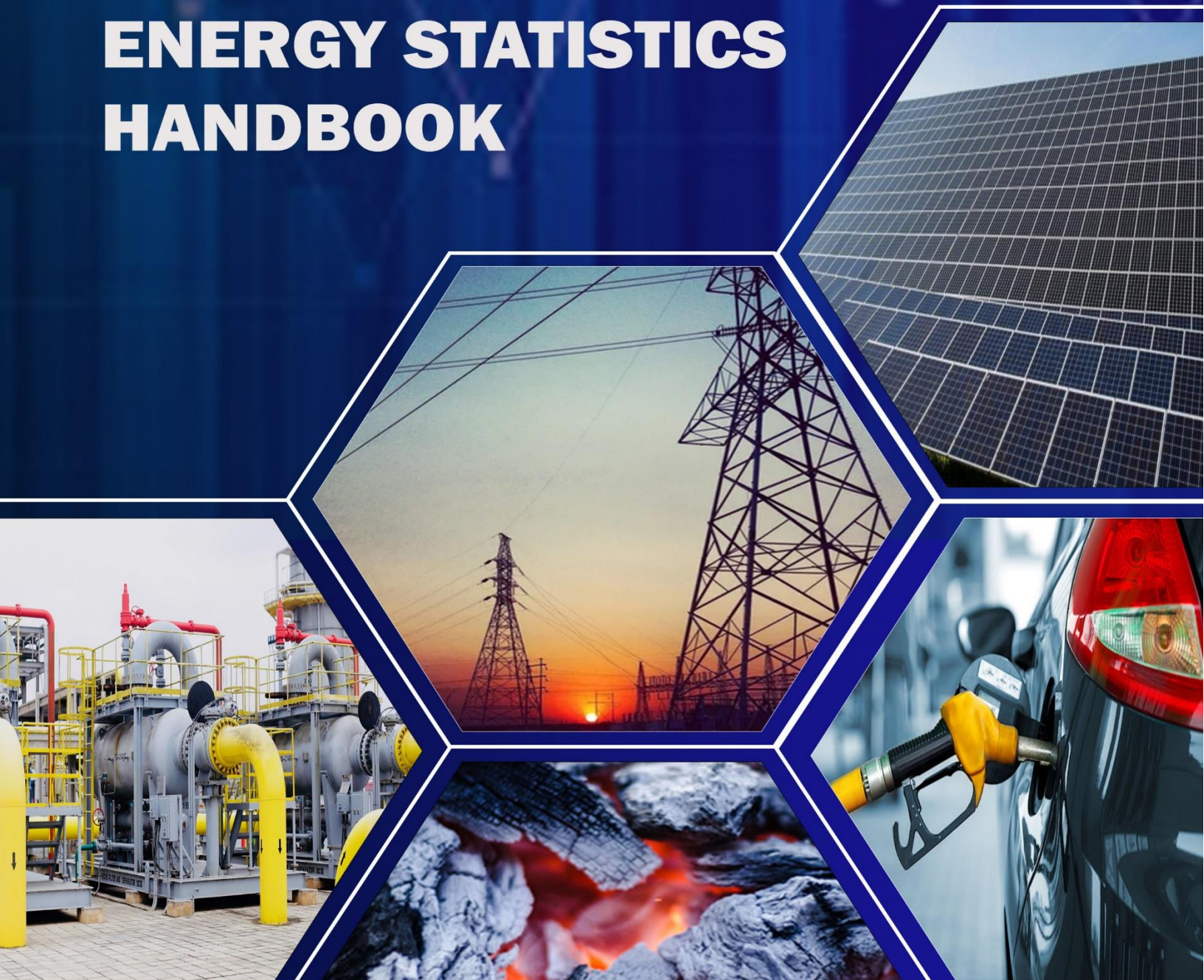
2023
GHANA KEY ENERGY STATISTICS HANDBOOK



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| Securing Ghana's Future Energy Today

FOREWORD

The Energy Commission was established in 1997 by an Act of Parliament (ACT 541) to regulate and manage the utilization of energy resources in the republic and coordinate policies in relation to them. Specifically, the Commission as part of its mandate is to secure a comprehensive energy database for national decision making on the extent of development and utilization of energy resources available to the nation.

To fulfil this mandate, the collection, analysis and dissemination of energy statistics has always been and remain at the heart of the work of the Commission. The energy statistics produced by the Commission provides a comprehensive view on energy production, transformation and final use as well as their prices. The energy statistics publication of the Commission has been recognised the world over as the authoritative source of energy data and information on Ghana.

The statistics produced can be used to monitor changes in the production and use of energy and also provide a wider understanding of the pattern of energy use in the country. The key energy statistics presents highlights on some of the key facts and trend in energy production and use to enable researchers, policymakers and students have deeper knowledge about the energy situation in the country. It also contains information on energy efficiency, outlook and the Sustainable Development Goal (SDG 7).

I hope that the information contained in this document will not only inform but also help policy makers, researchers and others to make informed decisions to ensure that, energy is produced and used in secure, affordable, efficient and sustainable manner in line with the achievement of SDG7.

We would appreciate any feedback by way of comments and suggestions from readers and users of the document.

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

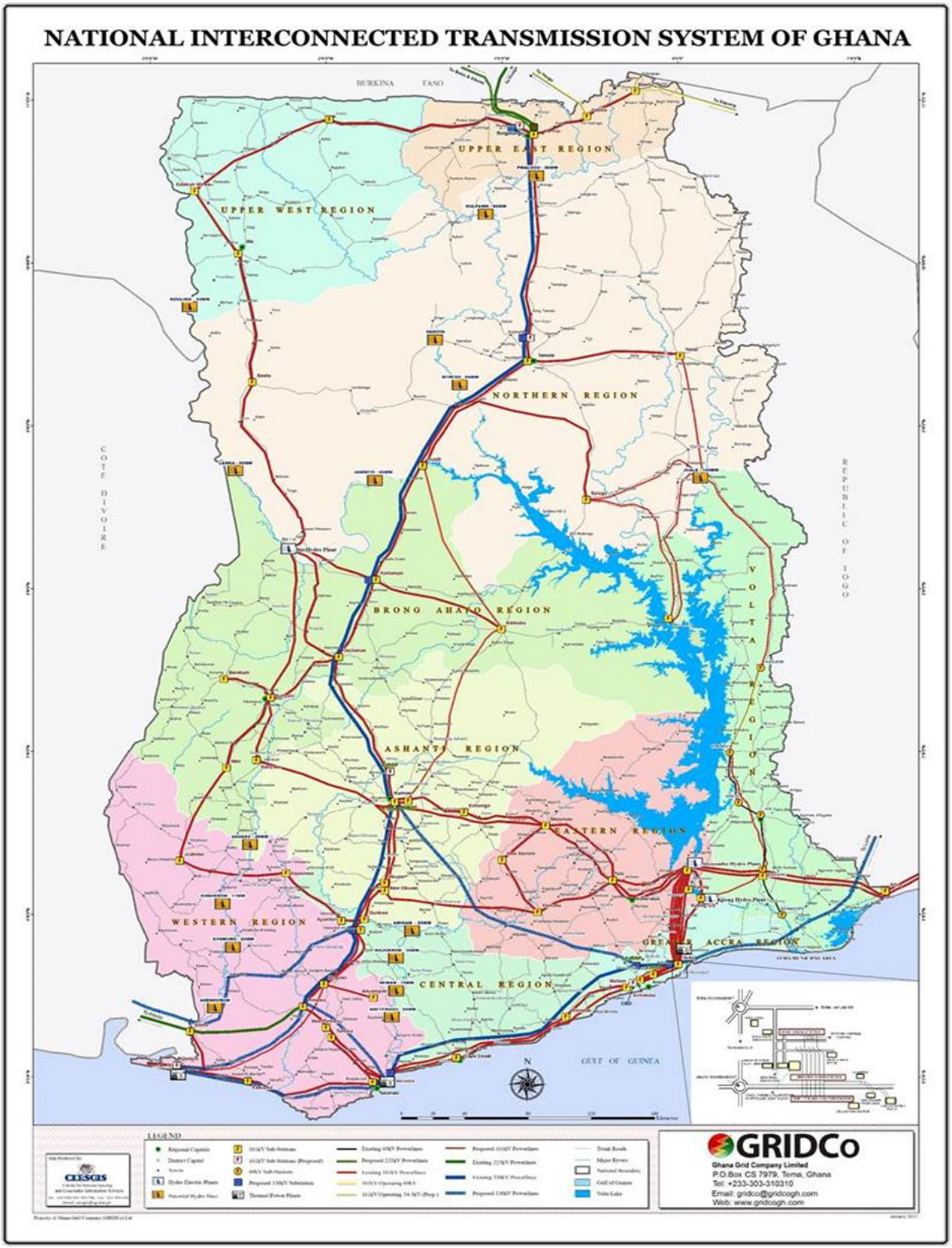
Ing. Oscar Amonoo-Neizer
Executive Secretary

Table of Content

ABBREVIATIONS AND ACRONYMS

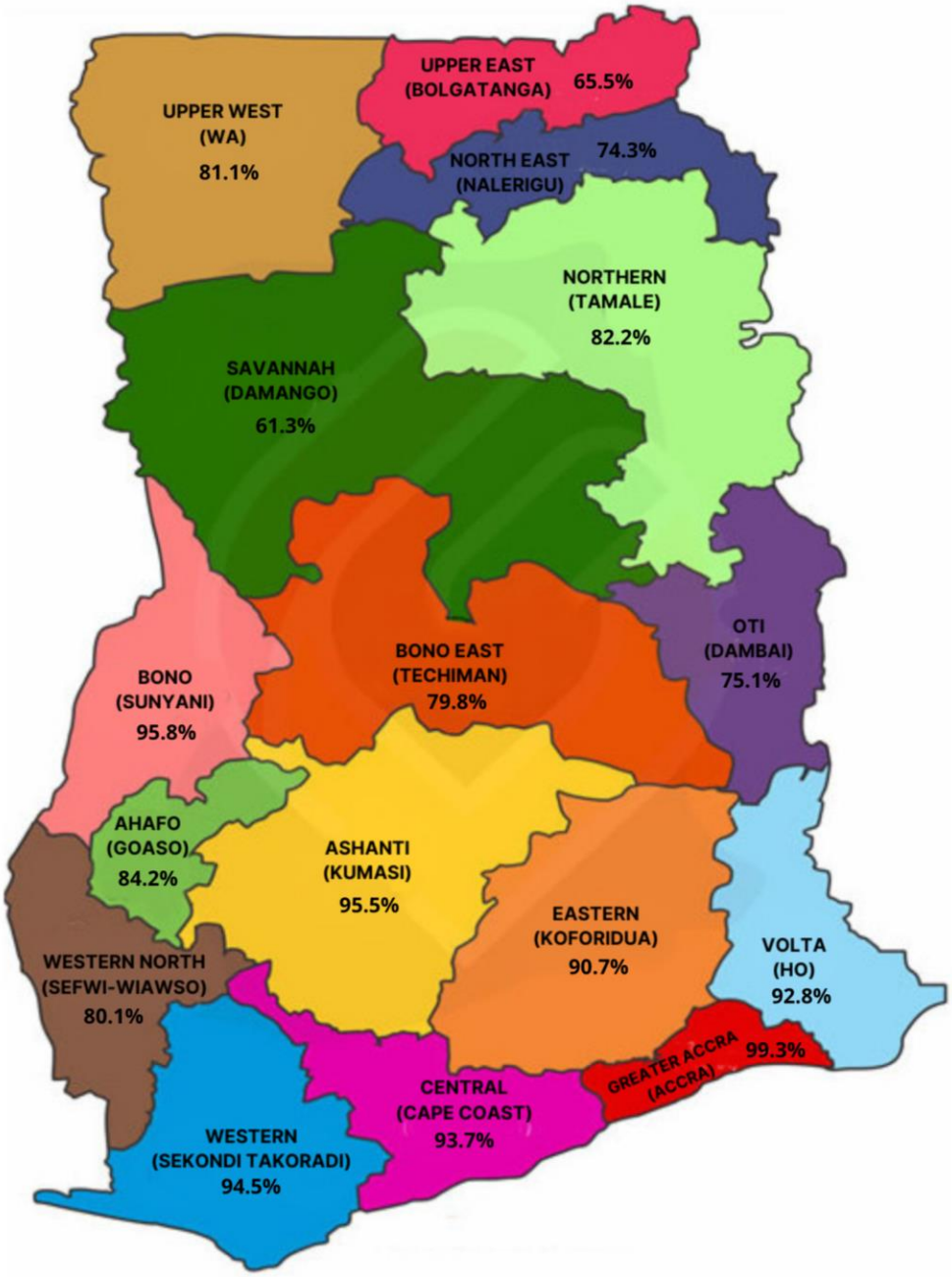
ATK	Aviation Turbo Kerosene
Bbls	Barrels
Dist. SPV	Distributed Solar PV
DPK	Dual Purpose Kerosene
ECG	Electricity Company of Ghana
EPC	Enclave Power Company Ltd
FEC	Final Energy Consumption
GNGC	Ghana National Gas Company
GNPC	National Petroleum Corporation
GRIDCo	Ghana Grid Company
GSS	Ghana Statistical Service
GWh	Gigawatt-hour
Kt	Kilotonnes
ktoe	thousand tonnes of oil equivalent
kWh	kilowatt-hour
LCO	Light Crude Oil
LPG	Liquefied Petroleum Gas
MMBtu	Million British thermal unit
MW	Megawatt
NEDCo	Northern Electricity Distribution Company
NPA	National Petroleum Authority
PURC	Public Utilities Regulatory Commission
RFO	Residual Fuel Oil
tBtu	Trillion British Thermal Units
tCO_2	Tonnes of Carbon dioxide
TES	Total Energy Supply
TFC	Total final consumption
toe	Tonnes of oil equivalent
VALCO	Volta Aluminium Company
VRA	Volta River Authority
W	Watt
W2E	Waste-to-Energy
WAGP	West African Gas Pipeline
WAPCo	West African Gas Pipeline Company

NATIONAL INTERCONNECTED TRANSMISSION SYSTEM OF GHANA



2022 ELECTRICITY ACCESS MAPS OF GHANA

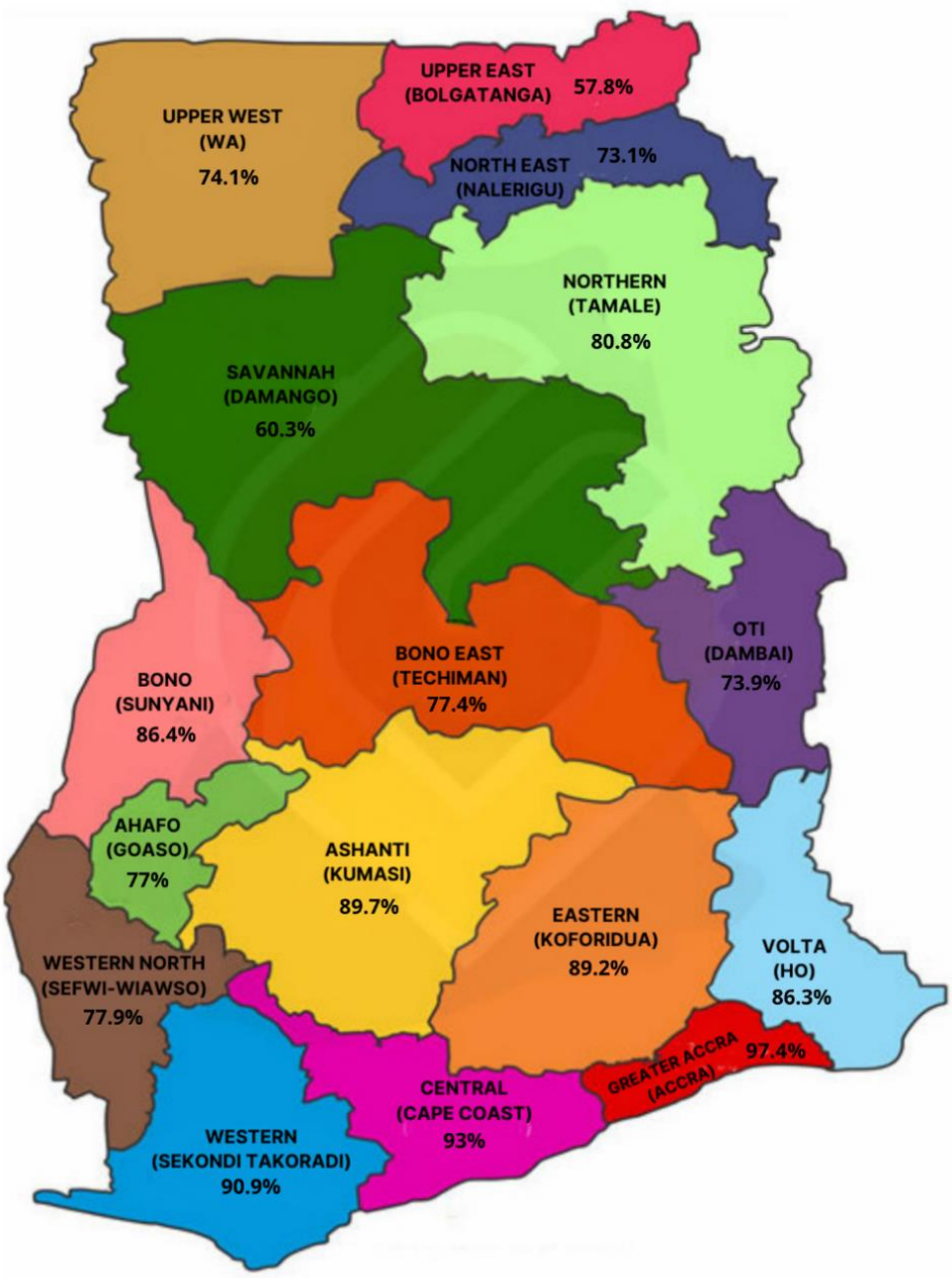
PROPORTION OF POPULATION WITH ACCESS TO ELECTRICITY



2022 National population electricity access rate: 88.8%

$$Regional\ population\ access = \frac{Total\ population\ of\ communities\ connected\ to\ the\ grid\ in\ the\ region}{Total\ population\ of\ the\ region} \times 100$$

PROPORTION OF HOUSEHOLDS WITH ACCESS TO ELECTRICITY



2022 National household electricity access rate: 86.8%

$$Regional\ household\ access = \frac{Total\ number\ of\ households\ connected\ to\ the\ grid\ in\ the\ region}{Total\ number\ of\ households\ in\ the\ region} \times 100$$

