,400 kilotonnes, surpassing the projected consumption of 3,130 kilotonnes for the same period. Total petroleum product consumption is projected to increase by 3.4% year-on-year in 2024, reaching 5,067.4 kilotonnes. Figure 21 shows the trend in petroleum product consumption since 1999, covering key products such as gasoil, gasoline, LPG, ATK, kerosene, premix, RFO, and marine gas oil (MGO).

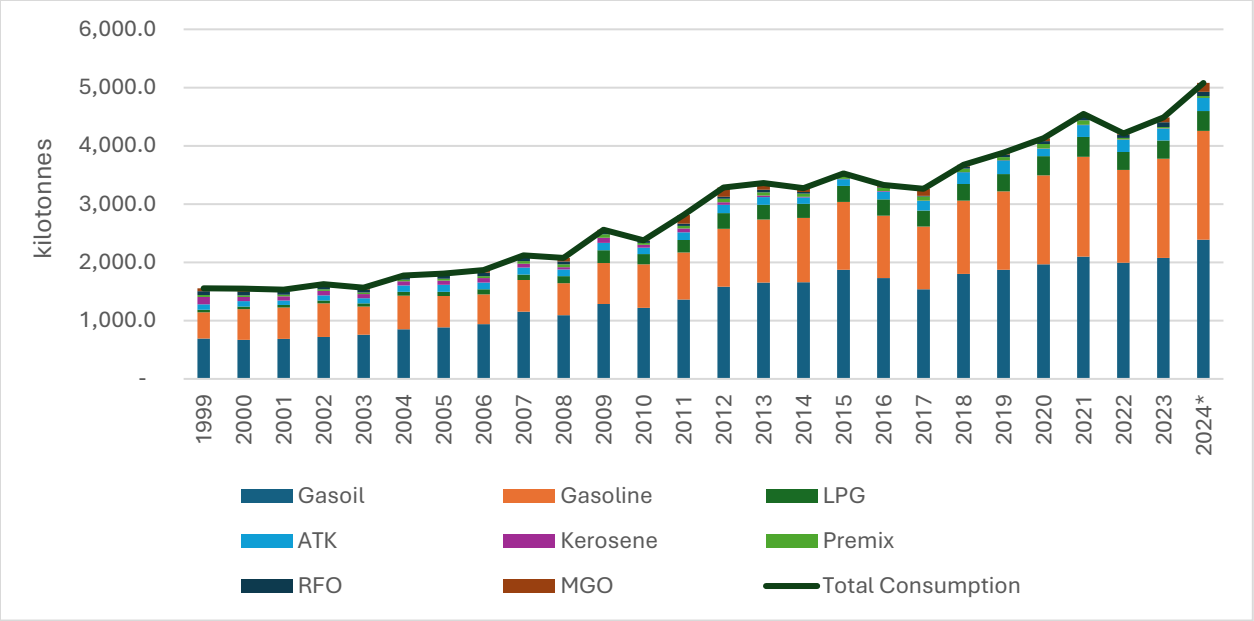
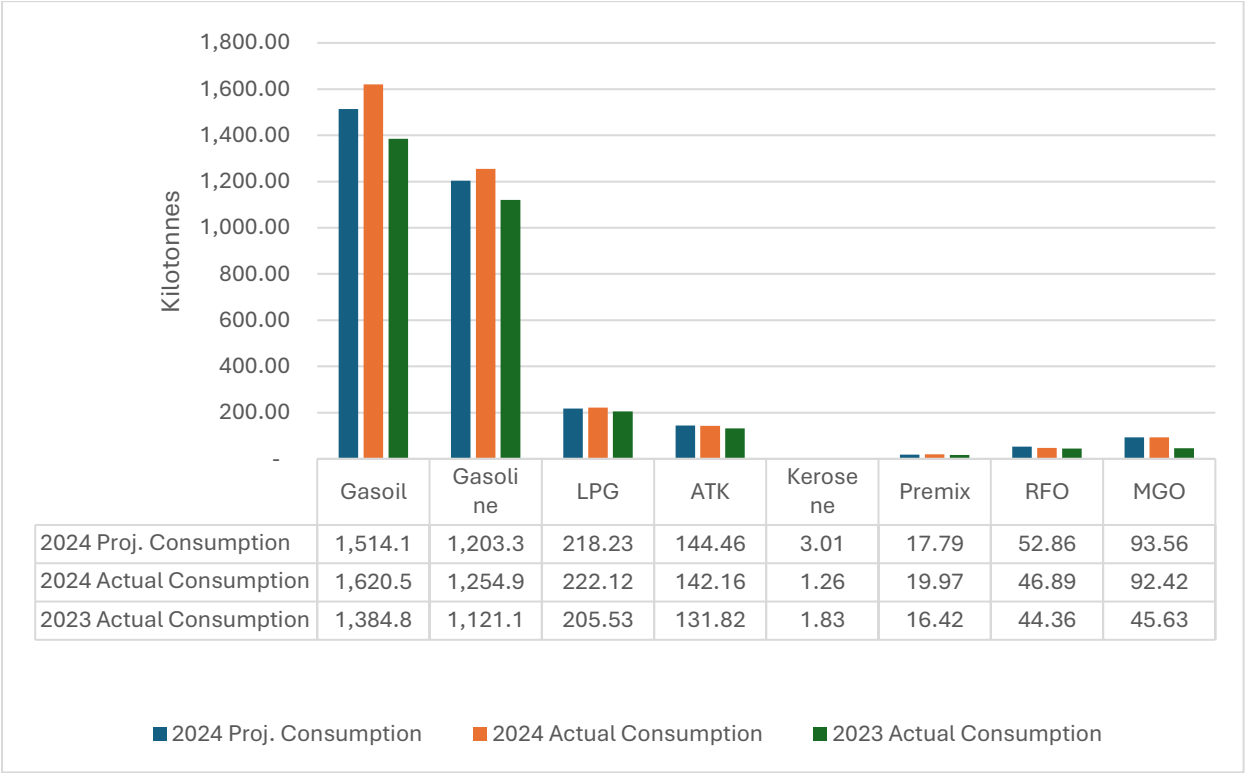


Figure 21: Trend in petroleum products consumption from 1999-2024*

Source: NPA, EC



	Gasoil	Gasoline	LPG	ATK	Kerosene	Premix	RFO	MGO
2024 Proj. Consumption	1,514.1	1,203.3	218.23	144.46	3.01	17.79	52.86	93.56
2024 Actual Consumption	1,620.5	1,254.9	222.12	142.16	1.26	19.97	46.89	92.42
2023 Actual Consumption	1,384.8	1,121.1	205.53	131.82	1.83	16.42	44.36	45.63

Figure 22: Projected verses of actual consumption of major petroleum products in 2024

Gasoil consumption as of August 2024 was 1,621 kilotonnes, marking a 17% increase over 2023's 1,385 kilotonnes and a 7% deviation from the projected 1,514 kilotonnes. Similarly, gasoline consumption reached 1,254 kilotonnes, up from 1,121 kilotonnes in 2023, but fell short of the 2024 projection of 1,203.4 kilotonnes by 4.3% (Figure 22). LPG, ATK, and premix consumption also grew by 8.1%, 7.9%, and 21.6%, respectively, compared to their 2023 levels. MGO consumption, however, saw a substantial increase of 102.5%, rising from 45.6 kilotonnes in 2023 to 93.56 kilotonnes in 2024. Figure 23 illustrates the monthly trend in actual petroleum product consumption from January to August, with projections for September to December 2024.

