

Electricity in the Liberian Context

By: William Thomas Bernard King | William.King@wtbkinvestments.com

Revised on July 27, 2023, 2023

Part 1 of 4

Objective

The intent of this correspondence is to provide a common context in which we will be able to comprehend all of the facets or variables in play relating to bringing a safe, reliable, affordable (cheap) electricity to every home, industry or business in Liberia. At the conclusion of this article my hope is that we will be able to not only comprehend all of the key players in the electricity utility industry but also be able to hold an informed conversation with those in charge of the herculean task of bringing electricity to Liberia. There is an opportunity for a paradigm shift on how we see the electricity business which will no doubt impact our views and insights into conversations or policies concerning electricity in Liberia. Our views and inputs does matter as it will determine whether or not we “Liberians” truly achieves a grid of the future where we can all benefit. To those who understand the electricity business this information will be nothing new, this article simply attempts to increase and broaden the awareness of the business of electricity for all citizens of Liberia, with the hope that this will in turn make the conversation flow much better and remove the proverbial sense of distrust and paranoia that we can at times harbor due to unmet expectations of past promises.

Liberians are eagerly anticipating an additional supply of safe, reliable, and affordable electricity when Mt. Coffee Hydro comes on line at the end of 2016, this much needed electricity supply will complement what is already being provided by the Heavy Fuel Oil Generating facilities, and the diesel generators. These combine generating facilities will provide an estimated 32MW in dry season or 76MW in the wet season. In addition the Electricity Law that recently passed which provides a mandate for the formation of a regulatory entity that will set the rules, processes, and guidelines that encompasses tariffs, generations, transmissions and distributions, customer services, independent power producers, and licensing will begin to make the pot boil in the electricity sector. In the past electricity – as a product – was left to governments or large industries to provide for the customer and electricity companies were oligopolies, working as the sole license provider within a define territory without a threat from outside competition. In today’s environment small scale commercial generation, environmental regulations, and improvement in technologies have changed the playing field. It appears that all pieces of the electricity supply chain have the ability to run independently of each other. While this may be true, the question is **“Is this model applicable and beneficial for Liberia?”**

The above question can be best answered by identifying the stakeholders in the electricity business arena and what drives them to deliver safe, reliable and affordable electricity. Each stakeholders uses a different rational within the same electricity business context in looking to deliver safe, reliable, and affordable electricity. Their unique rational will impact the journey to electrifying Liberia. Whether or not Liberia truly achieves a grid of the future that we can all benefit from will be left up to how quickly we can identify and contextualize our current position in regards to electricity in the West African region and globally.

Key Stakeholders:

Liberia Electricity Corporation (LEC): Currently LEC is authorized to perform: generation, transmission and distribution, customer service, and management of electricity, they are the producers and sellers. The regulation and governance is under the Ministry of Lands & Mines & Energy, within the office of the Deputy Minister for Energy. LEC has a clear mission, "To increase reliable access to affordable electricity throughout LEC's service areas, in the quickest, most prudent and sustainable manner possible." A private generation company that wants to produce and sell electricity at a commercial level in Liberia will have to coordinate and communicate their intent to LEC if they are looking to provide power through the national grid and to recoup their cost with some profit. To be sure before LEC looks to purchase privately generated electricity there must be a need for more electricity consumption than LEC can provide at a reasonable rate. At the moment LEC generates more than it can transmit and a portion of their cost is subsidized by donors.

West African Power Pool (WAPP): The West African Power Pool (WAPP) is a specialized institution of ECOWAS. It covers 14 of the 15 countries of the regional economic community (Benin, Côte d'Ivoire, Burkina Faso, Ghana, Gambia, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.) An international organization of public interest, the WAPP is to ensure Regional Power System integration and realization of a Regional Electricity Market. WAPP is made up of Public and Private Generation, Transmission, and Distribution companies involved in the operation of electricity in West Africa. It has to date, 26 member companies, *LEC is a member*. Liberia is part of the Cote D'Ivoire, Liberia, Sierra Leone, Guinea line which will span approximately 1,200 kilometers throughout these four countries. The construction has already begun and there are designated connection points in Liberia with one being Mt. Coffee Hydro. This will allow for Liberia to potentially sell power not being consumed to the other countries and vice versa. This will be helpful for Liberia because the lines will run through areas that LEC cannot service at the moment. Another benefit of having the WAPP is that private generation companies may sell directly into this market via a Power Purchase Agreement.

