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# USAID'S LIBERIA ENERGY SECTOR SUPPORT PROGRAM (LESSP)

PRELIMINARY GBARNGA CITY ELECTRICITY GENERATION,  
MARKET STUDY AND ASSESSMENT, GEONTIA LIBERIA LTD.  
(GLL)

CONTRACT NO: 669-C-00-10-00059-00



**July 5, 2014**

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Prepared for: USAID/Liberia  
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Prepared by: Winrock International  
LESSP  
Atlantis Beach Hotel Compound  
Mamba Point, UN Drive Monrovia  
Liberia

### Strategic Objectives:

- SO1: To extend grid electricity throughout Monrovia and its environs;
- SO2: To develop hydro capacity and other renewable energy sources;
- SO3: To expand grid electricity to other urban areas and some rural areas; and
- SO4: To improve legal, institutional and regulatory framework in the energy sector.

**Cover Photo:** Geonita, Ltd.'s Accountant, Victor Rivercess, examines Genset engine parts at the Gbarnga City Power House. (Photo Credit: Omar V. Al Sherif, April 16, 2014)

The author's views expressed in the publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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## Executive Summary

This study was undertaken to provide Geontia Liberia Ltd. (GLL), relevant government agencies, and possible Liberian funding / investing entities with preliminary and general information that can be used to assist in decision making concerning the improved establishment, management and operation of the existing privately held Gbarnga City electricity generation, distribution utility. This includes re-starting currently suspended business and electricity generation and distribution operations, potential expansion / upgrading / improving of GLL generation capacity and improvements to its existing electricity distribution system.

The information presented in this report is structured mainly in three sections: (1) existing administrative and operational systems and infrastructure, (2) business analysis and plan, and (3) recommendations for future improvements and customer base expansion.

## Main Findings:

1. **Electricity in Gbarnga City:** According to several sources, Gbarnga is Liberia's second largest City with a population exceeding 45,000. GLL is Gbarnga's only centrally available electricity system. Many small businesses and some residences not served by GLL are self-powered with expensive gasoline and diesel generators. There are also other small informal and independent power producers operating in Gbarnga selling electricity from three to as many as 15 or more customers.

Gbarnga could in the future be supplied electricity from the planned Mein River Hydropower electricity project through the Mein River Power Company (Mein River 1.0 MW hydro plant) and/or from a spur line off the West Africa Power Pool (WAPP) 33 kV transmission line that is planned to be extended from Guinea by way of Ganta City to Buchanan City. The schedule for these projects is not known and the opportunity for Geontia to provide electricity for the foreseeable future of say two to four years exists. This could give Geontia enough time to re-establish themselves and become relevant in future electricity operations.

2. **Early County Based and Current GLL Operations:** GLL operates generation equipment that was donated by Arcelor Mittal (Liberian mining concession) to the Bong County government in 2011 for the provision of electricity to Gbarnga. The County was not able to sustain the operation of this equipment due to its inability to collect sufficient customer revenue to pay for the management, operations and maintenance of the system. The system remained dormant for over a year and half prior to GLL re-starting operations. GLL establishment is through a service contract with the Bong County Government. The GLL operations which started in 2013 have now also been suspended for the same reason.
3. **Geontia Liberia Ltd. Operations:** GLL is the largest private sector electricity provider in Gbarnga City and in Bong County. While operations are currently suspended, it did serve 109 to 125 customers providing electricity for ten hours per day.

GLL contracted operational infrastructure includes: two diesel generators (250 and 110 kVA) provided to them by the Bong County government; a powerhouse with control panels, fuel storage tanks and distribution lines from pre-war and previous LEC operations that are functioning. GLL also has some distribution line and poles that do not meet any standard and include small trees and non-standard wiring.

GLL ceased operations in December 2013 after five months of electricity provision primarily due to insufficient revenue generation to cover higher than anticipated operational costs. The tariff used to generate revenue also was not calculated from a budgeting exercise.

The company also lacks sufficient distribution infrastructure to fully cover their service area. If they could reach more customers they could generate more revenue. At 109 customers today, GLL states that it is using 30% of its exiting generation capacity. While adding load (customers) will increase operational cost, it will not do so in a linear fashion. So, adding customers will allow Geontia to reduce its tariff as there will be more revenue to pay for expenses.

The company lacks adequate operational and administrative systems to facilitate efficient running of their system but this problem can also be overcome.

Their ownership is dedicated to public service and improvements and expansion of the GLL utility but also understands the risks involved with such goals to become a viable private sector electricity provider. However in order for it to succeed it must learn how to be a more efficient electric utility.

**Table I:** Existing GLL Customer Connections

Types of Connection		Total No. of Connections	Total Amp Subscription	Average Amp Subscription
Residential	1	68	259	3.8
Commercial	2	35	132	3.8
Industrial	3	2	4	2.0
Institutional-Private	4	3	8	2.7
Institutional-Public	5	1	3	3.0
<b>Total:</b>		<b>109</b>	<b>406</b>	<b>3.7</b>

4. **The Provision of Electricity by the Private Sector in Gbarnga and Rural Liberia:** Current reports written about the provision of electricity in Liberia today indicate the percentage of Liberians with access to electricity is approximately 2%. This study supports other findings that there are several perhaps hundreds of informal independent private power providers (IPPs) meeting partial electricity demand in the urban and rural areas and that the percentage of Liberians with access to some form of electricity is actually much higher than 2%.

Field trips to Gbarnga for this study show that many commercial establishments and residential homes are self-served or served by small independent power producers.

#### **Main Recommendations:**

1. **GLL Financials and Tariff:** GLL charges its customers \$35.00 per amp or at a rate of \$0.53 per kWh. However, its existing budget cannot be met from revenues unless it charges a minimum of \$0.86 per kWh.

To operate sustainably, GLL must increase its sales tariff. GLL currently charges a flat tariff of \$35.00 per amp (\$0.53 kWh). The company needs to charge a tariff that is 94% higher at \$68.00 per amp (\$0.94 kWh). This would allow a 9.7% profit margin taking into account recommended changes in costs and expenses. This revised tariff could also be significantly reduced if the County eliminates their 20% use fee as described in the following paragraph.

