GHANA COUNTRY REPORT ON ENERGY
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MINISTRY OF POWER
GHANA
ENERGY POLICY COURSE - JICA
GHANA STATISTICS

- Ghana is a west Africa country bounded by Burkina Faso on the North, on the East by Togo and the West by Cote d’Ivoire and on the south of the Atlantic Ocean. Ghana which was formerly Gold Coast was a British colony. Ghana Means “Warrior King”. Ghana’s capital city is Accra.

Population: 25.9 million
Population growth Rate: 2.1% Annual change
Regions: 10
Land Area: 238,535 km square
Coast line: 560 km square
Water: 11,000 km square
GDP: $38.61 bn
unemployment rate: 5.2%
ADMINISTRATIVE MAP AND THE FLAG OF GHANA
ACCRA CITY
Mandate

The Ministry of Power by Executive decision (November 2014) and in line with Sections 11 and 13 of the Civil Service Law (PNDCL 327) is mandated to initiate and formulate policies to ensure the effective and efficient generation and supply of power, as well as coordinate and evaluate the efficiency and effectiveness of the performance of the sector.
Vision
- Global top-notch Ministry with reliable, sustainable, export-oriented power to the Nation

Mission
- Ministry of Power exist to ensure effective and efficient generation and supply of reliable, sustainable, export-oriented power for Ghanaians, through the initiation, formulation, co-ordination, monitoring and evaluation of innovative policies and programmes for the sector. We are committed to being resourceful, innovative, industrious, competitive, client-centered, gender sensitive and disciplined, in the delivery of our policies, programmes and services.
# Power Sector Agencies

<table>
<thead>
<tr>
<th>Agency</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| **Power Sub-Sector:** | **Power generation (Thermal, Hydro & RE)**  
- Volta River Authority (VRA)  
- Bui Power Authority (BPA)  
- Ghana Grid Company (GRIDCO)  
- Electricity Company of Ghana (ECG)  
- Northern Electricity Development Company (NEDCo)  
- Development of Bui Hydro Dam  
- Power Transmission  
- Power distribution in Southern Ghana  
- Power distribution in Northern Ghana |
| **Regulatory Agencies:** | **Electricity tariffs approval, monitoring quality**  
- Public Utilities Regulatory Commission (PURC) of service and consumer protection  
- Energy Commission (EC)  
- Licensing of operators in the power sector, setting technical standards, sector planning & policy advice  
- Licensing of operators in the power sector, setting technical standards, sector planning & policy advice |
SECTOR POLICIES AND PLANS

- Strategic National Energy Plan (SNEP)
- GSGDA II
NATIONAL ENERGY POLICY - 2010

- **Background**
  - Developed in 2010 to provide a concise outline of Government’s policy direction to contribute to a better understanding of Ghana’s energy policy framework.

- **Objective**
  - Decision-making platform for the effective management and development of Ghana’s Energy Sector;
  - Guide to key stakeholders and institutions in the energy sector highlighting the definition and implementation of key activities in respect of their mandates;
  - Guide for coordinating the implementation and monitoring of energy sector policies; and
  - Platform for dialogue on investment opportunities with Ghana’s development partners and the private sector.
**POLICY GOALS -1**

- Ensure adequate, reliable and improved supply of electricity to meet national requirement and for export through consolidation: rehabilitation and expansion of electricity- generation, transmission and distribution infrastructure;

- Increase access to electricity from 66% to, at least, 80% by 2015;

- Secure sources of cost-effective and sustainable fuel supply for electricity generation;

- Increase financing for electricity supply infrastructure development from Government sources, Development Partners and the private sector;
POLICY GOALS-2

- Strengthen institutional and management capacity as well as regulatory regime for the smooth development and operation of the power sub-sector, and

- Achieve 10% contribution of modern renewables (excluding large hydro and wood fuels) in the electricity generation mix by 2020.

- Reduce the demand on woodfuels from 72% to 50% by 2020.

- Promote development and use of other biomass technologies including biogas, biofuels, gasification and waste-to-energy.
POLICY OBJECTIVES-1

- Increase generation capacity to 5,000 MW by 2020:
- Achieve gas-based generation for, at least, 50% of thermal power plant production by 2015;
- Reduce LCO based generation by at least 50% by 2016;
- Increase participation of IPPs in the Power Sector through transparent procurement;
- Improve and modernize electricity distribution infrastructure to reduce system losses from 25% to 18% by 2016;
- Develop a non-congested electricity transmission network by 2016, and
- Strengthen Regulatory Agencies to perform their functions effectively.
- Achieve universal access by extending electricity to all communities by 2020, and
- Increase access to, at least, 80% by 2016.
- Achieve economically efficient tariffs by 2016.
THE SCALABLE RENEWABLE ENERGY PROJECT