KEY HIGHLIGHTS

Indicator	Unit	2000	2010	2015	2016	2017	2018	2019	2020	2021	2022
Population	million	18.9	24.7	27.7	28.3	29.0	29.6	30.3	30.8	30.8	31.4
GDP (current US$)[1]	million US$	4,983	32,197	48,595	56,010	60,327	67,299	68,338	70,029	79,524	73,769
GDP, PPP (constant 2017 international $)[2]	million $	54,123	94,867	133,286	137,782	148,983	158,220	168,516	169,382	178,455	179,690**
Total Energy Supply	ktoe	6,146	6,967	9,483	9,658	9,593	10,839	11,305	12,053	12,129	12,174
Total Final Energy Consumed	ktoe	5,470	5,519	7,307	7,277	7,276	7,794	8,088	8,602	9,108	8,883
Total Electricity Generated	GWh	7,224	10,166	11,491	13,023	14,067	16,246	18,188	20,170	22,051	23,163
Total Electricity Consumed	GWh	6,889	8,317	10,625	12,528	13,036	13,380	14,261	15,434	16,898	17,547
Total Petroleum Products Consumed	ktoe	1,445	2,408	3,497	3,255	3,103	3,581	3,793	4,248	4,641	4,318
Total Biomass Consumed	ktoe	3,432	2,395	2,896	2,945	3,053	3,063	3,069	3,026	3,015	3,056
Energy Intensity (TES/GDP current million US$)	toe/million US$	1,233.5	216.4	195.1	172.4	159.0	161.1	165.4	172.1	152.5	165.0
Energy Intensity in PPP (TES/ GDP in PPP)	toe/million $	113.6	73.4	71.1	70.1	64.4	68.5	67.1	71.2	68.0	67.8
Total Primary Energy Supply/capita	toe/capita	0.33	0.28	0.34	0.34	0.33	0.37	0.37	0.39	0.39	0.39
Energy use per capita (TFC/persons)	toe/capita	0.29	0.22	0.26	0.26	0.25	0.26	0.27	0.28	0.30	0.28
Total Electricity Generated/capita	kWh/capita	382.0	412.3	415	460	486	549	601	655	715	739
Total Electricity Consumed/capita	kWh/capita	364.3	337.3	384	443	450	452	471	501	548	560
Total Petroleum Products Consumed/capita	toe/capita	0.08	0.10	0.13	0.11	0.11	0.12	0.13	0.14	0.15	0.14
Total Biomass Consumed/capita	toe/capita	0.18	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.10

**Estimated

[1]GDP in current prices and Population data from Ghana Statistical Service

[2]GDP in PPP (constant 2017 international $) from World bank database

SUSTAINABLE DEVELOPMENT GOALS 7 (SDG 7) INDICATORS

Target	Indicator	Indicator Definition	Disaggregation	Unit	2010	2015	2016	2017	2018	2019	2020	2021	2022
7.1 Ensure universal access to affordable, reliable and modern energy services.	7.1.1 Proportion of population with access to electricity	Proportion of population with access to electricity	National	%	64.4	83.2	83.6	84.1	84.3	85	85.3	87	89
			Urban	%	83.9	93.6	96.6	100	100	100	100	100	100
			Rural	%	39.7	56.9	61.7	67	68.3	70.5	71.7	72.9	74.0
		Household with access to electricity	National	%	64.2	75.7	78.5	81.4	81.6	82.5	82.8	86.3	86.8
			Urban	%	83.8	90.7	91.4	92	92.2	92.6	93	95.2	95.8
			Rural	%	39.5	56.6	61.5	66.9	68.1	70.4	71.5	72.6	73.6
	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Proportion of population using Electricity as primary source for cooking	National	%	0.54	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
			Urban	%	0.76	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
			Rural	%	0.27	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2
		Proportion of population using LPG as primary source for cooking	National	%	18.2	23.9	24.3	24.5	24.8	25.1	25.3	36.9	40.2
			Urban	%	28.9	35.3	35.1	34.8	34.6	34.3	34.1	51.3	56.1
			Rural	%	4.8	6.8	7.7	8.7	9.9	11.3	12.8	14.8	16.5
7.2 Increase substantially the share of renewable energy in the global energy mix.	7.2.1 Renewable energy share in the total final energy consumption		National[1]	%	52.4	46.0	46.8	48.1	44.8	44.0	40.8	34.1	38.1
			National[2]	%	8.9	6.4	6.4	6.2	5.5	6.1	5.6	5.9	6.4
7.3. Double the global rate of improvement in energy efficiency.	Energy intensity measured in terms of total energy supply and GDP, PPP (constant 2017 international $)		National	TOE/ million US$	73.4	71.1	70.1	64.4	68.5	67.1	71.2	65.9	66.9
	Energy intensity measured in terms of final energy consumption and GDP, PPP (constant 2017 international $)		National	TOE/ million US$	58.2	54.8	52.8	48.8	49.3	48.0	50.8	49.1	47.6

[1]Includes woodfuel

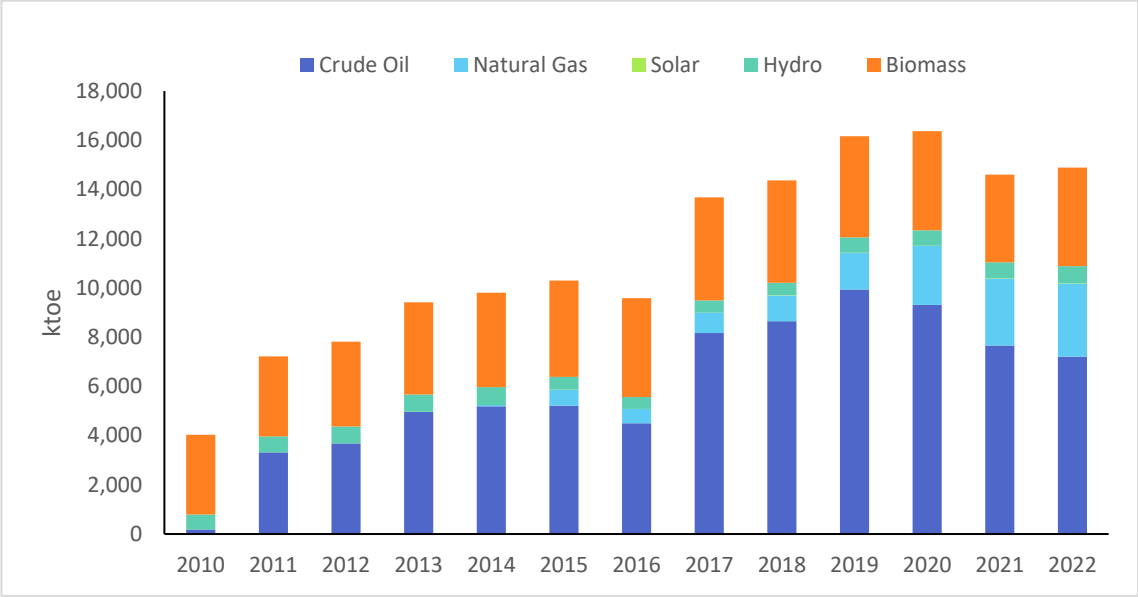
[2]Excludes woodfuel (electricity consumed from solar, biogas and hydro only)

Sources: Ghana Statistical Service, Ministry of Energy & Energy Commission

ENERGY SUPPLY

PRODUCTION OF PRIMARY FUELS

Production of Primary Fuels, 2010 - 2022



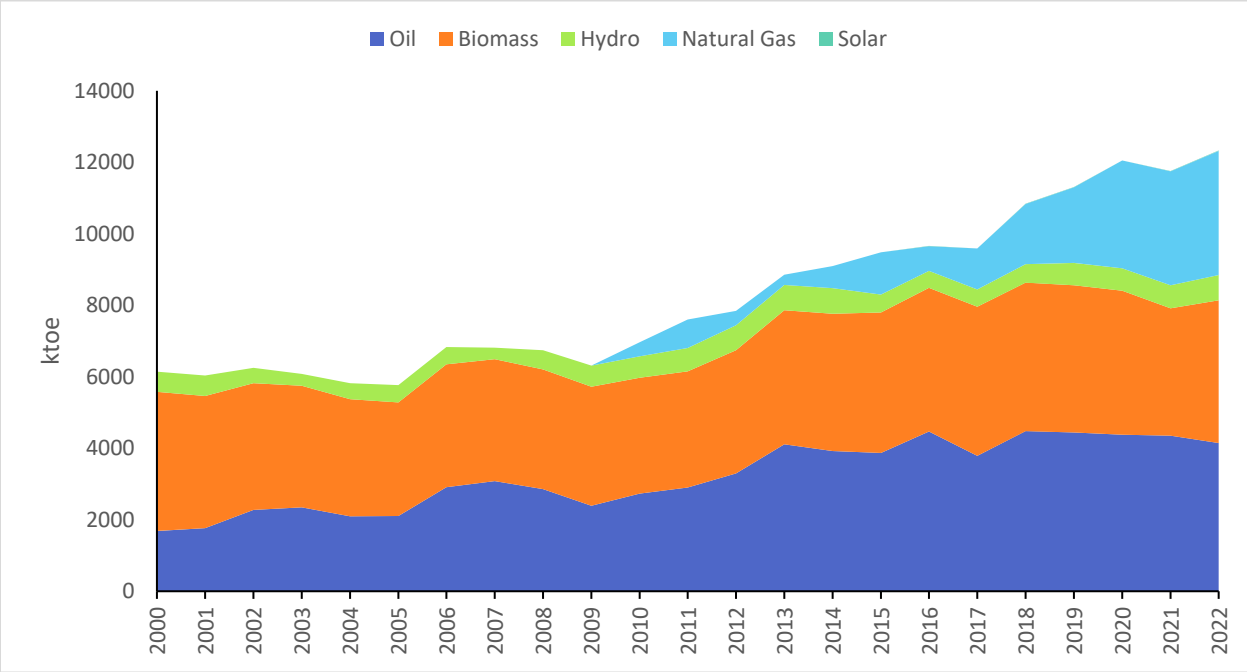
Production of Primary Fuels (ktoe)

Fuel	2010	2015	2016	2017	2018	2019	2020	2021	2022
Crude Oil	190	5,212	4,494	8,163	8,646	9,941	9,313	7,660	7,202
Natural Gas	0	665	592	850	1,046	1,481	2,398	2,717	2,970
Solar	0	0	2	2	3	4	5	11	14
Hydro	601	503	478	483	517	624	627	647	704
Biomass	3,237	3,925	4,019	4,177	4,153	4,115	4,029	3,562	3,993
Total	**4,029**	**10,305**	**9,585**	**13,675**	**14,365**	**16,165**	**16,372**	**14,597**	**14,884**

Production of primary fuels increased at an average annual growth rate of 11.5%, from 4,029 ktoe in 2010 to 14,884 ktoe in 2022 largely driven by increase in crude oil production. Crude oil production increased at an average annual growth rate of 35.4% from 2010 to 2022, reaching 7,202 ktoe in 2022.

TOTAL ENERGY SUPPLY

Total Energy Supply by Fuel, 2000 - 2022



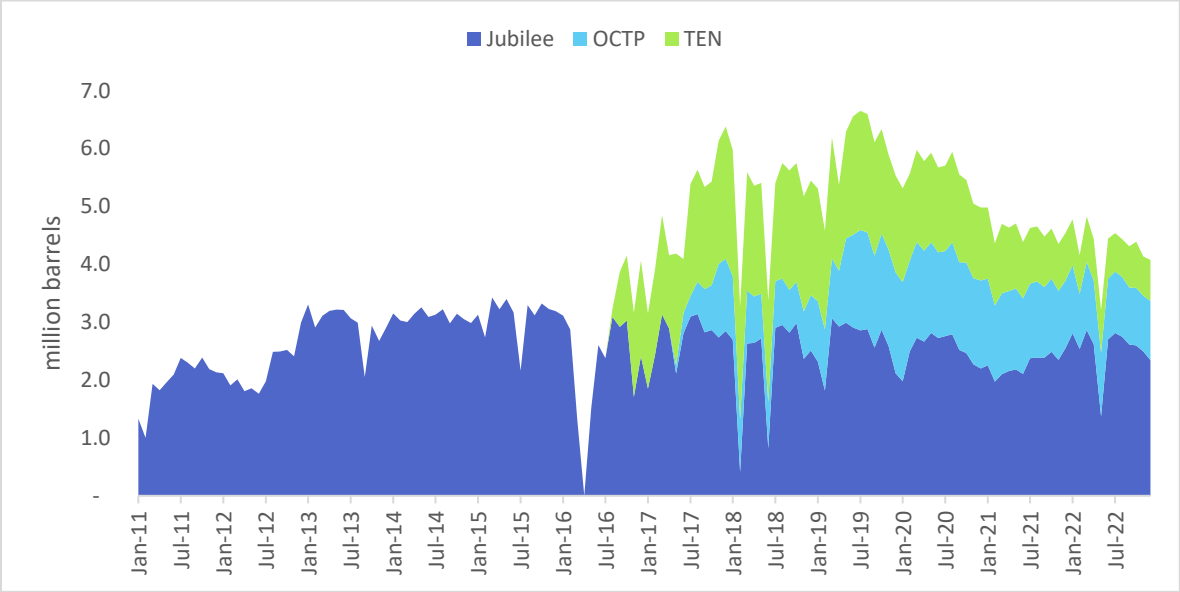
Total Energy Supply (ktoe)

TES	2000	2005	2010	2015	2020	2021	2022
Oil	1,688	2,103	2,735	3,871	4,378	4,352	4,147
Natural Gas	-	-	394	1,185	3,014	3,189	3,472
Hydro	568	484	601	503	627	647	704
Solar	-	-	-	0	5	11	14
Biomass	3,891	3,178	3,237	3,925	4,029	3,562	3,993
Total	6,146	5,766	6,967	9,483	12,053	11,760	12,331

The country's total energy supply in 2022 was 12,331 ktoe representing an annual growth rate of 3.2% from 2000 to 2022. Until 2013, biomass held the largest share of the country's energy supply, but since then, oil has emerged as the dominant source, constituting about 33.6% of the total energy supply in 2022.

CRUDE OIL PRODUCTION

Crude Oil Production, Jan 2011 – Dec 2022



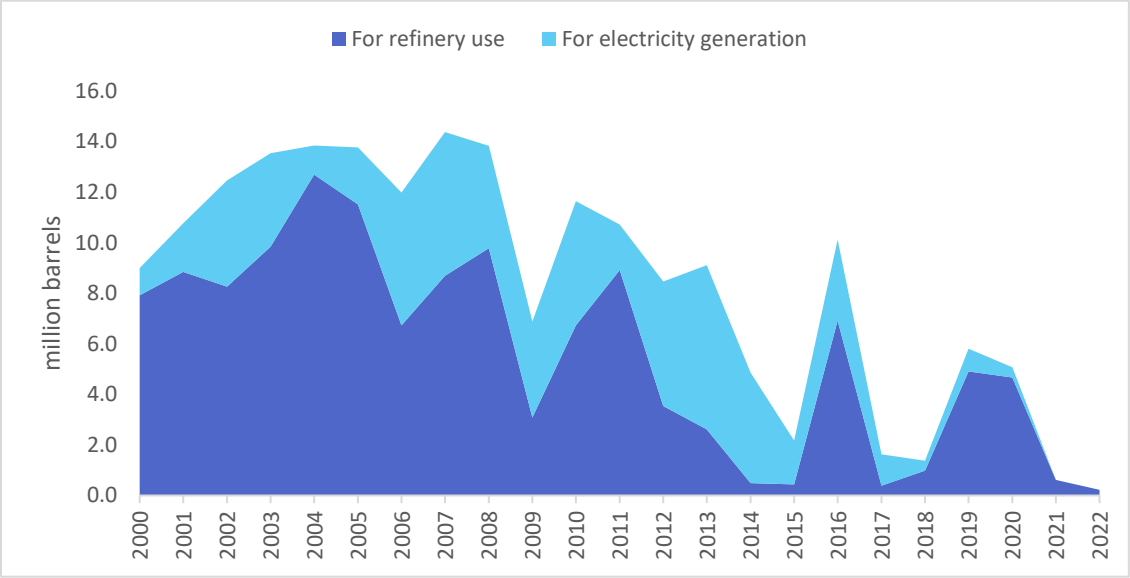
Crude Oil Production by field (mmbbls)

Year	Saltpond	Jubilee	TEN	OCTP	Total
2010	0.1	1.3	-	-	1.4
2012	0.1	26.4	-	-	26.5
2014	0.1	37.2	-	-	37.3
2016	-	27.0	5.3	-	32.3
2018	-	28.5	23.6	10.1	62.1
2020	-	30.4	17.8	18.7	66.9
2021	-	27.3	12.0	15.7	55.1
2022	-	30.5	8.6	12.6	51.8

Crude oil production has been increasing at an average annual growth rate of 7.3% from 2012 to 2022. Ghana's three offshore producing fields collectively yielded 51.8 million barrels of crude oil in 2022. However, there was a marginal decline of about 6% in crude oil production in 2022 compared to 2021.

CRUDE OIL IMPORT

Crude Oil Import, 2000 - 2022



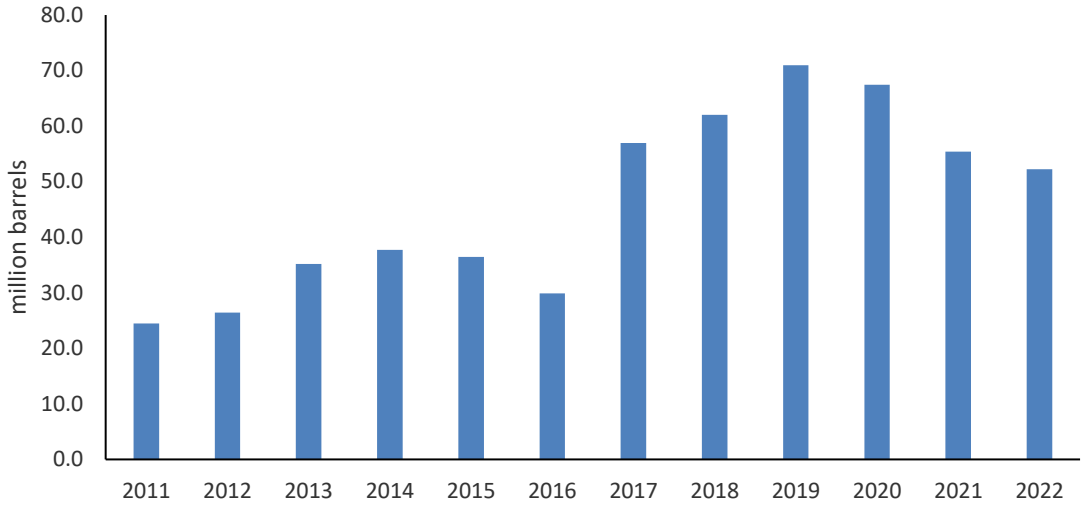
Crude Oil Import (MMBBL)

Use	2000	2005	2010	2015	2020	2021	2022
For refinery	7.9	11.5	6.7	0.4	4.7	0.6	0.2
For electricity	1.1	2.3	4.9	1.7	0.4	-	-
Total	**9.0**	**13.8**	**11.6**	**2.2**	**5.1**	**0.6**	**0.2**

Total crude oil imports increased by 53.1% between 2000 and 2005, followed by a 15.5% drop by the end of 2010. Subsequently, there was a significant decline in crude oil imports, plummeting from 11.6 million barrels in 2010 to 0.2 million barrels in 2022, at an average annual rate of 28%.