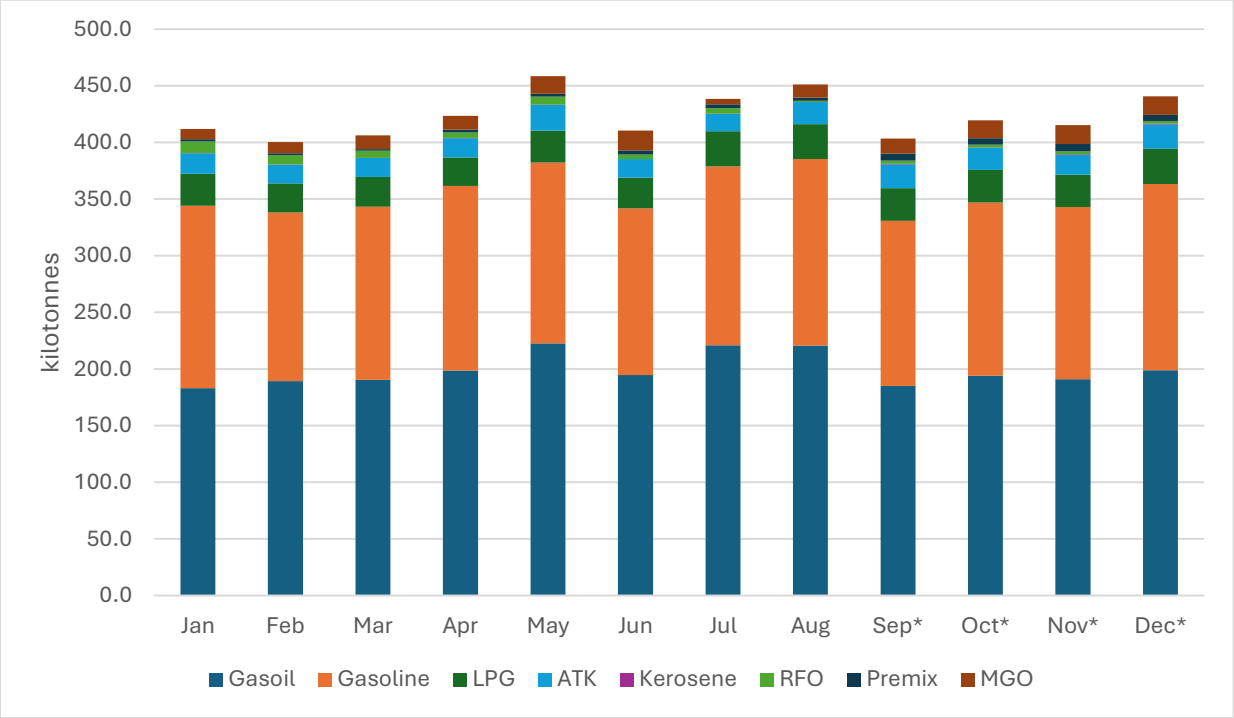


Figure 23: Monthly consumption of petroleum products in 2024

Source: NPA, EC

3.1.6 2024 Petroleum Product Prices

The ex-pump price trends for Premium (Gasoline), Gas Oil, and LPG in Ghana during 2024, published biweekly by the National Petroleum Authority, shows significant volatility influenced by global crude oil prices and exchange rate volatility.

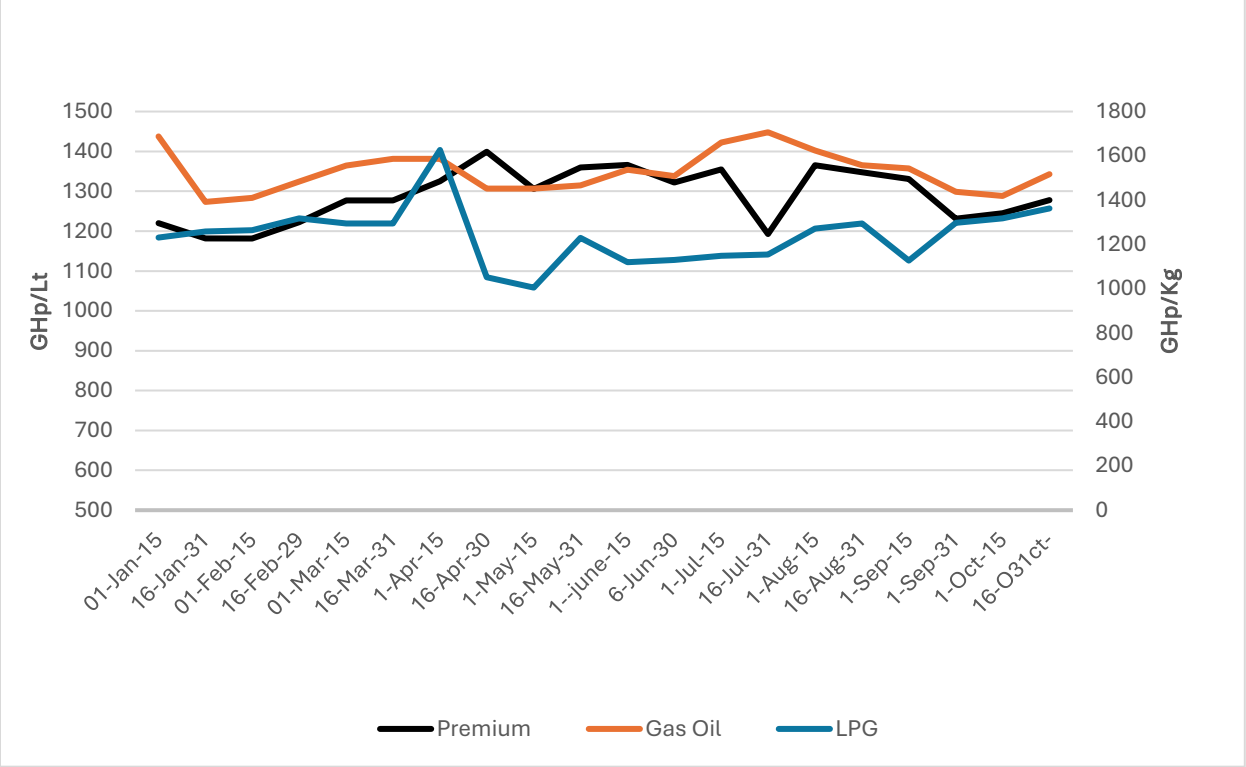


Figure 24: Trends in petroleum product prices

Premium fuel started at 1,219.9 GHp/Lt in January, peaked at 1,399.1 GHp/Lt in April, and then declined to 1,193 in July. Gas Oil experienced a general upward trend, rising from 1,437.8 GHp/Lt in January to a high of 1,448.0 GHp/Lt in July, with minor variations. LPG prices exhibited the most volatility, increasing sharply from 1,231.7 GHp/Kg to a peak of 1,626.6 GHp/Kg in April, before declining to 1,005.0 GHp/Kg in May and stabilizing around 1,100–1,200 GHp/Kg mid-year. Figure 24 shows the trends in the prices of some selected petroleum products.

3.2 Petroleum Outlook for 2025

3.2.1 Crude Oil Production Outlook

Ghana's crude oil production has been on a decline since the onset of the COVID-19 pandemic in 2020-2023, however, production has been increasing due to appraised and producing wells in the Jubilee and TEN in the last quarter of 2023. Projections indicate that production is expected to reach 50.34 million barrels, reflecting a 2.5% increase compared to the 2024 production of 49.12 million barrels. Figure 25 presents the expected monthly volumes of crude oil production from the three fields in 2025.

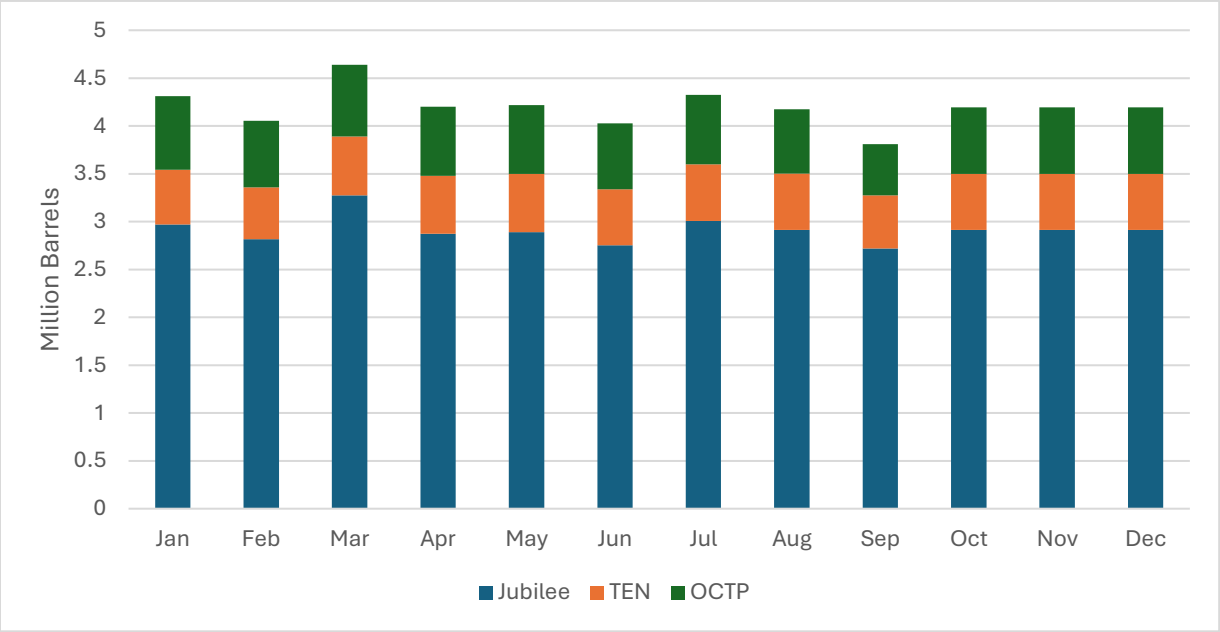


Figure 25: Monthly crude oil production outlook for 2025.

Source: Energy Commission, PIAC Technical Consultative Workshop

Production from Jubilee and TEN fields are expected to increase by about 7% and 2% respectively. Production from Jubilee is expected to increase from the 2024 production of 32.62 million barrels to 34.96 million barrels in 2025. Also, production from TEN is expected to increase slightly from 6.87 million in 2024 to 7.02 million barrels in 2025. However, production from Sankofa is expected to decrease by about 13% from the 2024 production.

Average daily production from the three fields combined is expected to be slightly higher in 2025, averaging 135,336 barrels per day, an increase of 0.7% from 2024 production. Figure 26 presents the expected monthly average daily production of crude oil in 2024.

