IEEJ：July 2017 © IEEJ2017

GHANA’S ENERGY SECTOR POLICIES PRESENTATION

Energy Policy (B) Training by JICA

Angela Rhoda Naa Ardua Nunoo

(Programme Officer, Ministry of Energy)

OUTLINE

- General information
- Energy reserves
- Current energy policy and measures
- Past energy demand and supply (at least past 10 years)
  - Energy demand by sector
  - Demand and supply by energy
  - Energy Prices
- Outlook of energy demand and supply
- Energy-related investment for domestic and overseas
- Challenges in formulating energy policies
- Areas of interest

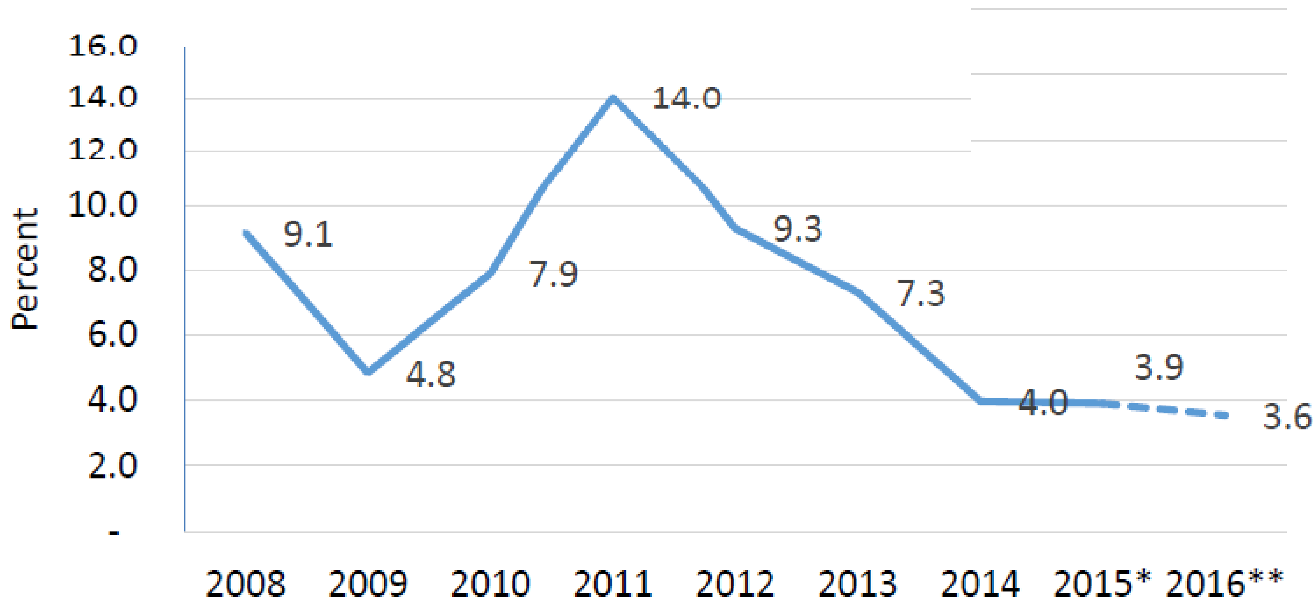
GENERAL INFORMATION
COUNTRY PROFILE

• Region	2015	West Africa
• Surface area (sq. km)	2014	238537
• Population (projection, 000)	2016	28033
• Population density (per sq km)	2016	123.2
• Capital city	2015	Accra
• Capital city population (000)	2015	2277
• Currency	2015	Ghana Cedi (GHS)

Source: United Nations Statistical Division 2017

GENERAL INFORMATION CONT'D
COUNTRY PROFILE

Annual Real GDP Growth (Percent), 2008-2016



Source: GSS/MOF

POLICIES AND STRATEGIES FOR THE ENERGY SECTOR

Ghana Shared Growth and Development Agenda (GSGDA) I & II

National Energy Policy (2010)

Energy Sector Strategy and Development Plan (2010)

SE4ALL Action Agenda (2012)

