THE GAMBIA: LICENSING AND INTERCONNECTION

2013

CHAPTER 6: The Regulatory Environment

THE GAMBIA: LICENSING AND INTERCONNECTION OF RENEWABLE ENERGY GENERATION

2013 Case Study by Jorry Mwenechanya

The Gambia is a small country of 11,300 km^2 situated on the West African coast, and named after the river Gambia which flows in the centre of the country. Apart from its Atlantic coastal line, The Gambia is entirely surrounded by Senegal. As of 2010, the majority (58%) of the total population of 1.8 million people lived along the coast in contiguous settlements around the capital city known as the Greater Banjul Area. The Gambia has few natural resource deposits and less than half of the arable land is under cultivation. Nevertheless, more than 70% of the people depend on agriculture for their livelihood. Greater use of modern energy services, especially electricity in the rural areas, could significantly increase household earnings.

Even by the standards of sub-Saharan Africa, The Gambia's household dependency on firewood and charcoal, estimated at more than 90%, is high. This overwhelming dominance of firewood and charcoal in primary energy consumption is followed by petroleum products. The Gambia relies on heavy fuel oil (HFO) and diesel to generate almost all of its electricity and as a substitute for domestic cooking. Lacking an indigenous oil industry, the import of petroleum products weakens the country's balance of payments position and strains the viability and growth of the electricity industry. In addition, the CO_2 emissions from fossil fuels and from the wide-scale use of firewood and charcoal raise serious environmental concerns. This case study describes the efforts being taken in The Gambia to exploit renewable energy for future electricity production, highlighting the role of the regulator as a focal point for new initiatives.

THE POWER SYSTEM

The Gambia's power system, with a total installed generation capacity of 88 MW, consists of a 33 kV transmission ring in the Greater Banjul Area and five isolated distribution networks that serve the rural parts of the country known as Regions. The National Water and Electricity Company (NAWEC), a wholly state-owned utility, shoulders the main responsibility for electricity supply, and for all water and sewerage services. NAWEC was formed in 1996 after the government cancelled a previous management concession to SOGEA, a French company.[i] The growth of the national economy, in particular the expansion of the key sectors of agriculture and services, requires a corresponding increase in electricity supply capacity. Additionally, the country accords priority to raising the household electricity access rate. The national average access rate to electricity is 35%, but in some of the rural regions, the rate falls below 5%.

Apart from generation shortfalls, NAWEC faces the challenge of unplanned system outages caused by ageing infrastructure and equipment. The purchase of generator fuels alone consumes

70% of the utility's budget, leaving little for system maintenance and equipment renewal. As an example, the biggest power station at Kotu, with a nominal capacity of 46 MW, has a plant availability of between 55-75%, forcing NAWEC to manage the system by considerable load shedding. NAWEC views renewable energy as a feasible and realistic option for diversifying away from expensive fossil fuels. The utility would also benefit from the low transmission and distribution losses associated with distributed generation.

Therefore, NAWEC is keen to understand how it can maintain the technical integrity of the interconnected system in an environment of distributed generation.

REFORM AND REGULATION

The Gambia has taken important steps to expand electricity supply and to promote the deployment of renewable energy. The enactment of the Electricity Act of 2005 opened the generation and distribution segments to private sector participation and instituted an open access regime. The liberalization left NAWEC unchanged both as a state-owned utility and as sole provider of electricity and water services. It has long been recognized that the integration of these services results in considerable cross subsidies from electricity to water, undermining NAWEC's ability to provide adequate and reliable electricity to its consumers. In addition, the consumer tariff is below cost reflectivity because NAWEC does not fully recover the cost of fuel. This is a concern not only for the utility, but also for the regulator and the government. To reveal the true cost of services and to improve the investment platform for electricity, the industry needs a new structure that separates the two services. Nevertheless, as an outcome of the liberalization reforms, an independent power producer (IPP) in 2008 commissioned a 25 MW conventional HFO generation plant, which added more than 50% to the installed capacity of the Greater Banjul system. The entry of the IPP signaled