GHANA SECURED FUNDS OF $40M FOR FOUR KEY PROJECT UNDER THE SREP

- Mini grids and stand alone solar PV system
- Solar PV based net metering with storage
- Utility scale solar PV/wind power generation and
- Technical assistance project
THE AKOSOMBO DAM
THE BUI DAM

- Supplies 400 MW to the Middle Belt and Northern part of Ghana namely:
  - Sawla
  - Techiman
  - Kintampo
  - Sunyani
ELECTRICITY SUPPLY INFRASTRUCTURE

Generation Sources

Hydropower
- Akosombo - 1,020 MW
- Kpong - 160 MW
- Bui - 400 MW

Thermal
- TAPCO (Takoradi I) - 330 MW
- TICO (Takoradi II) - 330 MW
- Mines Reserve Plant - 80 MW
- Osagyefo Barge - 125 MW
- Tema 2 Plant - 50 MW
- Kpone Thermal - 160 MW
- Takoradi III Plant - 132 MW
- CENIT - 110 MW
- Asorgli Power - 200 MW
<table>
<thead>
<tr>
<th>Plants</th>
<th>Installed Capacity</th>
<th>Effective Capacity MW</th>
<th>Type</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akosombo Hydro Station</td>
<td>1,020</td>
<td>1,001</td>
<td>Hydro</td>
<td>Water</td>
</tr>
<tr>
<td>Kpong Hydro Station</td>
<td>160</td>
<td>120</td>
<td>Hydro</td>
<td>Water</td>
</tr>
<tr>
<td>Bui Hydro Dam</td>
<td>400</td>
<td>133</td>
<td>Hydro</td>
<td>Water</td>
</tr>
<tr>
<td>Takoradi Power Company (Tapco TI)</td>
<td>330</td>
<td>350</td>
<td>Thermal</td>
<td>LCO/Gas</td>
</tr>
<tr>
<td>Takoradi Int. Co. (Tico TII)</td>
<td>220</td>
<td>220</td>
<td>Thermal</td>
<td>LCO/Gas</td>
</tr>
<tr>
<td>Takoradi Thermal Plant</td>
<td>132</td>
<td>132</td>
<td>Thermal</td>
<td>LCO/Gas</td>
</tr>
<tr>
<td>Tema Thermal Plant</td>
<td>50</td>
<td>50</td>
<td>Thermal</td>
<td>DFO/Gas</td>
</tr>
</tbody>
</table>
## GENERATION CAPACITY CONT.

<table>
<thead>
<tr>
<th>Plants</th>
<th>Installed Capacity</th>
<th>Effective Capacity MW</th>
<th>Type</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mines Reserve Plant (MRP)</td>
<td>80</td>
<td>80</td>
<td>Thermal</td>
<td>DFO</td>
</tr>
<tr>
<td>Sunon Asogli</td>
<td>200</td>
<td>200</td>
<td>Thermal</td>
<td>Gas</td>
</tr>
<tr>
<td>CENIT</td>
<td>110</td>
<td>110</td>
<td>Thermal</td>
<td>LCO/Gas</td>
</tr>
<tr>
<td>Navrongo Solar Farm</td>
<td>2</td>
<td>2</td>
<td>Renewable</td>
<td>Solar</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,814</strong></td>
<td><strong>2,942</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A National Electrification Planning Study (NEPS) was done with a grant from Canadian Government;

The Study was carried out by Acres International of Canada for the establishment of the National Electrification Master Plan;

Study considered alternative sources of providing power to communities i.e. solar, wind, biomass, small hydro etc.

Implementation of National Electrification Programme:

Six 5-year phases spanning the 30 years of implementation.
IMPLEMENTATION STRATEGY OF NES

Phasing of the NES:

- The first phase covered the connection of all District Capitals and all towns/villages en-route to the District Capitals;

- To ensure efficient Government business

- Provide electricity for local industry, commercial activities and domestic use

- The subsequent phases of the electrification of communities was based on most economically viable projects.
RATIONALE FOR THE SHEP

- Accelerate grid connection for communities which felt their proposed projects on the programme of implementation were too far into the future;

- Reduce overall cost on Government; Introduce community ownership.
CRITERIA FOR JOINING THE SHEP

- Community must be within 20km of an existing 11kV/33kV network;
- Interested Communities must apply to be included in the programme;
- Community must be willing and able to procure and erect all the Low Voltage distribution poles required for the works;
- A minimum of one-third of houses in the community should be wired and ready to be serviced as soon as electricity supply is connected to the communities.
ISSUES FACING RURAL ELECTRIFICATION & RE UTILIZATION IN GHANA

- High cost of energy delivery from RE incl. solar, wind, biomass-based RET

- The negative effect of subsidies on grid power

- Ineffectiveness of tariff collection in remote and dispersed rural houses.
POLICY GOALS-ELECTRICITY SUB SECTOR

- Increase Renewable Energy in the Supply-mix to 10% by 2020
- Promote exploitation and use of mini-hydro, solar, biomass and wind
STRATEGIES TO ACHIEVE 10% CONTRIBUTION OF RENEWABLE ENERGY BY 2020

- Provide the regulatory framework and fiscal incentives for the development and promotion of renewable energies by the private sector—Independent Power Producers (IPPs).