CRUDE OIL EXPORT

Crude Oil Export, 2011 - 2022



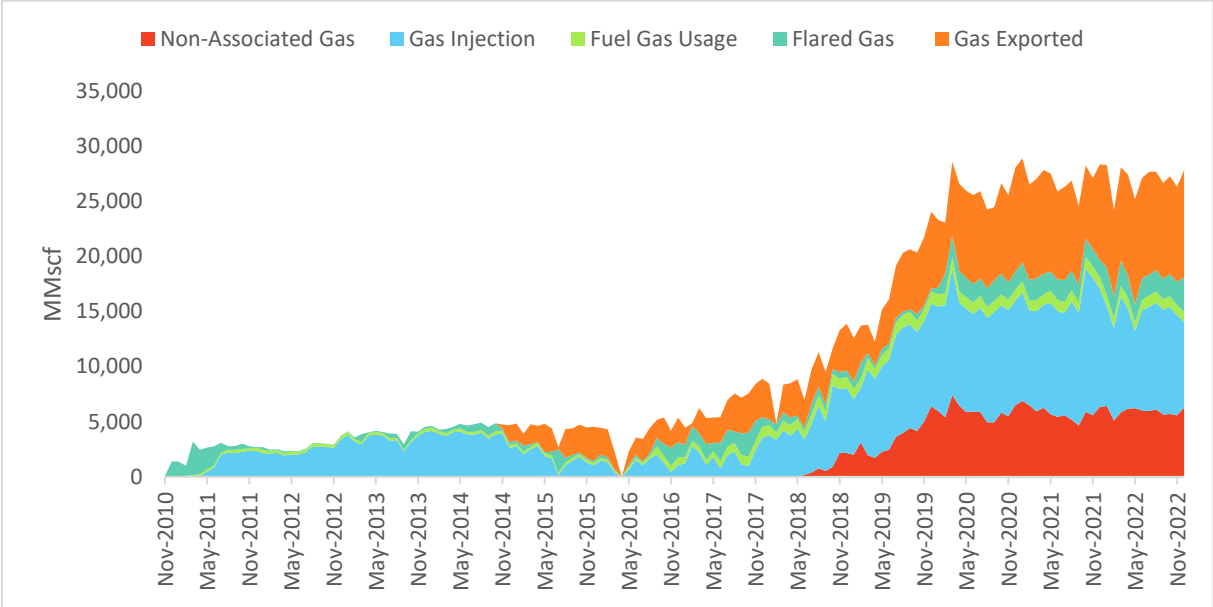
Crude Oil Export

Year	Export (Million barrels)	Total Merchandise Export (million US$)	Crude oil export as % of total merchandise export
2011	24.5	12,772.7	21.8
2012	26.4	13,552.3	22.0
2014	37.7	13,216.8	28.2
2016	29.9	11,138.4	12.1
2018	62.0	14,942.7	30.6
2020	67.5	14,471.5	20.1
2021	55.4	14,727.5	26.8
2022	52.2	17,406.8	31.2

The onset of commercial production of crude oil in 2011 led to a significant increase in crude oil export. It increased from 24.5 million barrels in 2011 to 52.2 million barrels in 2022, reflecting an average annual growth rate of 7.1%. However, there was a marginal decline of 5.7% in crude oil exports in 2022 compared to the preceding year, 2021.

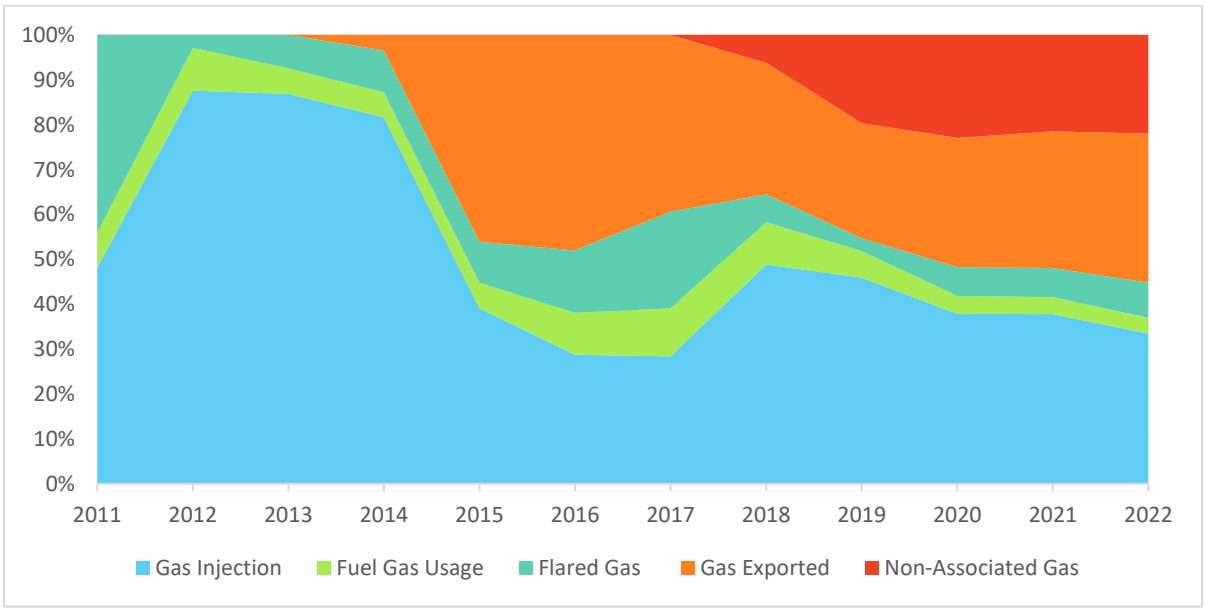
NATURAL GAS PRODUCTION

Natural Gas Extracted and Utilisation, Nov 2010 – Dec 2022



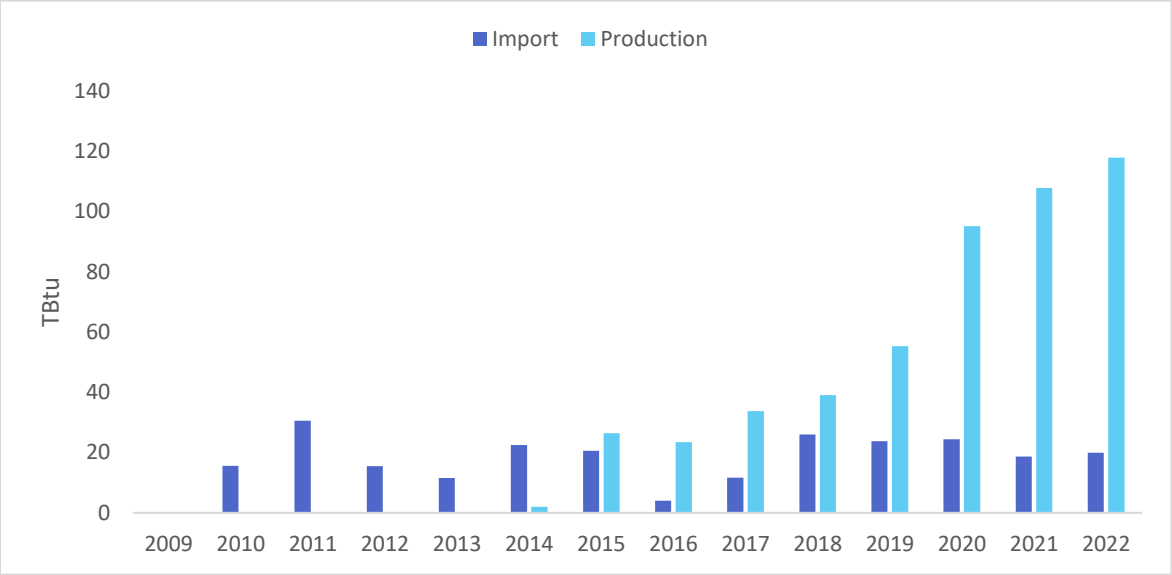
NB: All raw natural gas produced before November 2014 was used on the FPSO. It was injected, flared or used as fuel on the FPSO. Gas exported is the quantity transported through pipelines from the FPSO to the Gas processing plant.

Share in Annual Natural Gas Utilization



NATURAL GAS SUPPLY

Natural Gas Supply, 2009 - 2022



NB: Production includes natural gas production form GNGC and non-associated gas. Import is from Nigeria through the West Africa Gas pipelines.

Natural Gas Supply by Source

	Share (%) of total Supply								
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Import	91.7	43.9	14.6	25.8	40.0	30.0	20.4	14.8	14.5
Production	8.3	56.1	85.4	74.2	60.0	70.0	79.6	85.2	85.5

The total gas supplied to the country's consuming facilities was 138 tBtu in 2022. Around 19.9 tBtu (14.5%) of this volume was imported from Nigeria via the West African Gas Pipeline (WAGP), representing a slight increase of 6.5% over the import volume in 2021. The remainder (85.5%) was supplied from indigenous sources. Gas supply from indigenous sources (Atuabo and non-associated gas) witnessed its greatest boost in 2022, with a total of 117.9 tBtu. The bulk of imported and indigenous gas is utilised by mainly the electricity generation system.

INSTALLED ELECTRICITY GENERATION CAPACITY

Installed Generation Capacities as at end of December 2022 (MW)

Plant	Installed Capacity	Dependable Capacity
Hydro Power Plants		
Akosombo	1,020	900
Kpong	160	140
Bui	404	330
Tsatsadu	0.045	0.045
Sub-Total	**1,584**	**1,370**
Thermal Power Plants		
Takoradi Power Company (TAPCO)	330	315
Takoradi International Company (TICO)	340	330
Tema Thermal 1 Power Plant (TT1PP)	110	100
Tema Thermal 2 Power Plant (TT2PP)	80	70
Cenit Energy Ltd	110	100
Kpone Thermal Power Plant	220	200
Ameri Plant	250	230
Sunon Asogli Power (Ghana) Ltd	560	530
Karpowership	470	450
Amandi	210	201
AKSA	370	330
Cenpower	360	340
Early Power / Bridge[1]	191	144
Genser[2]	157	133
Sub-Total	**3,758**	**3,473**
Other Renewables		
On-grid		
VRA Solar (Navrongo)[2]	2.5	-
VRA Solar (Lawra)[2]	6.5	-
VRA Solar (Kaleo)[2]	13	-
BXC Solar[2]	20	-
Meinergy[2]	20	-
Bui Solar[2]	50	-
Safisana Biogas[2]	0.1	-
Sub-Total	**112**	**-**
Total	**5,454**	**4,843**

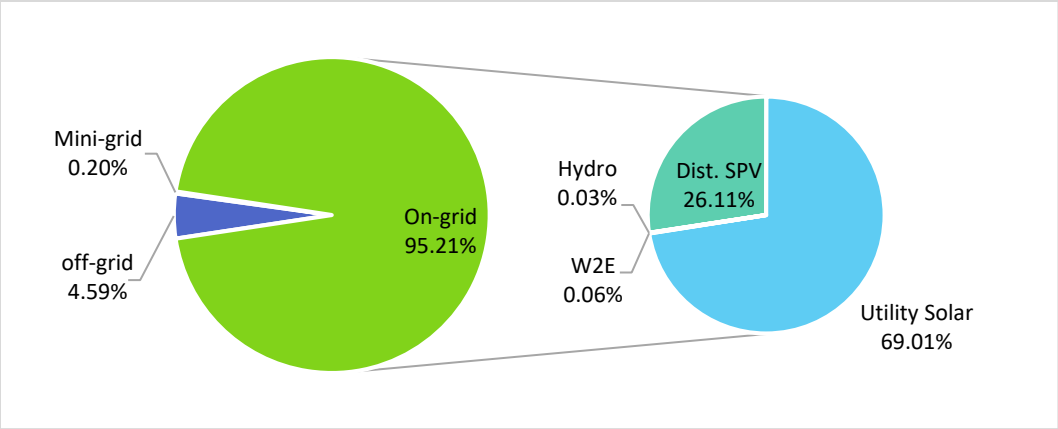
[1]Currently undergoing testing and preparations before its commercial operation date

[2]Connected at the sub-transmission level (embedded generation)

Renewable Energy Installed Generation Capacity (KW)

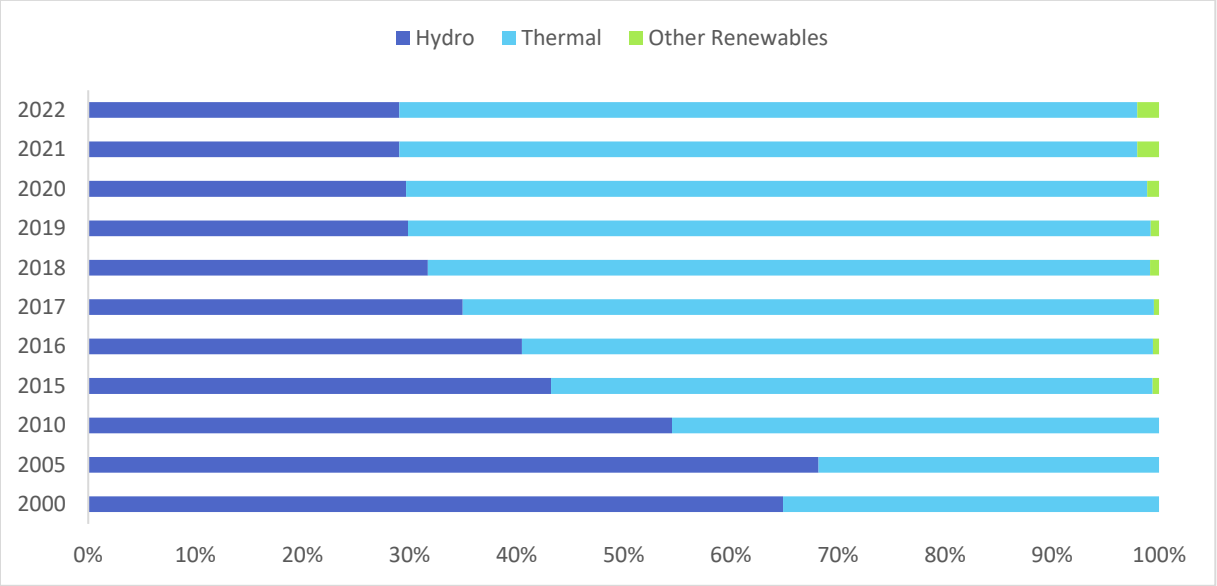
Year	Off-grid		On-grid					Mini-Grid		Installed
	Solar	Wind	Dist. SPV	Utility Solar	W2E	Hydro	Wind	Solar	Wind	
2013	-	-	495	2,500	-	-	-	-	-	2,995
2014	1,350	-	443	-	-	-	-	-	-	1,793
2015	4,003	20	700	20,000	100	-	-	256	11	25,090
2016	1,238	-	2,626	-	-	-	-	-	-	3,865
2017	678	-	4,266	-	-	-		58		5,003
2018	155	-	9,441	20,000	-	-	-	-	-	29,596
2019			9,924		-	45	-	-	-	9,969
2020*			7,520	6,540						14,060
2021*			3,975	63,000						66,975
2022*			3,001							3,001
Total	**7,424**	**20**	**42,390**	**112,040**	**100**	**45**	**-**	**314**	**11**	**162,345**

Note: This excludes large hydro (Akosombo, Kpong and Bui); *Provisional



The total installed renewable electricity generation capacity has been increasing significantly at an average annual growth rate of 55.8% from 2,995kW in 2013 to 162,345 kW in 2022. About 95% of the total installed capacity is grid-connected, while the rest comprises off-grid and mini-grid systems. Solar constitutes the majority of on-grid systems, with the rest being hydro or waste-to-energy sources.

Installed Electricity Generation Capacity



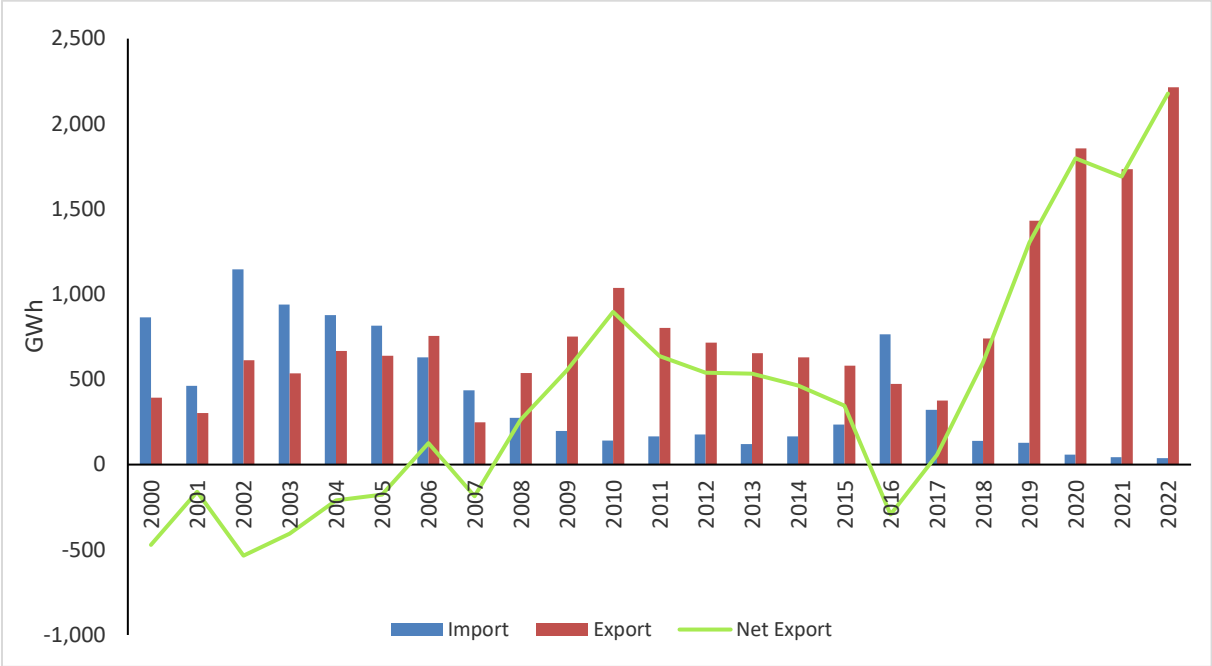
Share of Installed Electricity Generation Capacity

Generation Source	Shares (%)						
	2000	2005	2010	2015	2020	2021	2022
Hydro	64.9	68.2	54.5	43.2	29.7	29.1	29.0
Thermal	35.1	31.8	45.5	56.2	69.2	68.9	68.9
Other Renewables	0.0	0.0	0.0	0.6	1.1	2.1	2.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Total installed grid electricity generation capacity, excluding off-grid and mini-grid renewable facilities, increased from 2,165 MW in 2010 to 5,454 MW in 2022, representing an annual average growth of 8%. The long-term dependable capacity increased at an average annual growth rate of approximately 7.9% from 1,940 MW in 2010 to 4,843 MW in 2022.