Renewable Energy Promotion in Guatemala

Other countries have taken paths similar to that being followed by The Gambia as the following example of Guatemala shows. Guatemala's regulatory framework was revised to cater for the promotion of investment in renewable energy projects. This was achieved through the inclusion of the concept of Renewable Distributed Generation (RDG) in the Electricity Regulation Law. The revision of the Law was motivated in part by the need to reduce dependence on imported fossil fuels for generation, and in part by recognition that Guatemala had significant renewable energy sources distributed throughout the country that could be exploited to meet the country's electricity demand. To give practical effect to the law, the regulator CNEE (Comision Nacional de Energía Eléctrica) issued in 2008 a Technical Standard for the connection, operation, control and marketing of Renewable Distributed Generation. The standard targets renewable energy projects below 5 MW capacity.

The essential elements of the Technical Standard are:

1. *Distributors are required to allow connection to their facilities and to make any changes or extensions to enable the operation of the RDG.*
2. *The regulator approves the connection upon assuring itself that the distributor has made a reasonable assessment of the necessary changes and extensions, and that the estimate of the associated costs is reasonable. These costs are the responsibility of the RDG*
3. *If the energy from the RDG is not contracted, the distributor becomes the buyer. The compensation to the RDG "is the maximum value equal to the Energy Price of Opportunity in the Wholesale Market[1]", taking into account network losses.*

Additional technical requirements include an obligation on the distributor to supply a bidirectional energy meter. The user is credited with any surplus accrued over a 3-month period, after which the meter is reset to zero.

Since 2008 Guatemala has approved several projects of 5 MW or less, adding 35 MW of generation capacity to the system for the period up to 2013.

private sector confidence in the country's general investment climate and specifically in the regulatory environment for energy.

Established in 2004 as an autonomous body, the Public Utilities Regulatory Authority (PURA)[ii] regulates all service utilities, encompassing electricity, communications, water and sewage, and transport. PURA derives its general mandate from the PURA Act of 2001, which defines the institutional arrangements and general powers. Further, the 2005 Electricity Act outlines PURA's specific mandate in the electricity subsector. Under these laws, PURA recommends issuance of licenses and approval of tariffs to the Ministry of Energy.

The advent of PURA to The Gambia's energy sector required the incumbents to adapt to new regulatory requirements and interventions. Since its establishment, PURA has shown the benefits of independent regulation to the energy sector and to overall national development. PURA provides a clear institutional framework of regulating energy and other sectors, and this is essential for efficient management of utility services and for attracting much-needed private investment.

Embracing regulatory best practices, consultation and public awareness campaigns are the hallmarks of PURA's approach to building public support for new initiatives. It regularly organizes rural road shows, known as the Bantaba,[iii] to listen to the concerns of rural communities and to explain issues like energy conservation and electricity safety. It provides a forum known as a Consumer Parliament during which consumers, acting as a parliamentary assembly, hold the regulator and service providers accountable for their decisions and commitments. PURA has even secured time on community radio stations to disseminate information and further educate consumers. Through such efforts, PURA's outputs in the energy sector have helped the government of The Gambia to crystallize important policy issues and to map out strategies for the future. Increasingly, PURA plays a central role in tapping into international expertise to augment the country's capacity to develop. Importantly, these relationships help PURA to grow its competence in technical regulation and its skills in advocating progressive policies. In the last few years PURA has promoted investment in renewable energy, especially in the small plants that suit the size and nature of The Gambia's distribution networks.

RENEWABLE ENERGY IN THE GAMBIA

Recently, renewable energy has emerged as a potential short-to-medium term solution to meeting The Gambia's energy needs, especially in electricity supply.

Several projects in the last few years point to the potential of renewables for The Gambia's future energy needs. In 2008 in the village of Batokunku[iv], near Banjul, a 150 kVA wind turbine was installed to supply 80 residential compounds around an isolated grid. In 2012, the government, with support from UNIDO/GEF launched six demonstration projects to promote renewable energy[v]. These projects also promote community development. The project provided partial funding and technical support to private sector developers of solar and wind projects at different locations[vi]. They include a 2x450 MW wind turbine connected to the NAWEC grid and a 450-kW wind turbine generator for a mini-grid to supply a fisheries community at Tanji, near Batakunku,, and an 84-kW solar-wind hybrid system to supply the