- Renewable Energy Bill which has the following main contents is currently in parliament for consideration and enactment into law.
  - Feed-in-Tariff
  - Obligatory purchase
  - Renewable Energy Fund

- Support renewable energy sector agencies to undertake detailed assessment of renewable energy resources with potential for electricity generation.

- Support for the research, development and demonstration of economic viable renewable energy technological options for grid connected, mini-grid and off-grid applications.
**Required Investment in Renewable Energy Sub-sector (Solar, Biomass, Mini-Hydro and Wind) Targets to Attain 10% RE by 2020**

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Exploitable Targets (MW)</th>
<th>Investment Requirement US$ (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>200-300</td>
<td>250-400</td>
</tr>
<tr>
<td>Solar</td>
<td>20</td>
<td>100-150</td>
</tr>
<tr>
<td>Medium - small Hydro</td>
<td>150</td>
<td>200-300</td>
</tr>
<tr>
<td>Modern Biomass/waste to energy</td>
<td>90</td>
<td>90-150</td>
</tr>
<tr>
<td>Total</td>
<td>500 MW</td>
<td>640-900</td>
</tr>
</tbody>
</table>
FINANCING THE STRATEGY

- Private Sector Participation and Investment
- Public Private Partnership Arrangements
- Multilateral & Bilateral Sources from Development Partners
- Public Sector - Budget & Concessional Loan Facilities for “Special” Infrastructure Programmes (e.g. Rural Electrification & Renewable Energy Programme)
- Internally Generated Funds from Energy Sector Companies - (VRA, ECG, TOR, etc) - Cost-Recovery Pricing
- Commercial Loan Facilities to Support Financially Viable Projects by Energy Sector Companies (TOR, VRA, ECG)
- Listing on Ghana Stock Market
INVESTMENT CLIMATE

- Political Stability
- Legal and Institutional Framework for Players in the Energy Sector
- The Rule of Law
- Free and Independent Press
- Transparency and Accountability
- Commitment to fight Corruption and Crime
- Vibrant Private Sector
- Strong Civil Society
- Attractive Incentives to All Investors (GIPC Act)
# CHALLENGES AND STRATEGIES

<table>
<thead>
<tr>
<th>Key Sector Challenges</th>
<th>Mitigation Strategy Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate funding for Rural Electrification Projects</td>
<td>Increased budgetary allocation for Rural Electrification Programme</td>
</tr>
<tr>
<td>Poor financial Health of Power Utilities</td>
<td>Implementation of cost reflective tariff for the utilities and increase the collection rate of utility bills</td>
</tr>
<tr>
<td>Inadequate power supply to meet growing demand and low investment in the sector</td>
<td>Promoted private sector participation in the provision of energy infrastructure</td>
</tr>
<tr>
<td>Increasing demand for electricity for household and industry</td>
<td>Promoted private sector participation in the power sector</td>
</tr>
<tr>
<td>Low Staff strength and inadequate office accommodation for staff</td>
<td>Arrangements made to increase staff strength and create office space for staff</td>
</tr>
<tr>
<td>Poor hydrology of Volta River</td>
<td>Reduced number of turbines in operation to prevent total depletion of reservoir</td>
</tr>
<tr>
<td>Non-adherence to mandatory inspection and routine maintenance plans causing loss of generating units through faults</td>
<td>Schedule for maintenance of generating equipment adhered</td>
</tr>
<tr>
<td>Non-payment of utility bills by some MDAs</td>
<td>Institutions with outstanding bills disconnected from electricity supply to ensure their timely payment of debt owed</td>
</tr>
<tr>
<td>Ageing equipment in the Power Sector (Generation, Transmission and Distribution)</td>
<td>Routine programme in place for the replacement of old and obsolete equipment</td>
</tr>
<tr>
<td>Absence of a reserve margin</td>
<td>Increased the existing generation capacity with the Emergency Power Projects to meet the demand</td>
</tr>
<tr>
<td>Insufficient GoG budgetary allocation/releases</td>
<td>Programmes and projects of Directorates and Units developed within the approved budget</td>
</tr>
<tr>
<td>Non availability of fuel for thermal plants</td>
<td>An emergency LNG Agreement signed to provide 120mmsef To settle outstanding debt with West African Gas Pipeline</td>
</tr>
</tbody>
</table>
## CHALLENGES AND MITIGATION STRATEGY CONT’D

