

Electricity Regulation

Contributing editor
Daniel Hagan



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GETTING THE
DEAL THROUGH 

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DEAL THROUGH 

Electricity Regulation 2016

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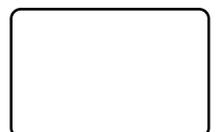


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1 Policy and law

What is the government policy and legislative framework for the electricity sector?

Policy framework

Ghana's electricity supply industry is unbundled with separate jurisdictions and entities regarding activities of electricity generation, transmission and distribution. The policies of government for the electricity sector are in relation to these three aspects.

The goal is to become a major exporter of power in the subregion by 2015. This is intended to be achieved through capacity addition, modernisation of transmission and distribution infrastructure.

The policy also focuses on institutional and regulatory reforms intended to create competitive electricity markets.

In respect of power generation capacity, the policy objective is to increase installed generation capacity from about 2,000MW to 5,000MW in the medium term.

The policy objective for the transmission market is to provide adequate, safe and reliable electricity transmission network. This may be achieved by supporting the mobilisation of commercial and domestic capital resources to supplement external funding for transmission infrastructure development. Also, the policy is to enforce technical regulations and operational standards, and to provide support for the maintenance of existing transmission infrastructure.

The policy objective for the distribution market is to seek adequate investment to improve the electricity distribution network and thereby reduce high system losses and improve the poor quality of electricity supply. This is intended to be achieved by assisting distribution utilities financially to improve their operations.

To secure future fuel supplies, the policy objective is to increase and diversify the fuel mix in power generation. The policy requires government to, inter alia, support infrastructure for new fuel supply sources, develop coal power, and support regional integration of energy resources. The government also intends to achieve universal access to electricity by extending the reach of electricity infrastructure to all communities by 2020.

With regard to electricity pricing, the government's objective is to ensure that electricity pricing is efficient and competitive while providing rates that are affordable.

Power sector reforms were initiated in 1995 to ensure an efficient and effective power sector and also to allow increased private-sector investment and participation. The policy objectives include to promote competition in the generation of electricity through the development of a wholesale electricity market, create the environment for retail competition in the electricity market, facilitate the entry of independent power producers (IPPs), and ensure improved performance of electricity utility companies.

The strategic policy focus for the sector is to attract investment to improve and expand the capacity of the existing infrastructure to deliver reliable power supply services in the short to long term and to be net exporter of electricity in the West African subregion.

Legislative framework

In 1997, the Ghanaian parliament enacted two principal acts to govern the energy sector. These are Energy Commission Act 1997 (Act 541) (the Energy Commission Act) and the Public Utilities and Regulatory Commission Act 1997 (Act 538) (the PURC Act).

The electricity industry comes under the energy sector. The Energy Commission Act provides, in relevant part, that a person must not carry on operations in the electricity supply industry unless the person either holds a licence authorising the relevant operations or is exempted from holding a licence. A licence may only be granted to a citizen of Ghana, a body corporate or a partnership.

The Energy Commission Act established the Energy Commission with the main object of regulating and managing the utilisation of energy resources in Ghana and to coordinate all policies in relation to them. The commission is responsible for granting licences to public utilities for the transmission, wholesale supply, distribution and sale of electricity and natural gas in Ghana.

There are a number of subsidiary legislation enacted under the authority of the Energy Commission Act for the proper management of the power sector of Ghana.

The PURC Act established the Public Utilities Regulatory Commission (the PURC) with the responsibility to approve rates chargeable by public utilities, ensure competition among public utilities, monitor standards of performance of public utility service provision and ensure the protection of consumer rights.

There are several other Acts of Parliament, legislative instruments and sector codes enacted for specific purposes within the electricity industry. The Volta River Development Act 1961 (Act 46) (the VRA Act) established the oldest power entity in Ghana – the Volta River Authority (VRA). The Act tasked the VRA with the responsibility to generate electricity by means of the water power of the Volta River and by any other means.

The VRA also supplies electrical power to distribution companies, bulk customers, and the township of Akosombo and Kpong.

In 2007, Parliament enacted the Bui Power Authority Act 2007 (Act 740) (the Bui Power Act) which established the Bui Power Authority to oversee the development of the Bui hydroelectric power project on the Black Volta River and any other potential hydroelectric power sites on the Black Volta River.

The Renewable Energy Act 2011 (Act 832) (the Renewable Energy Act) is the most recent energy-related legislation geared towards the encouragement of Ghana's drive to boost the renewable energy sector.

The object of the Renewable Energy Act is to provide for the development, management and utilisation of renewable energy sources for the production of heat and power in an efficient and environmentally sustainable manner.

The Energy Commission developed the National Electricity Grid Code (the Grid Code) in 2009, which is intended to set out the requirements, procedures, practices and standards that govern the development, operation, maintenance and use of the National Interconnected Transmission System (NITS) in Ghana.

The overarching objective of the code is to ensure that NITS provides fair, transparent, non-discriminatory, safe, reliable, secure and cost-efficient delivery of electrical energy.

The Grid Code describes the responsibilities and obligations associated with all the functions involved in the supply, transmission and delivery of bulk electric power and energy over the NITS including the functions of the electricity transmission utility (ETU), a NITS asset owner, a wholesale supplier, a distribution company and a bulk customer.

To ensure that electric power is produced, transmitted and distributed in an environmentally sustainable manner, the Environmental Protection Agency Act 1994 (Act 490) (the EPA Act) was enacted in 1994. The EPA

Act established the Environmental Protection Agency (the EPA) as the principal environmental watchdog in Ghana.

All electricity utilities must receive environmental permit from the EPA before they undertake any project. The EPA ensures compliance with the laid down environmental impact assessment procedures in the execution of electricity projects.

The existing legal regime envisages a spot as well as a bilateral market for power trading. The present position is largely bilateral as there are not yet enough players for a fully functioning liquid spot power trading market. The Ghana Grid Company Ltd (GRIDCo), as market operator, is currently working at establishing systems and procedures to support enhanced market operations.

2 Organisation of the market

What is the organisational structure for the generation, transmission, distribution and sale of power?

Generally, electricity goes through a three-step process before arriving at the end-user for consumption. First, power is produced from generators that are usually located far from the load centres. The power is then transported over the transmission grid, which is composed of transmission lines, transformers, and other components, to the bulk load distribution substations. From bulk load distribution substations, power is delivered to the individual customer sites using distribution lines.

Historically, Ghana's electricity market was structured as public monopoly with extensive integration of generation, transmission, and distribution services with centralised planning of supply resources to meet demand growth. To prevent utilities from abusing their monopoly power, they were regulated by government and were allowed a fixed rate of return above their cost.

Over time it became self-evident that the state-owned, vertically integrated monopoly structure was plagued by poor performance and limited capital for operations and investment. For example, many state-run power entities had high costs and untenable tariffs that under-recovered the long-run marginal cost of their operations.

The lack of competition inherent in a monopoly structure accounted in large part for poor performance and poor managerial decisions. The state-owned entities lacked reliable power supply, continued investment in infrastructure and fair prices to consumers. The regulatory regimes that existed failed to effectively use administrative means to achieve supply, availability and reliability of electricity.

Thus, a structural shift from a fully regulated monopoly became necessary to increase competition by allowing private participation and for consumers to pay fair rates. Ghana began its market-based power sector reforms in the mid-1990s to open up the industry to new market participants and simultaneously began to functionally unbundle generation, transmission and distribution of electricity.