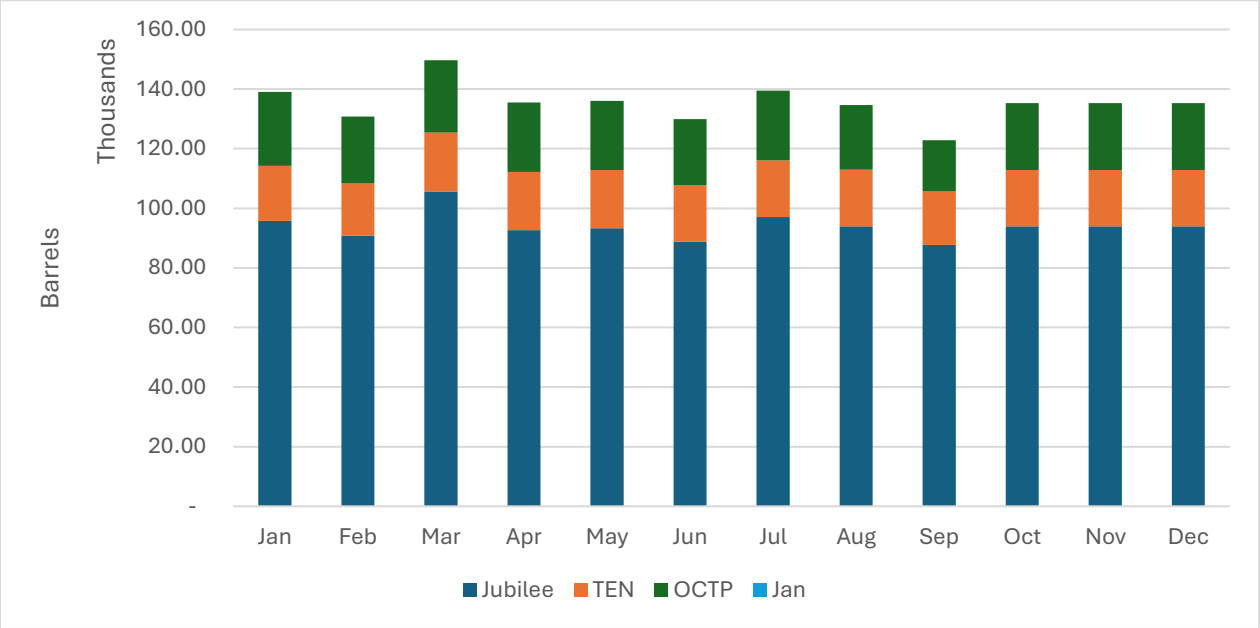


Figure 26: Projected daily average crude oil production for 2025

Source: Energy Commission

The average daily production from the Jubilee fields will be 93,977 up from the projection of 89,279 barrels in 2024, while that of TEN will also increase from the projected average of 18,791 barrels per day in 2024 to 18,886 bpd. However, production from Sankofa is expected to reduce to 22,492 barrels per day in 2025 as against the 26,356 bpd recorded in 2024.

3.2.2 Crude Oil Price 2025

The EIA[6] and Goldman Sachs[7] projects that Brent crude prices will average around $76 per barrel in 2025, reflecting a decline from the 2024 average of $82 per barrel. This forecast is influenced by several key factors. Firstly, the EIA has downgraded its expectations for global

[6] https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf
[7] https://www.reuters.com/business/energy/goldman-sachs-expects-oil-prices-average-around-80bbl-2024-2024-11-22/

oil demand growth, particularly in developed economies, which is expected to rise by only 1.3 million barrels per day (bpd) in 2025. Additionally, OPEC+ is anticipated to maintain production cuts, which will limit supply but may not be enough to counterbalance the expected increase in non-OPEC production. The EIA also notes that U.S. shale production is projected to grow at a slower rate, contributing to a more balanced market. Furthermore, geopolitical tensions, particularly in the Middle East, could lead to supply disruptions, adding volatility to prices.

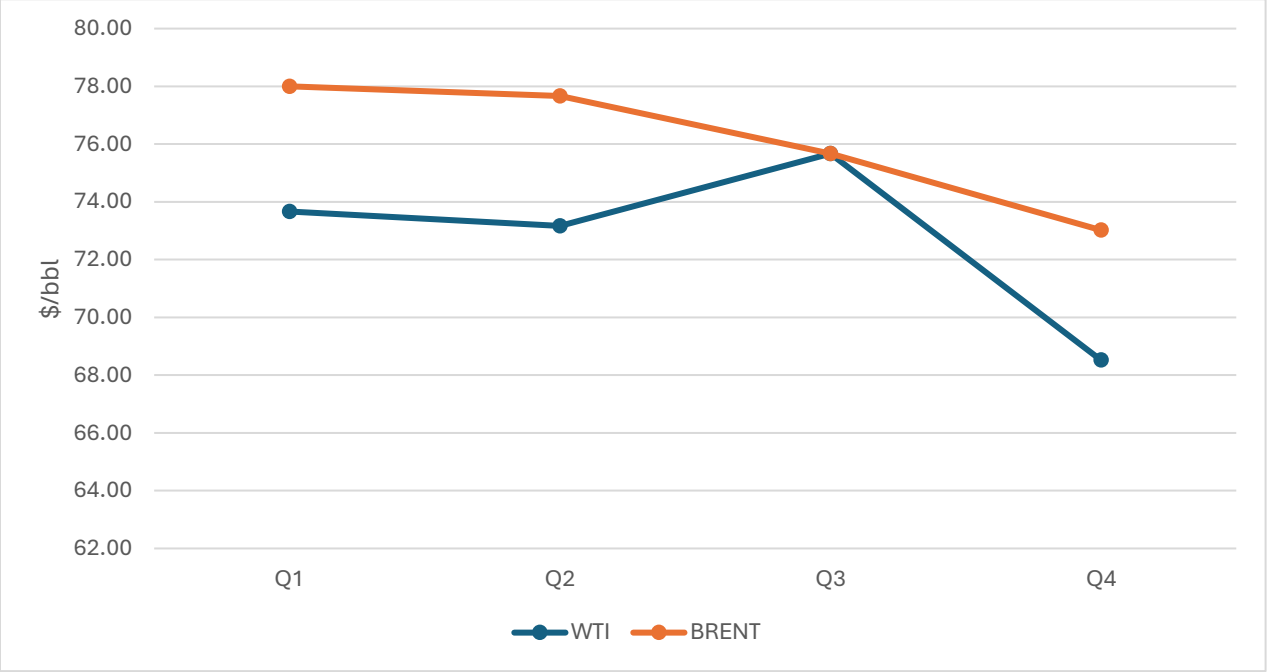


Figure 27: Projected monthly international benchmark crude oil prices for 2024
Source: US Energy Information Administration

Overall, while the market may see some upward pressure from production constraints, the overall trend suggests stability or a slight decline in prices (See Figure 27) due to the anticipated oversupply from non-OPEC sources and moderated demand growth.

Ghana's crude oil price will follow the international benchmark price. As such, it is expected that the market price of crude oil from Ghana's fields – Jubilee, TEN and Sankofa will average around US$76 per barrel.

3.2.3 2025 Natural Gas Supply

In 2025, raw gas export from Jubilee under the substitution agreement with TEN to the AGPP is expected to be 100 mmscfd. Thus, gas supplied by the Atuabo GPP in 2025 is projected to be 32,589 MMscf considering the two weeks (15 days) planned maintenance of FPSO Kwame Nkrumah in March 2025 as indicated in Figure 28. The 2025 Jubilee nomination remains the same as the 2024 nominations. Sankofa (non-associated gas) export to the ENI ORF is expected to maintain its flow of 246 MMscfd in 2025. Currently, there is two planned outages from Sankofa. The first is the 8-day shutdown in September and a two-week (15 days) shutdown in November 2025. Therefore, the projected gas supply to the ORF is 84, 251 MMscf. In all, a total of 116,840 MMscf of lean gas is projected to be supplied by domestic sources for electricity generation and other industrial use.

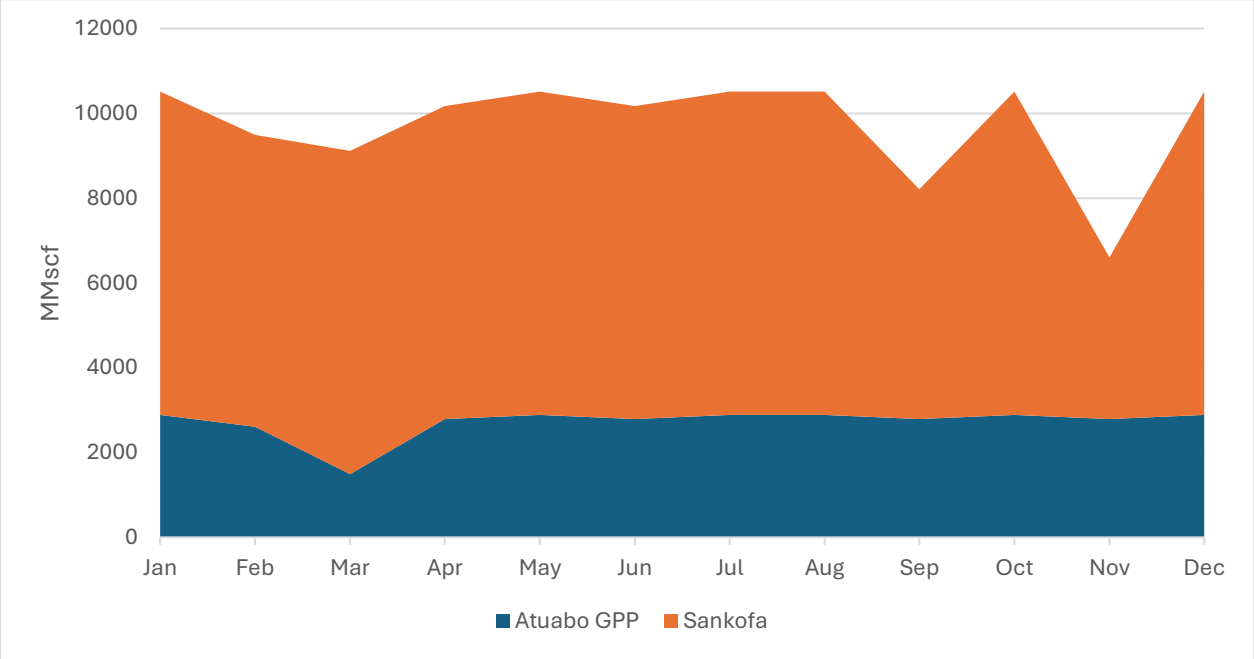


Figure 28: Expected lean natural gas supply in 2025

Source: GNPC, PC

3.2.4 2025 Natural Gas Import

Natural gas import from Nigeria is expected to be about 73 MMscfd minimum. However, N-gas can supply up to the contractual flows of 120 mmscfd depending on payment guarantees