International Donor Organization (IDO): *International Monetary Fund, USAID, World Bank, African Development Bank, United Nations, etc...* Although not impossible, it would have been an even more difficult task for Liberia to begin to establish the hydro facility such as Mt. Coffee, the Transmission & Distribution, the Liberian Electricity Law, a regulatory body, and any elements of electricity as listed without the financial and human capital resources of the IDO's. By the end of either 2016 or mid-2017 depending on when Mt. Coffee Hydro comes online, and LEC reaches its 2016 or 2017 T&D connection goals at least \$400 million would have been spent on the Liberia electricity sector of which over 70% to 80% is from the international community and 30% to 20% from the Government of Liberia. These IDOs play a vital and decisive role in the firm establishment of all the elements for the safe, reliable, and affordable delivery of electricity. The magnitude of investments by the IDOs may potentially dictate the terms at which privatization occurs in the generation and T&D electricity element. In the early years of deployment, the electricity sector could very well be an oligopoly by design until a substantial amount of cost is recuperated to satisfy debt obligations. It will be a bit naïve on our part to think that the privatization of the electricity sector will happen quickly. At the present moment, the private sector has yet to at least come up with an affordable pricing generation model that can complement or compete with Liberia's current electricity schedule long term. By providing grant funding and low-cost capital the

IDO's have made sure that generation (Mt. Coffee), T&D, and the other components of the electricity sector is competitively priced creating an incentive for major power consumers to temporarily endure the high cost of self-generation knowing that down the line the competitive price from LEC will beat out a long term commitment from a direct purchase from an independent power producer (IPP). One can drive down the cost to consumers in two ways: 1) Enormous capital (cash) infusion in electricity infrastructure or 2) government subsidizes the cost to consumers monthly. With our limited capital resource option 1 or 2 presents many challenges. Nigeria has experienced how expensive it is to subsidize the cost of electricity and that it does not promote economic growth as some were led to believe. A recent report from Global Subsidies Initiative, "[A Citizen's Guide to Energy Subsidies In Nigeria;](#)" produced by the Center for Public Policy Alternative (CPPA) and the International Institute for Sustainable Development's Global Subsidies Initiative states:

"The cost of underpricing electricity has been in the range of NGN 232.5–356.5 billion (US\$1.5–2.3 billion) from 2005–2009. This has caused insufficient maintenance and reinvestment in Nigeria's electricity supply, causing serious problems with access and reliability, at high cost to businesses and the broader economy. Plans are now underway to gradually increase tariffs to cover costs in full while maintaining a cheaper tariff for low-income consumers."

Nigeria is moving away from such a taxing model on its economy; we should be wary of any IPP that makes this recommendation, this should raise a red flag for our regulators. Option 1 may be feasible depending on the Government of Liberia (GoL) cash availability.

Government of Liberia (GoL - Executive, Legislature, and Judiciary): Establishes the Electricity Law, the master plan for electricity, the formulation and development of national energy policies, and appoints the electricity commission that will be responsible for implementing the policies and procedures as mandated by the electricity laws and governing policies. The Minister of Lands, Mine & Energy, or the Deputy Minister for Energy are not able to set the price of electricity, they may have an **opinion** but cannot dictate or influence what the tariff will be.

Commission / Regulator: Implement the mandate of the Electricity Law, regulates the industry, and sets the tariff for electricity. Ensure electricity companies are in line with the country's objectives. Responsible for making sure that all government mandates are carried out and that all players in the electricity sector are in compliance, establishing and updating construction and material standards to ensure the safety of all personnel and consumers, ensure national security is not compromised, issue licenses, provide a space for consumer advocate group voice to be heard. The issuance of licenses is not an automatic commitment from the GoL, nor the regulator or LEC to purchase power.