2. **Operational Budget:** GLL should make changes to its current annual operational budgets. This includes accurately predicting its costs and ensuring that these costs are used to develop a reasonable tariff system. We estimate an improved annual budget to be approximately 9% higher than the current budget due to the need to include a line item for the future cost for the replacement of capital equipment.
3. **Use Agreement with the County:** The agreement that GLL now operates under with the County, through which the County provides the Power House and generators, includes a clause that calls for 20% of all Revenue Generated Fee Payment to the County. This raises the operational cost of the system for no good reason. **GLL should approach the County so as to modify its agreement to eliminate this charge or substantially reduce it.** It is unclear what this arbitrary payment is for, or how it benefits the electric utility or the customers.  
  
If GLL could get the County to eliminate this Fee, GLL could adopt a new rate of \$55.00 per amp (\$0.75 kWh) while maintaining a modest 10% profit margin.
4. **Additional Customers:** Withing the current 10 hour operational constraint, Geontia can generate 2,720 kWh/day with its two generators. Currently with its 109 customers it generates 893 kWh/day. Geontia is running the generators at 33% capacity. Adding additional 200 customers would allow Geontia to reduce its tariff per kWh. **This is a priority along with reducing the County fee.**
5. **Future Operations:** GLL can gradually expand its distribution system to include additional customers. This will lower the tariff for all customers. However the existing distribution system and the future system should be constructed to at least an LEC standard if GLL expects that it will be used in the future after the WAPP transmission line provides electricity to Gbarnga.

## Introduction

### Geontia Liberia Ltd.

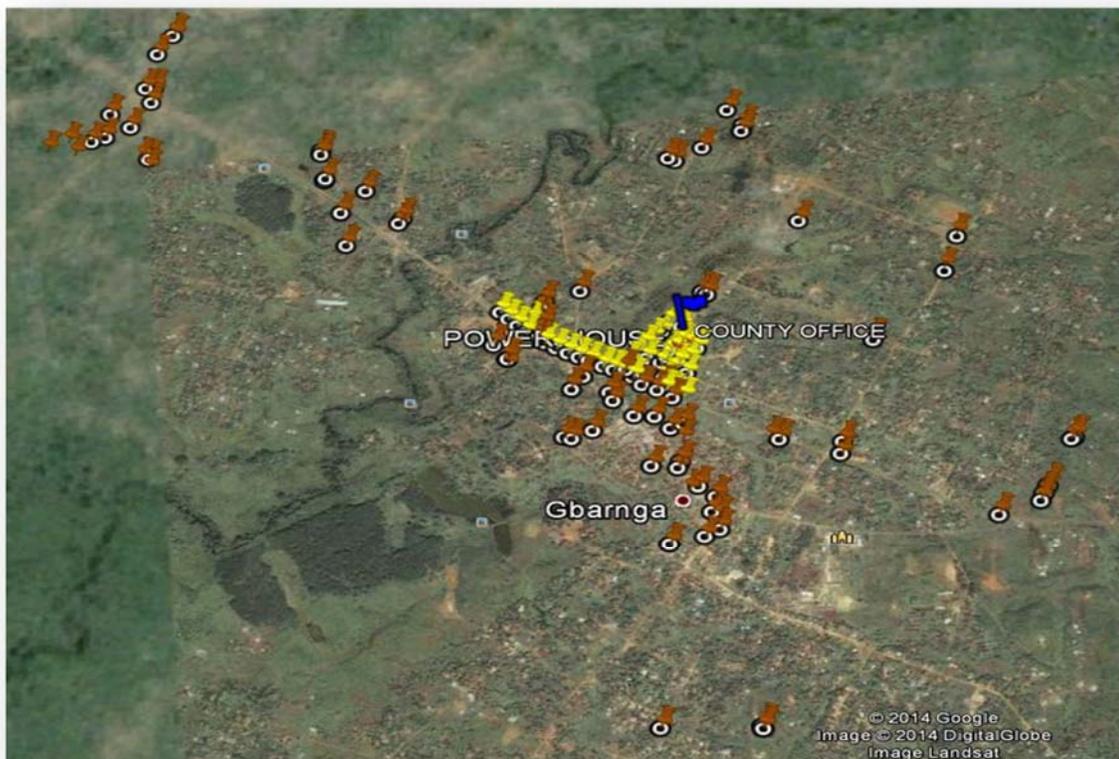
Geontia Liberia Ltd. (GLL) is a privately-held Liberian owned and operated micro-utility, mini-grid, providing 10 hour, night-time electric service in Gbarnga City, Bong County, with an installed generation capacity of 272 kW (or 340 kVA) from two diesel generators.

GLL is under pressure from current customers to resume operations as well as provide electricity to customers who had originally paid their connection fees but did not receive service. The company discontinued electricity provision due to insufficient income to cover their operational costs in December 2013. Potential customers are also calling for service with GLL. The company also wishes to respond to these requests for service and to carry out improvements and also to make these changes in accordance with sound business practices. GLL seeks to be a competent electricity utility within the city and within Liberia.

According to their current business plan, the current goal is to serve between 150 to 450 residential and commercial customers in Gbarnga, while their long-term goal is to meet their estimated 2.4 MW electricity demand (or all the residential, commercial, industrial and institutional electricity demand) in the city.

Currently the GLL service area exists within and outside the city limits of Gbarnga, with customers located randomly. See the Service Area Map **Figure I**.

**Figure I:** Map of the **Existing Customer Service Area** for GLL (connections are shown in brown, T&D poles are in yellow. The Power House is shown as a blue flag).



### Geontia Liberia Ltd. History

GLL operates two generators previously donated to the County by the mining company Arcelor Mittal. On May 20, 2013, GLL obtained a Certificate of Business Registration from the Ministry of Commerce and Industry/Ministry of Foreign Affairs/ Ministry of Finance/ Ministry of National Social Security and Welfare Corporation. The Certificate is post acquisition. The enterprise code 050960536 identifies the Company to the Government of Liberia for licensing and taxation purposes. The business activity is registered as “Electric Power Generation, Transmission and Distribution.”

According to current Liberian Energy Law, the Liberia Electricity Corporation (LEC) is the only GOL entity with the responsibility for generation, transmission and distribution of electricity throughout Liberia. GLL, in this case, is an informal electricity provider. A license or concession regulated by the Ministry of Lands, Mines and Energy (MLME) would be required to allow Geontia Liberia Ltd. to operate legally in accordance with the current Liberian laws and regulations.

### Enabling Agreement with the Government of Bong County

Geontia Liberia Ltd. provides electricity in accordance with the terms and conditions of a use and provision of service agreement with the County. The generators, power house, storage fuel tanks, transformers, and light poles used in GLL operations were provided by the Bong County government along with a set of terms, conditions, and assistance to be provided on the part of GLL as the Electricity Utility Contractor. One part of the agreement included the County arranging and providing 100 LEC donated poles. According to GLL’s president, they were prepared to install such poles and additional distribution line work through their sub-contractor GECCO (General Power Construction Company).