POLICIES AND STRATEGIES FOR THE ENERGY SECTOR CONT'D

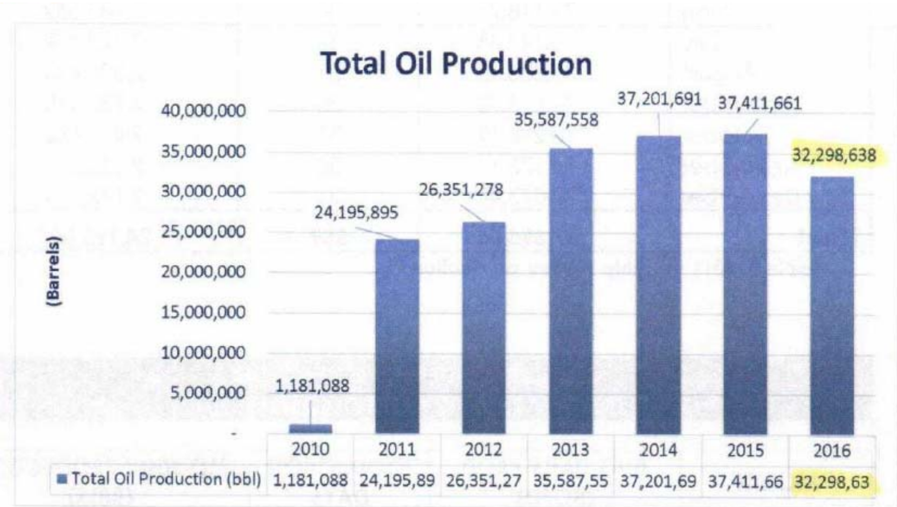
- Petroleum Sector Policies within the National Energy Policy (2009-2015)
- Petroleum Sector Strategies within the National Energy Strategy
- (2009-2015)
- Local Content Policy for Petroleum Upstream(2010)
- Natural Gas Pricing Policy (2012)
- Gas Master Plan
- Petroleum Downstream Deregulation Policy
- Zonalization Policy on Petroleum Product Distribution
- Draft Medium Term Plan (2014-2017)
- Draft Local Content Policy for Petroleum Downstream
- Rural LPG Promotion Policy (Draft)

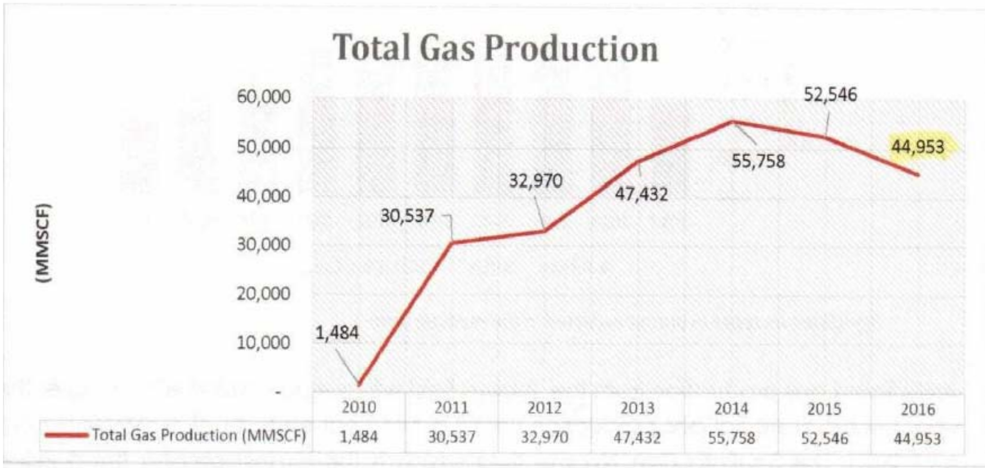
ENERGY RESERVES

❑Petroleum reserves

Producing Field	Component	Estimated Recoverable Reserve	Oil Produced (2016)
Jubilee Production	crude oil & gas	618 mmbo and 505 billion cubic feet (Bcf) of gas	• Total production 26,981.641 barrels with an average daily production of 73,720bopd • Total crude from inception November 28, 2010 to December 31, 2016 was 188.91mmbbls Total of 38,421MMscf of associated gas
TEN Development	crude oil & gas	240 mmbo and 3.96bcf of gas	• Oil Production commenced on 17th August, 2016 • Total of 5.32mmbbls with an annualized daily average production of 15, 824bbl/d and gas production of 6,532MMscf
Sankofa Gye Nyame	crude oil & condensate & gas	204 MMbbls of oil and condensate, and 1,071 bcf of gas	Oil production official commencement 7th July, 2017

Source: Ghana National Petroleum Corporation, Ghana's Upstream Oil and Gas Industry, March 2017





Source: Ghana National Petroleum Corporation, Ghana's Upstream Oil and Gas Industry, March 2017

CURRENT ENERGY POLICY

❑Policy Goals under the GSGDA II

➢ **Power**

- Provide adequate, reliable and affordable energy to meet the national needs and for export
- Achieve universal access by extending electricity to all communities by 2020
- Achieve economically efficient tariffs by 2016

➢ **Renewables**

- Increase the proportion of renewable energy (solar, bio-mass, wind, small and mini-hydro and waste-to-energy) in the national energy supply mix