Investors: Private entities who engage in the electricity sector for profit. They see that there is a need and look to provide a solution that is sustainable for the going concern of the entity and its shareholders. Private investors will look to provide a solution in any area of the electricity sector that they are licensed for and that is profitable per their business model. When the regulatory framework is established independent power producers (IPP) may be licensed to generate power and provide it into the grid, whether or not they can do so at a competitive price will be key.

Consumer: Those who purchase electricity. Normally electricity is charged at a different tariff rate depending on the intended use, these usage categories are classified as "tier". The regulatory arm sets the tariff price for each tier. Based on multiple constraints and their complexities and financial

implication tier pricing may not be available at the early stages of deployment in Liberia. Below are a few examples of some categories of tier pricing:

1. Residential - Customers who use their premises exclusively for residential purposes.
2. Commercial – Customers who use their premises for any other purposes other than residential or as factories.
3. Manufacturing - Customers who use their premises for manufacturing goods.
4. Streetlights – Lights managed by the Ministry of Public and Roads work.

With so many pivotal stakeholders involve adapting a decentralized modern microgrid business model in Liberia could possibly work but a lot of work and resources would be required. In the next few parts that will be published, we will explore our current electricity situation and the way forward.

Part 2 of 4

Liberia Current Electricity Situation in Context:

A. Consumer Reality Impact:

All if not most of the major corporations in Liberia that consume between 5-20MW a day are not connected to LEC, they rely on their own form of self-generation. The Liberian Agricultural Company, Firestone, Accelor Mittal, Sima Darby Plantation, The Coca Cola Distribution and Bottling Company, U.S. Embassy, all Major Banks, Hotels, mining companies, etc..., rely on their own source of generation. With the few companies listed above, if LEC was to be the electricity supplier of choice, they would have to generate over 150MW of safe, reliable, and affordable electricity a day for them. All of the above-mentioned entities would represent consistent and reliable paying customers. So the question is **“Why has electricity been so elusive”?** Here are some of the reasons within the Liberian current electricity context.

1. Most of the high industrial users are in remote areas and the transmission and distribution line have not yet reached their location for connection.
2. Constructing the major transmission and distribution lines takes time and has high-cost implications.
3. Liberia cannot afford the high cost required to construct and implement the required infrastructure and resources to establish a grid of the future. Liberia has turned to the international community for grants and subsidies and affordable capital financing. These funding sources have prerequisite requirements that will take time to achieve and tie you to the donor’s agenda.
4. The current market does not generate enough capital for there to be a market for the consumption of electricity at an affordable rate without the subsidies of the International Community and/or the Government of Liberia.
5. Independent private power producers that have expressed interest in getting into the power generation business with minimum take and pay agreement discover that the Liberian market is not yet mature to fit their business model. There is too much uncertainty.
6. Liberia is in the early stages of forming the regulatory commission that will be responsible for licensing and the tariff rates and ensuring the national security of the grid.

7. The governance and regulation required by private investors was not established.
8. Strategic allocation of limited financial resources to other key national development areas.