Historically, Ghana's power industry had featured semi-vertically integrated state-owned monopolies. The VRA was responsible for wholesale power generation and transmission, while the Electricity Corporation of Ghana (ECG) was responsible for distribution.

Ghana relies on two primary types of generation facilities: hydroelectric plants and thermal plants. Electricity generation is undertaken by the state-owned VRA.

As part of the reform process, VRA was functionally unbundled into two institutions. GRIDCo was created out of VRA in 2006 and was tasked with wholesale power transmission, and legacy VRA continued operation as a generation-only company. VRA owns and operates the Akosombo Hydro Power Station, Kpong Hydro Power Station and the Takoradi Thermal Power Plant situated at Aboadze.

VRA is also a minority joint partner with the Abu Dhabi National Energy Company, a private-sector company that owns and operates the Takoradi International Power Company thermal plant, also located at Aboadze.

The Bui Power Authority, another state-owned entity, is charged with the implementation of the Bui Hydroelectric Power Project.

Since the mid-1990s, several pieces of legislation have been passed to facilitate the creation of a competitive wholesale power market. These include the Energy Commission Act and the PURC Act. The Ministry of Energy is responsible for formulating, monitoring and evaluating policies, programmes and projects for the power sub-sector and the energy sector in general. It is also the institution charged with the implementation of the National Electrification Scheme, which seeks to extend the reach of electricity to all communities in the long term.

Two regulatory institutions, the Energy Commission and the PURC, were statutorily established with the responsibility of helping to create and maintain a healthy and competitive power sector.

The Energy Commission is responsible for technical regulation of the power subsector, including licensing of private and public entities that operate in the electricity sector. The Energy Commission also collects and analyses energy data and contributes to the development of energy policy for Ghana. It also issues licences and establishes performance standards for utilities. In addition, the commission advises the Minister for Energy on matters relating to energy planning and policy.

The PURC is an independent regulatory agency, and is responsible for economic regulation of the power sector, specifically approving rates for electricity sold by distribution utilities to the public. The PURC sets rates and tariffs, monitors performance, promotes fair competition, and works to balance the interests of utility providers and consumers.

The PURC also educates customers about electricity services as well as energy efficiency and conservation. It ensures the effectiveness of investments.

Under the power sector reforms, dispatch and transmission operations remain regulated mainly because they are monopoly functions. Dispatching and transmission operations is the responsibility of the ETU.

GRIDCo, a wholly owned government entity, was established as an independent operator of the NITS. GRIDCo owns transmission infrastructure and has operational control. GRIDCo became operational by the transfer of staff and assets from VRA on 15 July 2008. Its core functions are to acquire by purchase or otherwise construct, establish, manage, maintain all transmission facilities, works, buildings and other systems necessary to transmit energy.

Ghana has an extensive transmission system which covers all the regions of the country. The transmission system is an interconnected network that supports the bulk transfer of electricity over long distances from generation facilities to distribution centres called bulk power distribution substations. While generation's role is to make sure that electricity is available when customers demand it, transmission's role is to make sure electricity is available where customers need it.

Ghana's high-voltage transmission network connects generation sites in Akosombo, Aboadze, Kpong and Tema to the various load centres around the country. The network features more than 4,000km of high-voltage electric transmission lines that connect more than 40 substations.

The primary backbone of Ghana's transmission system is a network of 161kV lines and substations. This primary network is supplemented with a sub-transmission system of 34.5kV lines and a single 69kV line in the lower Volta region - the 34.5kV network is sometimes classified as distribution.

Ghana's high-voltage transmission system interconnects with Togo and Benin via a 161kV transmission line, and with the Ivory Coast via a 225kV transmission line. A small network of low-voltage lines connects Ghana to the border towns of Po and Leo in Burkina Faso and Dapaong in Togo.

These cross-border interconnections allow Ghana to trade power with its neighbouring countries. Regional efforts have been under way to integrate the transmission networks of Economic Community of West African States (ECOWAS) member states to facilitate power trading among the regional entities. In this regard, the West African Power Pool (WAPP) has begun efforts to build regional transmission lines to interconnect major load centres.

GRIDCo manages the Ghana transmission network. Because transmission interconnects both the supply side (generation) and demand side (distribution), the transmission authority is a natural candidate to coordinate the electricity system. Hence GRIDCo functions as an independent system operator for Ghana's electricity system, and consequently has the dispatch responsibility. With this comes the responsibility to maintain reliability at the wholesale supply level.

The distribution system is a network of low voltage distribution lines that deliver electricity directly to customers. The distribution system is generally considered to begin at the bulk power distribution substation where GRIDCo delivers power to the wholesale power buyers and end at the retail consumer's meter. Beyond the meter lies the customer's electric system, which consists of wires, equipment, and appliances.

Electricity distribution and sale services are currently conducted by three companies: ECG; Northern Electricity Distribution Company (NEDCo), a wholly owned subsidiary of VRA; and Enclave Power Company Limited.

Substations on the transmission system receive power at higher voltages and lower them to lesser volts to feed the distribution systems. The distribution system consists of the poles and wires commonly seen in neighbourhoods. At key locations, voltage is again lowered by transformers to meet customer needs.

ECG operates in the southern part of Ghana comprising the Ashanti, Western, Eastern, Central, Western and Volta regions. The ECG network consists of about 77,000km of service lines, connecting 24 bulk supply points (BSPs).

ECG has more transformer capacity than the present peak demand but growth in demand in certain areas has resulted in under-capacity in those areas. Under ongoing projects, ECG will add 820MVA to the existing transformer capacity by 2015.

ECG serves about two million customers including residential, commercial and some large industries. These include nine bulk customers within the ECG network infrastructure. These bulk customers, even though they are embedded in the ECG system have a choice to opt to buy power from VRA or any other wholesale supplier except that they are required to pay for the use of ECG system to reach their facilities.

NEDCo's operations cover largely the northern part of Ghana comprising the Brong-Ahafo, Northern, Upper East and Upper West regions. NEDCo's distribution network consists of 5,488km of medium-voltage lines and 7,832 km of low-voltage (415V) lines connecting 24 BSPs. The NEDCo system has transformer installed capacity of 200MVA compared with its average peak load of 130MVA.

NEDCo operates at 34.5kV, 11kV and 400V voltage levels. NEDCo serves over 350,000 customers including residential, commercial and some large industries.

NEDCo has no bulk customers under its jurisdiction primarily because of the absence of large industrial customers in their areas of operation. The northern part of the country is comparatively underdeveloped.

Enclave Power Company Ltd is the only privately owned electricity distribution company, licensed by the Energy Commission in 2009 to distribute and sell electricity within the Free Zones Enclave at Tema Industrial Area. Enclave Power Company's network consists of nearly 3 kilometres of service lines connecting one BSP at the New Tema substation.

Enclave Power Company Ltd currently serves 17 industrial and large commercial customers operating within the Tema Free Zones Enclave. The consumption of the customers within the Enclave Power Concession was estimated at about 17.8GWh with maximum demand well in excess of 32.0MVA in 2008.

The power market is evolving and there is a lot of interest being shown in the sector by IPPs. GRIDCo as the market operator is working towards putting systems and procedures in place to support market operations.