➢ **Petroleum**

- Ensure accelerated and integrated development of the oil and gas industry
- Ensure adequate availability of petroleum products in the Ghanaian market
- Ensure transparency in the management of petroleum resources

CURRENT ENERGY POLICY AND MEASURES CONT'D

❑Policy Goals under the GSGDA II

- Measures undertaken in the power, renewable and petroleum sub sectors

Energy Sub Sector	Policy Objective	Strategies	Activity/Project	Achievements
Power	Provide adequate, reliable and affordable energy to meet the national needs and for export	Increase power generation capacity to 5,000MW by 2016	Power Generation & Transmission Capacity Expansion	Generation: Installed capacity added • 220MW Kpone Thermal Power Project (KTPP) • 180MW first half of Asogli 360MW Phase 2 Project • VRA TT2PP (38 MW) expansion project. • 250MW Ameri Project
		Develop a non-congested electricity transmission network by 2016		Transmission Projects completed: • Tumu-Han-Wa 161kV line project • Prestea-Bogosu 161kV line project • 161kV Kintampo Substation • 330kV Tema-Tornu Interconnection line project
	Achieve universal access by extending electricity to all communities by 2020	Ensure Universal Access to electricity by 2020	Extension of electricity to un-electrified communities;	• 1,346 communities have been connected to the national grid at the end of 2016 December • Access rate is at 83.62% as at March; 2017
Renewable	Increase the proportion of renewable energy (solar, biomass, wind, small and mini-hydro and waste-to-energy) in the national energy supply mix	Increase the renewable energy supply in national energy mix to 10% by 2020	Renewable Energy Programme	• First 20MW solar PV installation by an Independent Power Producer (IPP) was commissioned and is currently feeding power into the national grid • 41,000 lanterns were distributed at subsidized rate to off-grid communities • Completed the development and installation of five (5) units of mini-grids electrification project on islands
Petroleum	Ensure accelerated and integrated development of the oil and gas industry	Accelerate exploration and development of petroleum resources	Exploration activites	Jubilee Production: • 27,006,014 barrels with an average daily production of 80,340 and gas production was 38,142MMscf.
				TEN Development: • Total of 5.32mmbbls with an annualized daily average production of 15, 824bbl/d and gas production of 6,532MMscf
	Ensure adequate availability of petroleum products in the Ghanaian market	Ensure the safe evacuation of NGLs from Atuabo	Construction of facility	The Ministry facilitated the transfer of the Single Point Mooring (SPM) and Conventional Buoy Mooring (CBM) Facility constructed on a Build Operate and Transfer (BOT) to the Government of Ghana

Source: MoP/MoPet Annual Reports

PAST ENERGY DEMAND AND SUPPLY

❑Energy demand by sector

- Policy Objective: Provide adequate, reliable and affordable energy to meet the national needs and for export

Grid Electricity supply, share and growth to the Demand Sectors since 2000

YEAR	DEMAND SECTORS										
	Industry			Non Residential			Residential			Total	
	1000 GWh	% Share	%Gr	1000 GWh	% Share	%Gr	1000 GWh	% Share	%Gr	1000 GWh	%Gr
2000	4.31	68	0	0.55	8.7	0	1.49	23.5	0	6.34	0
2001	4.33	66.4	0.5	0.58	8.7	5.5	1.61	24.7	8.1	6.53	3
2002	3.9	63.2	-9.9	0.6	9.8	3.4	1.67	27.1	3.7	6.17	-5.5
2003	2.21	48.6	-43.3	0.62	13.6	3.3	1,73	38	3.6	4.55	-26.3
2004	2.03	448	-8.1	0.66	14.6	6.5	1.78	39.3	2.9	4.53	-0.4
2005	2.54	49.2	25.1	0.7	13.6	6.1	1.92	37.2	7.5	5.16	13.9
2006	3.59	55.1	41.3	0.79	12.1	12.9	2.13	32.7	10.9	6.51	26.2
2007	2.7	48.3	-25	0. 80	14.3	1.3	2.1	37.6	-1.4	5.59	-14.1
2008	2.97	48.2	10	0.93	15.1	16.3	2.27	36.9	8.1	6.16	10.2
2009	2.94	47.2	-1	0.88	14.1	-5.4	2.41	38.7	6.2	6,23	1.1
2010	3.16	46.1	7.5	0.97	14.1	10.2	2.74	39.9	13.7	6.86	10.1
2011	3.9	48.9	23.4	1.31	16.4	36.1	2.76	34.6	0.7	7.98	16.3
2012	4.15	51.2	7.7	1.15	14.2	-0.8	2.8	34.6	-5.8	8.24	1.5
2013	4.22	47.1	1.7	1.53	17	32.3	3.23	36	15.2	9	10.7
Note: Gr is growth rate											