B. Ebola Crisis Impact to the Liberia: Inputs to the Energy Access Action Plan, 2012 – 2030.

The impact and pain of the Ebola Crisis on the Liberia Electricity Sector is an added sore that will be felt for quite some years and may only be shortened by the advancement in technology in the electricity sector, the rain and dry season climate, exponential growth in our economy, or an abundance of international aid to the electricity sector. The anticipation was that by 2015 Manitoba Hydro International (MHI) would have 33,000 connections, resulting in 160,000 people having access to electricity. LEC would be providing about 66.4MW of consumable electricity with an estimated cost to connect a customer at roughly \$1,000 (Liberia: Inputs to the Energy Access Action Plan, 2012 – 2030, pg. 5). Currently LEC generates about 16-20MW and the transmission and distribution lines are only able to distribute 10-12MW to the consumer. There is still a demand for an anticipated 75MW however, the transmission and substation needs to be built to deliver this supply. The good thing is that Mt. Coffee comes on board during the dry season when it produces only 8MW of its 64MW production capacity. This will give LEC time to connect more customers to the grid because the rainy season will impact the pace of connecting consumers. One downside to electricity is that it cannot be stored, if you overproduce electricity then your economic efficiency will suffer, and power will be wasted. While true that technology is improving and advancing to a point where electricity may be stored in batteries the heavy cost and subsidies made available to make this feasible may not be something that Liberia can afford at the moment. This could potentially change if the world becomes more environmentally and energy consumption conscious which may lead to such technology being affordable – “a debate for another day.” LEC looks to find the right balance where they can constantly recuperate a significant portion of their costs through steady consumption.

Production and Pricing

- A. Production & Consumption:** The total number of customers connected to the LEC Transmission and Distribution grid is enough to consume between 10 – 16 MW of electricity. The rule of thumb is that on average 1MW can power 1000 homes, in Liberia it may average to about 2000 or 3000 due to factors such as high tariff rate, self-generation, intermittent power outages, pre-paid electricity, and a limited number of electrical devices in households as compared to the developed world, businesses reluctance to rely on LEC due to inconsistencies in reliability.
- B. Wholesale Cost & Retail Price:** “Due largely to expensive diesel production, Liberia has one of the highest public tariffs in the world (in October 2012 \$0.52/kWh). The tariff is calculated on a quarterly basis taking into account the price of equipment, service schedule, cost of overhauls, 20 percent of technical and nontechnical losses, US\$0.02/kWh for distribution operation and maintenance costs, the LEC’s administrative costs, and a 93 percent efficiency in collections. The generation cost is estimated at US\$0.32/kWh. The cost of self-generation is estimated at no less than US \$0.75/kWh. The GoL subsidizes the balance of LEC’s costs and is expected to continue doing so during the transition to cheaper medium-term generation options now under active investigation and planning. The current retail price of electricity ranges from \$0.52 - \$0.55 per kWh. The high cost of diesel makes Liberia one of the countries with the highest tariff globally (Energypedia - Liberia).” *As part of the revision as of February 23, 2022, the current price for electricity is US \$0.24/kWh with a fixed cost of US \$2.48 for a prepaid residential customer, US*

\$0.24/kWh with a fixed cost of US \$4.47 for postpaid residential customer, US \$0.15/kWh for social customer (consumer who consume less than 50Kwh per month), US \$0.22/kWh with a fixed cost of US \$12.00 for commercial customer, and US \$0.19/kWh with a fixed cost of US \$50.00 for medium voltage customers. (Source: <https://allafrica.com/stories/202112140322.html>)

Tariff: This is the price that consumers will pay for electricity upon delivery. Currently, the tariff is set at **US\$0.15 to US\$0.24** cents per kWh. The goal is to get the tariff down to about \$0.13 - \$0.17 cents. Your tariff consists of incurred charges as electricity travels down its value chain and is delivered to the consumer. This tariff is one of the highest in the world, especially for a country like Liberia. In Los Angeles County, U.S. the average price is between US\$0.11 cents to US\$0.14 cents per kWh, and the per capita income is US\$42,042, compared to Liberia at **US\$0.15 to US\$0.24** per kWh with a per capita income of US\$457.90. In Nigeria, the price per kWh ranges from US\$0.02 to US\$0.19, at the low range we find the consumer who may only have a light bulb that is used on occasion, at the high price range you have the high-end residential, commercial, and industrial consumer. Most Nigerian residential consumers are in the US\$0.11 tariff, Liberia is paying roughly 2 times that amount at the moment in comparison to Nigeria and Los Angeles.