Mbolo Association's training centre, in Brikama, that empowers women with entrepreneurial skills.[vii]

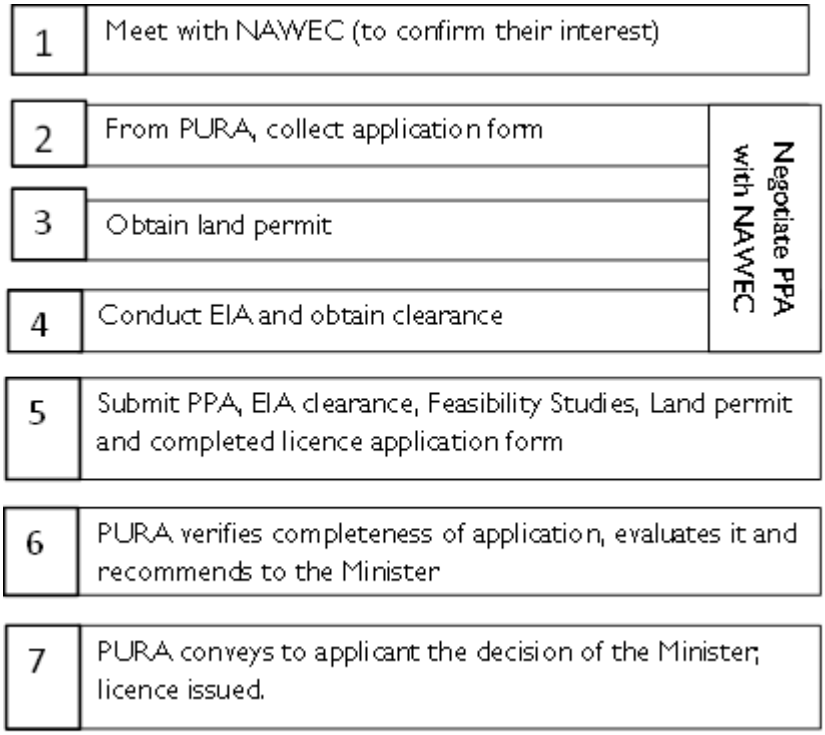
Of the three forms of renewable energy that are relevant to The Gambia – solar, wind and biomass – it is solar that holds the greatest promise. Across the seasons, solar radiation in The Gambia lies between 4,500 to above 5,300 Wh/m^2 per day, which is considerably higher than in some other regions of the world where solar energy has taken root[viii]. The declining prices for PV panels increase the attraction of solar energy as a realistic option for large-scale generation. In July 2011, neighboring Senegal inaugurated a factory to produce photovoltaic panels, which opens the possibility of lower import costs for The Gambia. The contribution of PV panels to the total cost of a solar system has fallen to around 20% compared to ten years ago when it was between 50 and 60%.[ix] Among solution providers, attention is focused less on the PV panels than on the ancillary equipment, and costs are an important consideration for any consumer, especially in a country like The Gambia where the majority of the population lives below the poverty level..

Licensing

PURA has led a process to streamline the licensing procedure in order to promote private sector participation in the electricity industry. At a National Forum on Renewable Energy Regulation held in January 2012[x], participants raised several concerns, including an unclear process and uncertain timelines for government approval of licensees. At this point PURA and the sector agencies – the Ministry of Energy and Mines, NAWEC, the National Environmental Agency (NEA), The Gambia Investment Promotion and Export Promotion Agency (GIEPA) – had already recognized that these hurdles increased transaction costs.

After a series of meetings and inputs from external experts, including U.S. regulators from NARUC, PURA produced a 7-step procedure, clarifying and streamlining the licensing of an IPP. This is shown in Figure 1. To support the procedure, PURA has also developed a template Power Purchase Agreement (PPA) that, among other things, defines the pricing methodology, the technical and metering requirements, and the rights and obligations of the utility (NAWEC) and an IPP. The availability of the PPA template enables negotiations to commence early in the application process. To further assist potential investors and developers, PURA's website (www.pura.gm) acts as one-stop portal for downloadable application forms, the applicable laws and general information about the sector and about PURA. These measures for transparency are designed to ease entry into the sector and to engender trust and confidence in the regulatory framework.