Source: Energy Commission, 2014 Energy (Supply and Demand) Outlook for Ghana

PAST ENERGY DEMAND AND SUPPLY CONT'D

❑Demand and Supply by energy

- Supply Side

Total Primary Energy Supply (ktoe)														
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Oil	1812	2022	2270	2306	2225	2140	2815	3017	2672	2316	2744	2820	3870	4011
Natural Gas	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	5	394	769	390	292
Hydro	609	582	479	363	472	499	472	337	510	544	522	598	648	700
Wood	3888	3703	3539	3395	3273	3174	3100	3068	3068	3124	3206	3370	3408	3553
Total	**6309**	**6307**	**6288**	**6063**	**5971**	**5814**	**6387**	**6250**	**6250**	**5989**	**6865**	**7557**	**8316**	**8556**

Source: Energy Commission, 2014 Energy (Supply and Demand) Outlook for Ghana

- Demand Side

Total Final Energy Consumed (ktoe)														
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Electricity	596.8	614.7	587.2	450.7	455.7	512.8	633.0	553.8	620.8	640.8	715.2	789.9	796.0	910.0
Petroleum	1,535.3	1,537.0	1,633.6	1,573.5	1,800.0	1,817.6	1,817.6	2,126.6	2,071.3	2,597.7	2,491.1	2,826.6	3,303.1	3,300.1
Biomass	3,432.4	3,237.8	3,081.8	2,924.7	2,839.0	2,745.2	2,671.3	2,593.7	2,517.8	2,493.3	2,463.9	2,575.6	2,588.8	2,676.0
Total	**5,564.5**	**5,389.4**	**5,302.6**	**4,948.9**	**5,094.6**	**5,075.7**	**5,176.9**	**5,274.1**	**5,209.8**	**5,731.7**	**5,670.2**	**6,192.1**	**6,687.9**	**6,886.0**

Source: Energy Commission, 2014 Energy (Supply and Demand) Outlook for Ghana

PAST ENERGY DEMAND AND SUPPLY CONT'D

❑Demand and Supply by Energy

- **Power**

Peak Load (MW)										
Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
System Peak	1,393	1,274	1,367	1,423	1,506	1,665	1,729	1,943	1,970	1,933

Source: Energy Commission, National Energy Statistics 2016

	Electricity Supply (GWh)				
Year	Generation	Import	Total Supply	Export	Supply to Ghana
2006	8,430	629	9,059	754	8,305
2007	6,978	435	7,413	246	7,167
2008	8,324	275	8,599	538	8,061
2009	8,958	198	9,156	752	8,404
2010	10,169	106	10,275	1,030	9,245
2011	11,200	81	11,281	691	10,590
2012	12,024	128	12,152	667	11,485
2013	12,870	27	12,897	530	12,367
2014	12,963	51	13,014	522	12,492
2015	11,492	223	11,715	552	11,163
2016	12,942	574	13,516	274	13242

Source: Energy Commission, Strategic National Energy Report

- **Petroleum**

Petroleum Products Supplied to the Economy (kilotonnes)										
Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
LPG	88.0	93.3	117.6	220.6	178.4	214.4	268.5	251.8	241.5	279.0
Gasoline	511.9	544.2	545.0	701.4	737.8	807.0	992.7	1,080.6	1,102.3	1,163.2
Premix	33.7	41.0	50.7	55.1	32.4	45.6	58.9	53.4	56.2	47.2
Kerosene	76.5	63.3	34.6	89.3	49.3	62.4	45.6	27.8	9.3	6.9
ATK	114.7	122.8	119.2	124.7	108.4	135.3	141.3	131.9	113.9	112.0
Gas Oil	934.0	1,147.0	1,092.1	1,280.0	1,271.9	1,431.2	1,665.0	1,722.6	1,713.0	1,902.7
RFO	56.8	51.3	47.9	40.3	30.9	37.5	33.5	39.3	26.8	13.4
Total	**1,815.6**	**2,062.9**	**2,007.1**	**2,511.4**	**2,409.1**	**2,733.4**	**3,205.5**	**3,307.4**	**3,263.1**	**3,524.4**

Source: Energy Commission, National Energy Statistics 2016

ENERGY PRICES

❑**Policy Objective:** Achieve economically efficient tariffs by 2016

- **Electricity Pricing**

FIRST SCHEDULE	
Tariff Category	**Effective 1st January, 2017**
BGC VRA - GHp/kWh	21.08
Composite BGC (VRA and IPPs) - GHp/kWh	35.97
SECOND SCHEDULE	
Tariff Category	**Effective 1st January, 2017**
TSC -GHp/kWh	5.59
ASC -GHp/kWh	3.15
THIRD SCHEDULE	
Tariff Category	Effective 1st January, 2017
DSC -GHp/kWh	22.22
DWC -GHp/kWh	32.74
Source: Public Utility Regulatory Commission 2017	