from VRA and the Ministry of Finance. WAPCo has indicated in its planned maintenance schedule for 2025 to be from January 20 through to February 16, 2025. This maintenance schedule is a safety critical and regulatory requirement which was earlier scheduled for October 2024. Consequently, N-gas is expected to supply a minimum of 24,674 MMscf in 2025.

In 2024, N-gas increased its flows from the contracted minimum during local supply disruptions and demand hikes. This arrangement is expected to continue in 2025 should VRA and GoG honour its payment obligations. LNG import is not expected in 2025 since the Tema LNG facility is yet to be commissioned.

3.2.5 2025 Non-Power Natural Gas Consumption

Currently, demand for natural gas for industrial purposes is mainly used as a heating fuel in the production of ceramics and crude oil refining. Twyford, Wankang, Plot Enterprise, Marco Polo Gh Ltd, Jintao, and Sentuo, all in the Western enclave, use natural gas in their industrial processes. Sentuo Oil refinery in Tema (Eastern enclave) also uses natural gas as fuel to generate the heat required for various refining processes, such as distillation.

In 2025, a total of 13,788 MMscf of natural gas is projected to be consumed by industries in Ghana. Natural gas consumption is expected to peak at about 39mmscfd in the last quarter of 2025 as new ceramics industries such as Tetracore, Continental Blue Investment Gh, and CIMPOR Gh. Ltd are expected to begin production (See Figure 29).

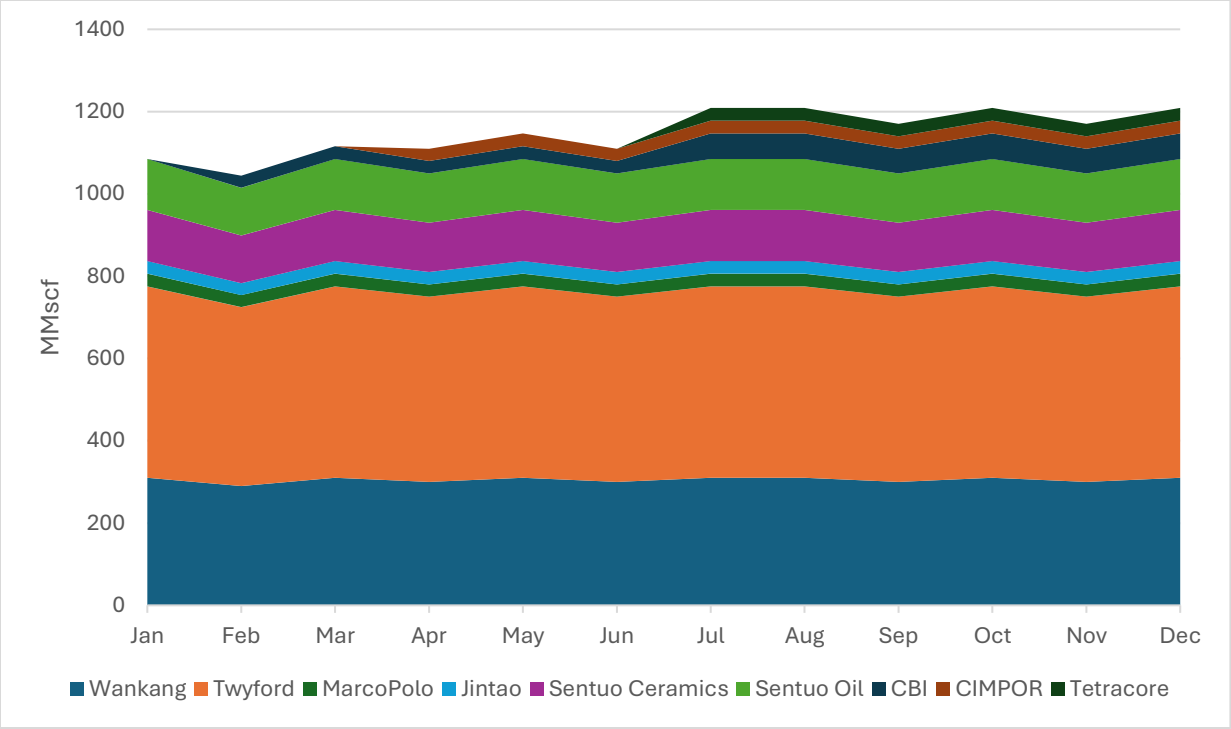


Figure 29: Non-power natural gas demand in 2025

Source: GNGC

3.2.6 2025 Natural Gas Demand Supply Balance

Incorporating Genser's projected natural gas consumption into the anticipated natural gas demand by power plants in 2025, an annual average of 369 MMscfd of natural gas is expected to be allocated for power generation, with an additional 38 MMscfd designated for industrial use.

Figure 30 illustrates the natural gas demand-supply balance for 2025. It is evident that the combined supply from domestic sources and minimum imports from Nigeria will be insufficient to meet the projected demand throughout the year. This shortfall is primarily attributed to maintenance activities on the WAGP and Jubilee fields in the first quarter, as well as on ENI facilities scheduled for September and November 2025. Additionally, supply during the second and third quarters will remain inadequate to fully meet the needs of both power generation and industrial usage.

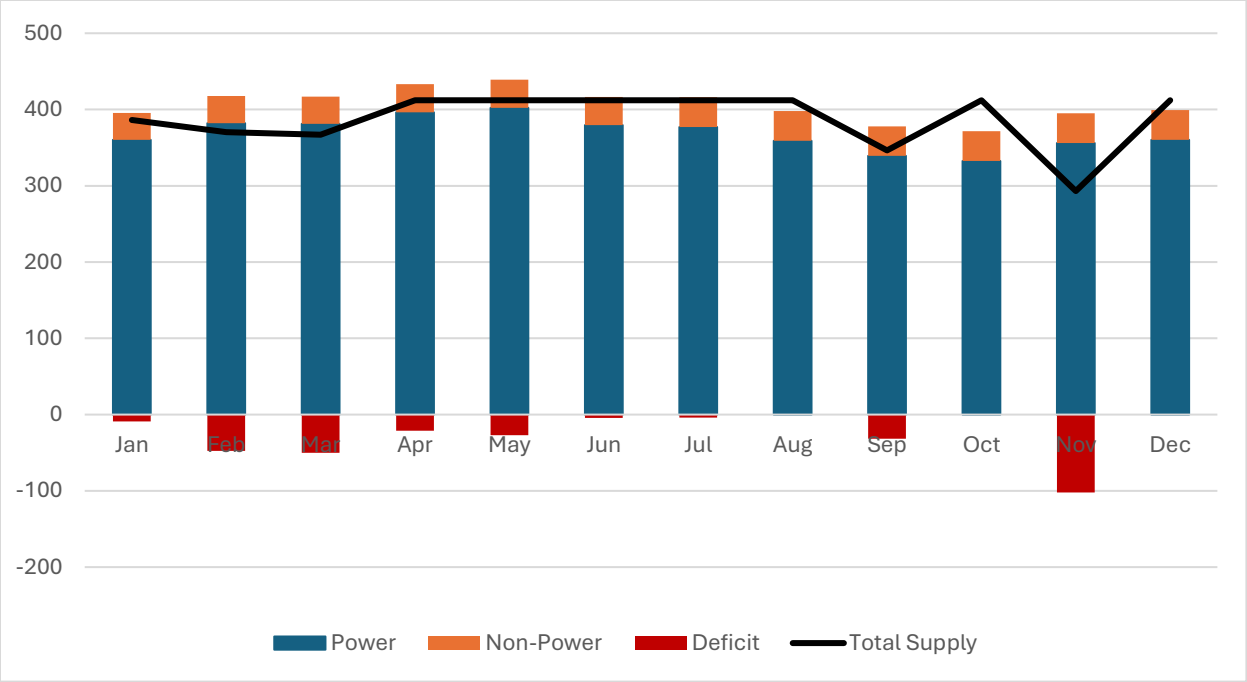


Figure 30: Natural gas demand-supply balance for 2025
Source: Energy Commission

The gas supply deficit is projected to worsen in the first half of 2025, with an average shortfall of 9 MMscfd in January, increasing to 47 MMscfd in February and 50 MMscfd in March due to maintenance activities on both the WAGP and Jubilee facilities.