#### County Fee

One condition of the GLL – County Agreement calls for GLL to pay each month to the County a 20% payback from the proceeds of the company’s revenue. This is about 22% of Geontia’s total monthly cost and raises the required customer tariff to fund operations thusly. It is the main reason why the monthly user tariff is so high.

The duration of the contract is five years, to be reviewed and renewed bi-annually. The service agreement was signed on March 29, 2013, though the project’s official start date was February 19, 2013 according to the letter to the superintendent. The company’s operations began in August 2013, and first bi-annual review by an unspecified party should have taken place in September or October 2013,

with a second review in March or April 2014. However, the company was only operational from August to December 2013.

Today, the county’s offices in Gbarnga (exempting the immigration office), however, use their own generator.

### Gbarnga Market for Electricity and Geontia Liberia Ltd. Customer Retention

Informal interviews with current and potential customers in the main areas of operation for GLL showed that there is a high demand for power. Most of the customers are willing-to-pay for electricity as “cost does not matter” since their businesses, homes, or both need

electricity. In general, homes used electricity for 5-10 light bulbs, fans, a television and/or a radio. Businesses and institutions with higher amperage subscriptions use these as well and may also have had stereos, air-conditioners, play stations, larger televisions, and other appliances.

Potential customers, such as the School of Theology, generating medium-high levels of power used one or two generators (a 5 kVA and a 2.5 kVA generator). Low-medium power generation customers used either a 2.5 kVA or a 5 kVA generator.

#### **Existing Electricity in Gbarnga City**

Existing GLL customers as well as potential customers have **three electricity options** other than GLL:

1. purchase a generator to generate their own electricity;
2. purchase a generator to be shared among two or more businesses/institutions; or
3. subscribe to small mini-grids (most of these charge an hourly rate of about 200 LD).

Once GLL suspended operations, most commercial customers bought their own generators (usually a 2.5 kVA Tiger Generator) to continue operating their businesses. These run for approximately 3-8 hours per day depending on the type of business. Several commercial customers used electricity for refrigeration purposes and ran their generators for 3-4 hours daily, consuming about 2 gallons of diesel fuel every two days. Residential customers, on the other hand, received intermittent power from various sources.

Customers were vocally dissatisfied with their current lack of electricity from GLL, and also pointed out problems even during their five-month operation. Some customers explained that they sometimes did not receive electricity for three to four days of the week; others said there were also fluctuations in their power even during these days. Fourteen (14) residential connections also paid the \$100 connection fee as well as the \$35 monthly rate and yet did not receive current. Some customers complained that the \$100 connection fee should not be a flat rate and instead depend on the distance from the main grid.

#### **Purpose of the Study**

The study will determine the ability of Geontia Liberia Ltd. to pay for their exiting power operations and provide recommendations that could help them to improve the level of service they can provide. To the extent possible, the study will also examine the current and potential future service area for the company's customers as well as any future power generation expansion (not the main focus of this study).

#### **Methodology**

As stated, this study was divided mainly in three areas: (1) existing administrative and operational systems and infrastructure, (2) business analysis and plan, and (3) recommendations for future plant improvements and customer base expansion. LESSP staff spent considerable time studying existing GL financial and customer records and examining existing infrastructure operational records. The LESSP team's work focused on the following:

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1 Some customers, for example, connect an air conditioner to a freezer to provide more cooling power to their refrigerators.

- a. Analyze current Geontia Liberia management, finance and operations;
- b. Characterization of current customers;
- c. Analysis of potential customers;
- d. Location and site maps, mapping of current customers;
- e. Gather information about GL infrastructure, operation, maintenance, and capabilities for expansion; and
- f. Provision of recommendations;
- g. Review of risks, opportunities and implementation issues that may exist; and
- h. Identification of follow up work beyond the scope of work of this study.

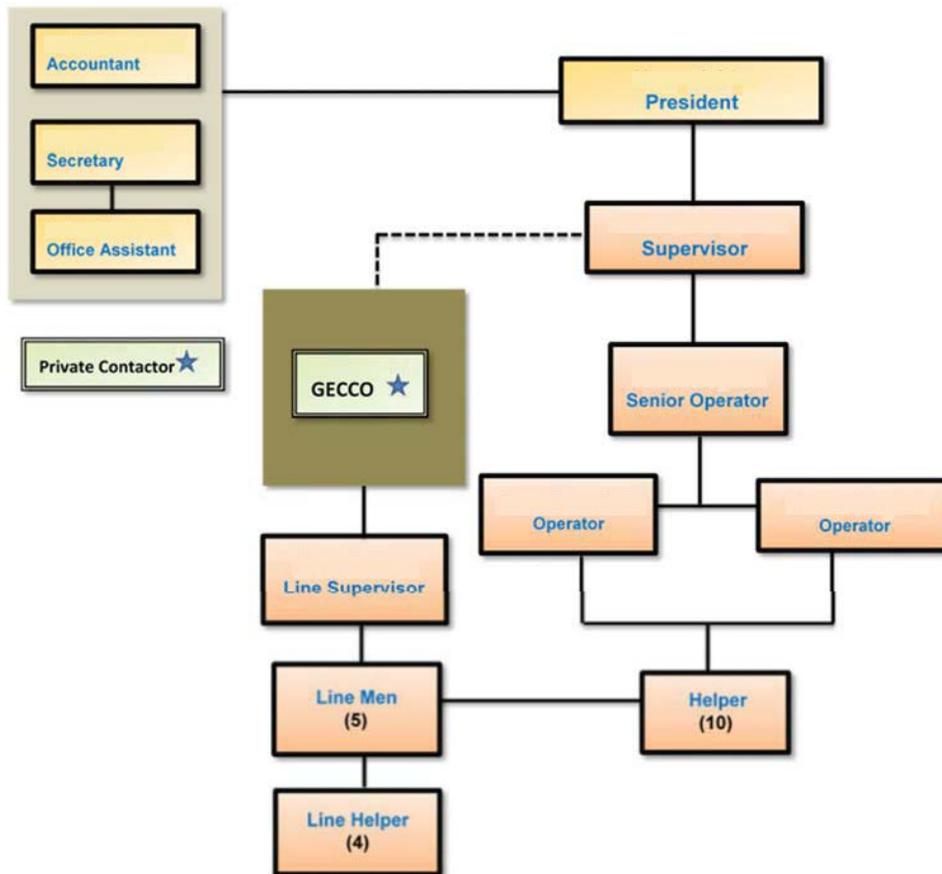
## Existing Management and Operations

### Geontia Liberia Ltd.'s Management and Operations

Geontia Liberia Ltd. head office is located on Carey Street, Monrovia, with its main operations office in Gbarnga City, Bong County. GLL management is a single unit that is headed by the president of the company. The operation of the company is divided into two main sections: the operations of the generator house and the linemen work conducted through their subcontractor GECCO. As for administrative operations, the accountant manages financial transactions while the supervisor manages all the technical and engineering activities. The supervisor is the primary customer contact; his work also overlaps with the financial transactions.