ELECTRICITY IMPORT AND EXPORT

Electricity Import and Export, 2000 - 2022



NB: negative net export means net import

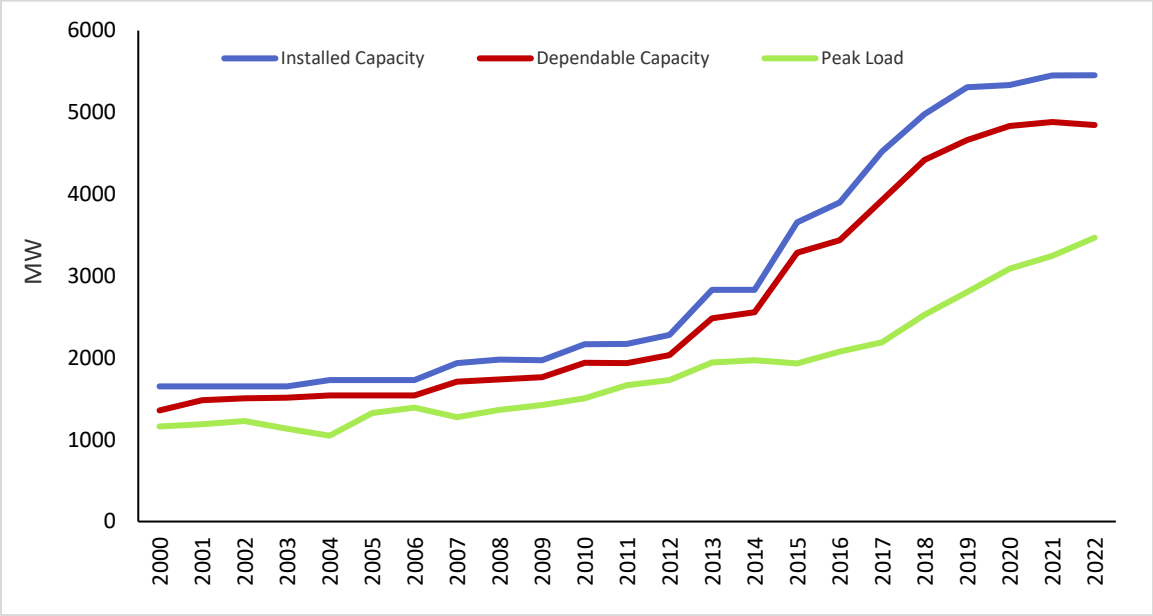
Electricity Import and Export (GWh)

	2000	2005	2010	2015	2020	2021	2022
Import	864	815	140.7	235.5	58.3	43.7	37.4
Export	392	639	1,036.3	581.4	1,855.1	1,734.0	2,214.8
Net Export	-472	-176	895.6	345.8	1,796.8	1,690.3	2,177.5

The electricity exported in 2022 was 2,214.8 GWh representing 27.7% increase over that of 2021. Conversely, electricity imports decreased from 43.7 GWh in 2021 to 37.4 GWh in 2022, representing a decline of 14.4%.

GENERATION CAPACITY AND PEAK LOAD

Installed Capacity, Dependable Capacity and Peak Load, 2000 - 2022



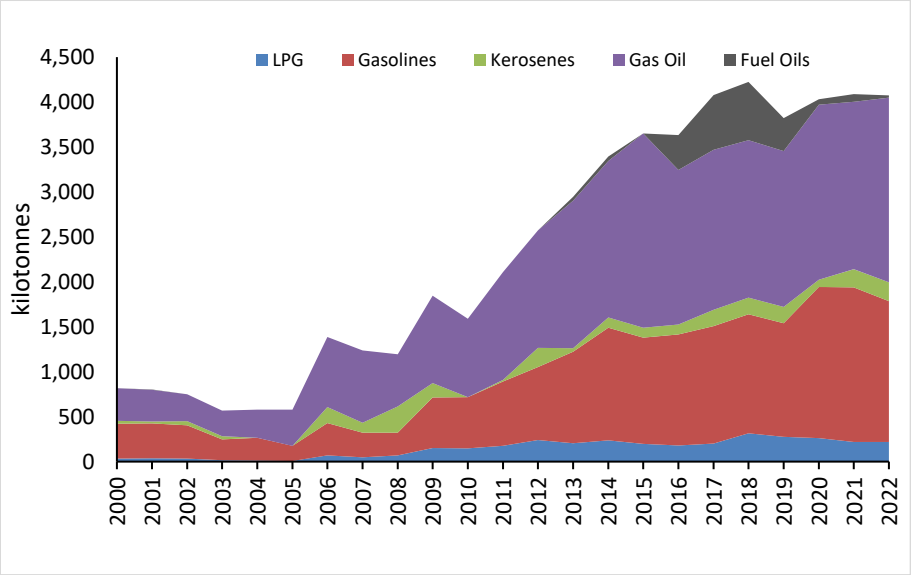
Generation Capacity and Peak Load (MW)

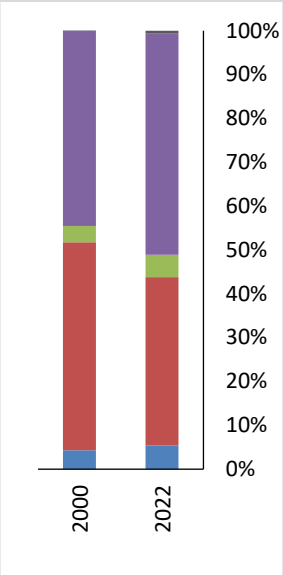
	2000	2005	2010	2015	2020	2021	2022
Installed Capacity	1,652	1,730	2,165	3,656	5,336	5,451	5,454
Dependable Capacity	1,358	1,540	1,940	3,359	4,835	4,882	4,846
Peak Load	1,161	1,325	1,506	1,933	3,090	3,246	3,469

System peak load (Ghana Load at Peak + VALCO load + export load) increased from 1,161 MW in 2000 to 3,469 MW in 2022, representing an average annual growth rate of 5.1%. The system peak load witnessed an increase of 6.9% in 2022 over 2021. Similarly, the total dependable capacity increased from 1,358 MW in 2000 to 4,846 MW in 2022 at an average annual growth rate of 6%.

PETROLEUM PRODUCT IMPORT

Trend in Petroleum Product Import, 2000 - 2022





Kerosenes =ATK + DPK + Kerosene
Fuel Oils = RFO + HFO

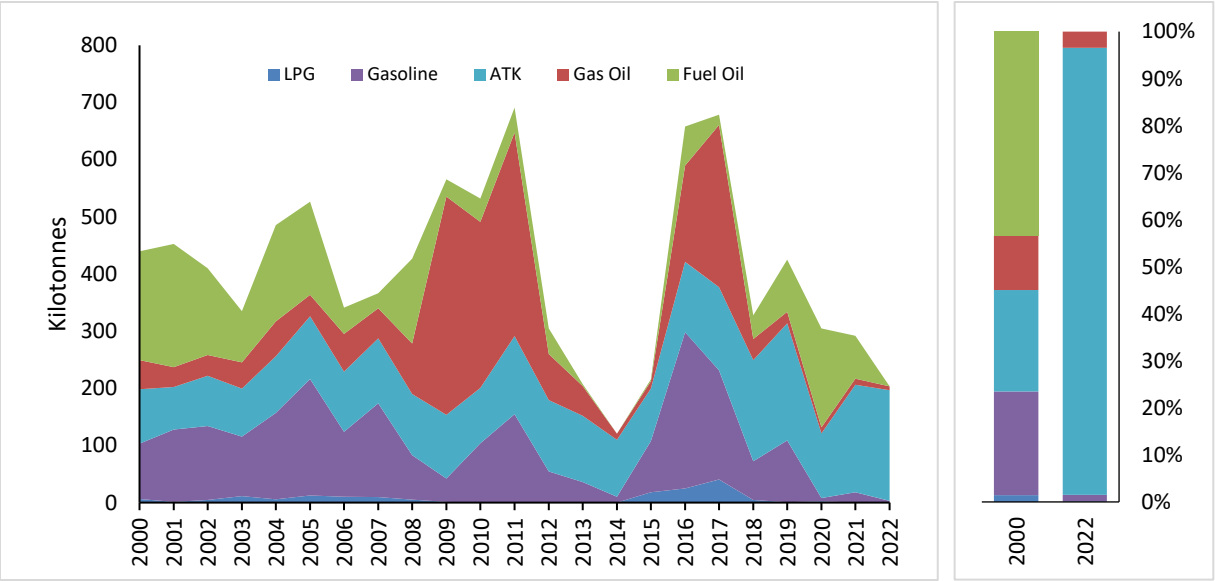
Petroleum Product Import (kilotonnes)

	2000	2005	2010	2015	2020	2021	2022
LPG	35	7	148	198	262	221	221
Gasolines	387	167	570	1,182	1,682	1,717	1,564
Kerosenes	30	-	-	109	80	203	209
Gas Oil	363	404	872	2,161	1,947	1,864	2,055
Fuel Oils	-	-	-	-	63	85	26
Total	**816**	**578**	**1,590**	**3,650**	**4,033**	**4,090**	**4,075**

Importation of gasoline and gasoil increased at an average annual growth rate of 6.6% and 8.2%, respectively, from 2000 to 2022. ATK recorded a marginal increase of about 3% in 2022 from the 2021 import volume. However, importation of fuel oils decreased drastically by about 70% in 2022 from the preceding year's volume due to the absence of HFO imports in 2022.

PETROLEUM PRODUCT EXPORT

Petroleum Product Export, 2000 - 2022



Petroleum Product Export (kilotonnes)

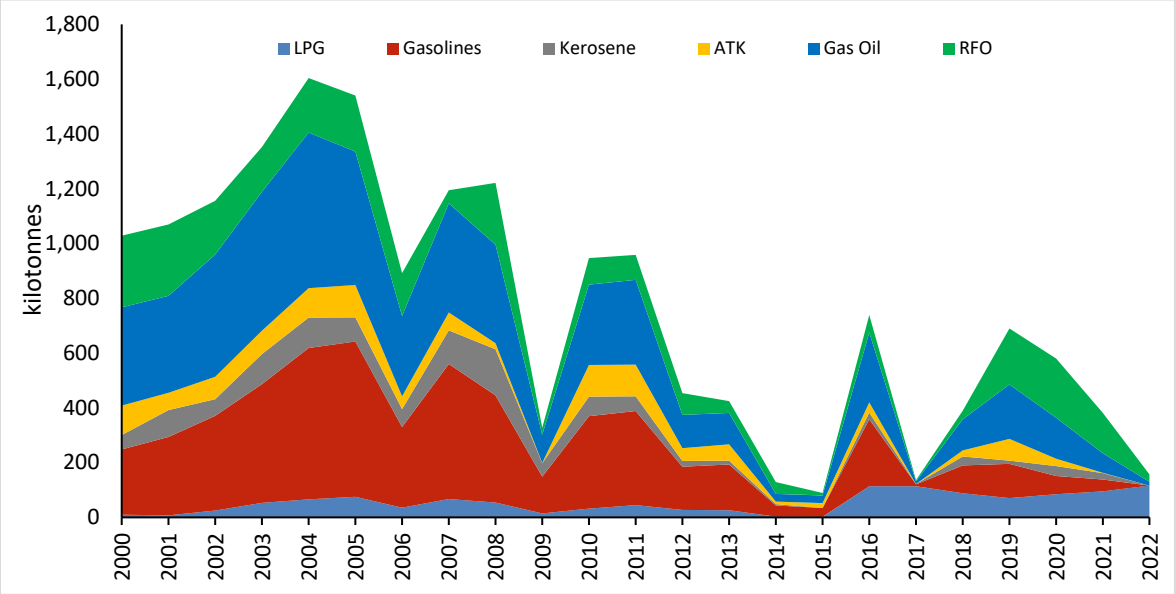
	2000	2005	2010	2015	2020	2021	2022
LPG	6	13	-	18	3	0.04	0.35
Gasolines	97	204	104	90	5	18	3
ATK	95	110	97	92	113	188	194
Gas Oil	51	38	291	13	10	10	7
Fuel Oil	191	163	41	3	173	75	-
Total	**440**	**526**	**532**	**215**	**305**	**292**	**204**

LPG export decreased at an average annual rate of 12.3%, from 6 kt in 2000 to 0.35 kt in 2022. ATK export (including volumes transferred to aircrafts engaged in international aviation bunkering) increased from 95 kt in 2000 to 194 kt in 2022 at an annual growth rate of 3.3%.

TRANSFORMATION

REFINERY PRODUCTION

Refinery Production by Product (2000-2022)



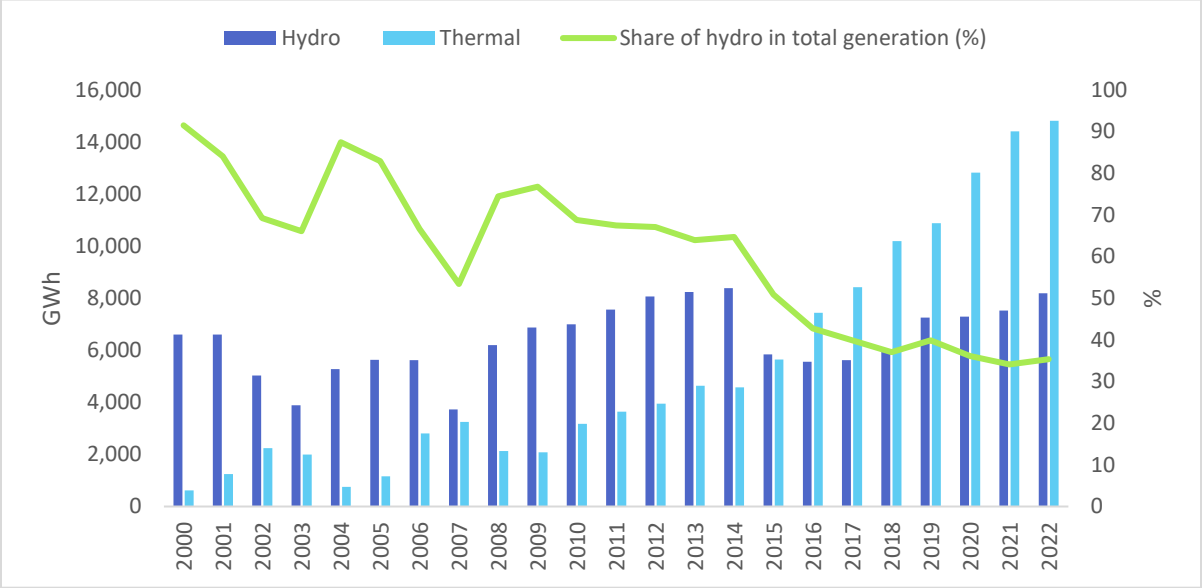
Refinery Production by Product (kilotonnes)

	2000	2005	2010	2015	2020	2021	2022
LPG	9.7	75.3	31.6	2.0	84.9	94.9	116.5
Gasolines	238.6	567.1	337.7	31.8	66.5	43.5	0.0
Kerosene	51.8	87.7	71.0	0.2	35.5	23.6	0.0
ATK	108.3	119.0	116.7	18.2	27.6	0.7	0.0
Gas Oil	358.1	486.3	292.6	28.0	149.6	71.3	13.6
RFO	261.9	205.4	96.8	8.9	216.1	147.4	26.8
Total	**1,028.4**	**1,540.8**	**946.4**	**89.1**	**580.2**	**381.2**	**156.9**

Petroleum product production underwent a significant drop, declining from 1,028 kt in 2000 to 157 kt in 2022 at an average annual rate of 8.2%. The country recorded its lowest level of production of petroleum products of 89kt in 2015.

ELECTRICITY PRODUCTION

Electricity Production, 2000 - 2022



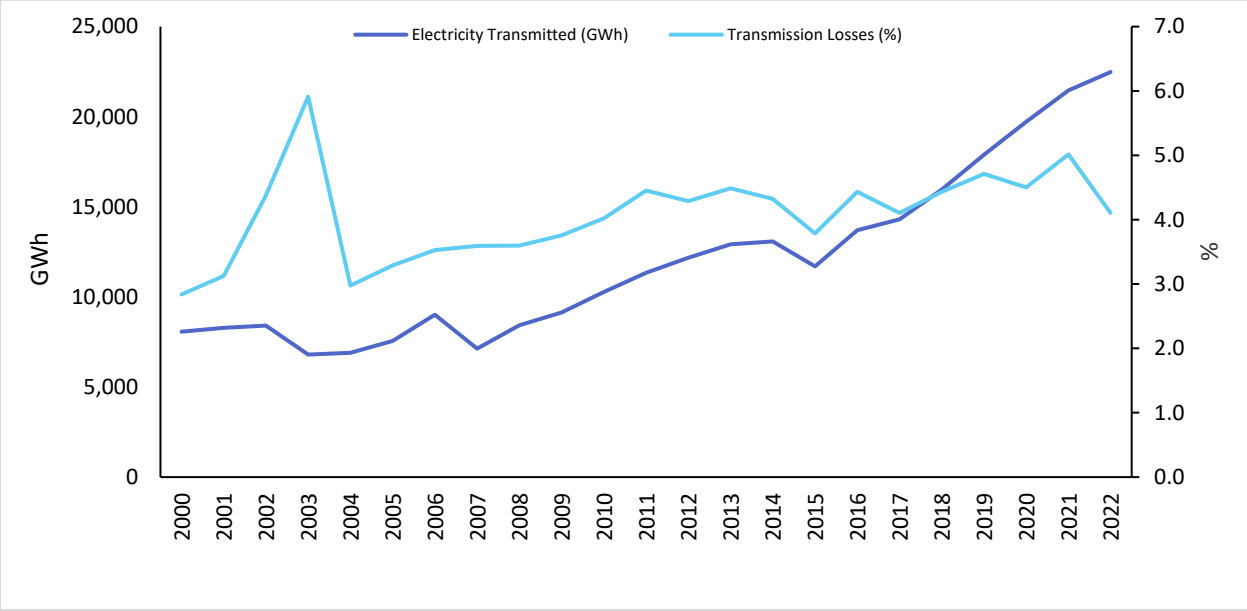
Share (%) of Electricity Production

	2000	2005	2010	2015	2020	2021	2022
Hydro	91.5	82.9	68.8	50.9	36.2	34.1	35.4
Thermal	8.5	17.1	31.2	49.1	63.6	65.3	63.9
Renewables	-	-	-	0.0	0.3	0.6	0.7
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Total electricity generation increased from 7,224 GWh in 2000 to 23,163 GWh in 2022 with an average annual increase of 5.4%. The share of hydro in the total electricity generation decreased from 91.5% in 2000 to 35.4% in 2022 whilst that of thermal increased from 8.5% in 2000 to 63.9% in 2022. Generation from renewable sources increased from 3 GWh in 2013 to 162 GWh by the end of 2022.