As seen in Figure 30, full nominated volumes are anticipated starting in April. However, the nominated supply of 412 MMscfd will be insufficient to meet the combined demand for power and non-power purposes until August. The planned shutdown by ENI in September is projected to cause a supply deficit of 32 MMscfd, while the 15-day shutdown scheduled for November is expected to result in a more significant deficit of 102 MMscfd.

3.2.7 Petroleum Product Consumption

Total petroleum products consumption in 2025 is projected to be 5,484.73 kilotonnes, an increase of 5.13% over 2024 consumption. Figure 31 presents the monthly forecast for petroleum products consumption for 2025.

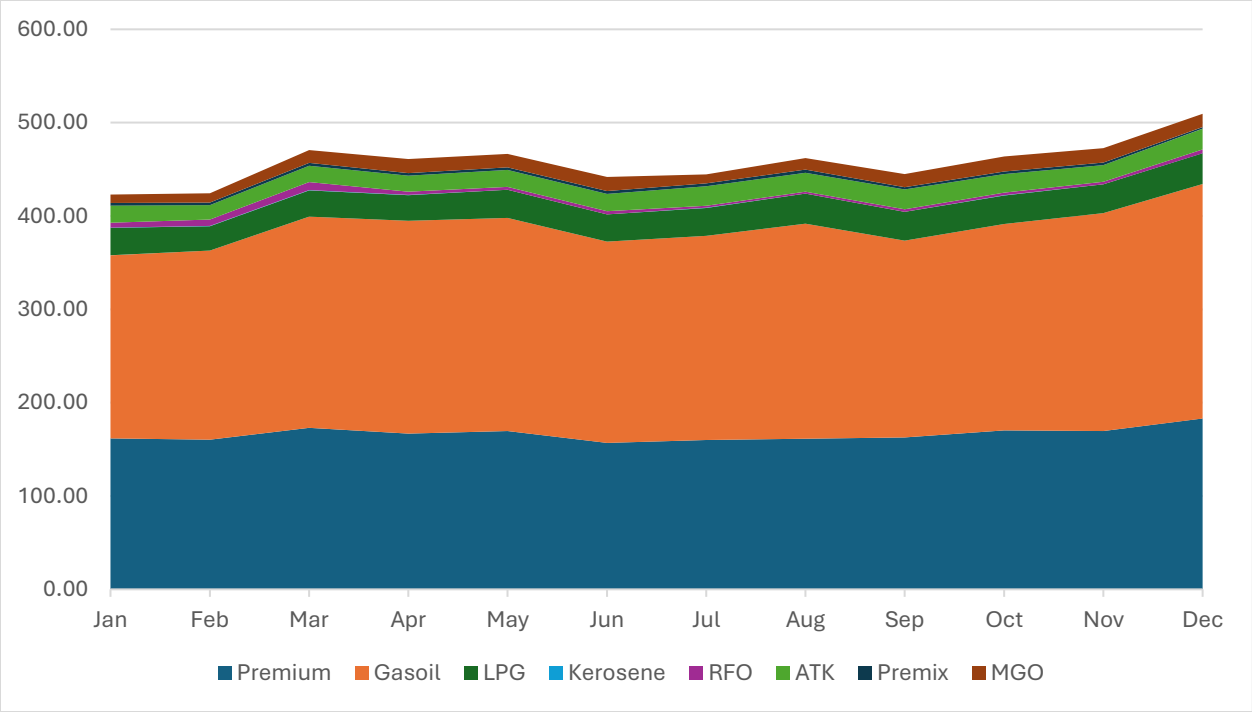


Figure 31: 2025 Monthly outlook for petroleum product consumption

Source: Energy Commission

Gasoil consumption is projected to be about 2,663.53 kilotonnes in 2025, an increase of about 7.8% over 2024 consumption. Total gasoline consumption for 2025 is projected to be about 1,994.92 kilotonnes in 2025, also up by 4.3% from the 2024 consumption. LPG is expected to increase by 4.6% from 342.39 kilotonnes in 2024 to about 358.12 kilotonnes in 2025. ATK consumption is expected to increase by 3% in 2025 to 227.39 kilotonnes. Consumption of other petroleum products, such as Premix and MGO, is expected to increase to 32.86 kilotonnes and 159.49 kilotonnes, respectively.

However, the consumption of Kerosene and RFO is projected to decline in 2025 as power plants and industries switch to clean fuels. Kerosene consumption is expected to reduce to 1.39 kilotonnes in 2025 from 1.9 kilotonnes in 2024. Likewise, RFO consumption is expected to decrease to 46.89 kilotonnes in 2025 from 62.93 kilotonnes in 2024.

Chapter Four: Woodfuel Sub-sector

In Ghana, the usage of wood fuel, encompassing both direct firewood consumption and processed charcoal, constitutes a major component of the national energy profile, especially within households, small businesses, and various artisanal industries. Understanding the dynamics, applications, and implications of firewood and charcoal usage in Ghana is essential for designing sustainable energy solutions and policies that address environmental, economic, and social considerations.

Despite concerted efforts to promote the transition to cleaner energy, the enduring cultural and economic significance of woodfuel contributes to its continued use. Notably, woodfuel remains readily accessible for households, particularly in areas where alternative energy options are limited. Additionally, the price of woodfuel, often lower compared to alternatives such as LPG, significantly influences consumer choices, particularly in economically constrained households. This affordability factor remains a critical determinant in the ongoing preference for woodfuel.

4.1 Woodfuel Production and Consumption

4.1.1 Wood for Woodfuel Production

As shown in Figure 32, The total quantity of wood used for woodfuel production (firewood and charcoal) grew from 3,891 Ktoe in 2000 to 4,029 Ktoe in 2020. This represents an overall average annual growth rate of approximately 0.17% over the 20-year period. From 2020 to 2024, total wood used as firewood and the production of charcoal showed a more nuanced growth pattern. The total wood for woodfuel production is projected to reach 4,076 ktoe, in 2025 continuing its growth from 4,009 ktoe in 2024.

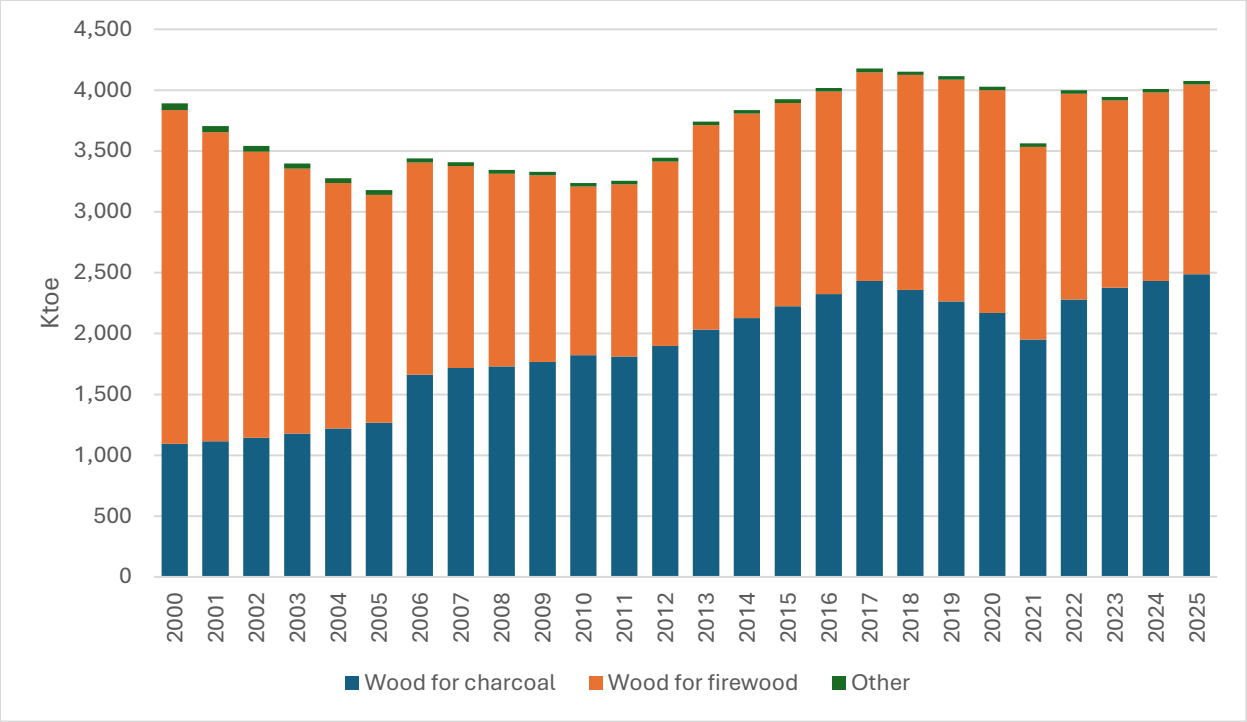


Figure 32: Wood for wood fuel production

This trend is consistent with the ongoing transition toward cleaner cooking options, yet woodfuel remains essential in rural areas and for specific industrial uses, ensuring that its demand persists in the medium term. Sustainable management practices and the integration of cleaner technologies will be crucial for balancing the growing demand for woodfuel with environmental preservation.

