Renewable Energy Solutions for the Manufacturing Industries in Ghana

Presentation By:

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October 20, 2017

OUTLINE OF PRESENTATION

- Introduction
- Overview of Ghana's Power Sector
- Power Supply Chain
- Journey through History
- Demand and Supply Analysis
- Expectations for the Next 5years
- Status of RE Policies & Next Steps
- Options for Decentralized Energy Supply
- Conclusion

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A BRIEF ON GHANA[1]

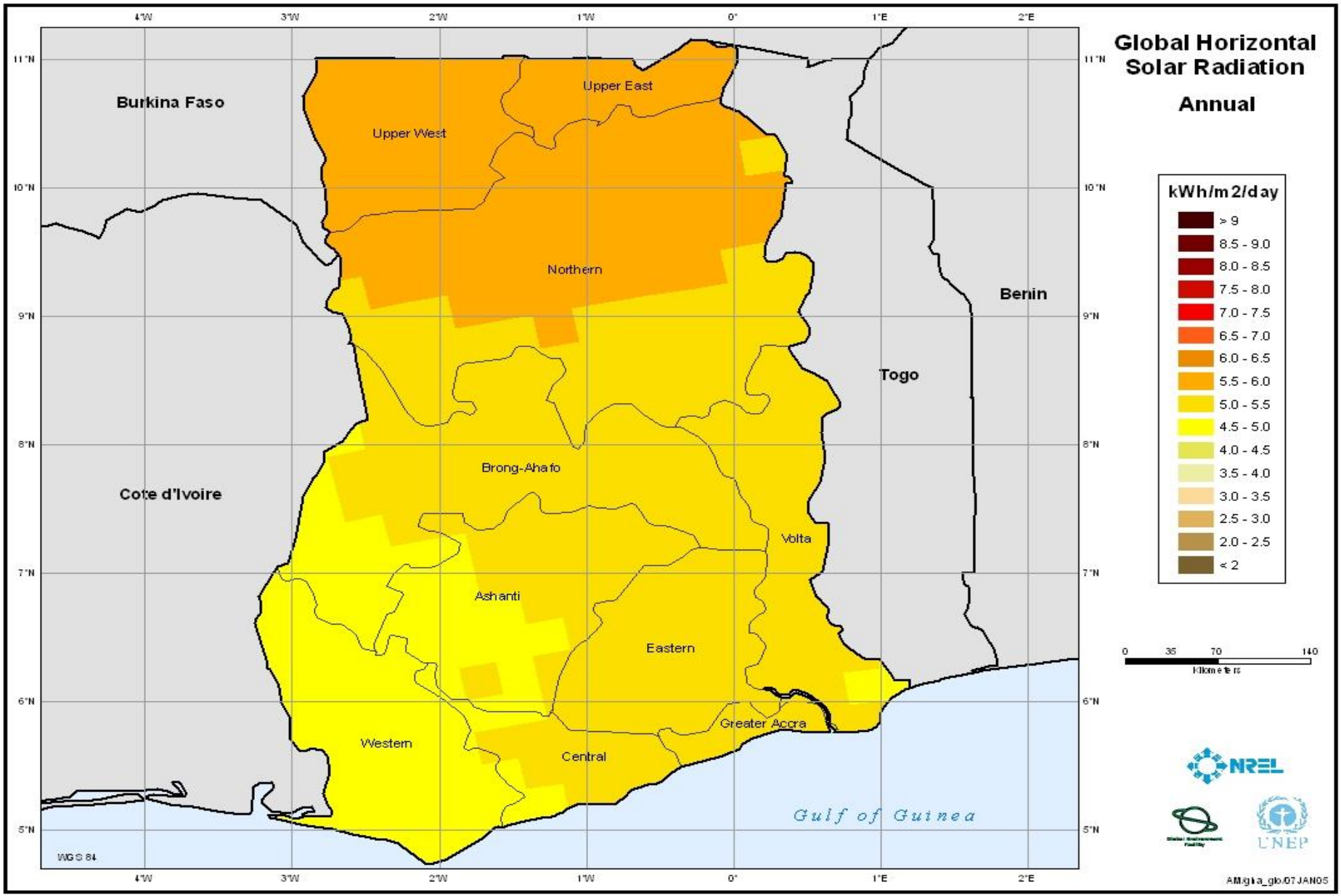
A BRIEF ON GHANA[2]