With the recent price of fuel down one may argue that the savings should be felt instantly by customers but this simplistic impetuous economic reasoning must be given serious consideration within the Liberian electricity context, and an important question needs to be asked and the answer understood; **“What is the supply chain for electricity and where are the add values and costs?”**

Part 3 of 4

Understanding Electricity Supply Chain

Let's take a minute to understand the key elements that are responsible for the delivery of electricity to the consumer door step. These elements are: generation, transmission and distribution (T&D), customer service, regulatory policy & affairs & government. These components form the electricity value chain and at each step there is an added cost but also employment opportunities, and value in the electricity that is delivered to the end user. Understanding these elements will allow us to level set the expectations for what we can expect from those who have made a choice to engage in the electricity sector.

1. **Generation:** Electricity may be produced by coal, hydro, wind, solar, renewable biomass, nuclear, diesel and heavy fuel generators, and countless other means. Generating electricity is not an issue, generating it in efficient large affordable quantity is the issue and moving that larger quantity across a wired or cabled infrastructure is even more complex.
 - a. **Liberia Hydro-Generation:** Currently there are three or four hydro-generation facility. One owned by Firestone-4MW, another by the Liberia Agricultural Company-1.25MW, Mt. Coffee Hydro – 8MW Dry Season, 64MW Wet Season owned and operated by LEC, Yandahun Plant-unknown. Liberia have many rivers that run through it with the potential for providing more electricity. If the rehabilitation of the 64MW Mt. Coffee

cost an estimated \$300 million, how much would it cost to build another one of equal or greater caliber? Hydro seems to be the most affordable because of the international donor support and backing. One could build smaller hydro dams but now you have to run across all of Liberia maintaining and managing them. I am not against Hydro but there are huge costs, lead time, environmental implications, and a tie to the international donor organizations (IDO), not to mention the power we received from them will be different during the dry season and wet season. Although this may not be a popular view hydro-generating facilities impact mother nature's natural water flow and can have a negative impact downstream and upstream, not to mention the cost to build. Currently, in the U.S. there is a push to decommission and demolish several hydro dams for environmental reasons. Feel free to research and read up on other generation sources.

2. **Transmission and Distribution (T&D):** This is the infrastructure that allows electricity to move from generation to the consumer where it is needed. These are the power lines that you see with the connection to homes, businesses, schools, government buildings, etc... No section of the electricity elements demands more attention and impacts the consumers more than T&D. This is the lifeblood of any electricity utility company. It is not only the heart, but it is also the brain and the spine, very critical elements and if you get this formula wrong the impact on the consumer is felt instantaneously.
 - a. **Transmission:** For simplification let's categorize transmission lines into four categories, along with the understanding that electricity voltage can be powered up or down to a high or low voltage via transformers and substations.
 - i. **High Power Voltage Line:** This is your 225kV line, this line is used for electricity to travel over long distances. Basically, this is the transmission line that is used by the West African Power Pool (WAPP) to interconnect electricity for trading across countries mainly Cote D'Ivoire, Liberia, Sierra Leone, and Guinea. This line carries a high construction cost to build. Higher-voltage transmission is more efficient than low-voltage transmission over long distances because the loss caused by conductor resistance decreases as the voltage increases. In developed nations, because power may have to travel over further distances, they have introduced a much higher voltage line but that is not relevant in the Liberia electricity context. The key thing to keep in mind is that you lose electricity as it travels through the lines. This is one of the reasons there is a difference between what is generated and what is delivered. Just like a gas tank will hold less gas after a traveled trip from Monrovia to Kakatown.
 - ii. **Medium Power Voltage Line:** This is your 66KV line or the 33KV lines, these lines are also referred to as the sub-transmission lines and it is used to transmit power throughout Monrovia in loops or rings. It is more economically affordable to drop from the medium power voltage line to the lower power voltage line at a central point than to drop from the high power voltage line of 225KV to the distribution of 22kV or to the consumable voltage of 110V or 220V for each connection because you need a higher cost transformer and substation equipment at each connection point hence the reason for the gradual step

down in power. In addition, transmitting power at the medium 33kV reduces the amount of power that is lost in transmission. This medium power can also handle more load when more electricity is consumed.