Wood for Charcoal Production

The demand for wood for charcoal has been increasing steadily from 2000 (1,094 ktoe) to 2024 (2,432 ktoe). The growth rate accelerates after 2010, showing consistent yearly increments. The wood for charcoal is projected at 2,488 ktoe for 2025, accounting for approximately 61% of the total wood that goes into woodfuel production.

Wood for Firewood

The quantity of wood used as firewood has shown a consistent decline over the years, decreasing from 2,742 Ktoe in 2000 to 1,499 Ktoe in 2024. This trend underscores a gradual reduction in reliance on firewood, likely driven by a shift toward more convenient and

efficient energy alternatives such as charcoal and liquefied petroleum gas (LPG). Production of wood for firewood is projected to stabilize at approximately 1,558 Ktoe in 2025, accounting for about 38% of the total wood utilized woodfuel production.

Other Biomass production

The production of alternative biomass, derived mainly from crop residue, reached 29 Ktoe in 2024, and it is anticipated to remain at a similar quantity in 2025.

4.1.2 Biomass Consumption

The total biomass consumption in the economy reached 2,880 Ktoe in 2024, reflecting a 1.2% increase from the consumption in 2023. In 2025, an anticipated further increase to 2,937 Ktoe is expected.

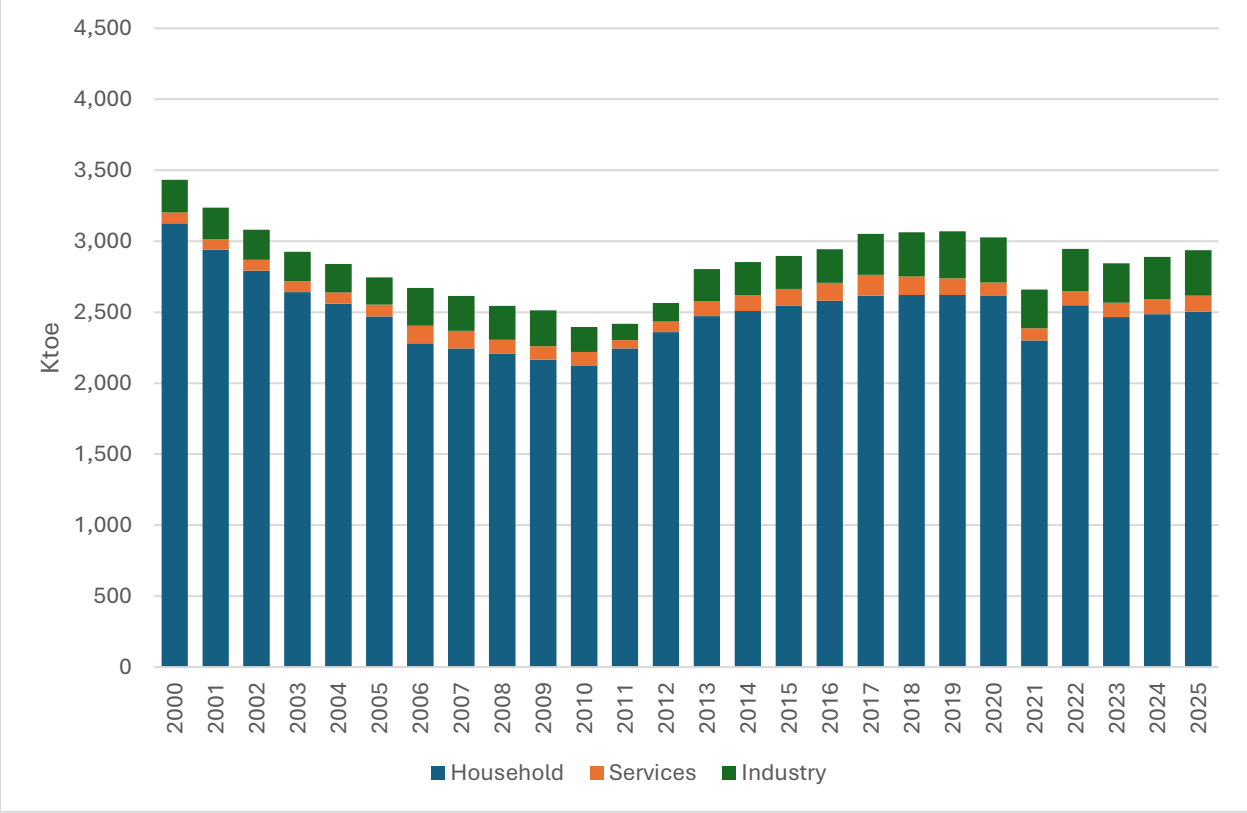


Figure 33: Biomass consumption by sectors

Residential Sector

In the residential sector, biomass serves as the primary energy source for cooking. Rural households primarily use firewood, while urban households tend to rely on charcoal because it burns more cleanly and is easier to store, transport, and use with more durable charcoal cookstoves compared with firewood. The extensive use of biomass in this sector, however, raises environmental concerns, contributing to deforestation and land degradation.

Biomass consumption in the residential sector shows a general declining trend over the years. Total biomass consumption has fluctuated from 2000 (3,432 ktoe) to 2024 (2,485 ktoe). There was a decline between 2000 and 2010, followed by partial recovery in subsequent years. The total biomass consumption is projected at 2,504 ktoe in 2025 reflecting a slight increase from 2024 (2,485 ktoe), indicating relatively stable consumption in recent years. This trend suggests an ongoing shift in the residential sector, possibly due to increased access to alternative cooking fuels like LPG.

Industrial Sector

The industrial sector, particularly small and medium-sized enterprises (SMEs) in rural areas, also depends heavily on biomass for activities such as agro-processing, brickmaking, and ceramics production. These industries find biomass to be a cost-effective solution for their high-heat needs, but its environmental impact and health risks highlight the need for more sustainable alternatives. The industry sector shows more variability, with a steady increase in recent years.

The industrial sector's biomass consumption has shown growth, increasing from 230 ktoe in 2000 to 320 ktoe in 2025. This reflects a steady demand for biomass in industrial processes. The industrial sector is projected to consume 320 ktoe, contributing 10.9% of the total biomass consumption by 2025.

Service Sector

In the service sector, establishments like restaurants, hotels, and institutional kitchens rely on biomass for cooking, especially in areas where liquefied petroleum gas (LPG) and electricity are either costly or inaccessible.

Biomass consumption in the services sector has remained relatively low and stable, with minor fluctuations. Consumption increases slightly from 75 ktoe in 2000 to 113 ktoe in 2025 accounting for 3.8% of the total biomass consumption.

4.2 Charcoal Price

In Ghana, charcoal is sold in volume, not by weight. In comparison with alternative fuels such as LPG which is priced in kilogram[8], the charcoal price was analysed per weight in all the markets visited as depicted in Figure 1. The average national price per kilogram of charcoal stands at GH₵ 2.27. Cape Coast reported the highest price per kilogram at GH₵ 4.24, followed by Koforidua (GH₵ 3.98) and Takoradi (GH₵ 3.66). Conversely, Nalerigu recorded the lowest price per kilogram at GH₵ 1.24, followed by Tamale at GH₵ 1.33, and then Kintampo at GH₵ 1.36.

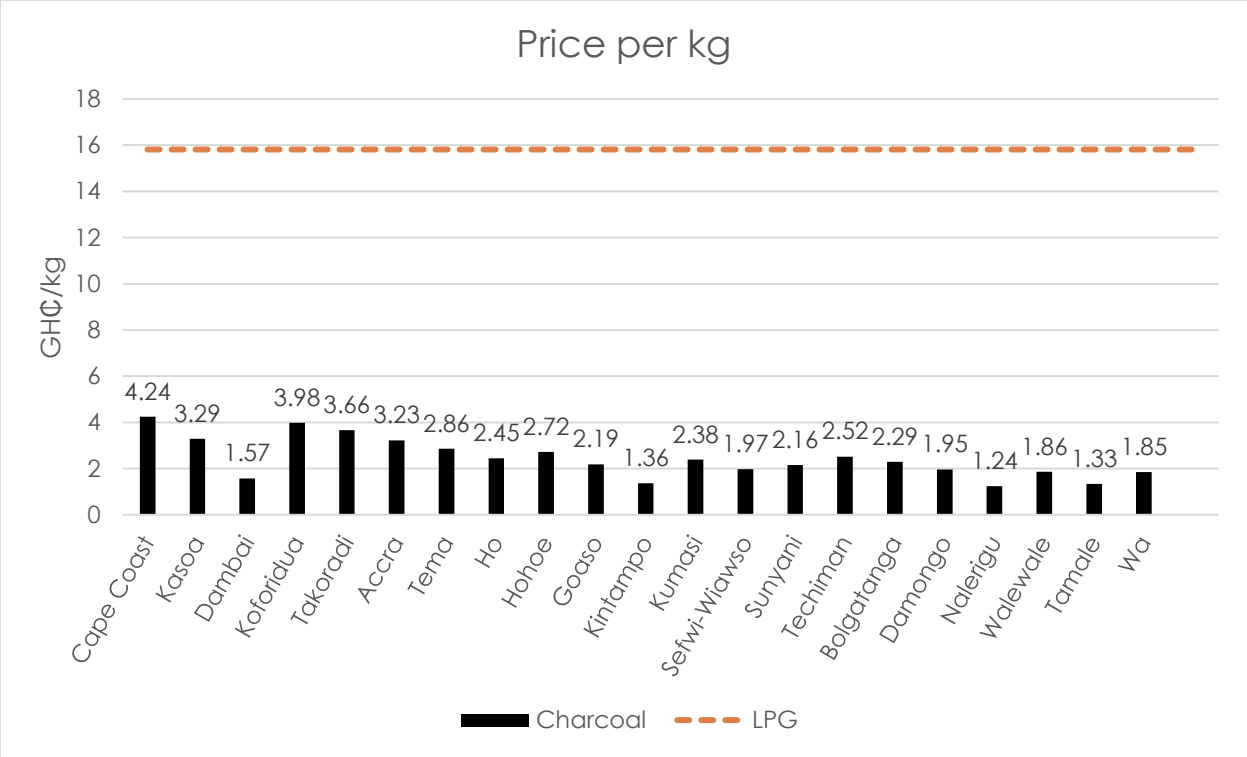


Figure 34: Average price per kilogram of charcoal across major market centres in Ghana in 2024

[8] Ghana has uniform pricing policy for all petroleum products. As such the price of LPG per kilogramme sold to consumers is the same irrespective of location in the country.