The diagram in **Figure 2** shows the GLL structure and the relationship and relative ranks of staff positions. Currently Geontia Liberia Limited has twenty-eight employees. The President is the administrator, decision maker, and leader in charge of general management of GLL. The second ranked personnel are the Accountant and Supervisor report directly to the president.

**Figure 2:** Geontia Ltd. Organizational diagram



GLL history is founded on sharing and good will. It was the main motivation of the founder to provide basic electricity service to people in need of light at night. **GLL was established as the government’s primary electricity company in Gbarnga but has limited effective technical, managerial, financial and administrative knowledge.**

GLL is currently lacking operational policies that should provide direction to managers and staff in general to perform their duties. Written policies needed generally include:

- Corporate governance (bylaws);
- HR and employee relations;
- Organizational structure;
- Finance, accounting; revenue management, auditing;
- Procurement;
- Planning, engineering and operations;
- Quality Assurance / Quality Control;
- Health & Safety;

- i. Security;
- j. Environmental Protection;
- k. Member and community relations; and
- l. Rules of service, consumer rights and tariffs.

Not having procedures in place creates conflicts in both human resources and physical plant operations. Procedures provide details of how policies should be executed. GLL staff is currently left to their own devices to determine how to manage their daily activities. This leads to inefficiencies, disorganization, wasted effort, service issues, customer issues, accidents, lack of morale, and ultimately higher operational costs.

Administrative tools in Gbarnga are two computers and a printer. The GLL filing system for customers, delinquent accounts, monthly and daily diesel purchases and use was checked and is found to be in need of better organization. In addition to this, GLL also does not record its daily and monthly load demand.

Personnel are the most important assets of any enterprise. Typically in such small electric companies, salaries and benefits are the second highest operating expense. However, **GLL does not have employee policies that include a basic salary plan, benefit plan, safety plan or training program.**

**GLL financial sustainability is at risk since no financial policies and procedures are in place to ensure adequate financial control, accountability and transparency.** GLL is currently mixing accounting methods for which information is not readily available.

The operations of the accountant consist of managing consumer information, billing, collections, new connections and service disconnections. Even though such activities are conducted, it was found that:

- a. Consumer information is not well organized;
- b. Consumer identification numbers were non-existent;
- c. Consumer identification was by done by memory;
- d. Customer identification relied on panel boxes (30 in total) that contained the circuit breakers for the units;
- e. Active and inactive accounts are not easy to categorize;
- f. Amperage subscriptions were not up to date;
- g. Reason for disconnections are unknown;
- h. Account delinquency data is not clear; and
- i. Customer database is non-existent.

## Generation and Distribution Facilities

The GLL powerhouse is situated in the Bong County government's administrative compound. It has one main entrance and a storage room. Inside the power house there are: two generators; one fuel tank; empty 220 liter rubber containers for fuel storage; three switch disconnectors; a double throw switch; and a control panel. No test had been done on the generators to determine the present operational conditions in term of power generated, output voltage and current in comparison to its name plate data. The power house has a fuel tank graduated from 120 to 960 units and several empty fuel containers. There are three sets of Havells Switch Disconnectors in storage.

**Table 2:** GLL generators nameplate data

<b>Geontia Liberia Ltd. Generator Name Plate Data</b>		
<b>Characteristic</b>	<b>Generator 1</b>	<b>Generator 2</b>
<i>a</i>	<i>b</i>	<i>c</i>
Manufacturer	Jubaili Bros S.a.l	FG Wilson(Engineering) Ltd
Model#	JGP230H2	PI10E
Year of Manufacture	2008	2008
ID No.	287930/0010	FGWPEP04EE0A16878
Size	230kVA/184kw	110kVA/88kW
RPM	1500	1500
Phase	3 phase	3 phase
Power Factor, pf	0.8	0.8
Frequency	50Hz	50Hz
Excitation Voltage	34V	40V
Rated Voltage	220/380V	220/380V
Alternator Connection	S-Star	S-Star
Insulation class	H	H
<b>AVR No</b>	R448	R250

Although no test was done for the working conditions of the fuses, the frame covers and handles of two of these switch disconnectors were damaged. There were fuel spills on the floor and the PVC pipe conduits for the generator cable were broken.

Old LEC and/or pre-war installed distribution lines and poles used by Geontia are in moderate to poor condition. Some connections that were too far from the main poles had 'tree rig' connections.

GECCO, GLL's distribution subcontractor, works primarily in the installation of new connections and repairs of circuit breakers (meters) that are located on poles that are high

on each pole. Each pole has a panel boxes (about 30 in total, housing circuit breakers for 5-10 connections). Each time a customer exceeds their amperage subscription and the circuit breaker is tripped, GECCO sends a line helper or lineman to re-set the customer's breaker/meter to the system.



**Photo 1:** Geontia Liberia Ltd. powerhouse and vehicle, and one of the light poles used by the company. **Photo Credit:** Omar V. Al Sherif (April 17, 2014)

<b>Energy Sold (kWh/day)</b>	893.2
<b>Total Power Generation Capacity (kVA)</b>	340
<b>Potential kWh/day generation</b>	2,720.0

GLL is also operating at less than total installed capacity. As seen above, GLL is operating only a fourth of its actual kWh capacity per day given its total generator capacity. **The number of customers can be increased by three times the current number of customers to fully tap into their daily potential kWh generation.** This would also allow for significant additional revenue and a decreased overall per kWh cost.

### Notes on Future Service Area, Expansion, and Growth

GLL has the generation capacity to expand its customer service area. This however would require an engineering, cost and finance study to determine the amount of funding required to provide this capital infrastructure improvement. This type of analysis is beyond the scope of this study. It is recommend that for the near term future, GLL look to modestly increase its customer base through careful planning of new pole and conductor installation.