FOURTH SCHEDULE		
EUT Tariff Category		**Effective 1st January, 2017**
Residential		
0-50 (Exclusive)	GHp/kWh	33.56
51-300	-GHp/kWh	67.33
301-600	-GHp/kWh	87.38
601+	-GHp/kWh	97.09
Service Charge	-GHp/month	633.17
Non-Residential		
0-300	-GHp/kWh	96.79
301-600	-GHp/kWh	102.99
601+	-GHp/kWh	162.51
Service Charge	-GHp/month	1055.29
Tariff Category		**Effective 1st January, 2017**
SLT-LV		
Max. Demand	-GHp/kVA/month	5909.60
Energy Charge	-GHp/kWh	100.89
Service Charge	-GHp/month	4221.15
SLT-MV		
Max. Demand	-GHp/kVA/month	5065.37
Energy Charge	-GHp/kWh	78.09
Service Charge	-GHp/month	5909.60
SLT-HV		
Max. Demand	-GHp/kVA/month	5065.37
Energy Charge	-GHp/kWh	71.76
Service Charge	-GHp/month	5909.60
SLT-HV MINES		
Max. Demand	-GHp/kVA/month	5909.60
Energy Charge	-GHp/kWh	113.97
Service Charge	-GHp/month	5909.60
Source: Public Utility Regulatory Commission 2017		

ENERGY PRICES CONT'D

❑**Policy Objective:** Ensure transparency in the management of petroleum resources

- **Petroleum Pricing**

OMCs and LPGMCs Ex-Pump Prices

INDICATIVE EX-PUMP PRICES* (1st - 15th JUNE, 2017)							
No.	COMPANY	PETROL (GHp/Lt)	DIESEL (GHp/Lt)	LPG (GHp/Kg)	KEROSENE (GHp/Lt)	MGO Local (GHp/Lt)	UNIFIED (GHp/Lt)
1	AI ENERGY	367.00	351.00	246.00	-	-	-
2	ALLIED	413.00	407.00	-	-	-	-
3	ALIVE GAS	-	-	437.13	-	-	-
4	ANDEV	-	-	435.98	-	-	-
5	AP OIL & GAS	399.55	397.25	421.68	-	283.13	-
6	BEAP ENERGY	432.17	426.31	-	-	-	-
7	BENAB OIL	425.80	419.97	418.83	-	-	-
8	BG PETROLEUM	424.11	417.47	459.51	342.18	320.36	372.76
9	BISVEL	403.73	406.03	-	-	-	-
10	CENTRAL BRENT	-	-	403.19	-	-	-
11	COEGAN	-	-	444.24	-	-	-
12	COMPASS OLEUM	399.00	399.00	-	-	-	-
13	DUKES	432.22	426.42	-	-	-	-
14	ENGEN	412.05	409.75	430.15	342.52	315.52	-
15	EXCEL	397.15	393.70	-	-	-	-

*Prices are indicative and may change at the pump.

BDCs Ex-Refinery Prices

	INDICATIVE EX-REFINERY PRICES* (1st - 15th JUNE, 2017)						
No.	BDC/REFINERY	PETROL (GHp/Lt)	DIESEL (GHp/Lt)	LPG (GHp/Kg)	KEROSENE (GHp/Lt)	MGO LOCAL (GHp/Lt)	UNIFIED (GHp/Lt)
1	BLUE OCEAN	219.98	216.91	-	220.58	216.91	-
2	CHASE	216.80	213.16	-	217.85	213.16	-
3	CIRRUS	222.84	220.11	-	-	-	-
4	EAGLE	203.10	199.21	-	-	200.71	-
5	EBONY	209.46	205.71	-	210.36	205.71	-
6	ECO	209.39	208.06	-	-	-	-
7	FIRM ENERGY	227.32	224.14	270.86	-	208.06	-
8	GLOBEX ENERGY	216.62	209.76	-	-	-	-
9	GO ENERGY	202.09	199.76	-	-	199.76	-
10	HASK	-	202.84	-	-	-	-
11	JUWEL	-	-	-	-	-	-
12	MOBILE OIL	187.00	187.00	-	-	-	-
13	MISYL	210.21	207.27	-	-	-	-
14	OIL CHANNEL	215.09	212.09	-	-	-	-
15	OIL TRADE	217.54	214.50	-	-	-	-
16	PLATON	-	218.26	-	-	-	220.93
17	PWSL	213.50	209.92	281.91	205.04	209.92	-
18	RAMA	217.54	214.50	-	-	-	-
19	VIHAMA	219.98	216.91	-	-	216.91	-
20	LHS ENERGY	210.42	206.64	-	-	206.64	-