The new market structure enables and encourages the free entry of IPPs into the generation market, creating a competitive generation market which, when combined with open access to transmission, also facilitates a bulk power trading market. The structure also emphasises decentralisation at the distribution level, with plans for eventually adding more distributors, each operating in a defined geographic service area.

All bulk customers are permitted to purchase electricity directly from any wholesale suppliers of their choice at prices negotiated directly between the parties. In other words, the bulk customers has the prerogative to decide which wholesale supplier it is willing to contract with.

Regulation of electricity utilities – power generation

3 Authorisation to construct and operate generation facilities

What authorisations are required to construct and operate generation facilities?

By virtue of the Energy Commission Act, participation in any segment of the power sector, either for generation, transmission, wholesale supply, distribution or sale of electricity, requires a licence.

The Energy Commission is required to make a decision of any application within a maximum period of 16 days. Applications will be granted as a matter of course unless there is compelling reason not to do so. Such reasons must be founded on technical data, national security concerns, public safety or any other reasonable justification.

Generators wishing to be connected to the transmission system must enter into an electrical connection agreement or transmission services agreement with GRIDCo.

4 Interconnection policies

What are the policies with respect to interconnection of generation to the transmission grid?

The policy for the transmission market is to provide adequate, safe and reliable electricity transmission network. To achieve this, the government intends to support the mobilisation of commercial and domestic capital resources to supplement external funding for transmission infrastructure development.

Also, the policy is to enforce technical regulations and operational standards, and to provide support for the maintenance of existing transmission infrastructure.

5 Alternative energy sources

Does government policy or legislation encourage power generation based on alternative energy sources such as renewable energies or combined heat and power?

Available renewable energy sources

In Ghana, the government has policy and legislation frameworks that encourage power generation based on alternative energy sources. It is government policy to increase access to modern forms of energy.

Ghana has a sub-sector for renewable energy. Renewable energy means energy obtained from non-depleting sources including wind, solar, hydro, biomass, bio-fuel, landfill gas, sewage gas, geothermal energy and ocean energy. Ghana is well endowed with renewable energy resources particularly biomass, solar, wind energy resources, and to a limited extent, and mini-hydro.

The goal of the renewable sub-sector is to increase the proportion of renewable energy, particularly solar, wind, mini hydro and waste-to-energy in the national energy supply mix and to contribute to the mitigation of climate change.

The development and use of renewable energy and waste-to-energy resources have the potential to ensure Ghana's energy security and mitigate the negative climate change impacts of energy production and use as well as solve sanitation problems.

Biomass is Ghana's dominant energy resource in terms of endowment and consumption. Biomass resources cover about 20.8 million hectares of the 23.8 million hectare land mass of Ghana, and is the source of supply of about 60 per cent of the total energy used in the country.

The vast arable and degraded land mass of Ghana has the potential for the cultivation of crops and plants that can be converted into a wide range of solid and liquid biofuels.

The production, transportation, sale and pricing of woodfuels are all undertaken by the private sector except for taxes and levies which are regulated by local government authorities. The woodfuels business will continue to be operated and managed by the private sector.

The development of alternative transportation fuels such as gasohol and other biofuels can provide substitute fuels for the transportation sector and help diversify and secure future energy supplies of Ghana.

The major challenge in biomass energy supply is how to reverse the decline in the woodfuel resource base of the country and further sustain its production and use by improving the efficiency of production and use.

The biomass policy focuses on improved production and efficient use of biomass in the short term while increasing regeneration and fuel substitution in the medium to longer term as well as shifting from the use of biomass to alternative sources of energy.

By virtue of its geographic location, Ghana is well endowed with solar resources which could be exploited for electricity generation and low heat requirements in homes and industries. Solar energy utilisation has, however, been limited owing to its comparatively higher cost.

The government is committed to improving the cost-effectiveness of solar and wind technologies by addressing the technological difficulties, institutional barriers, as well as market constraints that hamper the deployment of solar and wind technologies.

A major challenge in the development of solar and wind is the high cost of these energy sources owing to the current state of their technology.

Waste-to-energy projects have become a very important mechanism for the management of the growing sanitation problem facing urban communities as well as a means of contributing to energy supply and security. Significant amounts of wastes are generated in Ghana. These include municipal waste (both solid and liquid), industrial waste and agricultural waste.

There are many energy technologies which can convert these waste materials into electricity, heat and fuel. The conversion technologies include combustion, gasification, pyrolysis, anaerobic digestion, fermentation and esterification.

Some waste-to-energy technologies that have been developed in Ghana are anaerobic fermentation of municipal waste and industrial liquid wastes to produce biogas for heating and electricity generation, combustion of solid wastes to produce electricity in combined heat and power (CHP) systems.

Government policies and legislative framework

The Renewable Energy Act 2011 (Act 832) (the Renewable Energy Act) is the most recent energy-related legislation geared towards the encouragement of Ghana's drive to boost the renewable energy sector in Ghana.

The key policy focus is to engage Ghanaian engineers and scientists to cooperate with other experts to bring down the cost of renewable energy technologies in order to make them competitive as well as creation of fiscal and pricing incentives to enhance the development and use of renewable energy. Renewable energy technologies that are competitive will be promoted.

Government intends to diversify the national energy mix by implementing programmes to support development and use of renewable energy sources. Under the Renewable Energy Act, there are financial incentives (including a lucrative feed-in tariff) for renewable energy projects.

More specifically, the PURC has the power to mandate feed-in tariffs for renewables which includes a requirement that, for each energy purchase, an offtaker will have to obtain a certain percentage from renewable sources to benefit. The commission is tasked with recommending exemptions from taxes, duties and levies with respect to machinery, equipment and other input into renewable projects.

The feed-in tariff set by the PURC remains in force for a 10-year period and subsequently subject to review, every two years thereafter.

Free zone developers and enterprises granted licences under the Free Zones Act are exempted from the payment of income tax on profits for the first 10 years. The income tax rate after 10 years does not exceed a maximum of 8 per cent of the profit.

The benefits enjoyed by operators in the free zones include guarantee against expropriation, unconditional transfers of profits, dividends, charges and fees, remittances and other payments through an authorised dealer bank in free convertible currency.

6 Climate change

What impact will government policy on climate change have on the types of resources that are used to meet electricity demand and on the cost and amount of power that is consumed?

Environmental concerns are a prominent part of every industry today and the electric power industry is no exception. Climate change emerged on the political agenda in the mid-1980s with the increasing scientific evidence of human interference in the global climate system and with the growing public concern about the environment.

Electricity supply is currently vulnerable to climate change. About 67 per cent of electricity generation in the country is from hydropower and 33 per cent is from thermal generation using diesel (Energy Statistics, 2006), with a small contribution (less than 1 per cent) from small-scale solar systems. By 2020 the energy supply is expected to be more diversified, according to the National Energy Plan for 2006-2020, with a larger contribution from natural gas and renewables, and potentially from nuclear power.

The production and use of energy impact on the environment and global climate in varying degrees. The exploitation of biomass for energy purposes results in deforestation, while the use of fossil-based fuels contributes to climate change.

Ghana's participation in the Stockholm Conference in 1972 signified the beginning of the country's desire and willingness to make concerted and conscious efforts at the management of its environment.

At the Earth Summit in Rio 20 years later, Ghana and the world moved closer to the objective of living in harmony with our environment by signing the Rio Conventions.