For energy use purposes, fuel is utilised because of its energy content. **Error! Reference s ource not found.**, therefore, presents the price of energy (measured in MMBtu) of LPG versus charcoal.

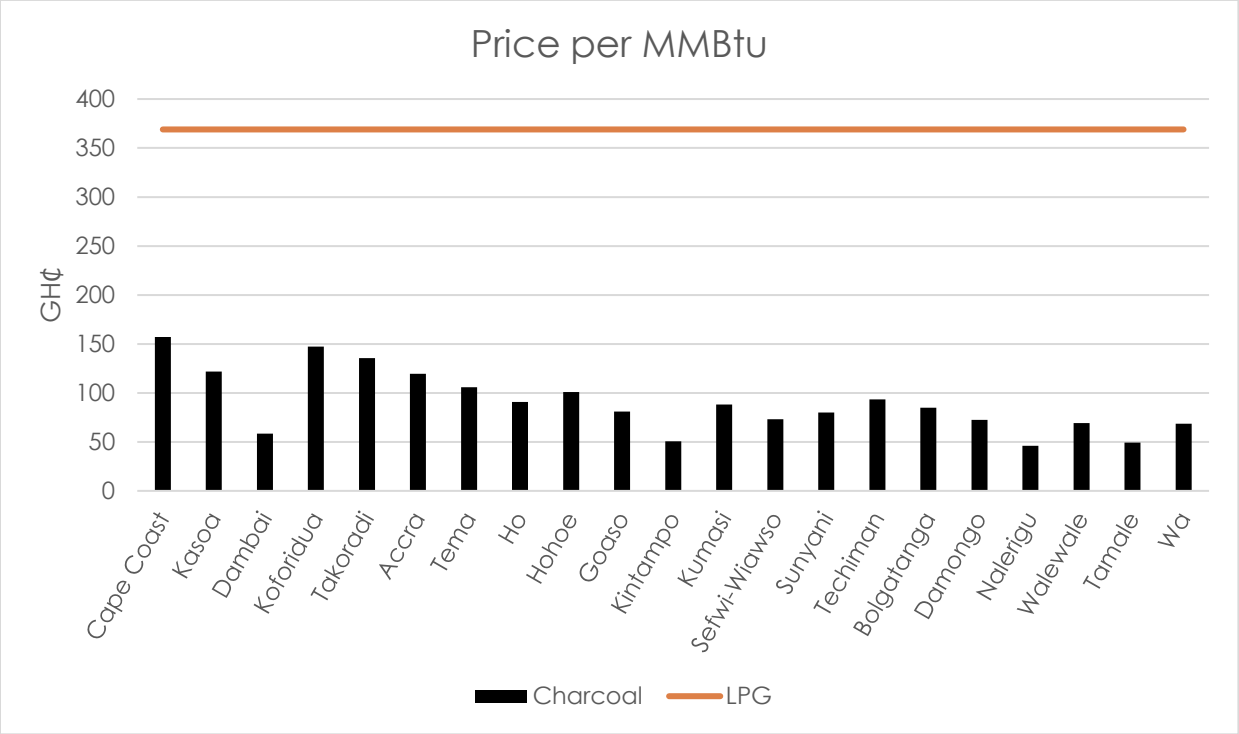


Figure 35: Price per MMBtu of LPG and Charcoal

As evident in **Error! Reference source not found.**, the price of charcoal per MMBtu is lower t han that of LPG in all locations.

Different technologies are used in burning these fuels. Whilst LPG uses the LPG stove, charcoal is used mainly in traditional stoves or improved cookstoves. These appliances have different thermal efficiencies. Therefore, the useful energy from LPG and charcoal when used in these end-use appliances is varied. LPG stoves have an average thermal efficiency of

60.7%[9], while locally available improved charcoal stoves have an average thermal efficiency of 46.7%[10], and traditional (coal pot) charcoal stoves operate at 35.3%[11].

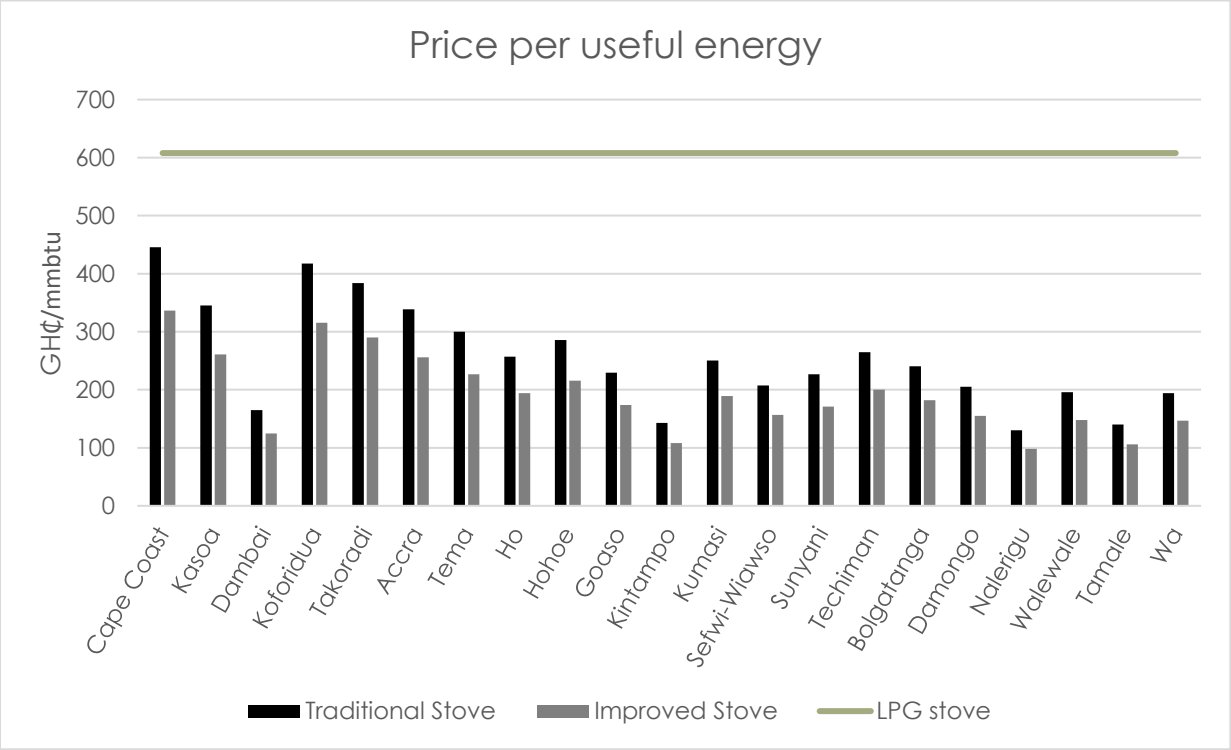


Figure 36: Price per MMBtu of useful energy of LPG and Charcoal Stove.

Source: Survey data

Generally, it costs households less to use a traditional charcoal stove or improved stove than to use LPG stove, as shown in the figure above. The cost of useful energy from LPG stove is GH₵608 per MMBtu. However, on average, it will cost a household about GH₵ 255.5 per MMBtu of useful energy if the household uses the traditional cookstove, giving a cost reduction of about 58%. This cost-saving will further increase to about 68% if an improved cookstove is used.

[9] Lather, R. S. (2019, November). Performance Analysis of an LPG Cooking Stove for Improvements and Future Usability Perspective. In National Conference on IC Engines and Combustion (pp. 633-643). Springer, Singapore.
[10] Energy Commission
[11] Energy Commission

The price of LPG is driven by developments in the global crude oil market and the depreciation of the Ghanaian Cedi. Anticipated for 2025 is a modest increase in charcoal prices, with the potential for growth aligning closely with the national inflation rate for the year at worst.