### Existing Customers and Service Agreement

GLL stipulates the requirements customers must comply with to be served through the GLL distribution system. All consumers are required to complete the application form .

A non-refundable connection fee of \$100.00 USD is required for the application. GLL flat rate for electricity is \$35.00 USD per ampere. When applying for the service, the potential customer enumerates the wattage of the appliances and number of lights they wish to power and purchase. GLL evaluates existing wiring (i.e. previous electricity wiring and connections) for the new customer to estimate the amount needed for establishing connection to their grid. When the application form is approved and signed, this becomes the customer agreement with GLL.

GLL customer service consists of attending applications for service, managing customer complaints and key accounts management. Currently, the company has 109 customers and several potential customers interested in connecting to their grid. All these functions are handled by the company's accountant who reports directly to the president.

A grace late payment period of three days is given to all subscribers beyond the due date. After three days, accounts are considered delinquent and subject to disconnection.

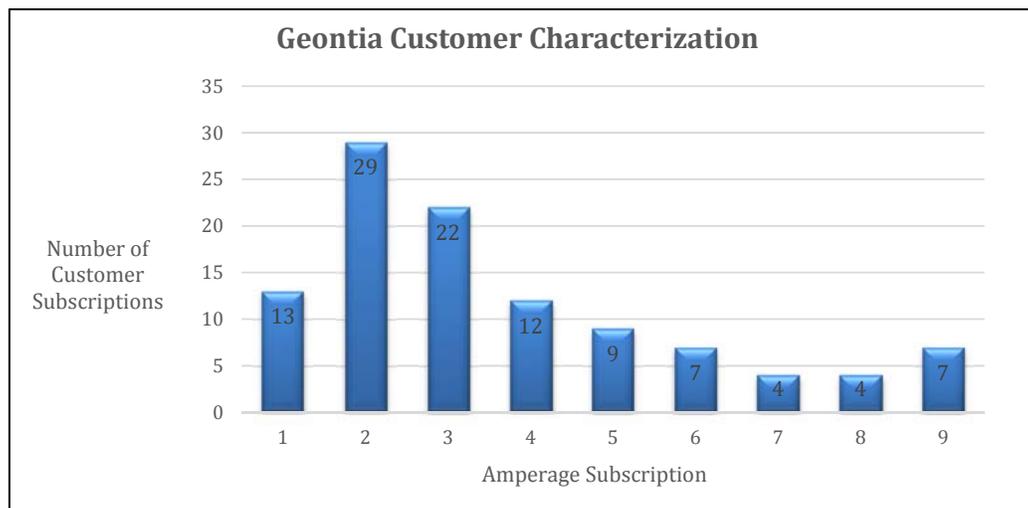
**Figure 3: Typical Customers Classified by Location**

Customer	Location	Amperage
C. Sumo	Baltimore Boulevard	10
J. Manyango Clinic	Baltimore Boulevard	2
A. Bah	Barwolor Quarter	3
A. Barey	Gbarnga Broad Street	1
Z. Skeswan	Gbarnga Broad Street	3
E. L. McGill	Brooklyn Community	4
C. Tucker	Brooklyn Community	2
P. B. Tarawalie	Catholic Mission	2
T. Mineral Water	Executive Drive	5

### Existing Customer Service Area and Base Characterization

In the short operation time of GLL, a total of 109 customers have been added and identified. **Figure 4** illustrates the number total number of customer and the number of ampere each has subscribed for. GLL does not maintain an automated customer database to be able to categorize properly and also to perform dynamic characterization of the customer base. There is no information available on customers that are active, inactive or those that have defaulted in the payment of their bills. Understanding the customer behavior of the total GLL population, by community and by customer could improve the general GLL operations.

**Figure 4:** Number of customers characterized according to their amperage subscriptions.



According to GLL, their operations scaled down hours in the five months:

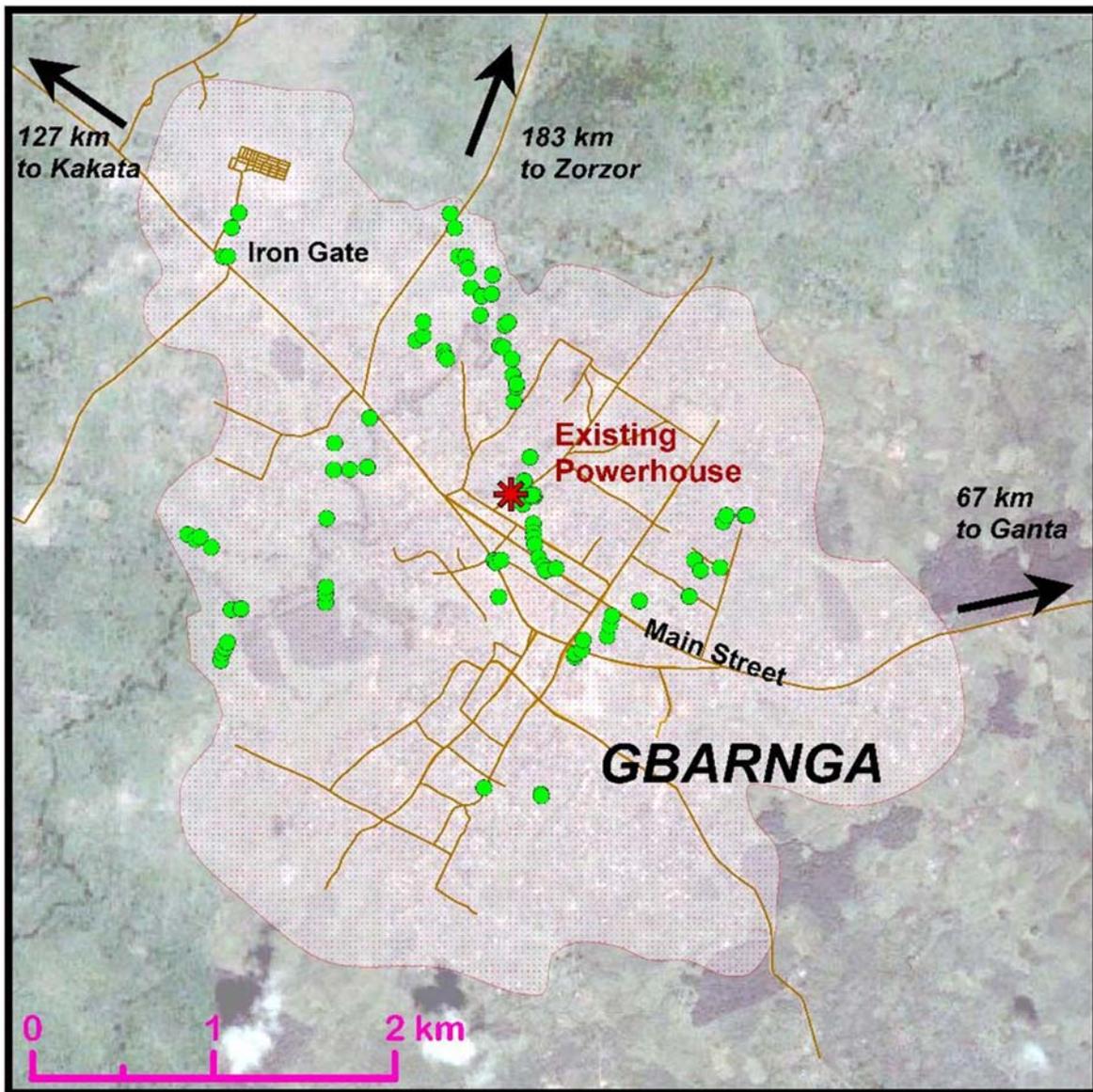
**Table 2:** Operations scale-down for GLL