Before a person undertakes any activity or operation in relation to electricity, that person must obtain the necessary environmental approvals and permits valid for a period of 18 months. The EPA will not grant an environmental permit unless the applicant submits an environmental impact assessment.

In addition to the granting of a licence by the Energy Commission, before any project can take place, the EPA must give a permit for the project after a detailed environmental impact assessment has been carried out as regards the potential effects of the project on the environment.

Ghana generates most of its power from hydroelectric facilities, which do not cause emissions of harmful elements into the atmosphere. But their large reservoirs have some impact on the environment by flooding large areas, dislocating people, changing the ecology and causing silt formation.

Transmission lines may require intrusion on natural areas. They may be visible from scenic areas or intrude on residential neighbourhoods. They may destroy or disrupt wildlife habitats. Therefore prospective operators in the electricity market seeking to obtain licence must provide environmental disclosure to the Energy Commission. Prior to construction, the applicant must acquire siting clearance (siting permit).

The applicant for licence must provide an environmental impact assessment (EIA) report certified by the EPA and an environmental permit or permanent environmental certificate issued by the EPA.

The government's policy on climate change is that there will be a shift towards generation from renewable energy sources. Thermal generation using crude oil will shift towards the use of natural gas. Consumption of power will decline due to energy conservation methods and cost of electricity might increase owing to the high cost of generation from using renewable energy technologies.

The medium-term policy objectives for the achievement of the energy sector goals include steps to minimise environmental impacts of energy supply and consumption through increased renewable energy and efficient energy delivery.

The government's strategic goal is to ensure that energy is produced, supplied and used in an environmentally sustainable manner. The strategies will focus on the conduct of strategic environmental assessment and EIA studies and social impact assessment studies of all energy projects, with associated adaptation and mitigation plans for environment and climate change.

The government's policy on climate change in relation to energy sector are:

- to adopt an inter-sectorial approach to energy planning and development which integrates energy development with energy conservation, environmental protection and sustainable utilisation of renewable energy resources;
- to reduce the pressure on forests for wood-fuels and encourage the use of renewable energy resources in order to reduce the use of fossil energy;
- to ensure that rigorous feasibility studies are undertaken for hydro-electricity facilities and other significant generating facilities all of which must be subjected to environmental impact assessment; and
- to maximise the use of the nation's hydrocarbon resources in the production and distribution of energy.

7 Government policy

Does government policy encourage or discourage development of new nuclear power plants? How?

Policy framework

In 1964, Ghana decided to undertake the Ghana Nuclear Reactor Project (GNRP). The project was intended to introduce nuclear science and technology into the country and to exploit the peaceful applications of nuclear energy for national development.

At present, the government's policy is to diversify the energy mix by exploring options to develop nuclear energy. The goal is to develop nuclear power as an option for electricity generation in the long term.

Ghana has participated and is still participating in coordinated research projects with the International Atomic Energy Agency (IAEA) which helps to increase the nuclear knowledge base of the country. Ghana Atomic Energy Commission (GAEC) is in close contact with other International Nuclear Agencies such as Global Nuclear Energy Partnership.

Nuclear Power Planning Committee (NPPC) involving stakeholder institutions was established in 2008 for the formulation of the nuclear power policy and development of the basic elements of nuclear infrastructure. Based on the NPPC's recommendations, the government took a cabinet decision in 2008 to introduce nuclear energy into Ghana's energy mix.

Human resource capacity building currently in place is in two forms (ie, degree and non-degree awarding programmes).

In the degree awarding category, the GAEC has established a Graduate School of Nuclear and Allied Sciences in collaboration with the University of Ghana with assistance from the IAEA to award masters and PhD degrees in nuclear science.

The non-degree training programmes involve the use of the 30kW Research Reactor in teaching and training of scientists and technicians in the field of reactor operation, physics, safety, engineering, maintenance etc.

There are also IAEA technical cooperation projects such as GHA0008; Planning for sustainable energy development, GHA0009; Human resource development and nuclear technology support, GHA0011, etc. All these have helped to increase the nuclear knowledge base of the country.

Ghana participates in IAEA training courses and workshops on national, regional and international levels.

Legal and regulatory framework

The Atomic Energy Commission Act 2000 (Act 588) provides the legislative framework for nuclear power in Ghana. The Act deals with the national energy policy including economic and commercial considerations, with a clear designation of responsible institutions or bodies, including their relationships with nuclear power.

The Atomic Energy Commission is the independent regulatory authority responsible for the safety, security and safeguards of nuclear power. This includes a system of licensing, inspection and enforcement covering all subject areas of nuclear law.

At the international level, there are some basic international legal instruments that Ghana has to ratify and implement to show commitment to peaceful use and application of nuclear technology.

Regulation of electricity utilities – transmission

8 Authorisations to construct and operate transmission networks

What authorisations are required to construct and operate transmission networks?

Construction and operation of transmission networks require the acquisition of an Electricity Transmission Licence.

The transmission system comprises electricity plant and equipment within the borders of Ghana that function or are operated at any voltage higher than 36kV as well as any associated feeder or supply equipment that are for shared or for common use.

The ETU is the exclusive and independent operator of all transmission assets irrespective of ownership and plays the central role in respect of activities related to the NITS. The ETU transports electricity from the producers to bulk consumers. GRIDCo is the sole owner and operator of the NITS.

All prospective participants in the deregulated segment of Ghana's electricity supply industry must obtain a transmission licence from the Energy Commission. They must also negotiate and conclude Interconnection Service Agreement with the ETU.

The ETU and all grid participants must comply with all relevant laws, the requirements of the Grid Code, permits, prudent utility practice and applicable international standards. Generators wishing to be connected to the transmission system must enter into an electrical connection agreement or transmission services agreement with GRIDCo.

To ensure transparency and non-discriminatory access to the relevant information, the ETU must make available to the public at its offices the procedures for obtaining and terminating Transmission Interconnection Services Agreements with any licensee.

A transmission licence authorises the licensee: to monitor and control the operation of the national interconnected network to provide open access transmission and interconnection services; and to provide open access transmission and interconnection services to operators domestically and internationally.

There are three stages in acquiring an electricity transmission licence. At stage one the prospective operator must acquire a provisional licence.

At stage two, the prospective licensee must obtain a siting clearance (siting permit) and construction permit (authorisation to construct). A construction permit authorises the operator to physically construct its machinery and plants on the approved site. Stage three involves the acquisition of operational licence (authorisation to operate). This authorises the operator to operate.

9 Eligibility to obtain transmission services

Who is eligible to obtain transmission services and what requirements must be met to obtain access?

Every bulk power customer (distribution utilities, companies, etc) is eligible to obtain transmission services at a fee if it satisfies all established technical and operational requirements.

A grid participant must be a legal entity having a valid connection agreement with the ETU for the purposes of:

- constructing, owning and providing NITS infrastructure or ancillary services;
- injecting, wheeling, or offtaking power for its own use or for retail; or
- exchanging power either with the electricity networks of neighbouring countries or within the WAPP.

By virtue of section 11 of the Energy Commission Act, participation in any segment of the power sector, either for transmission, wholesale supply, distribution or sale of electricity, requires a transmission licence.

A transmission licence is subject to the conditions determined by the Energy Commission. The commission is required to make a decision of any application within a maximum period of 16 days. Applications will be granted as a matter of course unless there is compelling reason not to do so. Such reasons must be founded on technical data, national security concerns, public safety or any other reasonable justification.