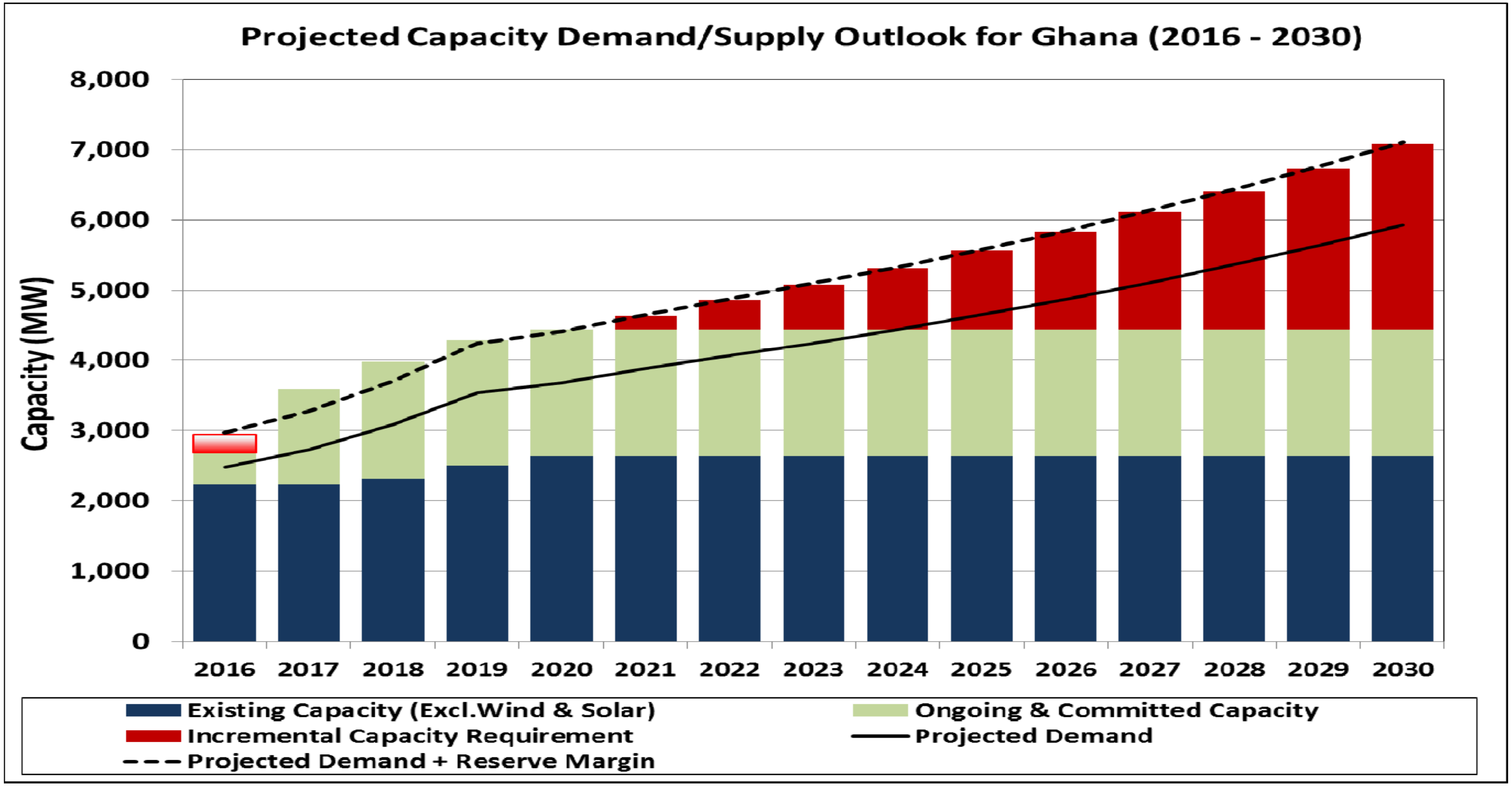
*Prices are indicative and may change within the sales window.