- Landmass - 238,535km^2
- Boundaries - Ivory Coast (West), Burkina Faso (North), Togo (East) and Gulf of Guinea (South)
- GDP - 42.69Billion USD (2016)
- GDP per Capita - 1,513 USD (2016)
- Population - 27million
- Traditional Exports - Cocoa Beans, Mineral Ore, Timber Logs, Fresh Fish and Fresh Yam
- Non Traditional Exports - All other exports except the above

A BRIEF ON GHANA[3]

- Installed Capacity - 4,400MW
- Conventional Power - 4,370MW
  - ✓ Hydro - 1,550MW
  - ✓ Thermal - 2,790MW
- Renewable Energy - 23MW

SOLAR RESOURCE MAP FOR GHANA



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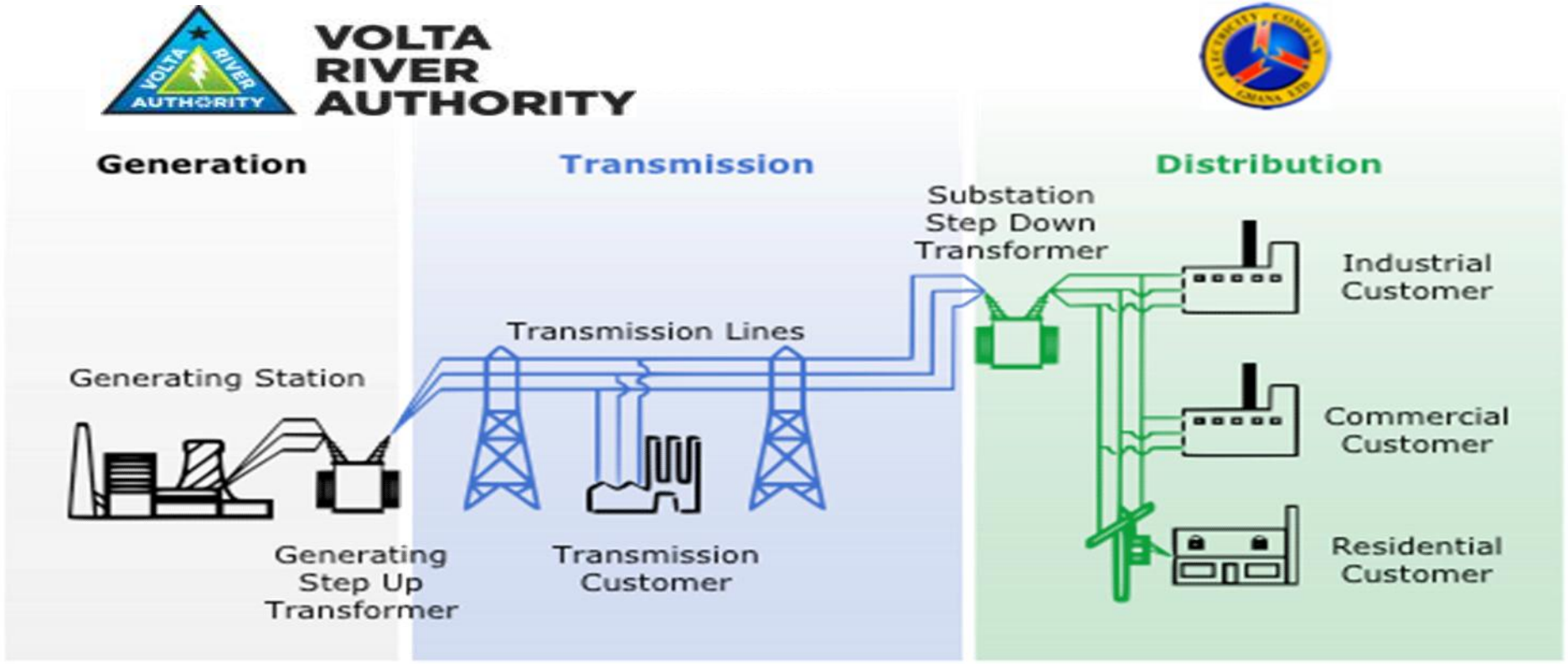
GHANA'S POWER SECTOR (Before Reforms)