Month	Start Time	End Time	Hours of Daily Operation
August to mid-September 2013	7:00 PM	7:00 AM	12
Mid-September to mid-October 2013	7:00 PM	5:00 AM	10
Mid-October to mid-November 2013	7:00 PM	3:00 AM	8
Mid-November to December 2013	7:00 PM	2:00 AM	7

However, the **informal interviews** said that **the company scaled down their hours of operation every month/week, even down to three hours per day.**

Residential and business customers alike in general subscribed to 1-3 amps per month. These can power between 5-15 light bulbs, a television, a fan and a radio. Overall, the customers were not pleased with their electricity company, and many (such as small businesses like cold water sellers) bought small 2.5 kVA generators and began generating their own electricity to continue running their businesses.

A Service area map is shown on the following page



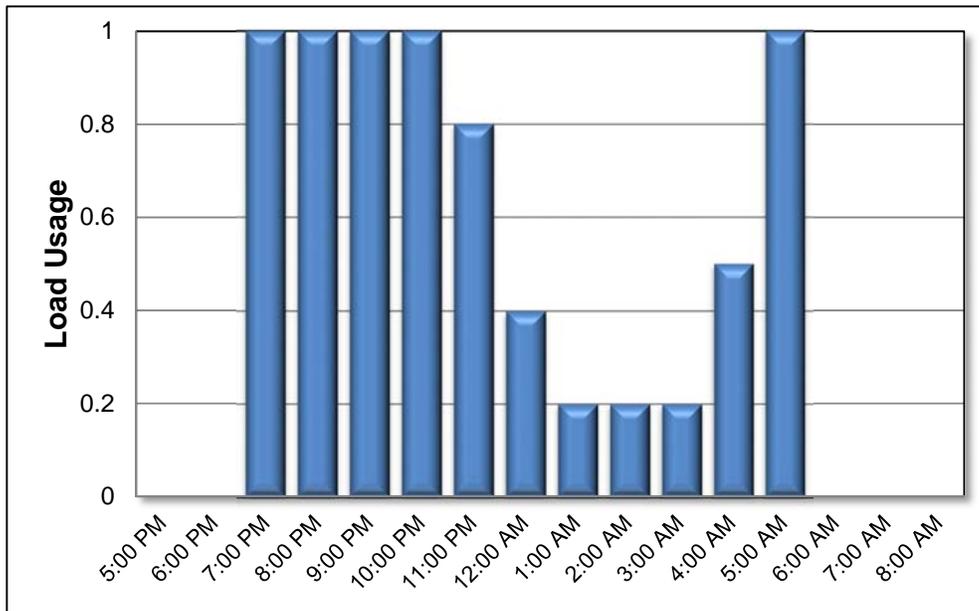
	<p><b>APPROXIMATE LIMITS OF GEONTIA SERVICE AREA AND EXISTING CUSTOMERS</b></p>	<p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Powerhouse</li> <li> Customers</li> <li> Service_Area</li> </ul>
	<p><b>Liberia Energy Sector Support Program (LESSP)</b>          Winrock International - Liberia          Atlantis Beach Hotel Compound, UN Drive, Mamba Point, Monrovia, Liberia.  <a href="http://www.winrock.org">http:// www.winrock.org</a></p>	
<p>Map Prepared by:          Alma Cota          26 May 2014</p>		

## Economic Analyses and Notes

### Present and Potential Future Energy Demand/Consumption

In general, customers preferred to receive current from 7:00 PM to 12:00 AM; however, commercial customers preferred receiving power during the day. Interviews also showed that peak hours in Gbarnga's residential customers are similar also to those for other in Monrovia IPPs:

**Figure 5:** Typical load usage of a Liberian residential connection.



A Willingness to Pay / Ability to Pay study was conducted for the Suakoko and Gbarnga areas for the Mein River Power Company's future operations. The study included a sample size of 193 surveys with about 68% (115 in total) of the surveys taken in Gbarnga City. The medium-sized and large institutions that would require more electricity provision in the coming years were also included. The survey found approximately 9,800 potential residential customers in the service area. For residential customers, the majority are reported willing to pay between \$7.90 to \$11.43 monthly, while small commercial customers are willing to pay between \$70.56 to \$123.60 monthly.

**Table 3** offers a theoretical service area customer profile for Gbarnga City that is taken from the LESSP Mein River Feasibility Study and subsequent NRECA studies.

**Table 3:** The following table details the load forecast for first five years.<sup>2</sup>

Year	1		2		3		4		5	
Consumers	No.	Total kWh	No	Total kWh	No.	Total kWh	No.	Total kWh	No.	Total kWh
Residential	3,800	76,000	4,339	88,516	4,821	100,315	5,303	112,552	5,786	125,259
Commercial	150	11,250	156	12,168	162	13,161	169	14,235	175	15,396
Large Consumers	10	182,900	11	190,548	12	198,463	13	206,655	14	215,133
<b>Peak Demand (kW)</b>		<b>849</b>		<b>912</b>		<b>979</b>		<b>1,048</b>		<b>1,120</b>

It is assumed here that there could be an initial penetration rate of 40% in year 1, building over the first five years to 60%. Consumers could be added to the system each year in accordance to their ability to pay and the cost of energy delivered and trust in the new utility. The specific consumption increases incrementally each year both for residential as well as for commercial users. The load projection shows the total energy consumption per year, as well as an estimate of the total demand.