ELECTRICITY TRANSMISSION

Electricity Transmitted, 2000 - 2022



Electricity Transmitted and Transmission Losses

	2000	2005	2010	2015	2020	2021	2022
Electricity Transmitted (GWh)	8,067	7,565	10,267	11,692	19,717	21,466	22,478
Transmission Losses (GWh)	229	249	413	443	888	1,076	922
Transmission Losses (%)	2.8	3.3	4.0	3.8	4.5	5.0	4.1

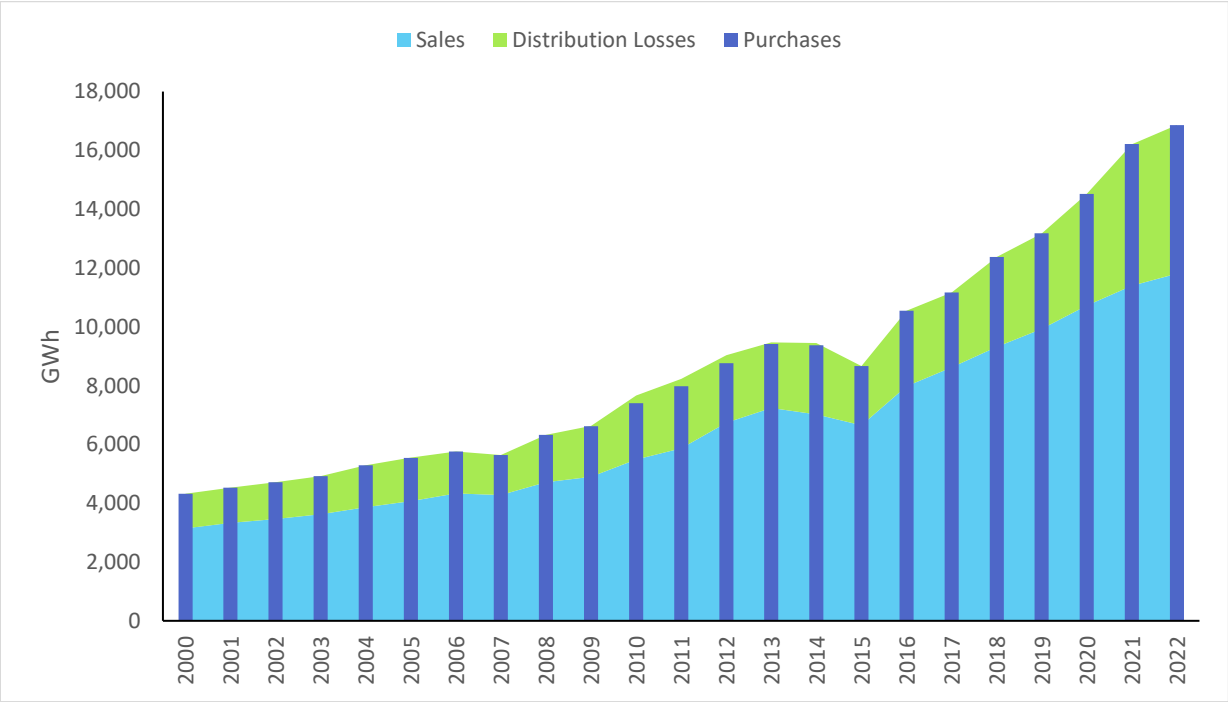
The total electricity transmitted in 2022 was 22,478 GWh, representing a 4.7% increase over that of 2021. This was made up of 8,191.8 GWh (36.4%) from hydro generation, 14,154 GWh (63%) from thermal generation[1], 95.22 GWh (0.42%) from Solar (directly connected to the NITs) and 37.4 GWh (0.17%) import.

The total transmission losses recorded in 2022 was about 922 GWh which is 4.1% of the total energy transmitted in the 2022 (22,478 GWh).

[1] Excluding Genser (distributed generation)

ELECTRICITY DISTRIBUTION

Electricity Purchases and Sales by Distribution Utilities, 2000 - 2022



Sales and Distribution Losses

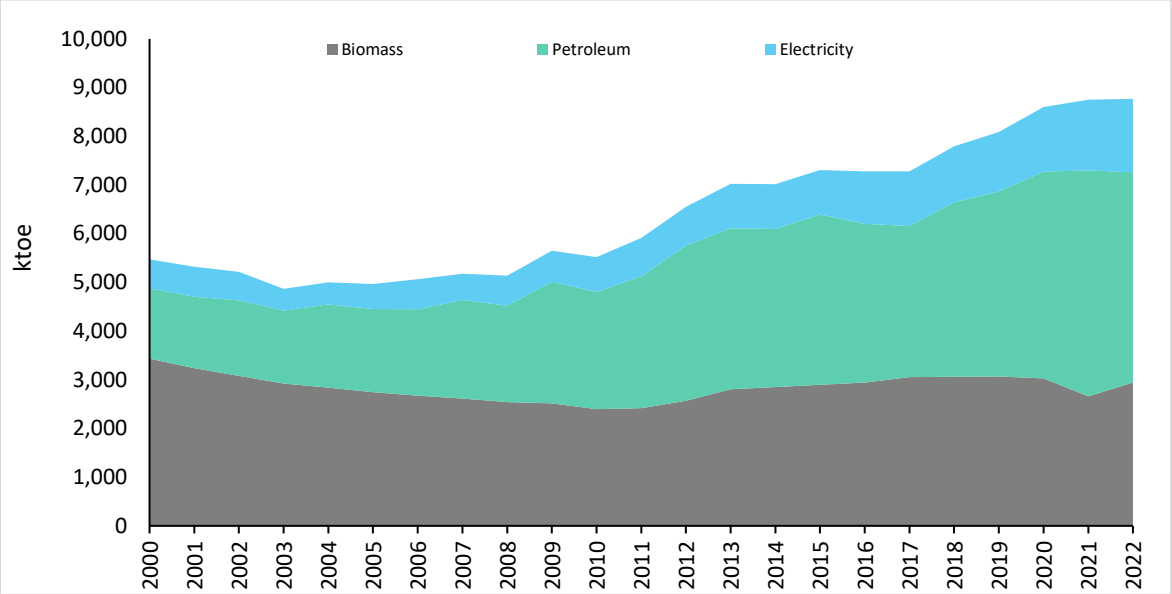
Year	Purchases (GWh)	Sales (GWh)	Distribution Losses[1]	
			GWh	%
2000	4,319	3,142	1,176	27.2
2005	5,546	4,072	1,474	26.6
2010	7,406	5,483	2,180	29.4
2015	8,659	6,646	2,013	23.3
2020	14,524	10,717	3,804	26.2
2021	16,219	11,394	4,809	29.7
2022	16,863	11,808	5,055	30.0

[1]Distrubution losses is made up of both technical and commercial losses

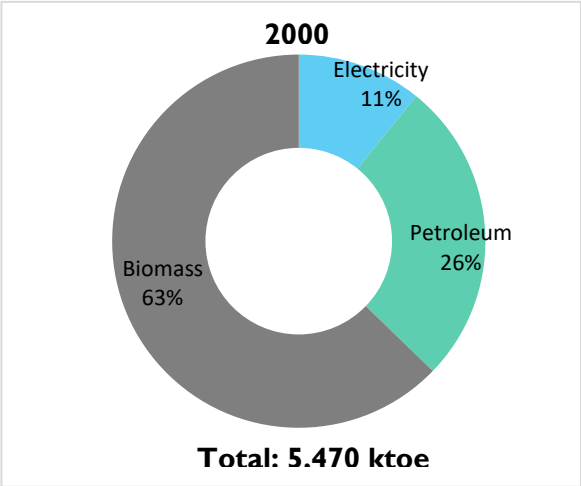
FINAL ENERGY CONSUMPTION

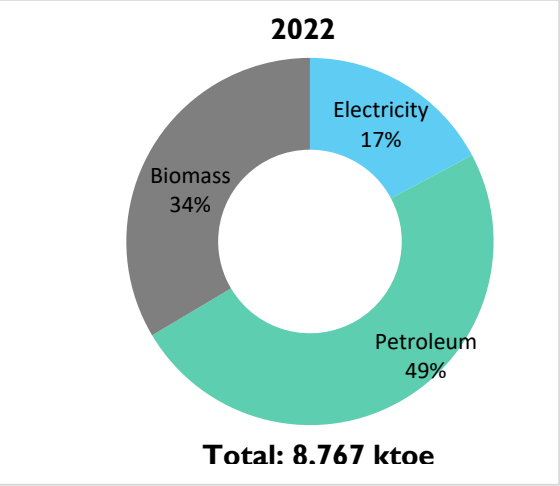
FINAL ENERGY CONSUMPTION

Final Energy Consumption by fuel Type (2000-2022)



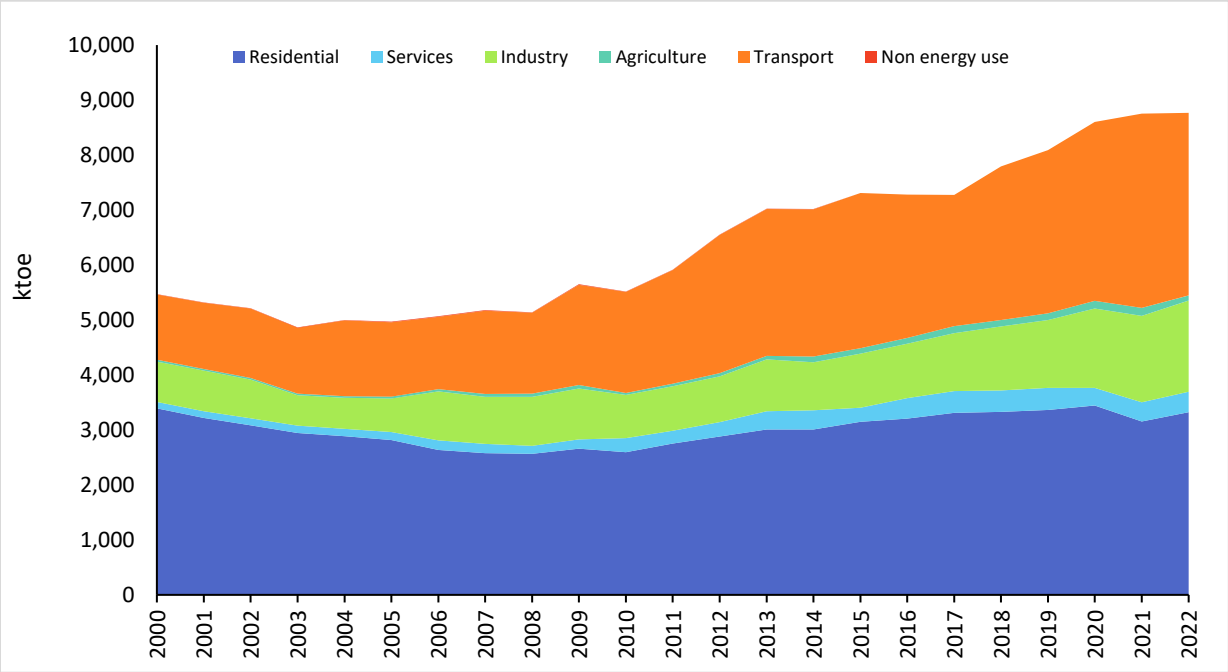
2000 and 2022 Share of Final Energy Consumption by Fuel Type



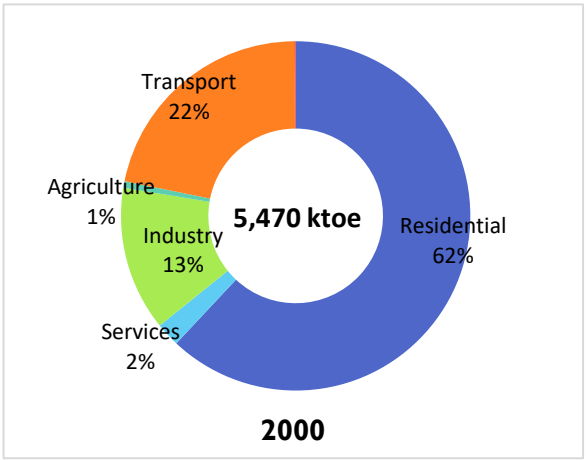


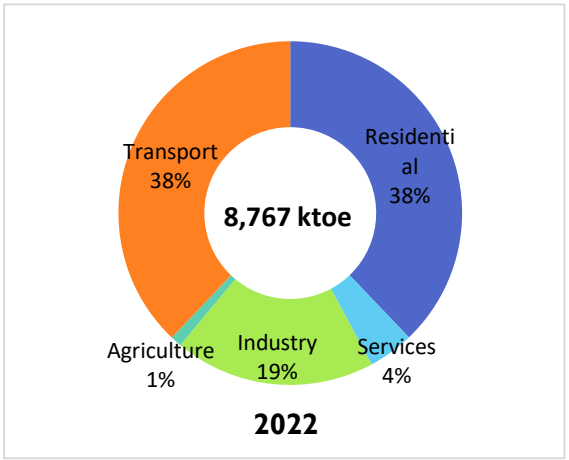
Final energy consumption increased at an annual average growth rate of 2.2%, from 5,470 ktoe in 2000 to 8,767 ktoe in 2022. Meanwhile, the share of biomass in total final energy consumption declined from 62.8% in 2000 to 33.5% in 2022.

Final Energy Consumption by Sector (2000 to 2022)



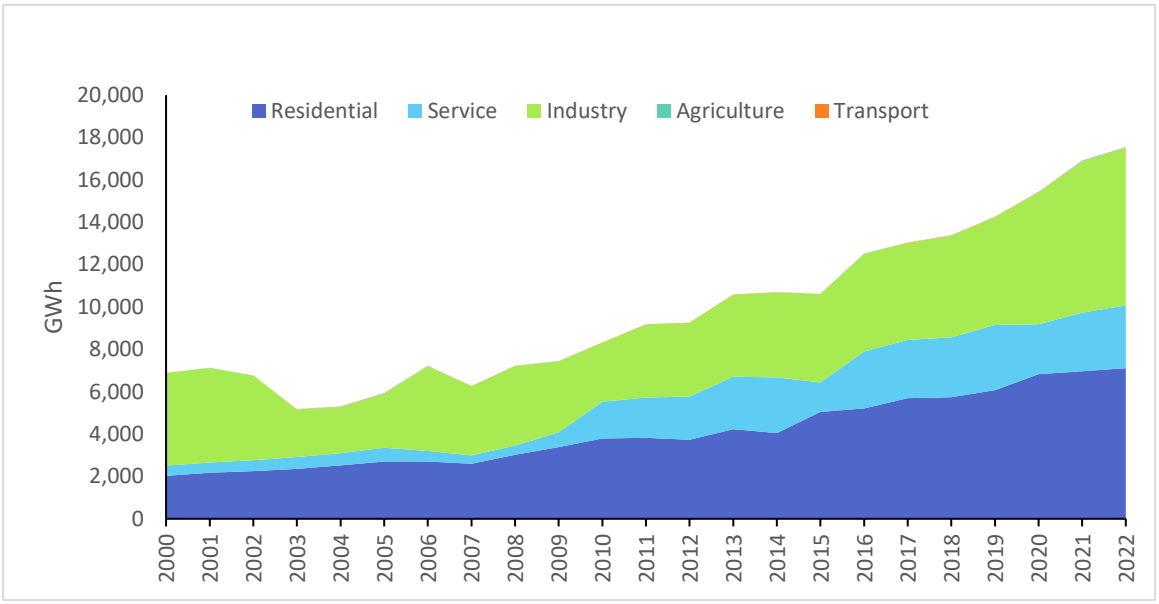
2000 and 2022 Share of Final Energy Consumption by Sector



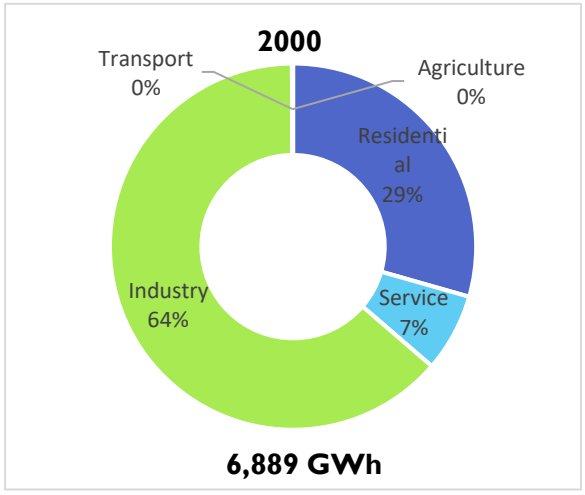


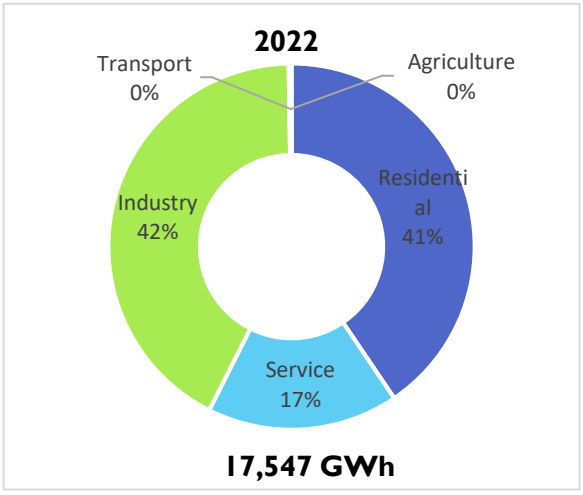
Final energy consumed by the residential sector in 2000 was 3,390 ktoe, accounting for 62.0% of the total final energy. However, by 2022, residential consumption slightly decreased to 3,320 ktoe, making up 37.9% of total final energy consumed across sectors. Final energy consumption by the transport sector rose from 1,186 ktoe (21.7% of total) in 2000 to 3,322 ktoe (37.9% of total) in 2022.