Ministry of Energy



GHANA'S POWER SECTOR AFTER REFORMS

- LI 1934
- LI 1935
- LI 1937
- RE Act 832

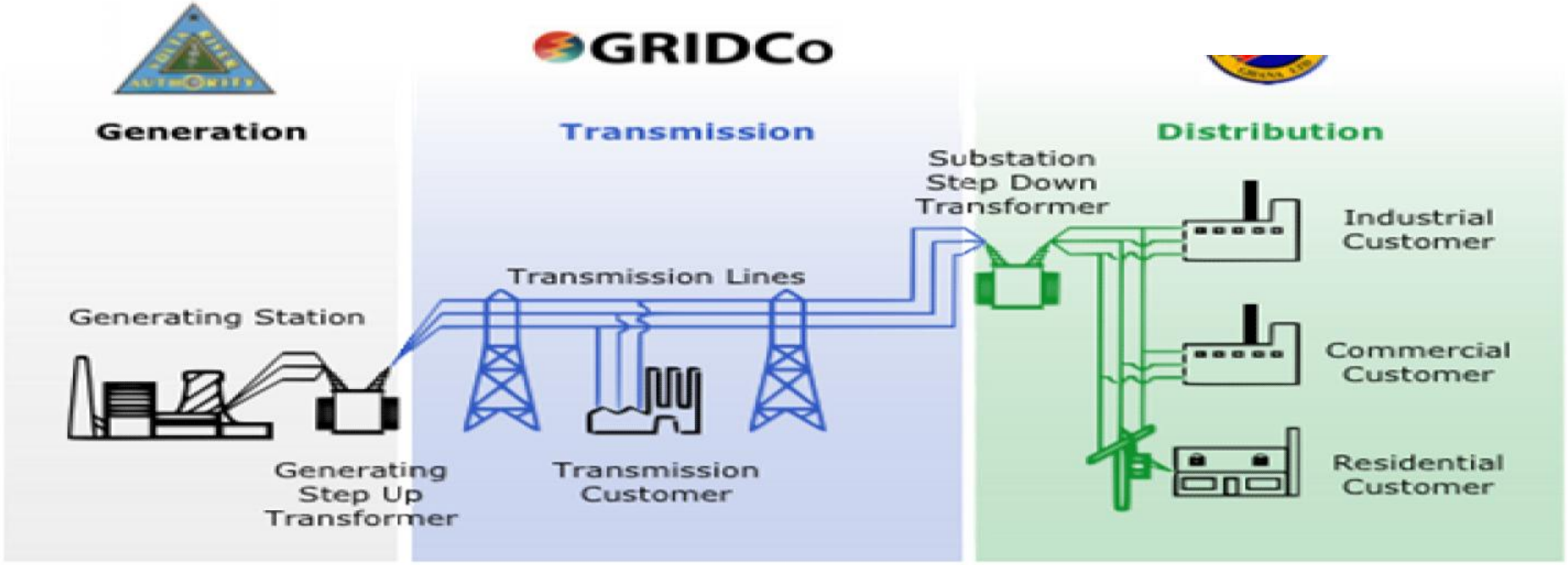
Ministry of Power (MoP)

Public Utilities Regulatory Commission

Energy Commission

VRA + IPPs

ECG + NEDCo + EPC



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ELECTRICITY GENERATION & SUPPLY CHAIN

Fuel Supply	Generation	Transmission	Off-takers	End-Users
 **Natural Gas**  **LCO / HFO**	**VRA + IPPs**  **Balance of technologies (hydro, thermal & RE technologies)	 **System Operator + ETU** GRIDCo	**ECG + NEDCo + EPCL + BCs**	**Residential + Commercial + Industrial** **Private + GoG**