### Power Distribution

<table>
<thead>
<tr>
<th>Activity/Project</th>
<th>Challenges</th>
<th>Mitigation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce system losses</td>
<td>Obsolete equipment&lt;br&gt;High Commercial losses</td>
<td>Replacement of equipment Injection &amp; Monitoring of prepayment metering</td>
</tr>
<tr>
<td>Extension of electricity to un-electrified communities; Self-Help Electrification Project (SHEP)</td>
<td>Performance of Contractors greatly impacts on the successful implementation of the project. Late submission of Customer Service data from utilities (ECG) thereby delaying completion of project and denying residents access to electricity. Right-of-way issues delaying progress</td>
<td>Monitor progress of work through regular site inspections. To involve top management to impress upon utilities (ECG) to submit Customer Service data on time. To get MMDAs to step to provide resolution on right-of-way issues</td>
</tr>
</tbody>
</table>
## Challenges and Mitigation Strategy Cont’d

### Renewable Energy

<table>
<thead>
<tr>
<th>Activity/Project</th>
<th>Challenges</th>
<th>Mitigation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Lighting Project</td>
<td>1. Inability of customers to pay for the energy service (mobile phone charging, etc.)&lt;br&gt;2. Difficulty in accessing community during raining season</td>
<td>1. Ensure full compliance with the signed MOU&lt;br&gt;2. Conduct bulk of monitoring in the dry season</td>
</tr>
<tr>
<td>Basic Schools ICT Pilot Project</td>
<td>1. Low staff strength to conduct beneficiary assessment&lt;br&gt;2. Difficulty in accessing community during raining season</td>
<td>1. Engage a consultant to carry out the assessment&lt;br&gt;2. Conduct bulk of assessment in the dry season</td>
</tr>
</tbody>
</table>
## CHALLENGES AND MITIGATION STRATEGY CONT’D

### Renewable Energy

<table>
<thead>
<tr>
<th>Activity/Project</th>
<th>Challenges</th>
<th>Mitigation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-grid electrification system project</td>
<td>1. Transportation of heavy materials and equipment from the various river banks to the islands, 2. Land related issues for the siting of power plants and right of way to string distribution lines</td>
<td>1. Quick arrangements with VLTC/VRA to transport all materials, equipment to islands on upstream of the Volta Lake 2. Secure land release agreement with the Nananum and educate communities on the need to cooperate and grant right of way as their contribution to project.</td>
</tr>
</tbody>
</table>
## CHALLENGES AND MITIGATION STRATEGY CONT’D

### Renewable Energy

<table>
<thead>
<tr>
<th>Activity/Project</th>
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<th>Mitigation Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling up Renewable Energy Program (SREP)</td>
<td>1. Raising leveraging finance by GoG and other stakeholders (private, DPs, MDBs, etc) 2. Capacity to implement project</td>
<td>1. Engage all potential funding stakeholders’ right from program preparatory stage to ensure interventions are focused on priority areas 2. Leverage on GEDAP to create formidable team and SREP PIU for the implementation of program</td>
</tr>
</tbody>
</table>
## CHALLENGES AND MITIGATION STRATEGY CONT’D

### Renewable Energy

<table>
<thead>
<tr>
<th>Activity/Project</th>
<th>Challenges</th>
<th>Mitigation Strategy</th>
</tr>
</thead>
</table>
| Hydropower Feasibility Studies & Development Project | 1. Climatic change and environmental degradation around catchment areas  
2. Financing for hydropower development              | 1. Carefully prioritize hydropower projects  
2. Fence projects for conducive financing arrangements |
THE WAY FORWARD

- Address Security Concerns over Power Enclaves
- Diversification of generation sources
- Rapid Diversification of Fuel Supply sources to include coal, LNG and nuclear
- Energy Efficiency & Conservation
- Intensify non-utility based Renewable Energy (200,000 roof top)
- Creation of indigenous jobs in the Electricity Supply Industry – Local Content in the ESI
DEMAND FORECAST

Comparison of Demand Forecasts for Ghana (MW)

- Consensus Forecast (MW)
- Actual Demand (MW)
- EC's Initial Forecast (MW)
GRAPH OF DEMAND AND SUPPLY

Projected Capacity Demand/Supply Outlook for Ghana (2016 - 2030)
COURSES IN ORDER OF PRIORITY

- Energy Policies in Japan
- International Energy situation
- Energy demand forecast in the World/Asia
- Subsidy system for Energy Field in Japan
- Energy Balance Sheet
- Observation: Mini Hydro Power Generation
Thank You