Steps for an IPP Application



Nevertheless, PURA's standard licensing requirements for generation, transmission and distribution, mainly designed for large conventional systems, can be taxing for the small renewable energy producer. The preparation of complex and time-consuming documents such as a feasibility study and environmental impact assessment reports, business plans, and project implementation plans, can weigh down potential developers of small systems. The applicant also needs to submit audited financial statements for three years and must demonstrate technical and industrial competence. These complexities and their associated costs inhibit the small developer.

PURA recognizes that many of the requirements on the standard license application form have little relevance to distributed renewable energy plants and small isolated grids. Therefore PURA offers guidance on some of the technical requirements, like business plans and feasibility studies, requirements which can be waived. In addition PURA and NAWEC often sit together with officers from the relevant government agencies, like the company registry or the environmental protection, to process an application or to clarify to an applicant the essential requirements. The one-stop arrangement obviates the need for an applicant to shuttle (sometimes in circles) among various offices.

Renewable Energy Law

The administrative arrangements that PURA has instituted to promote small-scale renewable energy development support the country's national energy goals. In 2013, the government of

The Gambia plans to enact a specific Renewable Energy Law providing for the establishment of a Renewable Energy Fund and for the introduction of a range of financial and fiscal incentives. They include exemption of equipment from import duties and priority dispatch of renewable energy plants.

The Renewable Energy Law will also require the regulatory agencies to simplify, among others, the permitting process for the environmental impact assessment, land use and construction. The processing of applications for renewable energy projects will be streamlined. For example, the Law will require that:

- An applicant should receive a response within ten (10) working days and a decision within sixty (60) days after submission.
- The application process should be tailored to the scale and potential impact of development, implying simple procedures for small projects.

Making the process simple, transparent, predictable, and accessible improves transparency and confidence in the sector.

For on-grid systems, the draft law establishes a Feed-in Tariff regime based on rules to be formulated by PURA. The rules will be ready as soon as the Law takes effect and PURA plans to derive the Feed-in Tariff from the avoided costs of fossil fuel generation. The draft Law stipulates 15 years as the minimum period of the PPA subject to periodic tariff review using indexation formulae. The draft Renewable Energy Law establishes a single buyer, currently the national utility NAWEC, in a take-or-pay arrangement. The buyer is further obligated to give priority dispatch to renewable energy sources. PURA has prepared a template of the PPA which details the full commercial arrangements between producer and buyer. The draft Law mandates PURA and the buyer to set the total maximum renewable energy capacity on the system.

Interconnection Standards

Interconnection standards specify the technical requirements that a renewable energy plant must meet in order to supply power to the grid. The utility pays close attention to the electrical conditions at the Point of Common Coupling (PCC), that is, the point where the output from the renewable energy plant enters the distribution network. The utility strives to keep the voltage and frequency fluctuations within legally defined and regulated limits. The utility also needs to minimize distortions during normal and faulty operating conditions. Adherence to these standards avoids damage to consumer appliances and to the suppliers' own sensitive equipment. Therefore, the distribution license and the consumer supply contract would include the maximum allowable deviations from the standards. A renewable energy plant installed at a low-voltage PCC has the potential to degrade the quality of supply especially to nearby consumers. This is because of the nature of the devices and equipment used to condition the output from the renewable energy plant to the standard of the conventional supply. Some renewable energy sources, especially wind, tend to inject intermittent power into the grid which has can cause network instability.

In general, the impact of the renewable energy plant on the distribution system depends on its size relative to the rest of the distribution network. For this reason, The Gambia's draft Renewable Law mandates PURA and NAWEC to decide the aggregate generation capacity that can be derived from renewable energy sources. In general, though, small renewable energy sources have little effect on the operation of the network. PURA has indicated that the projects currently underway will raise the contribution of renewable energy to 3% of the installed capacity.[xi] It is expected that the impetus from the Renewable Energy Law will raise the renewable contribution much higher.