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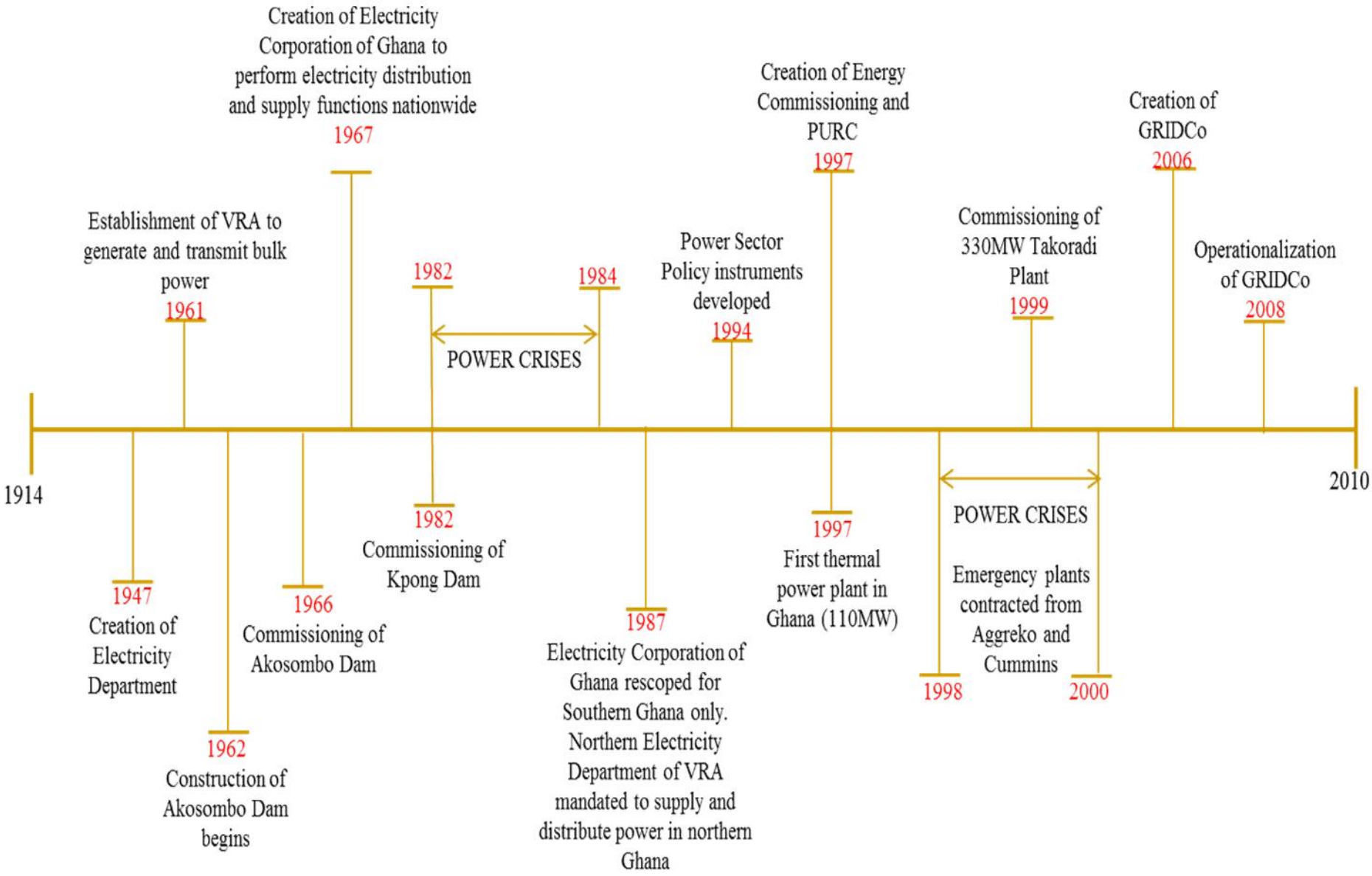
1914
1947
Creation of Electricity Department
1961
Establishment of VRA to generate and transmit bulk power
1962
Construction of Akosombo Dam begins
1966
Commissioning of Akosombo Dam
1967
Creation of Electricity Corporation of Ghana to perform electricity distribution and supply functions nationwide
1982
Commissioning of Kpong Dam
1982
1984
POWER CRISES
1987
Electricity Corporation of Ghana rescoped for Southern Ghana only. Northern Electricity Department of VRA mandated to supply and distribute power in northern Ghana
1994
Power Sector Policy instruments developed
1997
First thermal power plant in Ghana (110MW)
1997
Creation of Energy Commissioning and PURC
1998
2000
POWER CRISES
Emergency plants contracted from Aggreko and Cummins
1999
Commissioning of 330MW Takoradi Plant
2006
Creation of GRIDCo
2008
Operationalization of GRIDCo
2010