- iii. **Low Power Voltage Line:** This is your 22KV line, 33kV lines also fit in this category depending on the area of connection and the industry that it is servicing. The 22kV line goes into another transformer that is more affordable and more common and it is then stepped down to the daily consumable rate of 110V or 220V.
- iv. **Consumable Low Power Voltage Line:** This is your 110V or 220V. When we talk about safe electricity this is why either 110V or 220V is most applicable. I am not advocating that one should put their hand on a live wire. There is a belief out there that at 110V your muscles react and your instinct kicks in and you jerk away, whereas at 220V it shocks you and your body immediately clamps up and you may not be able to pull away. My advice to the readers is simply to stay away from any exposed wire. The benefits of 110V are that less electricity is lost, and it allows for the use of more affordable wiring when you are wiring your home. The purpose of this article is not to argue about which voltage Liberia should use for daily consumption.
- b. **Substation:** Substations are electrical infrastructures that are used to economically step up or down the power and reroute that power to any one of the above-listed categories lines. This centralized approach is required for power transformation and transmission efficiency. The key takeaway from this is that a substation that is required to step down a high-power voltage line to a consumer low-power voltage line has cost implications and requires an innovative safe, affordable, and reliable solution. “For instance in some remote areas such as Grand Kru, Maryland, Grand Gedeh, and Sinoe where these counties are far away from any currently planned substations in the CLSG Regional Transmission Line building a cost-effective connection may present some challenges. (Liberia: Inputs to the Energy Access Action Plan, 2012 – 2030).”
 - i. **Transmission and Substation Cost:** In the Inputs to the Energy Access Action Plan 2012-2030 report the estimated “cost for both the transmission and substation construction for Phase 1 which runs from the period 2012 to 2016 and encompasses a) Paynesville to Airport; b) Monrovia to Kakata; c) Monrovia to Bomi Hills/Kle is \$101 Million. Phase 2 from 2016-2020 estimated at \$20 Million, Phase 3 from 2021-2025 estimated at \$22 Million, and Phase 4 from 2026-2030 estimated at \$34 Million the last phase ensures all of Liberia will be connected. So, over the next 17 years, the estimated spend for the transmission and distribution system will be about \$200 million.” Please keep in mind that this does not include the cost of bringing Mt. Coffee Hydro online. To be sure we did encounter 10-15 months of delay with the Ebola Crisis which impacted the electricity plan for Liberia. Phase 1 has started back again and construction has restarted. The standard industrial cost to lay out 1 mile of transmission line cost about \$2 million dollars. The average cost to build a

130KV - 230KV substation is around \$0.9-5 million depending on how much load and work you require from the substation.

3. **Customer Service:** Responsible for billing, receivables, community work, and connections, customer metering and maintenance, safety, and industrial standards.
4. **Regulatory, Policy & Affairs:** Responsible for making sure the utility company is compliant with all of the rules and regulations per the electricity regulatory commission. Ensure that all filings are done in a timely manner and that all inquiries are responded to with accuracy and in a timely manner.
5. **Management:** Oversee all of the operations and make sure that the electricity company is operating at the most efficient level to ensure safe, reliable, and affordable electricity. Employee training and development.

These business units add value and are essential to the electricity business but they also have a value added cost. The two high-cost areas that are major constraints to delivering electricity to the consumer are the cost to generate and the cost of building and maintaining the transmission and distribution grid. To be sure each of these elements may stand as their own individual business unit or be a private entity, or a combination of private and public partnership. They may also be state-owned and operated, as LEC is currently.

Within all these complexities there are designated stakeholders with a passion and resolve to tackle this elephant one bite at a time and begin to wrap their arms around the issues that are the cause for this elusiveness and there is work being done, just at a slow pace.