### Income and Expenses

The current Budget cannot be paid for by the \$35 per amp (\$0.53 kWh) fee.

A fee of \$68 per amp (\$0.94 kWh) will allow GLL to operate and pay for its expenses.

The recommended Budget and Revenue statements include a reasonable 9.7 profit or \$2,448/mo

During the five months of their operations, GLL expenses always exceeded the income of each month of operation. Their main problem is a low tariff that cannot sustain their operational cost (their actual cost is \$0.86 kWh vs. a tariff of \$0.53 per kWh). This led to suspension of operations. A large part of this problem is the high payment cost to the county (20% of their income, 25% of their total expenses) as part of their agreement to operate in Gbarnga and as payback for the generators.

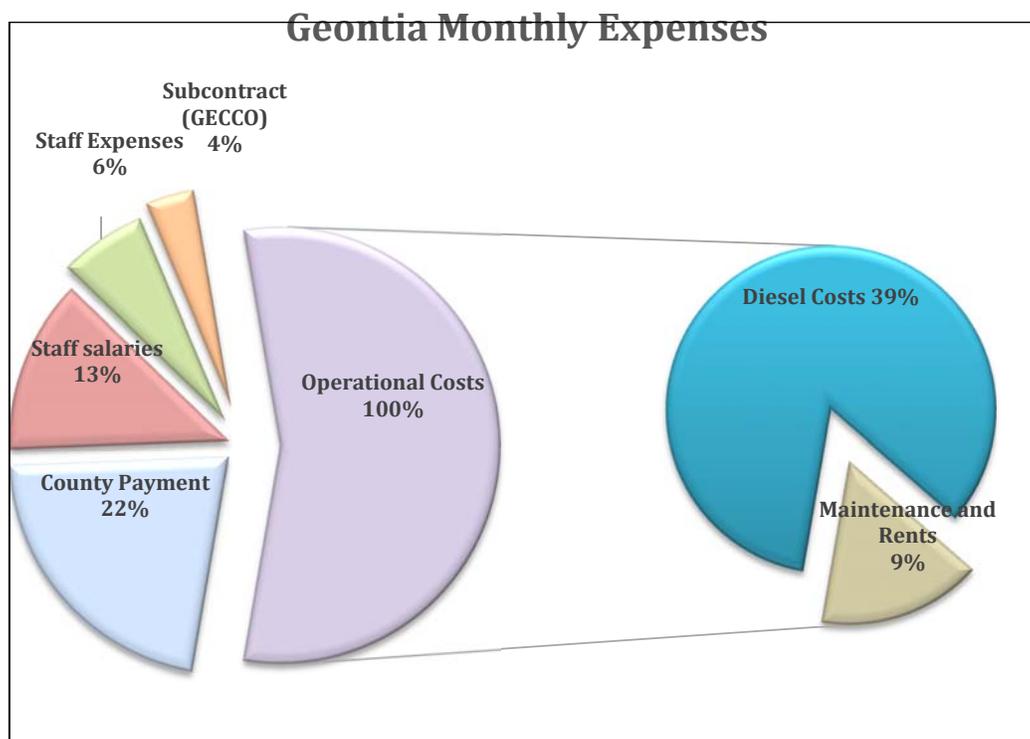
The distribution lines in place also do not sufficiently cover their service area to fully utilize their generation capacity. This is chiefly due to the lack of the county government promised poles according to their agreement. As a result, additional costs were added in sub-contracting a pole/line firm. In addition, with 17 employees and 15 day laborers, operations and the business were effective but inefficient due to a lack of experience in running a professional public utility.

**Figure 7** presents a snapshot of GLL's monthly expenses.

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<sup>2</sup> Source: National Rural Electric Cooperative Association (NRECA) business and market study for the Mein River Hydropower Plant Project.

**Figure 7: Percentage of GLL's expenses break-down**



The company operational cost is dominated by the cost of diesel fuel (39%) and the monthly payment (25%) to the county. In terms of their maintenance and operations, the cost of generator filters, oil/lubricants, and other maintenance work was also relatively high.

GLL proposed an initial start-up cost of \$160,603 to the county, of which they committed to invest an initial amount of \$136,203. According to the agreement, the county was to provide \$28,000 to cover the rest of this cost, totaling \$164,203 for the company's first year of operations. It is unclear how these costs were allocated and provided by both Geontia and the County.

## Findings, Recommendations, Risks

### Restarting Geontia Liberia Ltd. Operations

#### Administration and Operations

- Maintain Better Records:** The analyses of this study were hampered because GLL's records of all financial transactions were not well organized and documented. For example, the company has records of expenses for the months of October and November 2013, but not for the rest of their months of operations. The company has records on their spending for the County money allocated for their use and is largely reconciled with their accounting.

**Generally accepted cost accounting standards and methods are needed and recommended to make GLL information readable to accounting professionals and GL managers and officers. We recommend that GLL hire a qualified accounting firm for this.**

2. **GLL must carry out audits, improve accounting procedures and clarify financial statements.** This includes:

Financial policies and procedures should be implemented to ensure an adequate financial control, accountability and transparency.

Monthly internal audits/reports are needed to understand financing, accounts, and to accurately calculate the cost of electricity production and to redefine the tariff to a more affordable one for consumers while maintaining other standards of service and maintaining some profitability.

3. **GLL should decrease its current staff** to operate more efficiently.

4. **Establishment of coherent employee policies will contribute to the long-term success of the company.** Some recommendations of provisions that should be included within an overall set of GLL employee policies are:

- a. Employee ethics and code of conduct;
- b. Recruitment procedures;
- c. Benefit plans;
- d. Salary plan;
- e. Training program;
- f. Safety program;
- g. Annual work calendar, holidays and leave policy;
- h. Annual evaluation procedures;
- i. Conflict of interest policy; and
- j. Employee privacy rights.

6. **Improve the tracking and filing system for fuel use, maintenance costs, and operational data** per generator and the overall system.

7. **Increase the number of connections** as possible within the currently served areas to be able to lower the cost of service.

8. **GLL should adopt LEC engineering standards** for new pole and conductor installation.

9. GLL should develop and adopt a **Health & Safety Plan**.

10. GLL should include tools, safety equipment, insurance, and equipment replacement costs to their current budget annual/monthly expenses for more effective future operations.