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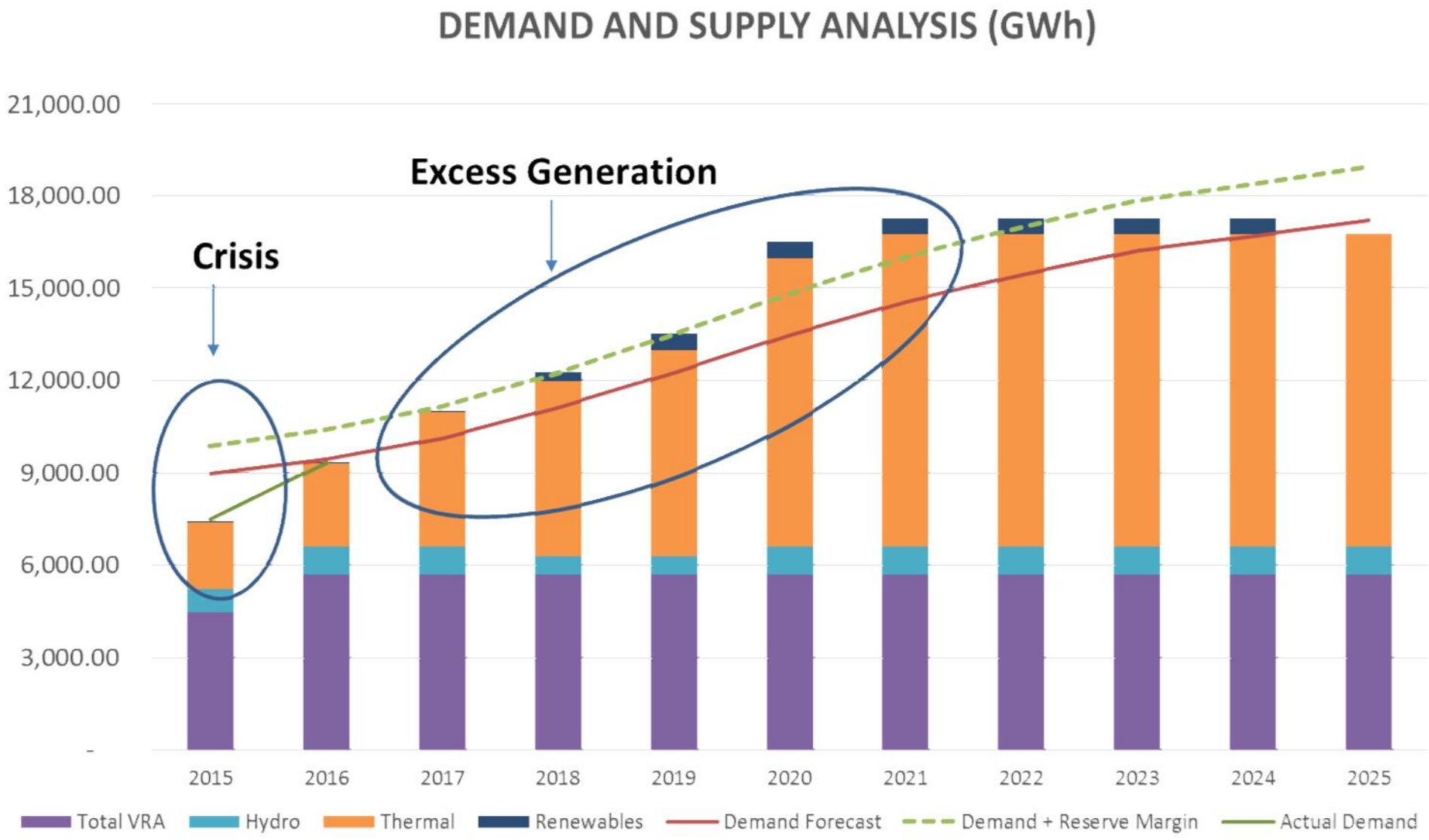
GHANA'S POWER GENERATION CAPACITY AND POWER PRODUCTION				
PLANT TYPE	**PLANT NAME**	**INSTALLED CAPACITY (MW)**	**DEPENDABLE CAPACITY (MW)**	**PERCENTAGE OF TOTAL DEPENDABLE CAPACITY (%)**
HYDRO	Akosombo	1,020	375	22.5%
	Kpong	160	105	
	Bui GS	400	180	
	Total	**1,580**	**660**	
THERMAL	T1	330	300	76.9%
	T2	330	320	
	TT1PP	126	100	
	KTPP	200	180	
	Sunon-Asogli (Phase 1)	200	180	
	Sunon Asogli Phase II Project	360	300	
	MRP	80	40	
	TT2PP	50	30	
	CENIT Power Plant	106	100	
	VRA/AMERI Energy Power	250	230	
	Karpower Barge-1	450	215	
	Aksa Enerji	250	220	
	Trojan I	18	12	
	Trojan II	40	32	
	Total	**2,790**	**2,259**	
RENEWABLES	VRA Solar Power Plant-Phase 1	2.5	2.5	0.6%
	BXC Solar	20	16	
	Safisana	0.1	0.1	
	Sub Total	**23**	**19**	
	Total	**4,392**	**2,938**	**100%**
	Peak Demand (MW)		***2,329***	
	Difference / Shortfall or Excess		***609***	