Part 4 of 4

Way Forward Despite Challenges

Truly the business of providing electricity in such a country as Liberia comes with its unique complexities and the solutions must come from within and it cannot be one that is adopted from other countries. Below are some thought-provoking insights that will start the conversation and encourage Liberians to get involved with the process and attempt to resolve these challenges in the right context.

- With the introduction of the WAPP, Liberian Independent Power Producers (IPP) will be competing against Cote D'Ivoire, Sierra Leone, and Guinea IPP for power delivery within Liberia and into the high-power WAPP grid. Inefficiencies and bureaucracies will only provide leverage to a competitor from another efficient neighboring country that is willing to provide electricity at competitive pricing. If there are any opportunities for operating in excellence and finding the right balance between the consumers' interest and national security we should act on them with a sense of urgency. The WAPP power lines could be completed before our grid due to the source of funding and scheduling.
- Currently LEC is in all facets of the electricity business with the exception of management which was outsourced to Manitoba Hydro International. This contract will end at the end of 2016. The new management has not yet been determined. LEC will be at its best when it can only focus on

the business of electricity delivery. Nigeria went a step further and privatize the T&D arm but with strict guidelines that a majority of shareholders be Nigerian because of National Security. Liberia may go this way however any private entity looking to purchase the Generation and/or T&D business element will want to see steady and sufficient profit from within these power areas; the high capital maintenance and build cost coupled with the insufficient power traveling on the lines may make investors “wait small” on the sidelines. Although debatable, LEC is currently operating at a very efficient and effective level given their restraints. The organization understands the business of electricity and they are moving along as fast as they can.

- Private investors will invest in the business of generation if they see the value to their shareholders. For this to happen the electricity regulatory commission will have to establish marketable and bankable tariffs.
- The success of the regulatory commission for electricity will depend on its ability to keep the consumer engaged as it operates and sets tariff rates based on objective facts, truths, and transparency. Investors like certainty and knowing the rules of engagement, politicians want a stable environment for investors, and consumers want transparency. The regulator must be neutral, have a high competency in knowledge of the electricity business, and be able to engage the consumer with a high level of transparency, truth, and frequency. All the methodologies applied to determine the tariff must be made available in a format that can be understood by the consumer. Politicians like to know that the electricity solution being provided is the best given the circumstances, while investors like to know that it will not change overnight and what the variables are. A regulator that strikes the right balance is a force to be reckoned with.
- Due to national security, the transmission and distribution grid will probably be managed and owned by LEC.

Consumer:

- Although it is tempting to focus on the short-term solution, the consumer will have to be disciplined, understanding, and appreciative of the herculean effort it takes to provide safe, reliable, and affordable electricity. When the complexities are fully internalized, the consumer will then fully appreciate LEC.
- Understand that to an investor Liberia is just one out of many countries they can invest for a return. When we are compared to other West African countries by an investor other countries present not only a better rate of return, but a larger consumer market with a ready infrastructure, and more ability to spread their risk. This may not be a popular topic, but we have to realize that we have a very small population of premium consumers and investors will discover that the numbers are tough to pencil out.
- All questions or concerns about the electricity tariff should be addressed to the appropriate office. We should avoid demonstrations and the destruction of the infrastructure. Electricity infrastructure carries a huge cost and is time heavy to build, and we will only be doing a disservice to ourselves.
- Insist and expect excellence in customer service from LEC, and expect the same from your regulator.
- The majority of our current electricity infrastructure from the generation, T&D lines, Management, etc.... is being funded by international donors in the form of grants and discounted capital. This is the primary reason why the cost of electricity is expected to come down and not based on supply and demand as a traditional business model.