Source: National Petroleum Authority

OUTLOOK OF ENERGY DEMAND AND SUPPLY

❑**Policy Objective:** Provide adequate, reliable and affordable energy to meet the national needs and for export (Power)

- **Capacity Demand and Supply (Power)**

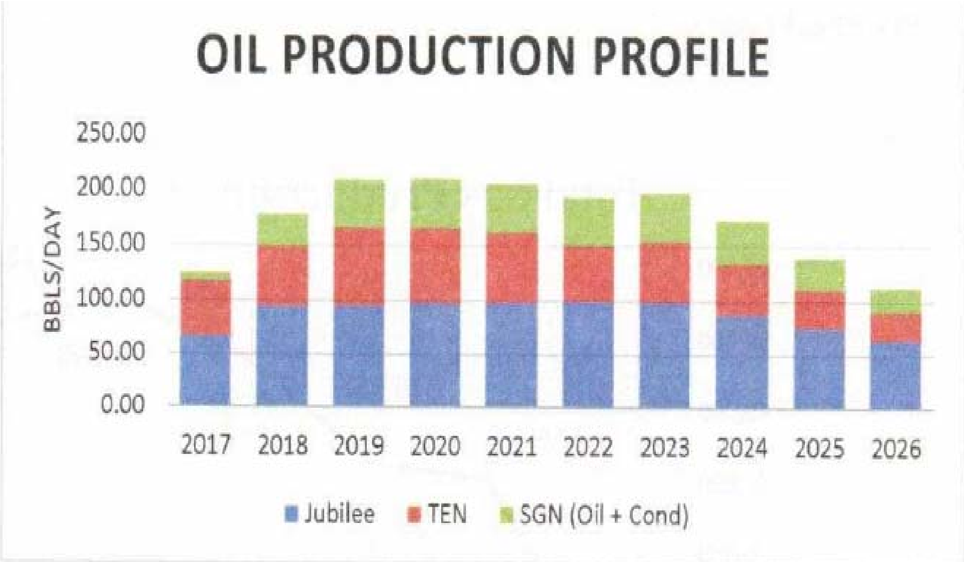


OUTLOOK OF ENERGY DEMAND AND SUPPLY CONT'D

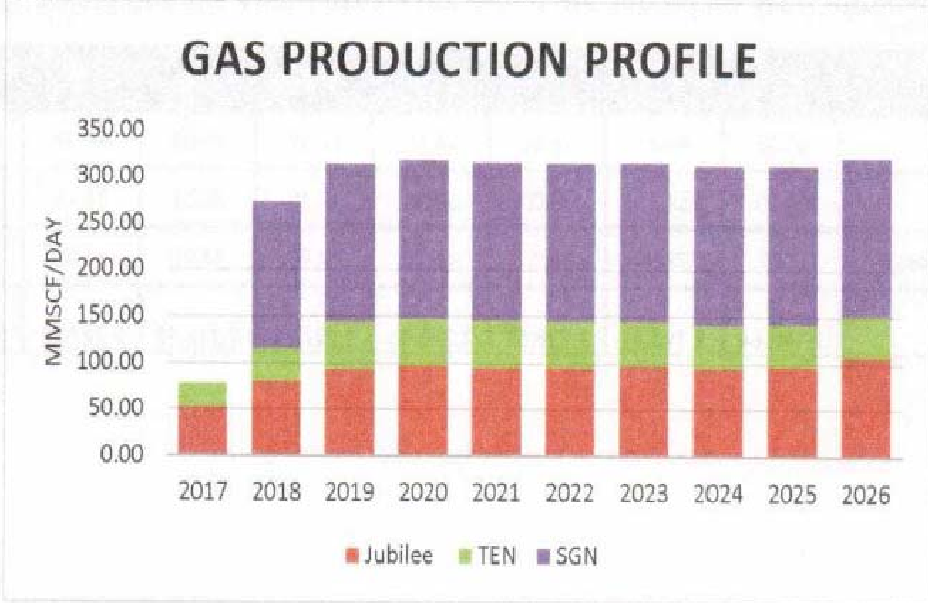
❑**Policy Objective:** Ensure accelerated and integrated development of the oil and gas industry

- **Petroleum Forecast**

Average daily oil production



Significant increase in output expected in the medium term



Source: Ghana National Petroleum Corporation, Ghana's Upstream Oil and Gas Industry, March 2017