In February 2013, with the approval of PURA, NAWEC entered into an interconnection agreement, more specifically a net metering agreement, for a 20-kW solar system installed by a hotel in Banjul. This followed a period of negotiations during which the hotel presented the specifications of the equipment and demonstrated its operation. NAWEC entered into the agreement because the installation was small and because it provided the utility an opportunity to gain practical understanding of on-grid solar systems without independent storage. In future these arrangements will be guided by a standard Network Connection Agreement annexed to a PPA. PURA has developed a draft document that awaits the enactment of the Renewable Energy Law. The connection agreement will specify the pre-conditions for the utility's consent to connect a renewable energy plant, and will cover such aspects as the responsibility for costs and the metering arrangements. The technical requirements will include capacity limitations on the size of the plant that can be connected at a given point of the network. The agreement also imposes on the developer minimum safe operating procedures.

Under the two-page agreement for the experimental scheme, NAWEC bills the hotel only for the net energy it draws from the grid every month. PURA decided that the hotel would be credited for sales to NAWEC using the approved retail tariff, which simplifies the accounting especially for the small size of the system. The agreement is silent on net inflows into the grid, but it specifically precludes cash payments by NAWEC. From the experience of this small system, which is subject to a six-month monitoring period, PURA and NAWEC plan to develop full technical and billing standards to be applied to on-grid renewable energy generation and to stand-alone systems. This agreement will be reviewed after the introduction of the Renewable Energy Law in 2013. NAWEC's willingness to enter into this agreement demonstrates its desire to understand the technical and administrative implications of independent generation injected at different points on the system.

An important element of the interconnection arrangements relates to the measurement and billing of energy flows. NAWEC phased out induction type energy meters and replaced them with pre-paid meters. This has increased revenue collection and has minimized the cost of meter reading, thus improving the utility's liquidity position and overall efficiency. However, for on-grid renewable energy systems, it is necessary to record energy flows in both directions. Payments are based on net energy flows, and this is the primary incentive for developers of on-grid solar systems. Since induction type energy meters are bi-directional, they offer a simple solution to net metering which would otherwise require two separate meters. Thus for the hotel installation in Banjul, NAWEC reinstalled a decommissioned credit meter to measure grid energy imports and exports. In time PURA plans to review the policy on metering to take

account of the Renewable Energy Law in relation to distributed generation from renewable energy sources.

CONCLUSION

For social and economic development, The Gambia needs to raise the level of access to electricity by its population. Growth and expansion in the priority sectors of economic development also rely on the continuing availability of adequate electricity. The major constraint to increasing electricity generation capacity is The Gambia's high reliance on fossil fuels. The importation of fossil fuels at high cost puts electricity beyond the reach of most people and hinders growth of the electricity industry. In addition, generation plants running on fossil fuels degrade the environment through GHG emissions. In the circumstances of The Gambia, renewable energy has potential to be an important part of the solution to the country's energy challenge.

Through clear policies, supportive legislation, and proactive regulation, The Gambia is laying a foundation for stimulating investment in renewable energy for its future needs. PURA is developing into a leader within the Government of The Gambia in terms of its technical ability to develop and draft appropriate regulations and procedures. At the same time, PURA is ensuring political will for its actions through an open engagement process with energy stakeholders.

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[i] http://www.accessgambia.com/information/nawec-water-electricity.html

[ii] www.pura.gm

[iii] Bantaba is originally a traditional meeting place resembling a gazebo where the men of the village discussed issues pertinent to the village. See www.accessgambia.com

[iv] http://thepoint.gm/africa/gambia/article/2008/8/7/wind-energy-project-inaugurated-in-batokunku

[v] http://dailynews.gm/africa/gambia/article/unido-gef-launch-us-2m-energy-project-for-gambia

[vi] www.naruc.org/.../GEF%20UNIDO%20PROJECT%20SLIDES.pd

[vii] http://www.m-bolo.org

[viii] Ceesay, K. K.: "Promotion and Development of Renewable Energy and Energy Efficiency in The Gambia", National Forum on Renewable Energy Regulation, Ministry of Energy, Banjul, Jan/Feb 2012

[ix] "Photovoltaic (PV) Price Trends: Historical, Recent and Near-Term Projections", Sunshot, US Department of Energy, November 2012

[x] Co-organized by NARUC with support from the U.S. Agency for International Development (USAID)

[xi] http://allafrica.com/stories/201303221070.html