A distribution company or bulk customer who wishes to receive power from the NITS must design, construct and operate its network connected to the NITS in accordance with prescribed standards and in accordance with the instructions of the ETU.

GRIDCo is responsible for the good governance and management of the NITS in accordance with the Grid Code and guided at all times by generally accepted best practices for an independent system operator.

All wholesale suppliers, distribution companies and permitted bulk customers have the opportunity to connect to the NITS and have fair and equitable access to the services provided by the ETU.

No facilities can be connected without a minimum arrangement for communications, metering and protective relaying being in place.

Any operator that wants to obtain transmission services must negotiate and execute a Connection Agreement with the ETU before the completion of the installation, erection or construction of the connection to the NITS. The Connection Agreement sets out the terms and conditions for connection to the NITS and provision of service.

The ETU is empowered to spell out its own transmission conditions and charges in the transmission agreement subject to approval by the PURC.

The Energy Commission in consultation with the PURC prescribes standards of performance for the supply, distribution and sale of electricity to consumers by licensed public utilities. The standards of performance include matters relating to voltage stability, maximum number of scheduled and unscheduled outages, number and duration of load shedding periods and metering.

Every grid participant that intends to establish and connect to the NITS any new or modified equipment or network that it owns, operates or controls must liaise with the ETU and the NITS asset owner, and obtain the required approval from the Energy Commission.

To avoid discrimination in the transmission of electricity, the ETU must develop and publish in detail all the requirements, qualifications and administrative procedures to be fulfilled or followed by those seeking to be provided services by the ETU.

A grid participant must construct, operate and maintain all equipment that are part of its facility in accordance with the requirements of the Grid Code, prudent utility practice and applicable national and international laws, protocols and standards.

10 Government incentives

Are there any government incentives to encourage expansion of the transmission grid?

There are many government incentives to encourage expansion of the transmission grid. For instance, there are tax exemptions and reliefs, easy clearing at the ports and the like meant to encourage expansion of the transmission grid.

Ghana's PURC sets electricity tariffs in consultation with key stakeholders including generators, distributors, and consumer representatives. The tariff is

composed of two parts – the bulk supply tariff (BST) and distribution service charge (DSC) – that are summed to form the end-user tariff (EUT).

The EUT is the retail price charged to the end user by distribution companies. This tariff applies equally to all customers, with the exception of ‘lifeline’ customers who consume less than 50kWh. These customers pay a low fixed rate commensurate with their means.

Under the Renewable Energy Act, there are financial incentives (including a lucrative feed-in tariff) for renewable energy projects.

More specifically, the PURC has power to mandate feed-in tariffs for renewables which includes a requirement that, for each energy purchase, an offtaker will have to obtain a certain percentage from renewable sources to benefit. The commission is tasked with recommending exemptions from taxes, duties and levies with respect to machinery, equipment and other input into renewable projects.

The Renewable Energy Act provides for the establishment of a renewable energy fund which is used to pay for the promotion and development of renewable energy sources as well as to fund the feed-in tariff.

The feed in tariff set by the PURC remains in force for a 10-year period and is subsequently subject to review, every two years thereafter.

The feed-in tariff levels are being established by the PURC on the basis of, among other things, the technology and the installation costs. The Renewable Energy Act also imposes minimum renewable energy purchase quotas on the distribution companies, however the actual quantification of the quotas is under development by the PURC.

Ghana’s tariffs are lower than the Sub-Saharan African average of US\$0.13 per kilowatt-hour and are among the lowest in West Africa. One contributing factor is Ghana’s traditional reliance on hydroelectricity as its prime energy source.

Ghana’s exchange controls were relaxed substantially in 2006, so that now it is only necessary for the repatriation of funds to be done by authorised dealer banks. These banks report foreign exchange transactions to the Bank of Ghana, but no exchange controls are imposed.

Businesses with foreign investment in Ghana are required to register with the Ghana Investment Promotion Centre, which guarantees that dividends, foreign debt service costs and distributions of equity following the winding-up of the business are freely convertible without restriction. An authorised dealer bank must be used to execute the conversion.

In addition to providing fiscal incentives, the fund will be used to pay for capacity building in the renewable energy sector, grid expansion and the development of technology and pilot projects.

Hydroelectricity is characterised by high up-front capital costs, and extremely low marginal production costs. Hence stakeholders in Ghana’s power sector (consumers, regulators and politicians) are used to extremely low electricity costs.

11 Rates and terms for transmission services

Who determines the rates and terms for the provision of transmission services and what legal standard does that entity apply?

Rates and other economic terms and conditions for transmission services are determined by the PURC. The technical terms for the provision of transmission services are determined by the Energy Commission. The Grid Code that contains technical standards and requirements for transmission services.

The only licensed utility that provides transmission services is GRIDCo. All grid participants are required to enter into transmission agreement with GRIDCo before they can operate. All rates set by GRIDCo are subject to approval by the PURC.

The PURC provides the guidelines for fixing rate to be charged by public utilities for their services. In doing this, the PURC takes into account such factors as the interests of the consumer, the interests of an investor, the cost of production of the service, and the assurance of the financial integrity of the public utility.

A public utility cannot directly or indirectly demand or receive a higher rate than the rate approved by the PURC. A public utility may, with the written permission of the commission, demand and receive from a consumer a special rate agreed to by the public utility and the consumer.

The PURC may also fix a uniform rate throughout the country, a region or district for a service provided by a public utility. In doing this, the commission may take into account the population distribution in the country, the need to make the best use of a natural resource of the country, and the economic development of the whole country.

All revision of rates or new rates chargeable in respect of new services must be filed with the PURC at least 60 days before they become effective.

Before approving a rate, the PURC is required to give the public utility and consumers affected by the rate a reasonable opportunity of being heard. Rates approved by the PURC must be gazetted.

12 Entities responsible for assuring reliability

Which entities are responsible for assuring reliability of the transmission grid and what are their powers and responsibilities?

Power system performance and reliability encompasses all aspects of providing reliable electricity supply to customers efficiently. Reliability connotes the degree to which the performance of the elements of the system result in power being delivered to customers within accepted standards and in the amount desired. Reliability includes adequacy and security.

Reliability of a power system pertains to its ability to satisfy its load demand under the specified operating conditions and policies and a reliable power system is one that only allows a few interruptions to customers’ services.

The reliability of the NITS is quantified in terms of probability or frequency of encountering an outage or inadequate state, or the period of time a system spends in these states. Reliability may be evaluated by the frequency, duration and magnitude of any adverse deviations from stipulated service standards.

The regulators (the PURC and the Energy Commission) are responsible for the reliability of the transmission grid. The PURC ensures reliability by approving tariffs. The Energy Commission, on the other hand, ensures that licensing requirements, procedures, practices and standards are enforced in the NITS.

The Energy Commission monitors the operations of the transmission utility to ensure that transmission services are reliable. The PURC also monitors performance, quality of service, efficiency and to ensure compliance with technical standards.

To maintain stable and secure operation of the NITS to provide the expected standard of service for the benefit of all grid participants, certain minimum technical, design and operational criteria are to be met by all grid participants seeking connection to the NITS.

GRIDCo is responsible for wholesale power supply reliability from generation and transmission to delivery at the bulk power distribution centres.