ENERGY-RELATED INVESTMENT FOR DOMESTIC AND OVERSEAS

No.	Project	Objective	Est. Budget
Generation			
1	Pwalugu Hydro Development	To increase hydro generation capacity by 50MW and to enhance energy supply security, to accelerate rural electrification and to promote agricultural activities through irrigation.	To be determined after feasibility study
2	Kpone Thermal Power Plant Expansion	To conduct a detailed feasibility studies for the expansion of KTPP into a 780MW power enclave.	EURO 1,180,482.17
Transmission			
3	Kpone Substation Project	Facilitate the evacuation of power from the Kpone Thermal Power Project.	USD 25M
4	Takoradi- Tarkwa Transmission Line Upgrade	To avert the overloading of the Takoradi-Tarkwa line when there is outage on the Aboadze-Prestea line.	USD 20M
Distribution			
5	Network Protection System Improvement Project Phase (2) (NPSIP II)	Improve distribution system reliability and safety	USD 2,366,994 GHS 128,871
6	NED Supply Improvement Rehabilitation Project Phase (2) (NSIRP II)	Improve system reliability	USD 2,500,000
Renewable			
7	Rooftop solar programme	To reduce the daily national peak load by 200 MW through self-generation using solar photovoltaic (PV) technology	
Petroleum			
8	Gas Commercialisation Projects: Investor could invest into ancillary projects such as power plants and other secondary use of the processed gas	Harnessing the associated gas from the Jubilee Field to supply cheap gas for power generation, industrial application and for domestic uses.	
9	Hydrocarbon Exploration And Development: Bidding for exploration blocks	To promote the sedimentary basin under a favorable fiscal and regulatory regime, transparent and flexible licensing policy to attract competent investors into exploring its sedimentary basins.	

CHALLENGES IN FORMULATING ENERGY POLICIES

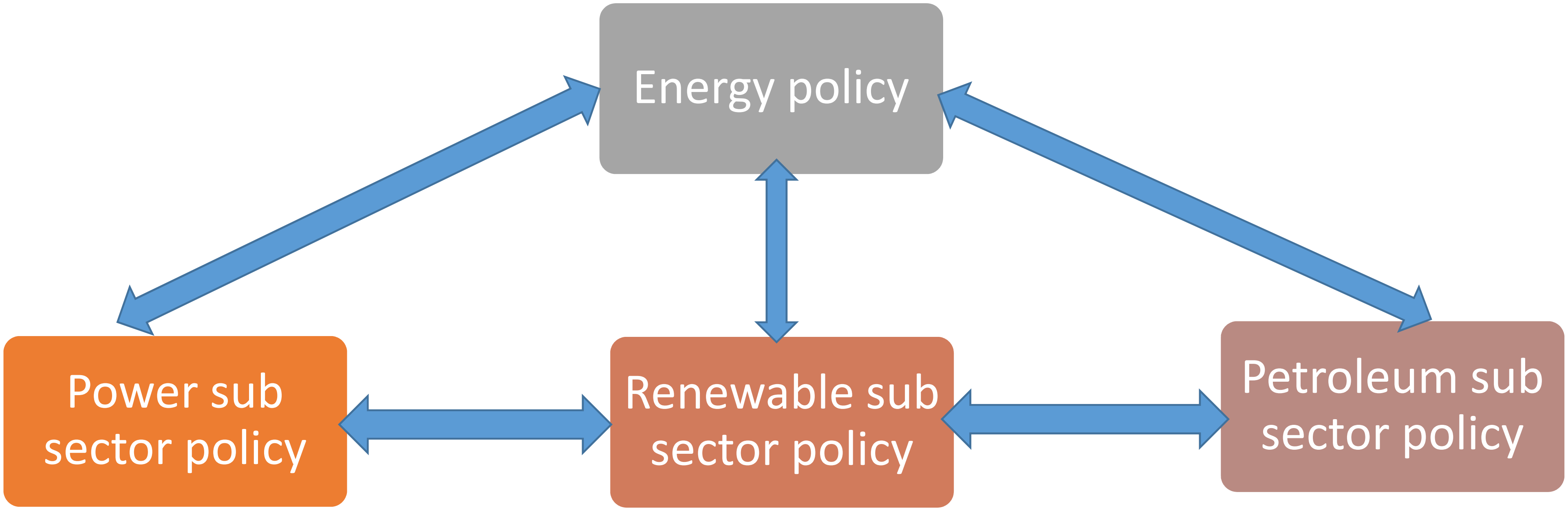
- Merging and adapting to existing policy framework
- Partnership coordination and knowledge management
- Identifying the real challenges of the Sector
- Ownership and management of the Value/supply chain infrastructure
- Budget constraints to formulate pertinent policies for the Sector

AREAS OF INTEREST

Energy policy in Renewable Energy	• Renewable energy & Energy Efficiency Policy to reduce cost of electricity
Energy policy in Coal	• Development of Coal fired plants
Energy forecasting and demand	• Calculation of demand and supply projections and its implementations

CONCLUSION

Ministry of Energy Mission: Develop and sustain an efficient and financially viable Energy Sector that provides secure, safe and reliable supply of energy to meet Ghana's developmental needs in a competitive manner



IEEJ：July 2017 © IEEJ2017

THANK YOU

Contact :report@tky.ieej.or.jp