Electricity Consumption by Sector (2000 to 2022)



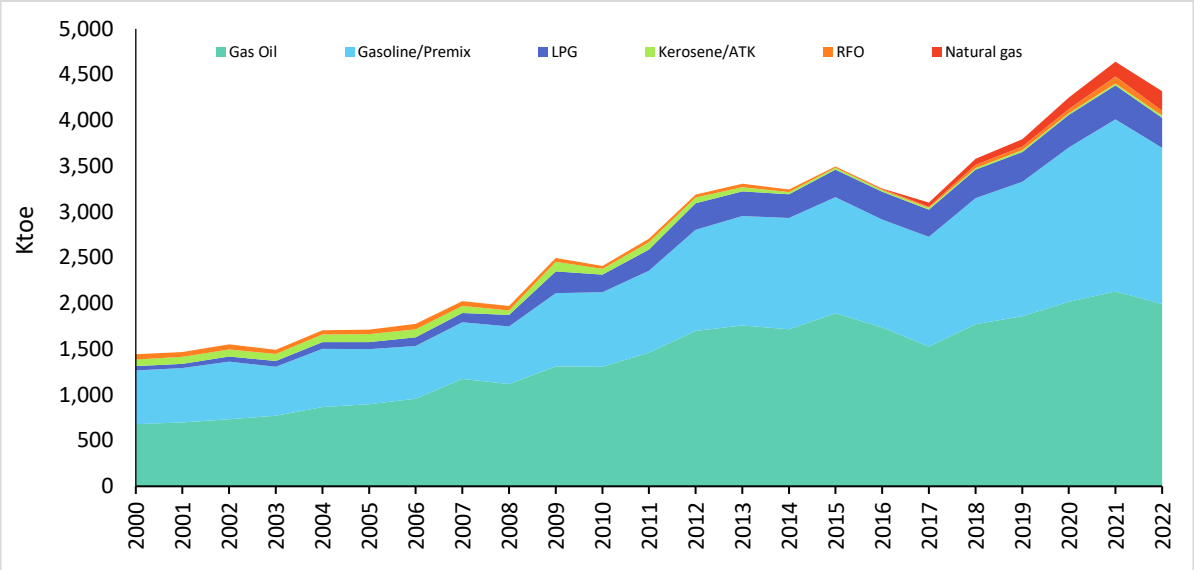
2000 and 2022 Share of Electricity Consumption by Sector



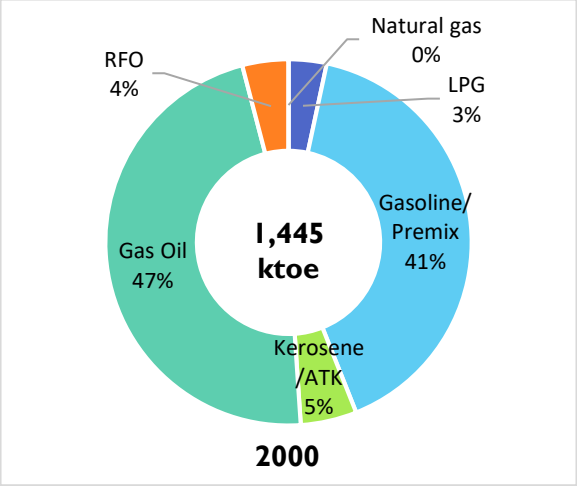


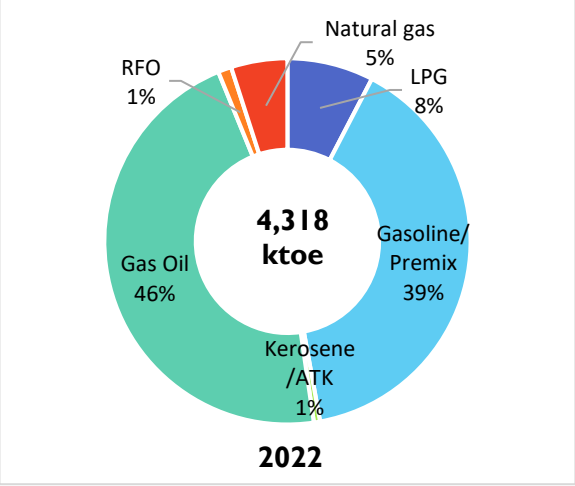
In 2000, the industrial and residential sectors consumed 4,380 GWh and 2,026 GWh of electricity, making up 64% and 29% of total electricity consumption, respectively. However, by 2022, the residential sector's share grew to 41% amounting to 7,111 GWh, while the industrial sector's share decreased to 42%, amounting to 7,428 GWh.

Petroleum Product Consumption by fuel type (2000 to 2022)



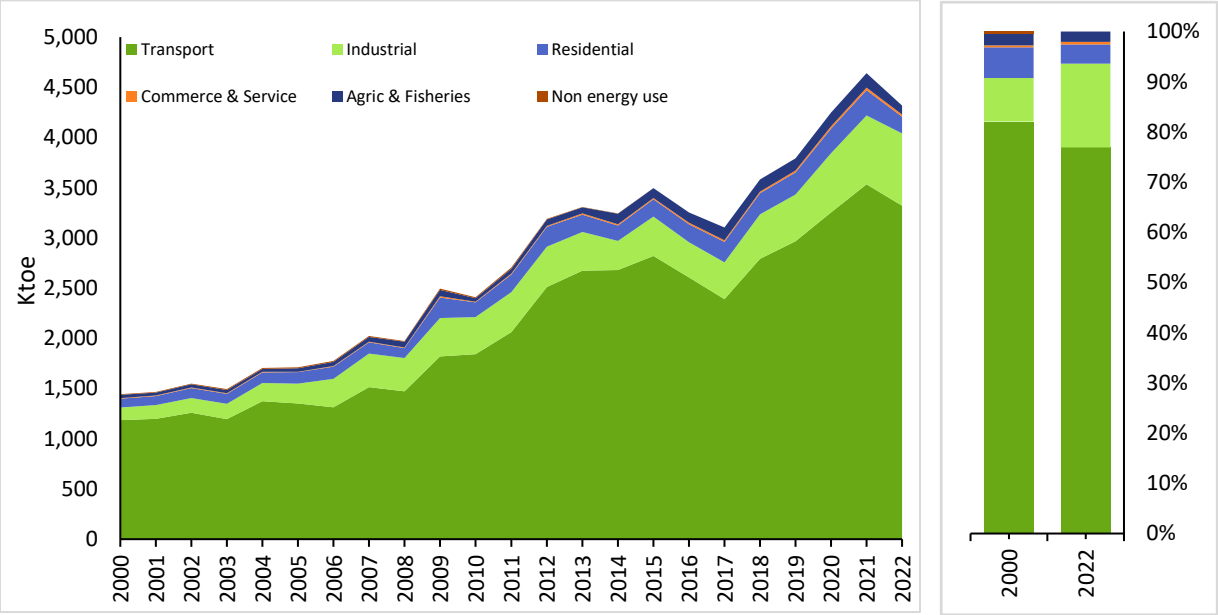
2000 and 2022 Share of Petroleum Products Consumption





Total petroleum products consumed increased at an annual average growth rate of 5.1% from 1,445 ktoe in 2000 to 4,318 ktoe in 2022. The share of gas oil in final petroleum product consumption average about 51.3% from 2000 to 2022 whilst LPG share of final petroleum product consumed increased from 3.4% in 2000 to 7.6% in 2022.

Petroleum Product Consumption by Sector (2000 to 2022)



Petroleum Product Consumption by Sector (Ktoe)

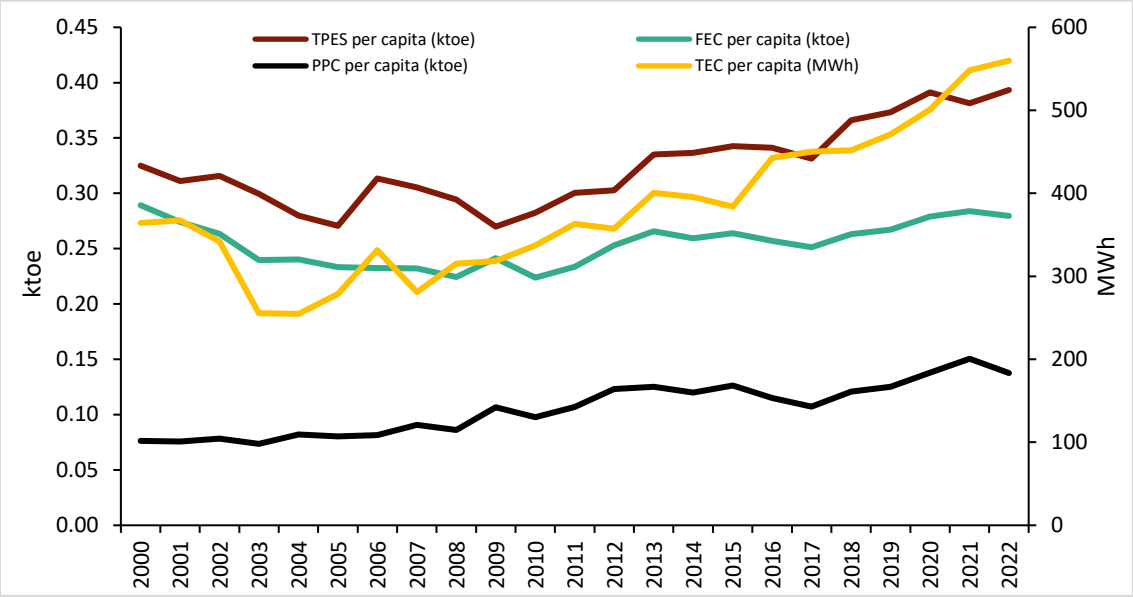
	2000	2005	2010	2015	2020	2021	2022
Residential	88	112	144	172	243	252	165
Industry	125	199	372	392	593	686	721
Service	5	6	8	13	23	25	21
Agriculture	33	34	35	100	137	144	89
Transport	1,186	1,351	1,842	2,819	3,252	3,534	3,322
Non-Energy Use	7	10	7	0	0	0	0
Total	**1,445**	**1,712**	**2,408**	**3,497**	**4,248**	**4,641**	**4,318**

The petroleum product consumption by the transport sector, which was 1,186 ktoe (82.1% of total) in 2000, increased threefold to 3,322 ktoe (76.9% of total) by 2022. Meanwhile, the industrial sector's share of total petroleum product consumption increased from 8.7% in 2000 to 16.7% in 2022. The residential sector, which mainly utilizes LPG, saw an increase in petroleum product consumption from 88 ktoe (6.1% of total) in 2000 to 165 ktoe (3.8% of total) in 2022.

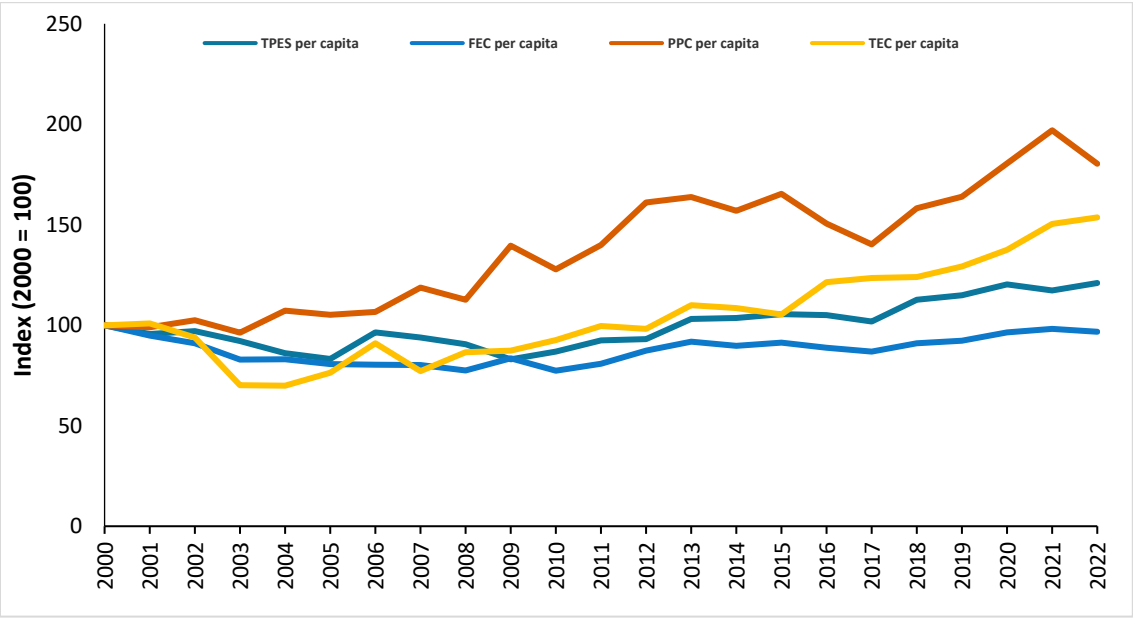
ENERGY INDICATORS

ENERGY SUPPLY AND CONSUMPTION PER CAPITA

Energy Supply and Consumption per capita, 2000 - 2022

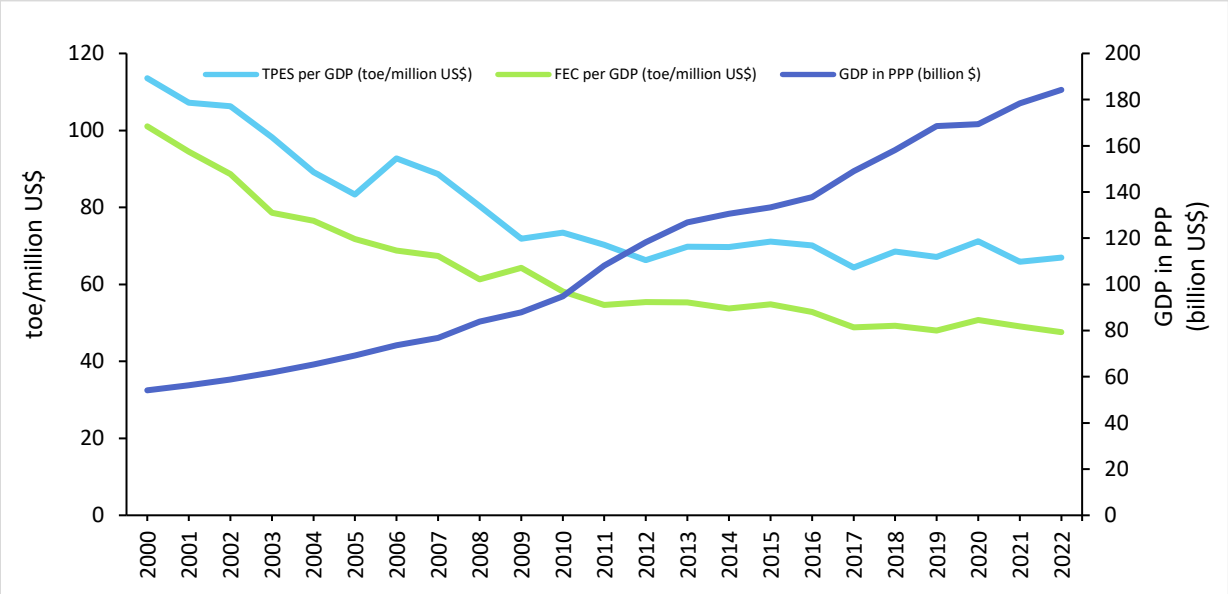


Energy Supply and Consumption per capita Index (2000=100)

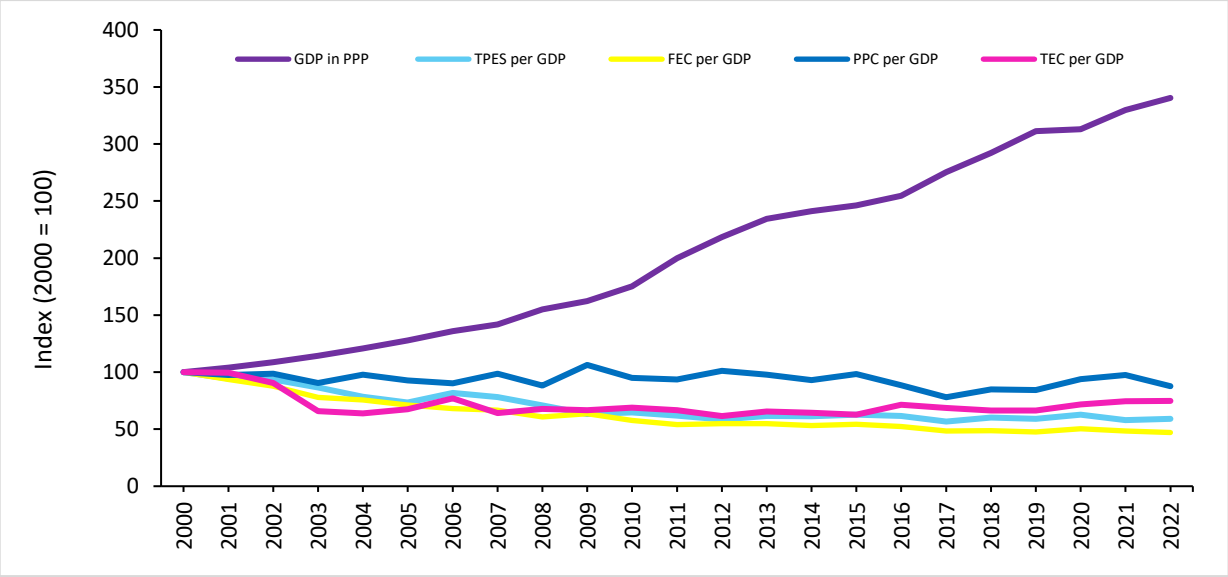


ENERGY SUPPLY AND CONSUMPTION PER GDP

Energy Supply and Consumption per GDP, 2000 - 2022



Energy Supply and Consumption per GDP, Index (2000 = 100)