To assure reliability of the transmission grid, transmission licences are granted subject to conditions. The Energy Commission monitors and enforces compliance with all licence conditions. A contravention of the licence conditions gives rise to penalties.

As part of the compliance monitoring procedure, the licensee is required to submit to the Energy Commission a detailed corporate performance statistics half-yearly and an annual report at the end of each financial year. The performance statistics includes the benchmarks stipulated in all the relevant legislation and Codes as well as the benchmarks stipulated in the respective licences.

Authorised officers of the Energy Commission have the right of free access to the premises and/or operational area of the licensee for the purpose of inspecting and ensuring compliance with the licence conditions.

Prior to suspension or cancellation of a licence, the defaulting licensee must be given an opportunity to respond to the commission’s written complaint and the proposed action of remedy.

The commission may cancel a licence that has been granted but has not been utilised within one year from the date of issue after giving 30 days’ notice to that effect. The ETU monitors and reports to the Energy Commission the performance of the NITS in terms of quality and reliability (ie, adequacy and security) of supply.

Regulation of electricity utilities – distribution

13 Authorisation to construct and operate distribution networks

What authorisations are required to construct and operate distribution networks?

To construct and operate distribution networks, an operator requires an electricity distribution licence issued by the Energy Commission. VRA is exempted from the requirement for a licence to produce and supply wholesale electricity from the hydropower installations on the Volta River basin. An electricity distribution licence is site-specific.

In Ghana, a distribution licence includes a sale licence. This is because the electricity distributors also sell electricity to consumers. A distribution and sale licence authorises the licensee to operate a distribution network, and to distribute, sell or retail electricity.

There are three stages for the acquisition of authorisation to construct and operate distribution networks. Stage one involves the acquisition of a provisional electricity distribution licence. An applicant must submit the required documents to the Energy Commission.

Stage two involves the acquisition of a siting clearance and construction work permit. An applicant must submit the required documents to the Energy Commission. Stage three is the final stage and involves the acquisition of authorisation to operate.

A distribution licence is granted on the conditions determined by the Energy Commission and includes a condition that the rates or charges for services are subject to the approval of the PURC.

14 Access to the distribution grid

Who is eligible to obtain access to the distribution grid and what requirements must be met to obtain access?

All power consumers, especially the bulk customers or special load customers have access to the distribution grid. The distribution utility must ensure that all requirements are met before granting access.

A participant seeking to engage in embedded electricity generation or distributed generation services must negotiate and conclude a distribution network access agreement with the relevant licensed distribution entity. This must be done while seeking a licence from the Energy Commission.

The conditions for connection agreements must comply with the Grid Code. The Energy Commission facilitates these negotiations as and when required.

Licensed distribution service providers must connect embedded electricity installations to their distribution network.

15 Rates and terms for distribution services

Who determines the rates or terms for the provision of distribution services and what legal standard does that entity apply?

Rates and other economic terms and conditions for distribution services are determined by the PURC. The technical terms for the provision of distribution services are done by the Energy Commission.

The Energy Commission in consultation with the PURC prescribes standards of performance for the supply, distribution and sale of electricity to consumers by licensed public utilities. The standards of performance include matters relating to voltage stability, maximum number of scheduled and unscheduled outages, number and duration of load shedding periods, and metering.

An electricity supplier must ensure that the voltage at the point of supply to a customer's premises or electrical installation is within the prescribed voltage levels. The voltage levels are 230V, 400V, 11kV, 33kV or 34.5kV.

Regulation of electricity utilities – sales of power

16 Approval to sell power

What authorisations are required for the sale of power to customers and which authorities grant such approvals?

In Ghana, an electricity sale licence is required for the sale of power to customers. Distribution companies hold both electricity distribution licence and electricity sale licence. This is because the electricity distributors also sell electricity to consumers.

A distribution and sale licence authorises the licensee to operate a distribution network, and to distribute, sell or retail electricity.

There are two stages involved to acquire an electricity sale licence. These are the acquisition of provisional licence and acquisition of operational licence (authorisation to operate).

Sale of power to consumers in Ghana is done by three distribution companies, namely ECG, NEDCo and Enclave Power. The authorities which grant approvals are the Energy Commission and the PURC.

There are two types of markets, namely, the regulated market and deregulated market.

Regulated market: this includes the distributors and sellers that are directly supervised by the PURC. Their tariffs are set by the PURC.

Deregulated market: this is made up of bulk consumers or customers with average demand of 3MVA or annual consumption of 6GWh. They must obtain a permit as bulk customers from the Energy Commission before they can negotiate with suppliers or generators of electric power.

17 Power sales tariffs

Is there any tariff or other regulation regarding power sales?

In Ghana, distribution of power and sale of power are done by the same entities. The PURC determines distribution or sale service charges. Since distribution and sale are done by same entities, the tariff for sale of power is embedded in tariff for distribution of power. Power sales tariffs are the same as the DSC as approved by the PURC.

Wholesale suppliers are entities that generate power and feed into the grid. They also sell power to bulk customers. The tariffs to be charged by the licensee for its services are determined by the PURC.

18 Rates for wholesale of power

Who determines the rates for sales of wholesale power and what standard does that entity apply?

The rates or charges for wholesale supply of electricity are determined by the PURC. The Energy Commission grants wholesale supply licence to public utilities to operate facilities and installations for the wholesale supply of electricity. The wholesale supply licence permits the public utility to produce electricity for supply to distribution companies and bulk customers.

A wholesale supply licence will not be granted unless the Energy Commission is satisfied that the grant will promote the safe, reliable and economic operation of the interconnected transmission systems in the country.

19 Public service obligations

To what extent are electricity utilities that sell power subject to public service obligations?

There are standards of performance to be observed by the utilities. Except where a licence or authorisation given to a public utility is revoked, suspended, cancelled or expires, a public utility cannot refuse to provide its service generally without the prior written permission of the Energy Commission.

Licensed public utilities are required to maintain their equipment and property used in the provision of the service in a condition that enables them to effectively provide their services. They must make the reasonable effort necessary to provide to the public a service that is safe, adequate, efficient, reasonable and non-discriminatory.

Public utilities must submit monthly bills to their consumers. There are strict rules governing the termination of services by public utilities.

Licensed public utilities are required to make the repairs, changes, extensions and improvements in or to the service that are necessary or proper for the efficient delivery of the service to the consumer. Licensed public utilities are subject to penalties for failure to discharge their service obligations including payment of compensation to consumers who suffer on account of that failure.

Regulatory authorities

20 Policy setting

Which authorities determine regulatory policy with respect to the electricity sector?

The Energy Commission and the PURC are the regulatory bodies established to ensure the proper functioning of all players in the energy sector and to create the requisite conducive environment for the protection of private investment in the sector.

The Energy Commission is mandated, among other things, to license and regulate the technical operations of service providers in the electricity supply industry. The commission performs these regulatory functions through elaborations and enforcement of licensing conditions, technical rules of practice and standards of performance rules.

On the other hand, the PURC is responsible for the economic regulation of the electricity sector. Its main function is to set tariffs and monitor compliance with performance standards of the service providers in the power supply chain.

The PURC is responsible for approving electricity tariffs, monitoring quality of service and consumer protection.

21 Scope of authority

What is the scope of each regulator's authority?