Chapter Five: Conclusions and Recommendations

5.1 Conclusions

5.1.1 Electricity

The expected system peak demand for 2025 would rise by 4.4%, reaching 4,125 MW. Concurrently, energy consumption for 2025 is estimated at 25,836 GWh, reflecting a 4.7% increase compared to the consumption in 2024. Domestic consumption, encompassing VALCO and losses, is expected to constitute 92.4% of the total consumption, with energy export accounting for the remaining 7.6%. In 2025, VALCO is expected to operate on two potlines.

To fulfil the expected demand, hydroelectric and thermal power plants are projected to produce 8,561 GWh (33.1%) and 16,997 GWh (65.8%), respectively. The remaining 196 GWh, constituting 0.8%, is anticipated to be supplied by embedded generation, predominantly sourced from renewable energy. Power import in 2025 is not anticipated. However, inadvertent energy exchanges estimated at 82 GWh (0.3%) on tie-lines could result from transient flows.

In 2025, the grid-connected power generation capacity will be 5,260 MW, with a total dependable capacity of 4,856 MW for electricity generation. However, factoring in scheduled maintenance for planned units and fuel supply situation, it is expected that up to 4,656 MW of the total dependable capacity will be utilized to meet the projected system peak demand of 4,125 MW, ensuring a reserve margin of 13%, less than the minimum reserve margin requirement of 18%.

In 2025, the primary fuel for thermal power plants is expected to be natural gas, sourced through domestic production and imports. The projected total natural gas consumption for the year is 151.4 TBtu. The AKSA plant is estimated to require 344,387 barrels of HFO in 2025 for the operation of some of its units. The overall fuel expenditure is estimated to be

US$1,248.53 million, with US$1,217.54 million allocated for the procurement of natural gas and the remaining amount designated for the acquisition of HFO to fuel the AKSA plant.

5.1.2 Petroleum

Ghana's crude oil production saw a moderate recovery in 2024, reaching a total of 36.841 million barrels by September, marking a 4.01% increase compared to the same period in 2023. The Jubilee field remains the leading contributor, accounting for over 66% of total production, mainly due to appraised and producing wells. Production from the TEN field showed a slight increase, while Sankofa field output declined due to equipment failures and ongoing maintenance. The 2025 outlook suggests further growth in crude oil production, expected to reach 50.34 million barrels, with Jubilee and TEN fields projected to increase by 7% and 2%, respectively. However, Sankofa production is forecasted to decrease by 13% due to planned maintenance.

International crude oil prices in 2024 were volatile, driven by global demand recovery, OPEC+ production cuts, and geopolitical tensions. The average Brent crude price peaked in April at $88.85 before declining to $73.63 in November. Projections for 2025 suggest a decline in crude oil prices, with Brent expected to average $76 per barrel, reflecting moderate global demand growth and increasing non-OPEC supply. Ghana’s crude oil prices will, therefore, closely align with international benchmarks, impacting the overall revenue from crude exports.

In 2024, total raw gas exports from Ghana’s producing fields increased by 11.8%, driven by higher demand for power generation and industrial applications. The Sankofa field accounted for most gas exports, despite ongoing maintenance. Additionally, lean gas supply from domestic sources and imports rose to 70,578 MMscf in 2024, due to increased demand from the power sector.

In 2025, natural gas supply is expected to face shortfalls, mainly due to maintenance on key facilities and limited imports. The projected domestic supply will be 116,840 MMscf, but it will not fully meet the growing demand for power generation and industrial use. The gas supply deficit is anticipated to average 47 MMscfd in February and 50 MMscfd in March.

Industrial demand, particularly from new ceramic manufacturers, is expected to rise significantly, highlighting the need for strategic planning to ensure a sustained gas supply.

Ghana's petroleum product consumption showed steady growth in 2024, reaching 3,400 kilotonnes as of August, with gasoil and gasoline driving the increase. Ex-pump petroleum product prices experienced significant volatility in 2024, influenced by global crude oil price fluctuations and exchange rate challenges.

For 2025, total petroleum product consumption is projected to increase by 5.13% year-on-year to 5,484.73 kilotonnes, with gasoil and gasoline expected to account for the largest shares. The total consumption of petroleum products in 2024 is estimated to be 4,797.3 kilotonnes. Out of this, gasoil consumption is forecasted to be 2,109.5 kilotonnes, while gasoline is expected to be 1,781.4 kilotonnes. LPG consumption is anticipated to grow to around 329.05 kilotonnes in 2024. ATK and kerosene consumption for the same year are projected to be 203.1 kilotonnes and 2.16 kilotonnes, respectively. Other petroleum products, including Premix, RFO, and MGO, are expected to witness an increase in their consumption levels to 43.6 kilotonnes, 64.5 kilotonnes, and 264.1 kilotonnes, respectively.

5.1.3 Woodfuel

In 2025, the estimated extraction of wood for firewood usage would be 1,558 Ktoe, representing a 3.9% increase from 2024. Similarly, the extraction of wood for charcoal production is anticipated to reach 2,488 Ktoe in 2025, representing a 2.3% increase from the previous year. The production of other biomass, primarily crop residue, is expected to be around 29 Ktoe in 2025.

The residential sector will maintain its position as the largest consumer of biomass. Household biomass consumption is forecasted to reach 2,504 Ktoe in 2025, while the services and industrial sectors are expected to consume 113 Ktoe and 320 Ktoe, respectively.

In 2024, the national average price per kilogram of charcoal was GH¢2.27, a decline from the price of GH¢2.84 in 2023. For 2025, charcoal prices will change at a rate consistent with the national inflation rate for the country.

5.2 Recommendations

The following recommendations are made.

5.2.1 Electricity

1. Overdrafting of hydropower plants must be strictly avoided to ensure sustainable operations. Accordingly, the allocated hydro generation targets for Akosombo and Kpong should not be exceeded. In the event of higher-than-anticipated inflows, generation plans should be reviewed and adjusted in collaboration with relevant stakeholders.

2. Security and adequacy of fuel supply to thermal plants remain the single most important risk to power supply reliability in the country. In this regard, it is strongly recommended that all stakeholders work together and timely to ensure that the fuel supply is adequate and secure.

3. Consequently, the Commission recommends that when domestic gas supply is insufficient to meet demand, increasing imports from Nigeria should be pursued first. Purchasing liquid fuel, such as LCO and DFO, should be the last fuel supply option due to higher costs and environmental impact.

4. Quantities of liquid fuels (LCO, HFO and Diesel), therefore, need to be procured and stored for use at the respective dual-fired thermal power plants in case of instances of gas supply interruption.

5. Due to the growing electricity demand, there is a need to make medium to long-term

arrangements to increase gas supply volumes to enable more thermal generation to avoid excessive drawdown on Akosombo and Bui hydro facilities.

6. Government should make necessary investments towards improved gas supply reliability owing to the increasing dependency on natural gas for power generation. The government should, therefore, expedite action on the proposed construction of a gas pipeline connecting Tema and Tarkoradi power enclaves.

5.2.2 Petroleum

1. Address operational challenges such as equipment failures at the Sankofa and Jubilee fields by investing in resilient infrastructure and advanced maintenance protocols.
2. Expedite exploration of new fields and optimize output from existing fields to counter declining crude oil production trends.
3. Adopt advanced technologies for reservoir management to enhance crude oil production efficiency across the Jubilee, TEN, and Sankofa fields
4. Develop contingency plans to address natural gas supply disruptions, particularly during planned maintenance of key facilities in the first quarter of 2025.
5. Measures should be implemented to enhance non-associated gas exports from the Offshore Cape Three Points (OCTP) field, particularly during the first quarter of 2025, when both the Nigeria Gas (N-Gas) pipeline and the Jubilee Field are scheduled for maintenance. To facilitate this, the Electricity Company of Ghana (ECG) and the Ministry of Finance must prioritize the timely settlement of arrears owed to ENI. This will enable the country to optimize gas flows from OCTP, reducing reliance on costly liquid fuels.
6. Strengthen collaboration with Nigeria and WAGPCo to secure contractual gas import volumes, while ensuring timely payment guarantees by the Ministry of Finance and Volta River Authority (VRA).

7. Diversify energy sources by expediting the actions on the Tema LNG facility
8. Timely procure liquid fuels for the various shutdown periods to forestall load shedding.
9. Promote the use of natural gas for industrial applications and incentivize new industries to adopt gas as a cleaner and cost-effective fuel source.
10. Align gas supply strategies with industrial development plans to support non-power applications, particularly in emerging sectors like ceramics and refining.
11. The government should intensify the rollout of the cylinder recirculation model nationwide to help increase access as the government targets 50% LPG penetration in households by 2030.
12. Improve fuel price stabilization mechanisms to cushion consumers against sudden price hikes.
13. Promote energy efficiency measures and use of derivatives of natural gas, such as compressed natural gas (CNG) to reduce reliance on imported petroleum products.

5.2.3 Woodfuel

1. Biomass consumption has been estimated to be increasing over the last decade. It is recommended that government intensify measures that will increase LPG penetration, especially in rural areas, to displace the increasing demand for woody biomass.
2. A comparison of charcoal and LPG prices per MMBtu revealed that it costs more to get a unit of useful energy from LPG than from charcoal, regardless of stove efficiency. To encourage and increase LPG use (which is more efficient and environmentally friendly), the Ministry of Energy, through relevant stakeholders such as NPA, take necessary steps to reduce the price of LPG. The price intervention will also help realise the government's policy of achieving 50% of households using LPG by 2030.