NB: TPES = Total Primary Energy Supply;
PPC = Petroleum Product Consumption;
GDP in PPP = Gross Domestic Product in Purchasing Power parity
FEC = Final Energy Consumption
TEC = Total Electricity Consumption

ENERGY BALANCE

2022 Energy Balance, ktoe

Supply and Consumption	Crude Oil	Natural Gas	Petroleum Products	Wood	Charcoal	Solar	Hydro	Electricity	Total
Production	7,325	2,970	-	3,993	-	14	704	-	15,007
Imports	32	502	4,217	-	-	-	-	3.2	4,754
Exports	-7,269	-	-13	-	-0.5	-	-	-190	-7,473
Intl. Marine Bunkers	-	-	-2	-	-	-	-	-	-2.4
Intl. Aviation Bunkers	-	-	-194	-	-	-	-	-	-194
Stock changes	66.9	-	-9.7	-	-	-	-	-	57.3
TES	**154**	**3,472**	**3,998**	**3,993**	**-0.5**	**14**	**704**	**-187**	**12,148**
Transfers	-123	-	132	-	-	-	-	-	8.6
Statistical differences	10	51	-17	-	-	-	-	-	24
Electricity plants	-	-3,206	-33	-	-	-14	-704	1,992	-1,966
Oil refineries	-42	-	40	-	-	-	-	-	-1.6
Other transformation	-	-	-	-2,279	1,226	-	-	-	-1,053
Energy industry own use	-	-	50	-	-	-	-	68	119
Losses	-	-	-	-	-	-	-	227	227
TFC	**-**	**215**	**4,103**	**1,715**	**1,226**	**-**	**-**	**1,509**	**8,767**
Residential	-	-	165	1,395	1,148	-	-	611	3,320
Industry	-	215	506	296	0	-	-	639	1,656
Commerce & Service	-	-	21	23	77	-	-	255	376
Agriculture & Fisheries	-	-	89	-	-	-	-	2.8	92
Transport	-	-	3,322	-	-	-	-	0.9	3,322
Non-Energy Use	-	-	-	-	-	-	-	-	-

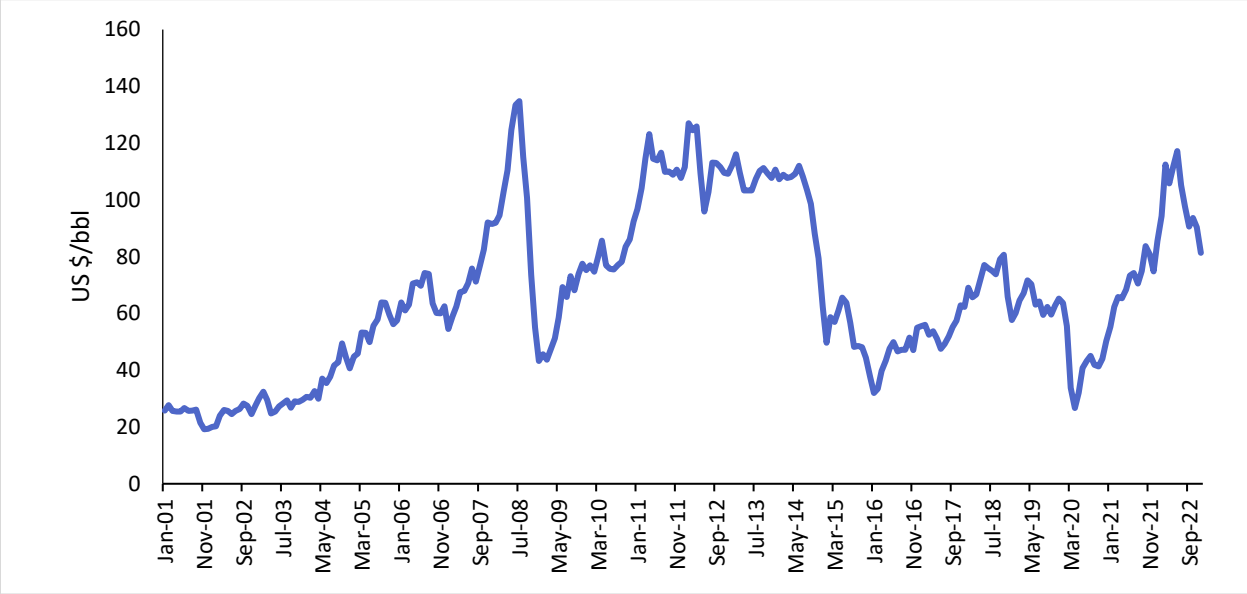
2021 Energy Balance, ktoe

Supply and Consumption	Crude Oil	Natural Gas	Petroleum Products	Wood	Charcoal	Solar	Hydro	Electricity	Total
Production	7,759	2,717	-	3,562	-	10.5	647	-	14,695
Imports	85	471	4,234	-	0.01	-	-	3.8	4,794
Exports	-7,711	-	-96	-	-1.3	-	-	-149	-7,957
Intl. Marine Bunkers	-	-	-7.0	-	-	-	-	-	-7.0
Intl. Aviation Bunkers	-	-	-194	-	-	-	-	-	-194
Stock changes	78	-	203	-	-	-	-	-	282
TES	**211**	**3,189**	**4,141**	**3,562**	**-1.3**	**11**	**647**	**-145**	**11,613**
Transfers	-98	-	105	-	-	-	-	-	6.9
Statistical differences	-289	41	-56	-	0.01	-	-	-	-304
Electricity plants	-50	-2,985	-73	-	-	-11	-647	1,896	-1,869
Oil refineries	-300	-	288	-	-	-	-	-	-12.1
Other transformation	-	-	-	-1,952	1,051	-	-	-	-901
Energy industry own use	23	-	40	-	-	-	-	62	125
Losses	28	-	-	-	-	-	-	236	264
TFC	**-**	**163**	**4,477**	**1,610**	**1,050**	**-**	**-**	**1,453**	**8,754**
Residential	-	-	252	1,315	985	-	-	598	3,151
Industry	-	163	522	272	0.2	-	-	613	1,571
Commerce & Service	-	-	25	23	64	-	-	238	351
Agriculture & Fisheries	-	-	144	-	-	-	-	2.2	147
Transport	-	-	3,534	-	-	-	-	0.8	3,535
Non-Energy Use	-	-	-	-	-	-	-	-	-

ENERGY PRICES

CRUDE OIL PRICES

Average Crude Oil Prices ($/bbls), Jan 2001 – Dec 2022



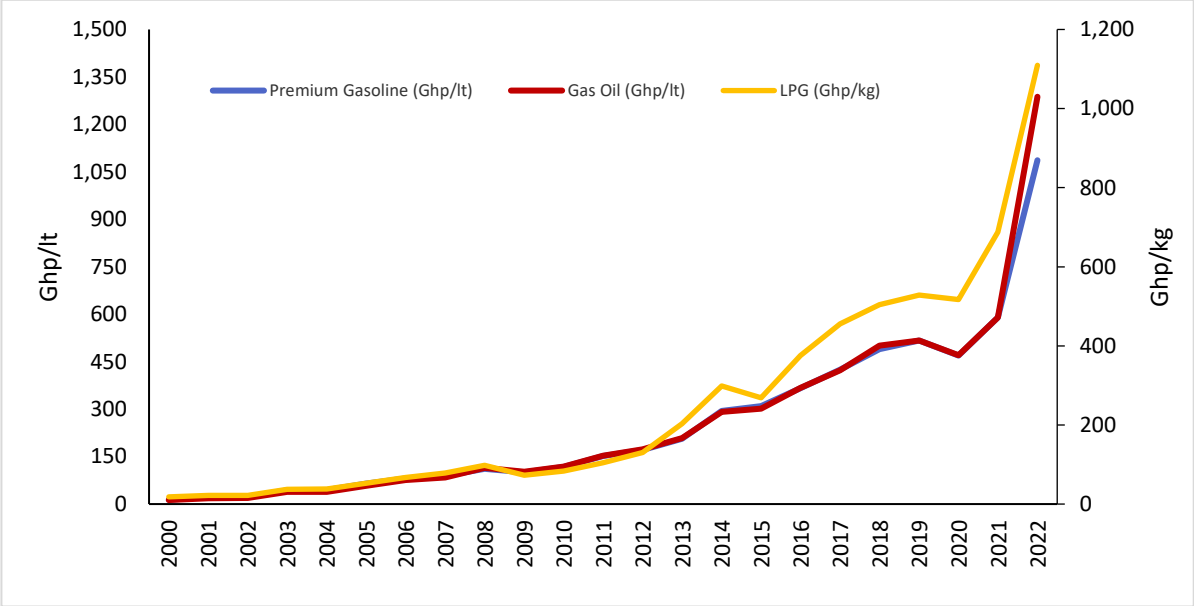
Monthly Average Crude Oil Prices ($/bbl)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	25.8	27.7	25.7	25.4	25.4	26.7	25.7	25.8	26.1	21.5	19.2	19.3
2005	44.9	45.9	53.3	53.2	49.9	55.6	57.9	63.8	63.7	59.4	56.2	57.6
2010	76.9	74.7	79.9	85.7	77	75.7	75.5	77.1	78.2	83.5	86.1	92.4
2015	49.7	58.7	57	60.9	65.6	63.8	56.8	48.2	48.6	48.1	44.4	37.7
2020	63.7	55.5	33.7	26.6	32.1	40.8	43.2	45	41.9	41.4	44	50.2
2021	55.3	62.3	65.8	65.3	68.3	73.4	74.3	70.5	74.9	83.8	80.8	74.8
2022	85.5	94.3	112.5	105.8	111.6	117.2	105.1	97.7	90.6	93.6	90.4	81.3

In December 2022, the average crude oil price was $81.3 per barrel, marking a marginal $6.5 rise from December 202. In 2022, international crude oil prices fluctuated, rising from 85.5 U.S. dollars in January to 117.2 U.S. dollars in June, then falling to 81.3 U.S. dollars by December.

PETROLEUM PRODUCTS PRICES

Petroleum Products Prices, 2000 - 2022



NB: prices are in Ghp/litre except for LPG, which is in Ghp/kg

Petroleum Product Prices

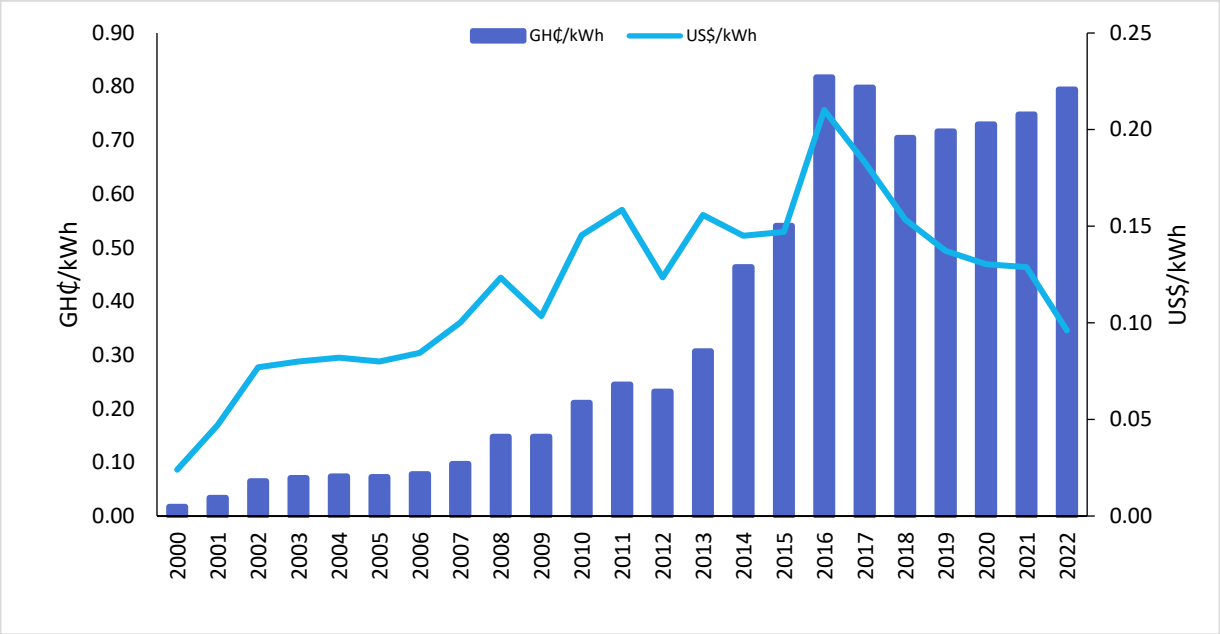
Year	Premium Gasoline (Ghp/lt)	Gas Oil (Ghp/lt)	Kerosene (Ghp/lt)	LPG (Ghp/kg)
2000	13.7	12.8	12.8	18.2
2005	65.0	57.8	49.7	52.4
2010	117.0	118.1	91.0	83.8
2015	310.1	301.9	296.9	268.3
2020	469.3	469.9	425.1	517.4
2021	589.9	589.8	-	687.8
2022	1,086.7	1,287.4	-	1,109.5

Average ex-pump prices of petroleum products specifically petrol, diesel and LPG increased from Ghp13.7/litre, Ghp12.8/litre and Ghp 18.2/kg respectively in 2000 to Ghp 1,086.7/litre, Ghp 589.8/litre, Ghp 1,287.4/litre and Ghp 1,109.5/kg respectively as at the end of 2022.

Electricity Tariff by Customer Class

Tariff Category	Effective dates									
	Dec, 2011	Oct, 2013	Oct, 2014	Dec, 2015	Oct, 2018	Jul, 2019	Oct, 2019	Oct, 2020	Jan, 2021	Sept, 2022
Residential										
0 - 30 (Exclusive)	-	-	-	-	-	-	-	-	-	42
0 - 50 (Exclusive)	10	16	21	34	28	31	33	33	33	-
31 - 300 (GHp/kWh)	-	-	-	-	-	-	-	-	-	89
51 - 300 (GHp/kWh)	18	31	41	67	56	62	65	65	65	-
301 - 600 (GHp/kWh)	23	41	54	87	72	80	85	85	85	116
600+ (GHp/kWh)	25	45	59	97	80	89	94	94	94	128
Service Charge for Lifeline Consumers (GHp/month)	165	296	388	633	213	213	213	213	213	213
Service Charge for Other Residential Consumers (GHp/month)	165	296	388	633	633	704	746	746	746	1073
Non-Residential										
0 -300 (GHp/kWh)	25	45	59	97	68	75	80	80	80	84
301 - 600 (GHp/kWh)	27	48	63	102	72	80	85	85	85	89
600+ (GHp/kWh)	42	76	100	163	114	126	134	134	134	133
Service Charge (GHp/month)	276	493	646	1055	1055	1173	1243	1243	1243	1243
SLT - Low Voltage										
Maximum Demand (GHp/kVA/month)	1543	2760	3617	5910	5910	-	6960	6960	6960	6960
Energy Charge (GHp/kWh)	26	47	62	101	76	99	89	89	105	133
Service Charge (GHp/month)	1102	1972	2584	4221	4221	4693	4971	4971	4971	50,000
SLT - Medium Voltage										
Maximum Demand (GHp/kVA/month)	1323	2366	3100	5065	5065	-	5966	5966	5966	5966
Energy Charge (GHp/kWh)	20	37	48	78	59	75	69	69	80	100
Service Charge (GHp/month)	1543	2760	3617	5910	5910	6570	6960	6960	6960	50,000
SLT - High Voltage										
Maximum Demand (GHp/kVA/month)	1323	2366	3100	5065	5065	-	5966	5966	5966	5966
Energy Charge (GHp/kWh)	19	34	44	72	54	79	63	63	83	75
Service Charge (GHp/month)	1543	2760	3617	5910	5910	6570	6960	6960	6960	50,000
SLT-High Voltage - Mines										
Capacity Charge (GHp/KVA/Month)	1543	2760	3617	5910	5910	-	6960	6960	6960	6960
Energy Charge (GHp/kWh)	30	53	70	114	103	249	121	121	264	264
Service Charge (GHp/Month)	1543	2760	3617	5910	5910	6570	6960	6960	6960	50,000

Average Electricity End-User Tariff (2000-2022)



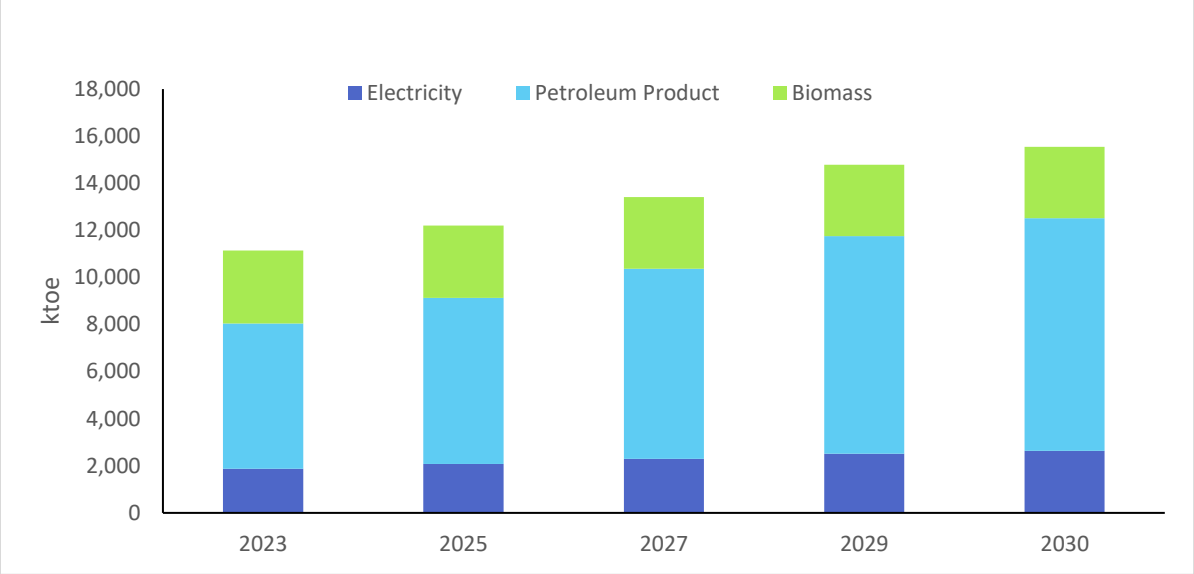
Average Electricity End-User Tariff (2000-2022)

Year	GH¢/kWh	US$/kWh
2000	0.02	0.02
2005	0.07	0.08
2010	0.21	0.15
2015	0.54	0.15
2020	0.73	0.13
2021	0.75	0.13
2022	0.79	0.10