The Energy Commission has responsibilities for the licensing of operators and setting technical standards for the power sector. The Energy Commission also advises the Minister for Energy on energy sector policy and planning issues.

The statutory functions of the Energy Commission include to recommend and advise the Minister for Energy on national energy policies; to prepare, review and update periodically indicative national plans to ensure that reasonable demands for energy are met and to grant licences to public utilities.

The Energy Commission is required to establish and enforce uniform rules of practice and standards of performance for public utilities engaged in the transmission, wholesale supply, distribution and sale of electricity and natural gas.

The Energy Commission also has a role to play in developing and promoting renewable energy sources in Ghana. The commission is independent.

The PURC's regulatory mandates are:

- to provide guidelines on rates chargeable for electricity services;
- to examine and approve the rates;
- to protect the interests of consumers and providers of utility services;
- to monitor the standard of performance of the utilities; and
- to promote fair competition.

Under the Energy Commission Act, the PURC is also required to approve charges for the supply, transportation and distribution of electricity.

The PURC approves rates and charges chargeable in respect of renewable energy sources.

22 Establishment of regulators

How is each regulator established and to what extent is it considered to be independent of the regulated business and of governmental officials?

The Energy Commission was established by the Energy Commission Act. The source of funds for the commission is the Energy Fund. The commission manages and administers the fund. Parliament is statutorily required to annually provide the commission with such monies as may be necessary for the efficient performance of the functions of the commission.

The President appoints the commissioner of the Energy Commission. Appointment of the Executive Secretary, other staff and employees of the commission is done by the President acting in accordance with the advice of the commission given in consultation with the Public Services Commission.

The PURC is established by the PURC Act. The President appoints the commissioner and members of the PURC. The commission is not subject to the direction or control of any person or authority in the performance of its functions. The President also determines their allowance.

The PURC Act specifies four sources of funding for the PURC namely, government subventions, loans granted to the commission, monies accruing to the commission in the course of the performance of its functions, and grants it may obtain.

23 Challenge and appeal of decisions

To what extent can decisions of the regulator be challenged or appealed, and to whom? What are the grounds and procedures for appeal?

A complaint that relates to the provision of utility service or rates chargeable for service provided by a public utility is required to be referred to the PURC for investigation and settlement. The PURC may apply to the High Court for the enforcement of its decision or direction.

Persons who are dissatisfied with a decision of the Energy Commission in relation to a licence application may have the decision reviewed by the commission.

An application for the review of a decision is required to:

- be made in writing;
- set out the decision to which the application relates;

- set out in detail the grounds on which the applicant seeks a review of the decision in question;
- be accompanied by any information or evidence that the applicant considers should be taken into account by the commission; and
- be lodged with the commission within 14 days after the decision is given.

Once the application for the review of a decision has been received, the commission:

- may stay the execution of the decision to which the application relates;
- will take a decision on the review within 30 days;
- may confirm, amend or substitute the decision; and
- will give the applicant written notice of the commission's decision, and the reasons for the decision on the review.

An applicant who is dissatisfied with a decision of a review by the Energy Commission has a right to appeal to the Minister for Energy, and subsequently to the courts. The appeal must be made within 14 days after receipt of the written notice of the decision appealed against.

Acquisition and merger control - competition

24 Responsible bodies

Which bodies have the authority to approve or block mergers or other changes in control over businesses in the sector or acquisition of utility assets?

The Energy Commission has the power to approve or block mergers or other changes in control over businesses in the sector. The commission requires that all operators are licensed. Licences granted by the commission are not transferable except with the prior written approval of the Energy Commission. Whenever a merger occurs, a new licence has to be applied for.

However, no licence is required where the entities were named, and the fact of the merger was mentioned, in the regulations of the licensed operator or in the application for the licence.

To avoid double licensing in the event of a merger, the merging entities are required to prepare a single corporate module or structure that reflects the merger.

25 Review of transfers of control

What criteria and procedures apply with respect to the review of mergers, acquisitions and other transfers of control? How long does it typically take to obtain a decision approving or blocking the transaction?

An operator must apply to the commission for permit where:

- there is any change in its directors or corporate structure;
- there is transfer of a part of the utility; or
- there is modification of the plant or capacity.

A licensed operator that intends to undergo a merger must state that in its application for a licence specifying the new corporate identity. The non-licensed company merging with a licensed operator must demonstrate to the commission that it has all the technical and financial capacities to operate as an independent power operator.

26 Prevention and prosecution of anti-competitive practices

Which authorities have the power to prevent or prosecute anti-competitive or manipulative practices in the electricity sector?

Ghana's energy sector is dominated by state-owned enterprises. Transmission and distribution of electricity are under state monopoly, with minor private participation in distribution. The current legal regime does not make any express provisions for the regulation of anti-competitive practices in the electricity market. However, the PURC is mandated to promote fair competition among public utilities. The PURC is responsible for competition regulation and quality.

Anti-competitive practices only occur in the wholesale market. The independent system operator has the authority to prevent these practices in the electricity sector. The Energy Commission has the power to withdraw the licences of operators or refer operators to the Attorney-General for prosecution.

Update and trends

Ghana's electricity sector is evolving on several fronts but has equally been saddled with some challenges that have had some repercussions on the economic growth of the nation. Expanding generation capacity, extension of the distribution network, reliability of the power supply, reduction of technical and commercial losses and access to natural gas feedstock are areas of focus in the power and energy sectors for the government of Ghana to maintain economic growth.

Ghana's total system installed capacity is about 2,884.5MW.

Currently it has a generation capacity of about 2,125MW, which is made up of about 55 per cent hydro and 45 per cent thermal. Ghana's current electricity demand stands at over 2,000MW, with the demand for power estimated to be growing in excess of 10 per cent per annum and as a result has contributed to an electricity supply gap that has oscillated between 300MW and 600MW with the Ghana Grid Company Limited (GRIDCo).

The failure of Nigeria to supply Ghana with an agreed quantity of gas through the West Africa Gas Pipeline to power Ghana's thermal plants, low water levels in the Akosombo Dam, which have led to the loss of some of its generation units, a rapidly growing population that is driving increasing demand for power supply, structural and generational issues and mismanagement, just to name a few, have contributed to the electricity supply gap.

The President of Ghana, in a bid to restructure the energy sector to make it more efficient, recently carved out a new Ministry of Power from the former Ministry of Energy and Petroleum. It is expected that the new ministry will bring about a sharper focus on the generation, supply and efficiency of power to match the growth that the economy is experiencing.

Ghana currently has an energy production target of 5,000MW by the end of 2016. It also aims at expanding investment opportunities in renewables such as solar, wind and biogas/mass projects, with a goal of achieving 10 per cent renewables in the generation mix by 2020, and developing currently identified offshore natural gas deposits and bringing on stream processed gas to reduce dependency on liquid fuels for existing and planned generation.

However, for the nation to industrialise, the energy per capita has to be increased to 500W per capita from the current paltry 53W per capita.

In addition, Ghana is targeting 1,000MW in new generation capacity over the next five years through expansion at existing facilities, including upgrades of single to combined cycle plants. The President of Ghana has authorised the Ministry of Power to procure and feed into the system 1,000MW of emergency power.

In June 2014 the Electricity Company of Ghana signed a power purchase agreement with Karpowership, a Turkish company, to supply 450MW of electricity to Ghana's grid every year for 10 years through two 225MW capacity powerplants. The Ministry of Power estimates that this emergency power can be rolled out in months to bring relief to the system while long-term solutions are implemented.