- The business model for electricity is a bit different than your other commodities or products. An investor will require a guarantee fix price per kWh and a minimum take (amount of kWh of purchase) before they even put the first shovel in the ground. This means that once a power purchase agreement (PPA) is set up with an IPP you have to honor that PPA and said terms before you can take from another IPP even if they have a better price. In the food market, the buyer just goes to the next stall. With electricity, the consumer must purchase the agreed-upon amount at the agreed price, and then if they still need more, they then may go to the next IPP.
- In Texas (USA), the electricity market is unique, it allows consumers to choose their electricity provider and the form of electricity (renewable, coal, hydro), as available by the utility company chosen. To be sure this model works for Texas at the moment due to the population, the consumer market, the stiff competition, many years of investing hard capital in the grid, and other policies put in place at the state level. This model may present some challenges in the Liberian electricity context because our market is not mature or sizable to obtain such consumer leverage, our electricity consumer market pales in size compared to Texas. Texas has a population of over 27 million of which 88% 24 million (88%) are connected to the grid, with electricity consumption of around 70,000MW out of their 78,000MW produced capacity. Compare this to Liberia where maybe an estimated 300 thousand (10%) of our population may have access to consuming 10-12MW. Not to mention Liberia is still considered to be unstable, and one of the poorest nations in the world.
- Most IPP and their financier want a traditional 20-year PPA. If the price and terms are competitive in the Liberia electricity context this is great especially if it is without some form of subsidy.
- Insist that 20% to 40% of the IPP be offered up for ownership to the Liberia public via issuance of shares.
- An IPP that has the ability to scale up generation in a short time frame as the economy grows and more consumers are connected to the grid could potentially be of great value to the electricity sector.
- Microgrids seem to work when they are completely funded by a non-profit organization. There's been a lot of challenges for investors to come up with a working business model without huge support via some form of a public-private partnership. These are mostly used in rural areas. In addition, how much value is electricity to a rural habitant and at what price, this is a tough topic especially if we were to speak about need vs. demand.

Conclusion

When I think about electricity in the Liberia context I cannot help but think about the Pied Piper who was invited to the town by its townspeople to save it from the rat infestation because of his extraordinary gift of playing the flute. He kept his word and utilized his flute and rescued the town, but in a blink of an eye they forgot how painful it was to live with the rats when he demanded his pay and they reneged on their promise to him. It did not end too well for them as the Pied Piper returned on July 26th, of that same year and led away all of the town's children by playing the flute. Liberians should remember that over US\$500 million will have been spent from approximately 2010 to 2030 on electricity, about 80% coming from the International Donor Organization to power Liberia by 2030. A centralized approach to electricity at the moment appears to be the most cost-efficient. If there is a space for independent private producers insist they are completely vetted by the regulatory commission and that the methodology for the vetting process is transparent, especially on the safety, reliable and affordable metrics. Whenever there are articles in the press about an independent power producer

wanting to provide a certain amount of electricity into the Liberian grid remember the Pied Piper and ask this question:

Will Johnny's rates be competitive (cheap/affordable) and is the Pied Piper okay with it?

Work Cited and Research Articles

1. West African Power Pool: Environmental and Social Impact Assessment (ESIA)
2. Ministry of Lands, Mines & Energy: Energy Briefing for Partners (Power Point Presentation for Partners)
3. Energypedia: https://energypedia.info/wiki/Main_Page
4. Electric Reliability Council of Texas: <http://www.ercot.com/mktinfo/>
5. Electricity Local: <http://www.electricitylocal.com/states/california/los-angeles/>
6. Global Subsidies Initiative: "A Citizen's Guide to Energy Subsidies In Nigeria," produced by Center for Public Policy Alternative (CPPA) and the International Institute for Sustainable Development's Global Subsidies Initiative. <https://www.iisd.org/gsi/resources/introductions-non-experts/citizens-guide-energy-subsidies-nigeria>

About the Author: William Thomas Bernard King works for Southern California Edison (SCE), one of the largest private electricity utility in the United States that leads the United States with the biggest renewable energy portfolio. In 2014 SCE delivered 17.7 billion kWh of renewable, roughly 24% of all the electricity delivered. His 10 years at SCE has afforded him the opportunity to comprehend the business of electricity and the constraints of providing safe, reliable, and affordable electricity. William frequently visits Liberia to visit his family and in 2012 spent 3 months visiting and exploring the country. If you would like to share a comment with William his email is: William.TB.King@gmail.com