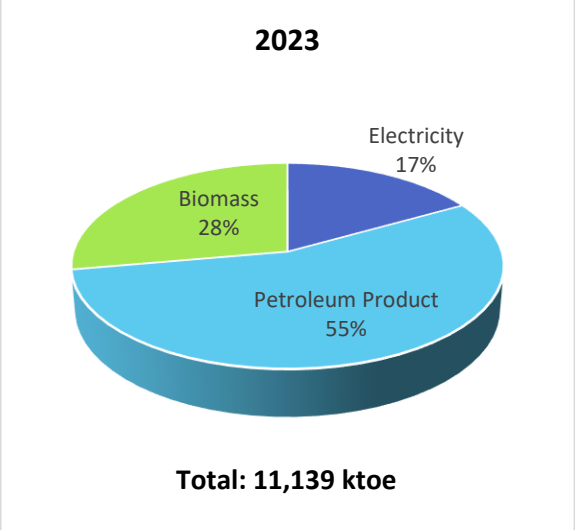
ENERGY OUTLOOK

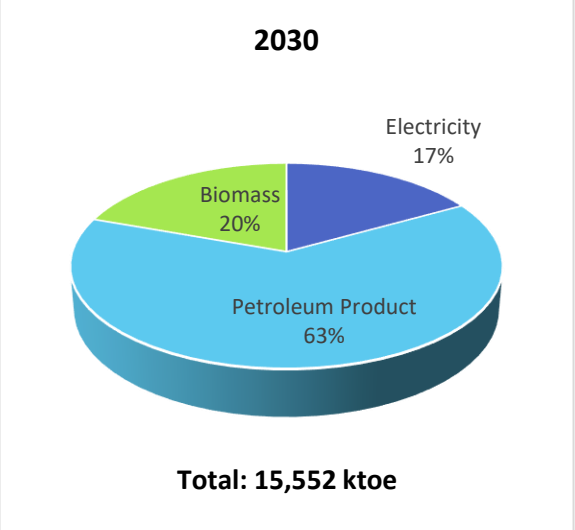
OUTLOOK FOR ENERGY DEMAND

Outlook for Energy Demand by Fuels (Business-as-Usual Scenario)



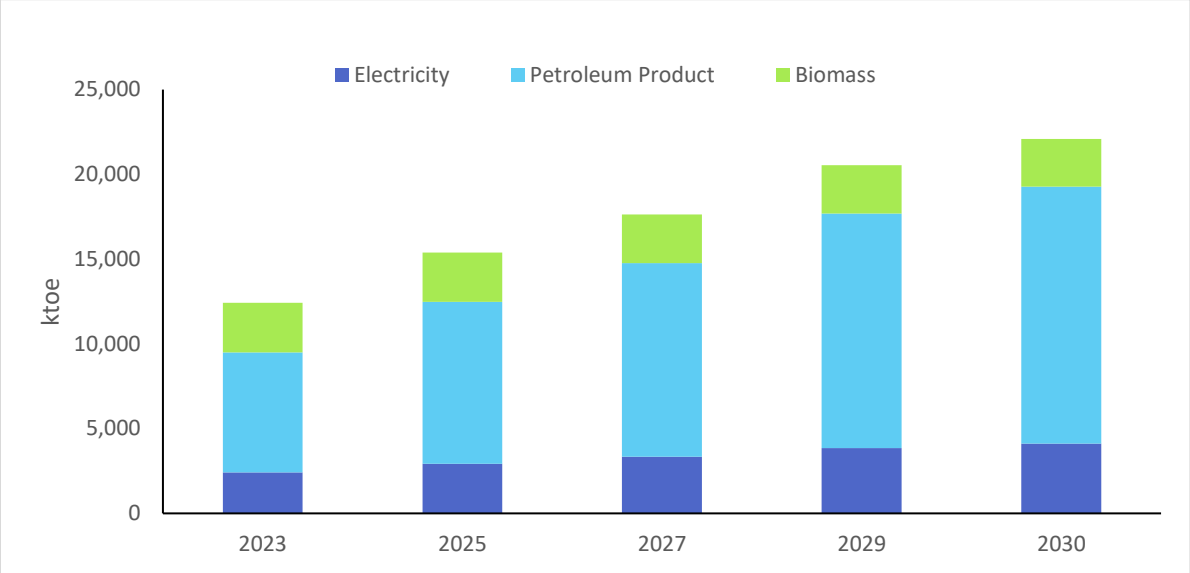
2023 and 2030 Shares of Energy Demand by Fuels (Business-as-Usual Scenario)



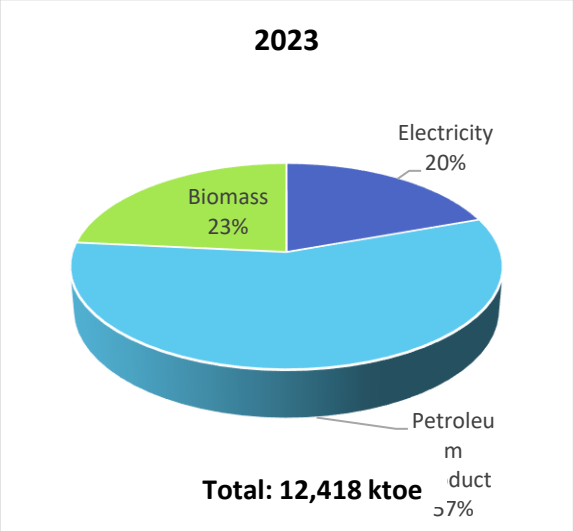


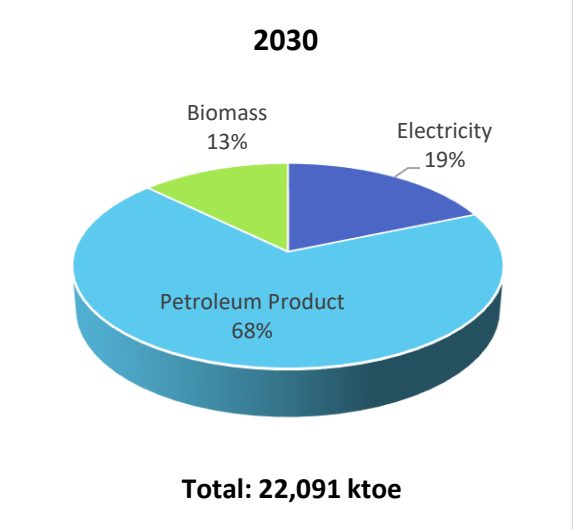
NB: The Business-as-Usual scenario describes a socio-economic outlook based on trends from the historical past until 2030.

Outlook for Energy Demand by Fuels (Accelerated Economic Growth Scenario)



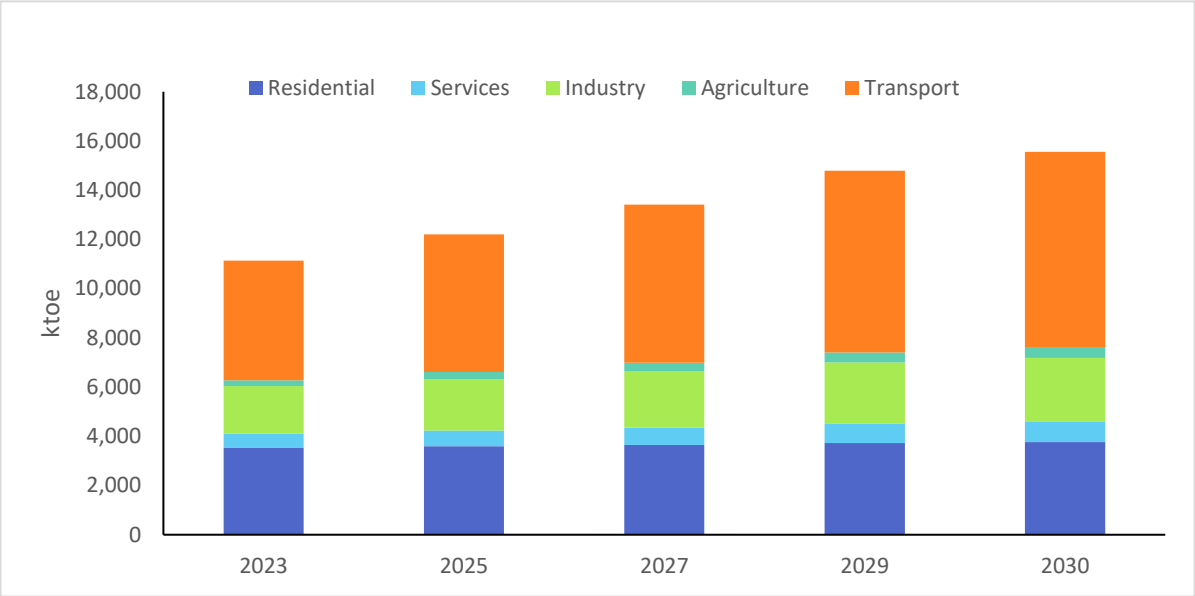
2023 and 2030 Shares of Energy Demand by Fuels (Accelerated Economic Growth Scenario)



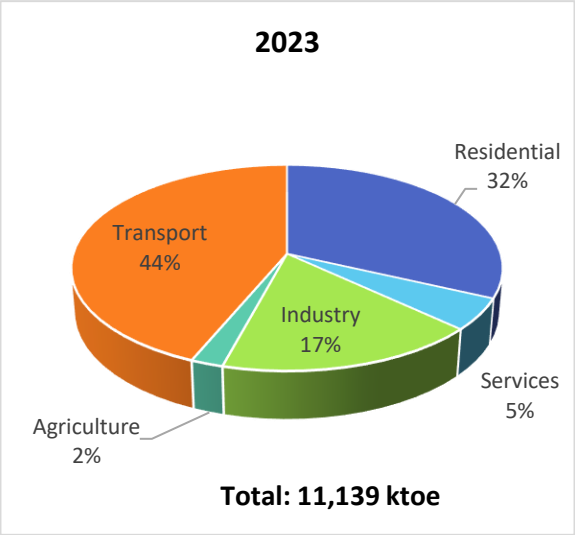


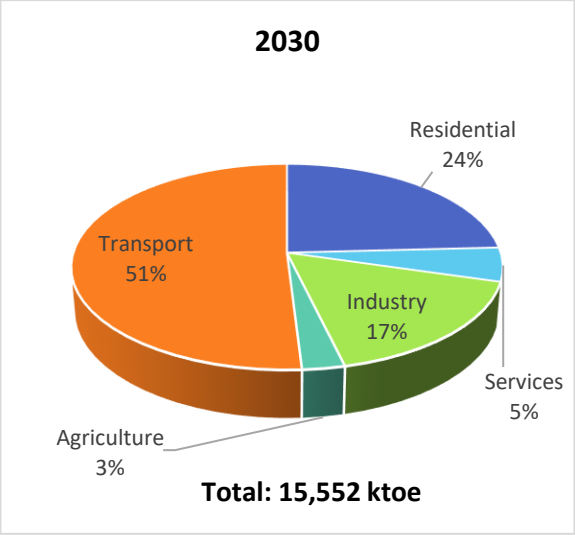
***NB**: The Accelerated Economic Growth scenario considers the objectives of the Ghana Shared Growth and Development Agenda, Medium-Term National Development Policy Framework (2018-2021) and the Coordinated Programme for Economic and Social Development Policies (2017-2024), which included project and programmes in the industrial and agricultural sectors such as the 'One District-One Factory' initiative and the 'planting for food and jobs' policy.*

Outlook for Energy Demand by Sectors (Business-as-Usual Scenario)



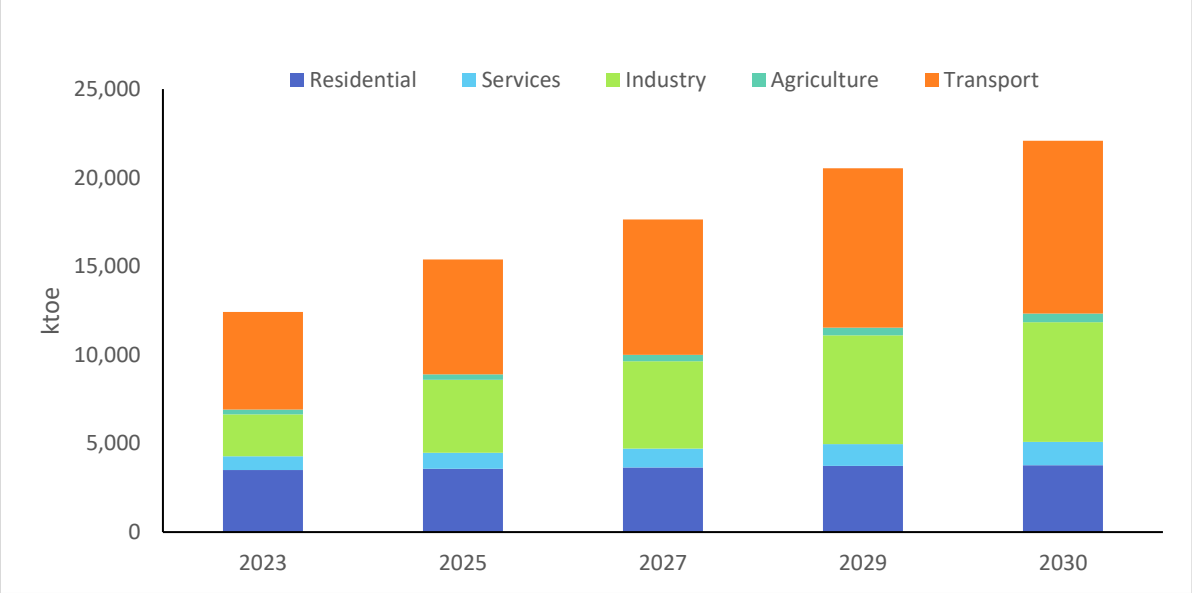
Outlook for Energy Demand by Sectors (Business-as-Usual Scenario)



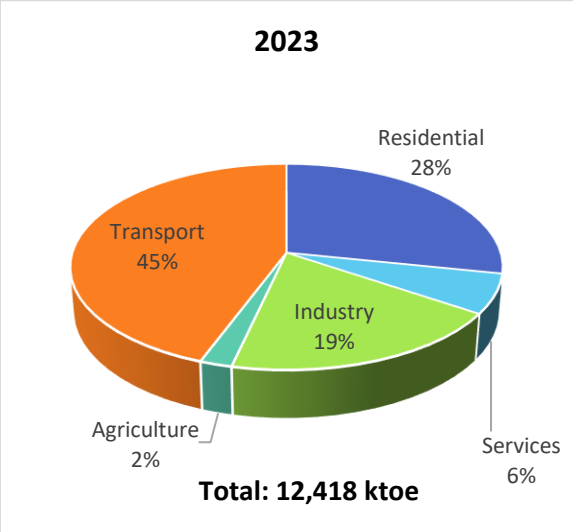


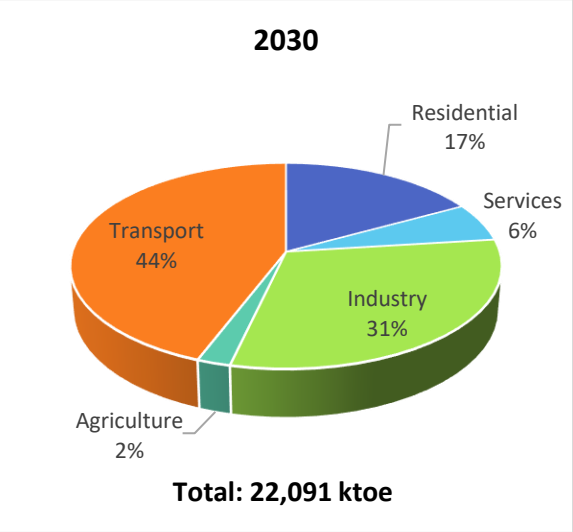
***NB**: The Business-as-Usual scenario describes a socio-economic outlook based on trends from the historical past until 2030.*

Outlook for Energy Demand by Sectors (Accelerated Economic Growth Scenario)



2023 and 2030 Outlook for Energy Demand by Sectors (Accelerated Economic Growth Scenario)





***NB**: The Accelerated Economic Growth scenario considers the objectives of the Ghana Shared Growth and Development Agenda, Medium-Term National Development Policy Framework (2018-2021) and the Coordinated Programme for Economic and Social Development Policies (2017-2024), which included project and programmes in the industrial and agricultural sectors such as the 'One District-One Factory' initiative and the 'planting for food and jobs' policy.*

CONVERSION FACTORS

Ghana Standard Figures				
Petroleum				
Crude Oil	1	Tonne	1.02	TOE
Gasoline / Petrol	1	Tonne	1.05	TOE
Kerosene	1	Tonne	1.03	TOE
Jet Kerosene	1	Tonne	1.03	TOE
Gasoil / Diesel	1	Tonne	1.02	TOE
Fuel Oil	1	Tonne	0.97	TOE
LPG	1	Tonne	1.08	TOE
Crude Oil	1	barrel	36	Imperial gallons
	36	Imperial gallons	163.66	Litres
	7	Barrels	1	Tonne
	1	cubic metre	6.29	Barrels
Natural Gas	1	GJ	1.05	MMBtu
	1.05	MMBtu	1.07	MSCF
	1	MMBtu	27.10	cubic metre (m3)
	1	MMBtu	5.82	bbl. of crude oil equivalent
	1000	m^3	36.91	MMBtu
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

Ghana Standard Figures				
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

Average	It is a measure of central tendency. It could be mean, median or mode depending upon the distribution of the data. For a normal distribution set, the mean, median and mode are the same.
Electricity Plants	It refers to powerplants designed to produce only electricity.
Final Energy Consumption	It refers to all fuel and energy delivered to final users for their energy use
Import and export	It comprises of quantities of fuels entering or leaving the national territorial
International Aviation Bunkers	It covers quantities of fuels delivered to airplanes of any nationality for consumption during international flights
International Marine Bunkers	It covers quantities of fuels delivered to ships of any nationality for consumption during international voyages
Own Use	It is the primary and secondary energy consumed by transformation industries for heating, pumping, lighting and other purposes
Production	It covers the capture, extraction or manufacture of fuels or energy in forms that are ready for general use
Statistical differences	It is the numerical difference between the total energy supply and the total use of it. It includes the sum of the unexplained differences for individual fuels as they appear in the energy statistics
Stock changes	It is the difference between opening and closing stock levels. A stock draw is an addition to supply and so will be entered with a positive sign. The converse applies for a stock build.
Total Energy Supply	Represents the amount of energy that is available in the national territory during the reference period. It includes production, import and stock changes, less export and international aviation and marine bunkers

NOTES

NOTES

ENERGY COMMISSION OF GHANA