Ghana signed the Millennium Challenge Compact II with the US government. The Ghana Power Compact invests up to US\$498.2 million to support the transformation of Ghana's electricity sector and stimulate private investment. The five-year compact is designed to create a self-sustaining energy sector in Ghana by reforming laws and regulations needed to transform the country's power sector and catalyse more than US\$4 billion in private energy investment and activity from American and global energy firms in the coming years.

Ghana aims at privatising the energy sector with the aim of demonopolising the industry and to allow competition from private companies. Doing so will increase energy supplies, improve quality and reduce costs in the long run.

It must be stated that with the entry of the private sector and independent power producers (IPPs) into the upstream generating sector, the government must set up a tariff structure that provides adequate returns and that enables generation and transmission utilities to invest in the sector.

The government of Ghana has entered into power purchase agreements with several IPPs to inject more megawatts of power into the power transmission grid.

Additionally, the completion of planned steam generation units on some current single-cycle plants will add more megawatts to power generation.

In the long run, Ghana aims at shifting its baseload generation from hydro to thermal and thus make hydropower a supplementary source of power, especially since the prospects of gas-fired thermal generation look very bright.

Currently the Ghana gas plant at Atuabo is going through its commissioning phase and is supplying about 60mscf of gas to the Aboadze enclave of thermal plants. Gas supplies are expected to rise in 2016 when production begins in the TEN and Sankofa fields, which is expected to bring Ghana's gas production to above 300mscf daily.

As part of Ghana's commitment to fully incorporate renewable energy into the energy supply mix, a number of solar, wind, tidal wave and biomass projects are being pursued. The African Plantations Limited project under which thousands of hectares of eucalyptus trees are being planted as fuel is intended to generate 120MW of power, if operationalised.

Further, in a bid to counter the high rate of energy loss, the Energy Commission is embarking on a Refrigerator Energy Efficiency Project under which the commission is replacing old refrigerators with new energy-efficient ones for households at a discount. This is necessary since in Ghana, on average, refrigerators consume more than 1,200kWh a year.

Last, Ghana signed a nuclear agreement between the International Business Cooperation of Russia's Rosatom, aimed at establishing a legal framework for cooperation in the field of peaceful application of atomic energy and to develop atomic energy infrastructure.

The Energy Commission is empowered to promote and ensure uniform rules of practice for the transmission, wholesale supply, distribution and sale of electricity.

27 Determination of anti-competitive conduct

What substantive standards are applied to determine whether conduct is anti-competitive or manipulative?

The market rules that exists in the wholesale market are the standards that are applied in determining anti-competitive or manipulative conduct. Currently, GRIDCo has a draft version of the market rules.

In determining anti-competitive or manipulative conduct, the Energy Commission and the PURC apply their own benchmarks. They also apply the various legislative instruments and licensing conditions as well as international best practices.

28 Preclusion and remedy of anti-competitive practices

What authority does the regulator (or regulators) have to preclude or remedy anti-competitive or manipulative practices?

The PURC has the statutory power to handle competition in the electricity market. The system operator handles the wholesale market.

International

29 Acquisitions by foreign companies

Are there any special requirements or limitations on acquisitions of interests in the electricity sector by foreign companies?

There are no limitations or special requirements on acquisitions of interests in the electricity sector by foreign companies. The operator must be registered in Ghana. An operator must include in its corporate structure all the foreign companies it intends to partner or deal with (eg, for supply of equipment).

30 Cross-border electricity supply

What rules apply to cross-border electricity supply, especially interconnection issues?

Ghana's imports and exports of electricity are driven primarily by two factors: the need to meet growing peak demand and the variability of the Volta River flow rates. The primary electricity trading partners are Ivory Coast and Togo, with whom electricity is traded via the existing transmission interconnections. For example, Ghana has an exchange agreement with the Ivory Coast for up to 200-250MW of power import or export as the need arises on either side.

In December 2003, Ghana signed the ECOWAS Energy Protocol, which calls for the elimination of cross-border barriers to trade in energy, and encourages investment in the energy sector. This agreement, along

with the WAPP agreement, is expected to lead to a more active regional import and export power market.

A grid participant wishing to interconnect the NITS to the electricity networks of neighbouring countries in the WAPP must do so in accordance with the provisions of the Grid Code, the ECOWAS Energy Protocol and the WAPP Operation Manual.

These agreements have potentially significant benefits for Ghana. Demand for electricity is growing rapidly throughout the region, which simultaneously creates a larger market for Ghana to trade power within the larger ECOWAS region.

The ECOWAS Regional Electricity Regulatory Authority (ERERA) is the regulator of regional cross-border trade of electricity in West Africa.

There are rules which are under development by ERERA. The Energy Commission licenses operators that intend to export power. WAPP is an ongoing project.

Transactions between affiliates

31 Restrictions

What restrictions exist on transactions between electricity utilities and their affiliates?

The law permits a public utility to arrange for the joint use of its equipment and facilities by another public utility. This may be done for a reasonable compensation where the arrangement is convenient or necessary and the use will not result in damage to the owner or other users of the equipment.

The PURC has the power to direct that two or more public utilities enter into an arrangement for joint use of equipment and facilities for the

provision of a service. The PURC may exercise this power only when it is satisfied that the arrangement:

- is necessary to provide safe, adequate and economic service to consumers;
- will not result in irreparable damage to the owners or users of the equipment or facilities; and
- is just and reasonable having regard to the circumstances of the case.

The Energy Commission must be informed of all operations of affiliates for the commission to determine whether the licence of the operator covers the affiliates. The operator must submit any existing agreement or material contract between it and its affiliate or any other company to the Energy Commission.

32 Enforcement and sanctions

Who enforces the restrictions on utilities dealing with affiliates and what are the sanctions for non-compliance?

In the event of a dispute relating to transactions between affiliates, the parties may lodge complaints with the PURC for settlement. In enforcing the restrictions relating to dealing with affiliates, the PURC may, on a complaint from a public utility or consumer affected by the arrangement, modify or revoke an earlier directive.

The Energy Commission may arbitrate and settle a dispute arising between licensees where the parties cannot reach an agreement.

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Anti-Corruption Regulation	Electricity Regulation	Loans & Secured Financing	Right of Publicity
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Arbitration	Environment	Merger Control	Securities Litigation
Asset Recovery	Executive Compensation & Employee Benefits	Mergers & Acquisitions	Ship Finance
Aviation Finance & Leasing	Foreign Investment Review	Mining	Shipbuilding
Banking Regulation	Franchise	Oil Regulation	Shipping
Cartel Regulation	Fund Management	Outsourcing	State Aid
Climate Regulation	Gas Regulation	Patents	Structured Finance & Securitisation
Construction	Government Investigations	Pensions & Retirement Plans	Tax Controversy
Copyright	Healthcare Enforcement & Litigation	Pharmaceutical Antitrust	Tax on Inbound Investment
Corporate Governance	Initial Public Offerings	Private Antitrust Litigation	Telecoms & Media
Corporate Immigration	Insurance & Reinsurance	Private Client	Trade & Customs
Cybersecurity	Insurance Litigation	Private Equity	Trademarks
Data Protection & Privacy	Intellectual Property & Antitrust	Product Liability	Transfer Pricing
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