ENERGY BALANCE (2015-2025)



OPERATIONAL PROJECTS

- 20MW Solar Power Plant installed at Winneba
  - The largest in W/A
  - 2.5MW Solar Farm in Northern Ghana
  - Construction of Additional 20MW has began
- 0.1MW Bio-Gas Plant at Ashaiman, Tema
- Pilot Implementation of 0.5MW Tidal Project at Ada
  - Project to be scaled up to 10MW
  - Highly Competitive tariff of US Cents10/kWh

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PROJECT EXPECTATIONS

- 150MW wind power project
- 100MW of solar
- 80MW of biomass
- 10MW of wave (pilot underway)

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STATUS OF RE POLICIES & NEXT STEPS

❑RE Law and Associated Policies

✓RE Purchase Obligations (REPOs)

- ✓10% of total electricity consumption shall emanate from REs
- ✓What are the technology mix envisaged
- ✓Technology caps introduced

✓Implementation of FiTs

- ✓Adherence to the published rates
- ✓10year versus 20year guaranteed FiT issue requires resolution
- ✓What are the forms of credit enhancements
- ✓Are subsidies required to make projects work?

STATUS OF RE POLICIES & NEXT STEPS

❑ Net Metering Code

- ✓Approved by the regulators to encourage own generation & roof top solars
- ✓Two way meters now available
- ✓Framework under discussion
- ✓Industry could benefit from it
- ✓Scheme requires careful thinking to avoid adverse impact of power distribution
  - ❖Energy for own use
  - ❖Energy for Energy?
  - ❖Are tariffs required?

❑ RE Code

- ✓Under full implementation
- ✓Supporting the role of IPPs

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OPTIONS FOR DECENTRALIZED ENERGY SUPPLY[1]

- Microgrids
  - ✓A feasible solution to be explored
  - ✓Off-grid solutions to power supply
- Storage systems
  - ✓Recent technologies and innovation
  - ✓To create reliability
- Issues
  - ✓Legislation and regulatory framework
    - ➢Clarity policy (who should benefit)
    - ➢Sustainability

OPTIONS FOR DECENTRALIZED ENERGY SUPPLY[2]

- Unbundling of electricity rates
  - ✓Wires business (capacity charge)
  - ✓Energy Charge (flow through)

- Electricity Consumption Pattern (Load Duration Curve)
  - ✓Can time of use help reshapen it?

- Partnerships are very much encouraged
  - ✓Capacity building
  - ✓Technology drive

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CONCLUSION

Ghana is preparing for ……

- To embrace meaningful solutions to electricity supply through
  - ✓Clean energy
  - ✓Price competitiveness and sustainability

Industry is being encouraged to ……

- Take advantage of these opportunities
  - ✓ To support Ghana's development in renewable energy
  - ✓ And help to strengthen the electricity market for national growth and stability

THANK YOU