#### Tariff Structure and Customer Retention

The main objective of GLL should be to provide reliable electric service to GLL customers at the lowest possible cost to the consumer.

1. **The company must increase its tariff from \$35.00 to \$68.00/amp**, thus increasing its charges from \$0.53 to \$1.03 kWh. This includes a GLL set profit margin of 9.7%.
2. **GLL should attempt through negotiation with the County to reduce or better yet eliminate its County payment.** This is particularly important since this is the second highest cost the company faces and simply becomes a burden to the GLL Customers. Elimination of this County payment would allow Geontia to reduce the tariff from
3. GLL needs to have a better understanding of its customers; this will allow developing a suitable strategy for
  - a. Increasing connections within currently served areas; and
  - b. Defining adequate tariffs for different types of consumers.
4. GLL needs to develop a **computer based customer database** that shows accurately kept, managed and updated account histories

#### Risks and Risk Mitigation

There are **risks** that need to be addressed prior to making major financial decisions. At a minimum these include:

1. **Operating Within a Multiple Grid Service Area:** GLL is operating in an area with several small grids as competition (particularly in the Gbarnga Broad Street and other commercial areas) as well as the possibility that customers will opt to generate their own electricity.

**Risk Mitigation:** GLL must become more efficient and cost-effective in its operations to reduce tariff in comparison to the alternative electricity sources; therefore, the measures discussed here previously must be implemented. In addition, GLL's customers are not chosen according to proximity to the grid; rather, they are scattered all over Gbarnga. One option is to conduct a willingness-to-pay and ability-to-pay survey in concentrated areas in order to target geographically convenient in order to potentially reduce cost.
2. **Geontia Liberia Ltd. Operational Standard:** GLL utility management, business, accounting, customer services, planning, engineering, and O&M are weak. The GLL business works today and provides a needed and desired service to its customers but if it wishes to grow and improve; there will have to be changes that bring this

organization into compliance with generally acceptable professional utility business management, accounting/auditing, engineering and legal standards. A management team that is more experienced in this business is also required to be added to implement it.

**Risk Mitigation:** GLL would need to carry out a study to develop an approach to converting the GLL business into an electric utility that is managed and operated in accord with basic levels of professionally acceptable practices and standards. There will also have to be at least two experienced electric utility managers (one overall manager with an engineering background and one finance officer) hired and in place to lead this transition and also guide GLL to be an acceptably proficient utility. EP needs internal professional engineering, accounting and auditing in place before any financing is arranged.

3. **Geontia's Future in Gbarnga:** The WAPP transmission line from Ganta to Buchanan will pass close by Gbarnga within the next 24 to 36 months. Within another 24 months some electricity may be available in Gbarnga (say total four years from today) with a much lower kWh cost if a spur line is run from the WAPP to Gbarnga City. Even if this occurs it is estimates that it will take another two to five years to extend a new distribution system into Gbarnga city. Geontia still has a window of perhaps five to seven years to operate. Perhaps Geontia could also be the distribution agent for the WAPP electricity if it became viable during this time.

**Risk Mitigation:** Geontia needs to improve its operations and become a viable firm in order to be a player in the future of the electricity provision in Gbarnga City.

Annex ° : Customer Application Form and Contract

**GEONTIA ELECTRICITY PROGRAM**

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CITY OF GBARNGA

BONG COUNTY, LIBERIA

NO \_\_\_\_

**APPLICATION FORM**

**NAME OF APPLICANT:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**TEL:** \_\_\_\_\_

**HOUSE TYPE:** CONCRETE  DIRT BRICKS  MAT  ZINC

**NO: OF ROOMS:** \_\_\_\_\_

**FAMILY SIZE:** \_\_\_\_\_

Have you ever use electricity in your house? If yes, how long?

\_\_\_\_\_

Are there electrical connections already in your house? If yes, how long?

\_\_\_\_\_

Have you ever been involved in illegal connection that led to lawsuit? If yes, state the number of times and why. \_\_\_\_\_

\_\_\_\_\_

**TERMS AND CONDITION**

- Applicant facility will be inspected as part of the process to install electricity
- Our technical team will determine the equipment and wires as well as all components needed to enhance electrical connectivity.
- All applicants are required to settle their registration fees before inspection is made.
- No applicant is to purchase his or her own electrical components/wire so as to avoid setbacks or malfunction of electrical connection.
- No customer is "ALLOWED" to connect anyone after electricity has been installed to your facility or residence. Anyone caught will face prosecution and disconnection.
- Customers are asked to contact management in case of shocks, short circuit or malfunction of electricity.
- Failure to pay your electricity bills on time, your electricity will be disconnected, and before any reconnection, you will settle your previous bills and reregistration fee.
- Any disconnection warrants a reconnection fee

**(cont. Customer Service Agreement)**

## **GEONTIA ELECTRICITY PROGRAM**

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### **REQUIREMENTS**

1. REGISTRATION FEES
2. HOUSE WIRING (awg8, awg10, awg12)
3. DOUBLE THROW
4. BREAKER
5. INSPECTIONS
6. USE ENERGY SAVING BULBS (Optional)
7. INDICATE THE AMOUNT OF AMPS TO BE CONSUMED
8. SURFACE WIRING(16MM)

**I THE UNDERSIGNED AGREED TO THE TERMS AND CONDITIONS INDICATED ON THIS FORM AS PER ELECTRICITY CONNECTION.**

**I THEREFORE AFFIXED MY SIGNATURE, IN FULLFILLMENT TO THIS AGREEMENT.**

\_\_\_\_\_

Date: \_\_\_\_\_

\_\_\_\_\_

Approved

***ELECTRICITY IS LIFE; GET ELECTRICITY AND LIVE TODAY.***

## Annex B: Photos



**Photo 1:**  
Geontia Liberia Ltd. control system for their powerhouse.

**Photo Credit:**  
*Omar V. Al Sherif*  
(April 17, 2014)



**Photo 2:**  
Geontia Liberia Ltd. control system for their powerhouse.

**Photo Credit:**  
*Omar V. Al Sherif*  
(April 17, 2014)

**Photo 3:** Palm trees are used as electrical poles for Geontia Liberia Ltd. connections.

**Photo credit:** *Momo N Kaifa*

(April 16, 2014)



**Photo 4:** Gbarnga Broad Street, one of their main areas of operation.

**Photo credit:** *Momo N Kaifa*

(April 16, 2014)

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